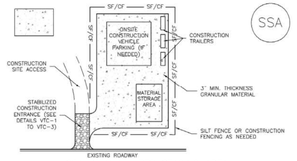
Stabilized Staging Area (SSA) SM-6



SSA-1. STABILIZED STAGING AREA

STABILIZED STAGING AREA INSTALLATION NOTES

1. SEE PLAN VIEW FOR
   -LOCATION OF STAGING AREA(S).
   -CONTRACTOR MAY ADJUST LOCATION AND SIZE OF STAGING AREA WITH APPROVAL FROM THE LOCAL JURISDICTION.

2. STABILIZED STAGING AREA SHOULD BE APPROPRIATE FOR THE NEEDS OF THE SITE. OVERSIZING RESULTS IN A LARGER AREA TO STABILIZE FOLLOWING CONSTRUCTION.

3. STAGING AREA SHALL BE STABILIZED PRIOR TO OTHER OPERATIONS ON THE SITE.

4. THE STABILIZED STAGING AREA SHALL CONSIST OF A MINIMUM 3" THICK GRANULAR MATERIAL.

5. UNLESS OTHERWISE SPECIFIED BY LOCAL JURISDICTION, ROCK SHALL CONSIST OF DOT SECT. #703, AASHTO #3 COARSE AGGREGATE OR 6" (MINUS) ROCK.

6. ADDITIONAL PERIMETER BMPs MAY BE REQUIRED INCLUDING BUT NOT LIMITED TO SILT FENCE AND CONSTRUCTION FENCING.

STABILIZED STAGING AREA MAINTENANCE NOTES

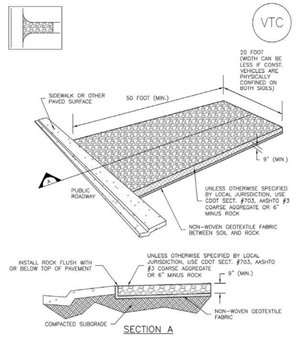
1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

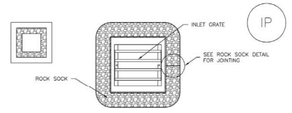
4. ROCK SHALL BE REAPPLIED OR REGRADED AS NECESSARY IF RUTTING OCCURS OR UNDERLYING SUBGRADE BECOMES EXPOSED.

Vehicle Tracking Control (VTC) SM-4



VTC-1. AGGREGATE VEHICLE TRACKING CONTROL

Inlet Protection (IP) SC-6

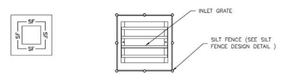


IP-3. ROCK SOCK SUMP/AREA INLET PROTECTION

ROCK SOCK SUMP/AREA INLET PROTECTION INSTALLATION NOTES

1. SEE ROCK SOCK DESIGN DETAIL FOR INSTALLATION REQUIREMENTS.

2. STRAW WATTLES/SEDIMENT CONTROL LOGS MAY BE USED IN PLACE OF ROCK SOCKS FOR INLETS IN PERVIOUS AREAS. INSTALL PER SEDIMENT CONTROL LOG DETAIL.



IP-4. SILT FENCE FOR SUMP INLET PROTECTION

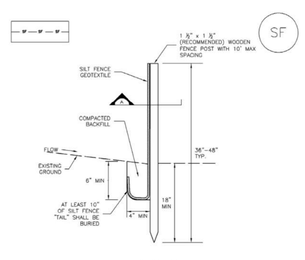
SILT FENCE INLET PROTECTION INSTALLATION NOTES

1. SEE SILT FENCE DESIGN DETAIL FOR INSTALLATION REQUIREMENTS.

2. POSTS SHALL BE PLACED AT EACH CORNER OF THE INLET AND AROUND THE EDGES AT A MAXIMUM SPACING OF 3 FEET.

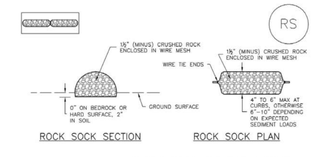
3. STRAW WATTLES/SEDIMENT CONTROL LOGS MAY BE USED IN PLACE OF SILT FENCE FOR INLETS IN PERVIOUS AREAS. INSTALL PER SEDIMENT CONTROL LOG DETAIL.

Silt Fence (SF) SC-1



SF-1. SILT FENCE

SC-5 Rock Sock (RS)



ROCK SOCK SECTION ROCK SOCK PLAN



ROCK SOCK JOINTING

GRADATION TABLE	
SIEVE SIZE	MASS PERCENT PASSING SQUARE MESH SIEVES
	NO. 4
3"	100
1½"	90 – 100
1"	20 – 55
¾"	0 – 15
⅜"	0 – 5
	MATCHES SPECIFICATIONS FOR NO. 4 COARSE AGGREGATE FOR CONCRETE PER AASHTO M43. ALL ROCK SHALL BE FRACTURED FACE, ALL SIDES.

ROCK SOCK INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   -LOCATION(S) OF ROCK SOCKS.

2. CRUSHED ROCK SHALL BE 1½" (MINUS) IN SIZE WITH A FRACTURED FACE (ALL SIDES) AND SHALL COMPLY WITH GRADATION SHOWN ON THIS SHEET (1½" MINUS).

3. WIRE MESH SHALL BE FABRICATED OF 10 GAGE POULTRY MESH, OR EQUIVALENT, WITH A MAXIMUM OPENING OF ½", RECOMMENDED MINIMUM ROLL WIDTH OF 48"

4. WIRE MESH SHALL BE SECURED USING "HOG RINGS" OR WIRE TIES AT 6" CENTERS ALONG ALL JOINTS AND AT 2" CENTERS ON ENDS OF SOCKS.

5. SOME MUNICIPALITIES MAY ALLOW THE USE OF FILTER FABRIC AS AN ALTERNATIVE TO WIRE MESH FOR THE ROCK ENCLOSURE.

RS-1. ROCK SOCK PERIMETER CONTROL

SM-6 Stabilized Staging Area (SSA)

STABILIZED STAGING AREA MAINTENANCE NOTES

5. STABILIZED STAGING AREA SHALL BE ENLARGED IF NECESSARY TO CONTAIN PARKING, STORAGE, AND UNLOADING/LOADING OPERATIONS.

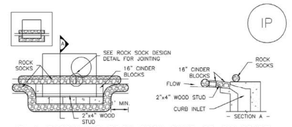
6. THE STABILIZED STAGING AREA SHALL BE REMOVED AT THE END OF CONSTRUCTION. THE GRANULAR MATERIAL SHALL BE REMOVED OR, IF APPROVED BY THE LOCAL JURISDICTION, USED ON SITE, AND THE AREA COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY LOCAL JURISDICTION.

NOTE: MANY MUNICIPALITIES PROHIBIT THE USE OF RECYCLED CONCRETE AS GRANULAR MATERIAL FOR STABILIZED STAGING AREAS DUE TO DIFFICULTIES WITH RE-ESTABLISHMENT OF VEGETATION IN AREAS WHERE RECYCLED CONCRETE WAS PLACED.

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

(DETAILS ADAPTED FROM DOUGLAS COUNTY, COLORADO, NOT AVAILABLE IN AUTOCAD)

SC-6 Inlet Protection (IP)



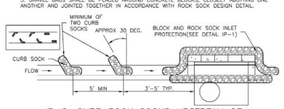
IP-1. BLOCK AND ROCK SOCK SUMP OR ON GRADE INLET PROTECTION

BLOCK AND CURB SOCK INLET PROTECTION INSTALLATION NOTES

1. SEE ROCK SOCK DESIGN DETAIL FOR INSTALLATION REQUIREMENTS.

2. CONCRETE "CINDER" BLOCKS SHALL BE LAID ON THEIR SIDES AROUND THE INLET IN A SINGLE ROW, ABUTTING ONE ANOTHER WITH THE OPEN END FACING AWAY FROM THE CURB.

3. GRAVEL BAGS SHALL BE PLACED AROUND CONCRETE BLOCKS, CLOSELY ABUTTING ONE ANOTHER AND JOINTED TOGETHER IN ACCORDANCE WITH ROCK SOCK DESIGN DETAIL.



IP-2. CURB ROCK SOCKS UPSTREAM OF INLET PROTECTION

CURB ROCK SOCK INLET PROTECTION INSTALLATION NOTES

1. SEE ROCK SOCK DESIGN DETAIL INSTALLATION REQUIREMENTS.

2. PLACEMENT OF THE SOCK SHALL BE APPROXIMATELY 30 DEGREES FROM PERPENDICULAR IN THE OPPOSITE DIRECTION OF FLOW.

3. SOCKS ARE TO BE FLUSH WITH THE CURB AND SPACED A MINIMUM OF 5 FEET APART.

4. AT LEAST TWO CURB SOCKS IN SERIES ARE REQUIRED UPSTREAM OF ON-GRADE INLETS.

SC-6 Inlet Protection (IP)

GENERAL INLET PROTECTION INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
   -LOCATION OF INLET PROTECTION.
   -TYPE OF INLET PROTECTION (IP-1, IP-2, IP-3, IP-4, IP-5, IP-6)

2. INLET PROTECTION SHALL BE INSTALLED PROMPTLY AFTER INLET CONSTRUCTION OR PAVING IS COMPLETE (TYPICALLY WITHIN 48 HOURS). IF A RAINFALL/RUNOFF EVENT IS FORECAST, INSTALL INLET PROTECTION PRIOR TO ONSET OF EVENT.

3. MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

INLET PROTECTION MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

4. SEDIMENT ACCUMULATED UPSTREAM OF INLET PROTECTION SHALL BE REMOVED AS NECESSARY TO MAINTAIN BMP EFFECTIVENESS, TYPICALLY WHEN STORAGE VOLUME REACHES 50% OF CAPACITY, A DEPTH OF 6" WHEN SILT FENCE IS USED, OR ¼ OF THE HEIGHT FOR STRAW BALES.

5. INLET PROTECTION IS TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS PERMANENTLY STABILIZED. UNLESS THE LOCAL JURISDICTION APPROVES EARLIER REMOVAL OF INLET PROTECTION IN STREETS.

6. WHEN INLET PROTECTION AT AREA INLETS IS REMOVED, THE DISTURBED AREA SHALL BE COVERED WITH TOP SOIL, SEEDED AND MULCHED, OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE LOCAL JURISDICTION.

(DETAIL ADAPTED FROM TOWN OF PARKER, COLORADO AND CITY OF AURORA, COLORADO, NOT AVAILABLE IN AUTOCAD)

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

NOTE: THE DETAILS INCLUDED WITH THIS FACT SHEET SHOW COMMONLY USED, CONVENTIONAL METHODS OF INLET PROTECTION IN THE DENVER METROPOLITAN AREA. THERE ARE MANY PROPRIETARY INLET PROTECTION METHODS ON THE MARKET. UDFCD NEITHER ENDORSES NOR DISCOURAGES USE OF PROPRIETARY INLET PROTECTION; HOWEVER, IN THE EVENT PROPRIETARY METHODS ARE USED, THE APPROPRIATE DETAIL FROM THE MANUFACTURER MUST BE INCLUDED IN THE SWMP AND THE BMP MUST BE INSTALLED AND MAINTAINED AS SHOWN IN THE MANUFACTURER'S DETAILS.

NOTE: SOME MUNICIPALITIES DISCOURAGE OR PROHIBIT THE USE OF STRAW BALES FOR INLET PROTECTION. CHECK WITH LOCAL JURISDICTION TO DETERMINE IF STRAW BALE INLET PROTECTION IS ACCEPTABLE.

SC-1 Silt Fence (SF)

SILT FENCE INSTALLATION NOTES

1. SILT FENCE MUST BE PLACED AWAY FROM THE TOE OF THE SLOPE TO ALLOW FOR WATER PONDING. SILT FENCE AT THE TOE OF A SLOPE SHOULD BE INSTALLED IN A FLAT LOCATION AT LEAST SEVERAL FEET (2-5 FT) FROM THE TOE OF THE SLOPE TO ALLOW ROOM FOR PONDING AND DEPOSITION.

2. A UNIFORM 6" X 4" ANCHOR TRENCH SHALL BE EXCAVATED USING TRENCHER OR SILT FENCE INSTALLATION DEVICE. NO ROAD GRADERS, BACKHOES, OR SIMILAR EQUIPMENT SHALL BE USED.

3. COMPACT ANCHOR TRENCH BY HAND WITH A "JUMPING JACK" OR BY WHEEL ROLLING. COMPACTION SHALL BE SUCH THAT SILT FENCE RESISTS BEING PULLED OUT OF ANCHOR TRENCH BY HAND.

4. SILT FENCE SHALL BE PULLED TIGHT AS IT IS ANCHORED TO THE STAKES. THERE SHOULD BE NO NOTICEABLE SAG BETWEEN STAKES AFTER IT HAS BEEN ANCHORED TO THE STAKES.

5. SILT FENCE FABRIC SHALL BE ANCHORED TO THE STAKES USING 1" HEAVY DUTY STAPLES OR NAILS WITH 1" HEADS. STAPLES AND NAILS SHOULD BE PLACED 3" ALONG THE FABRIC DOWN THE STAKE.

6. AT THE END OF A RUN OF SILT FENCE ALONG A CONTOUR, THE SILT FENCE SHOULD BE TURNED PERPENDICULAR TO THE CONTOUR TO CREATE A "J-HOOK." THE "J-HOOK" EXTENDING PERPENDICULAR TO THE CONTOUR SHOULD BE OF SUFFICIENT LENGTH TO KEEP RUNOFF FROM FLOWING AROUND THE END OF THE SILT FENCE (TYPICALLY 10' - 20').

7. SILT FENCE SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBING ACTIVITIES.

SILT FENCE MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

4. SEDIMENT ACCUMULATED UPSTREAM OF THE SILT FENCE SHALL BE REMOVED AS NEEDED TO MAINTAIN THE FUNCTIONALITY OF THE BMP, TYPICALLY WHEN DEPTH OF ACCUMULATED SEDIMENTS IS APPROXIMATELY 6".

5. REPAIR OR REPLACE SILT FENCE WHEN THERE ARE SIGNS OF WEAR, SUCH AS SAGGING, TEARING, OR COLLAPSE.

6. SILT FENCE IS TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND APPROVED BY THE LOCAL JURISDICTION, OR IS REPLACED BY AN EQUIVALENT PERIMETER SEDIMENT CONTROL BMP.

7. WHEN SILT FENCE IS REMOVED, ALL DISTURBED AREAS SHALL BE COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED AS APPROVED BY LOCAL JURISDICTION.

(DETAIL ADAPTED FROM TOWN OF PARKER, COLORADO AND CITY OF AURORA, NOT AVAILABLE IN AUTOCAD)

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

Rock Sock (RS) SC-5

ROCK SOCK MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

4. ROCK SOCKS SHALL BE REPLACED IF THEY BECOME HEAVILY SOILED, OR DAMAGED BEYOND REPAIR.

5. SEDIMENT ACCUMULATED UPSTREAM OF ROCK SOCKS SHALL BE REMOVED AS NEEDED TO MAINTAIN FUNCTIONALITY OF THE BMP, TYPICALLY WHEN DEPTH OF ACCUMULATED SEDIMENTS IS APPROXIMATELY ½ OF THE HEIGHT OF THE ROCK SOCK.

6. ROCK SOCKS ARE TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND APPROVED BY THE LOCAL JURISDICTION.

7. WHEN ROCK SOCKS ARE REMOVED, ALL DISTURBED AREAS SHALL BE COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED AS APPROVED BY LOCAL JURISDICTION.

(DETAIL ADAPTED FROM TOWN OF PARKER, COLORADO AND CITY OF AURORA, COLORADO, NOT AVAILABLE IN AUTOCAD)

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

NOTE: THE DETAILS INCLUDED WITH THIS FACT SHEET SHOW COMMONLY USED, CONVENTIONAL METHODS OF ROCK SOCK INSTALLATION IN THE DENVER METROPOLITAN AREA. THERE ARE MANY PROPRIETARY ROCK SOCK PRODUCTS ON THE MARKET. UDFCD NEITHER ENDORSES NOR DISCOURAGES USE OF PROPRIETARY PROTECTION PRODUCTS; HOWEVER, IN THE EVENT PROPRIETARY METHODS ARE USED, THE APPROPRIATE DETAIL FROM THE MANUFACTURER MUST BE INCLUDED IN THE SWMP AND THE BMP MUST BE INSTALLED AND MAINTAINED AS SHOWN IN THE MANUFACTURER'S DETAILS.

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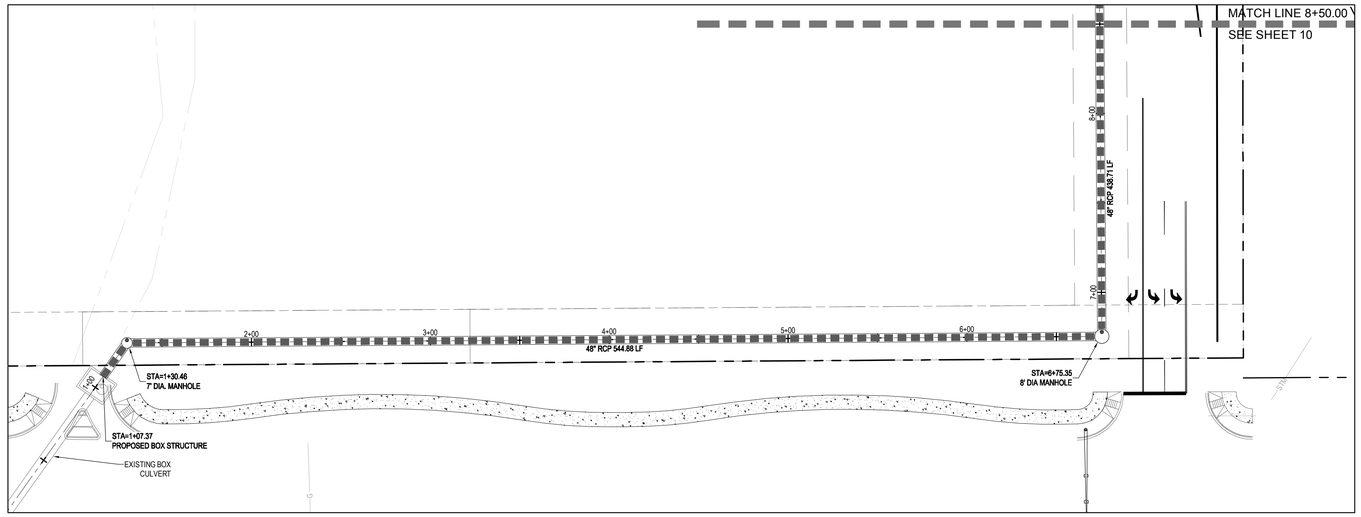
#	Date	Issue / Description	Init.

Project No:	EDI000018
Drawn By:	RDG
Checked By:	BSM
Date:	APRIL 2017

OVERALL
EROSION CONTROL DETAILS

8
OF 28

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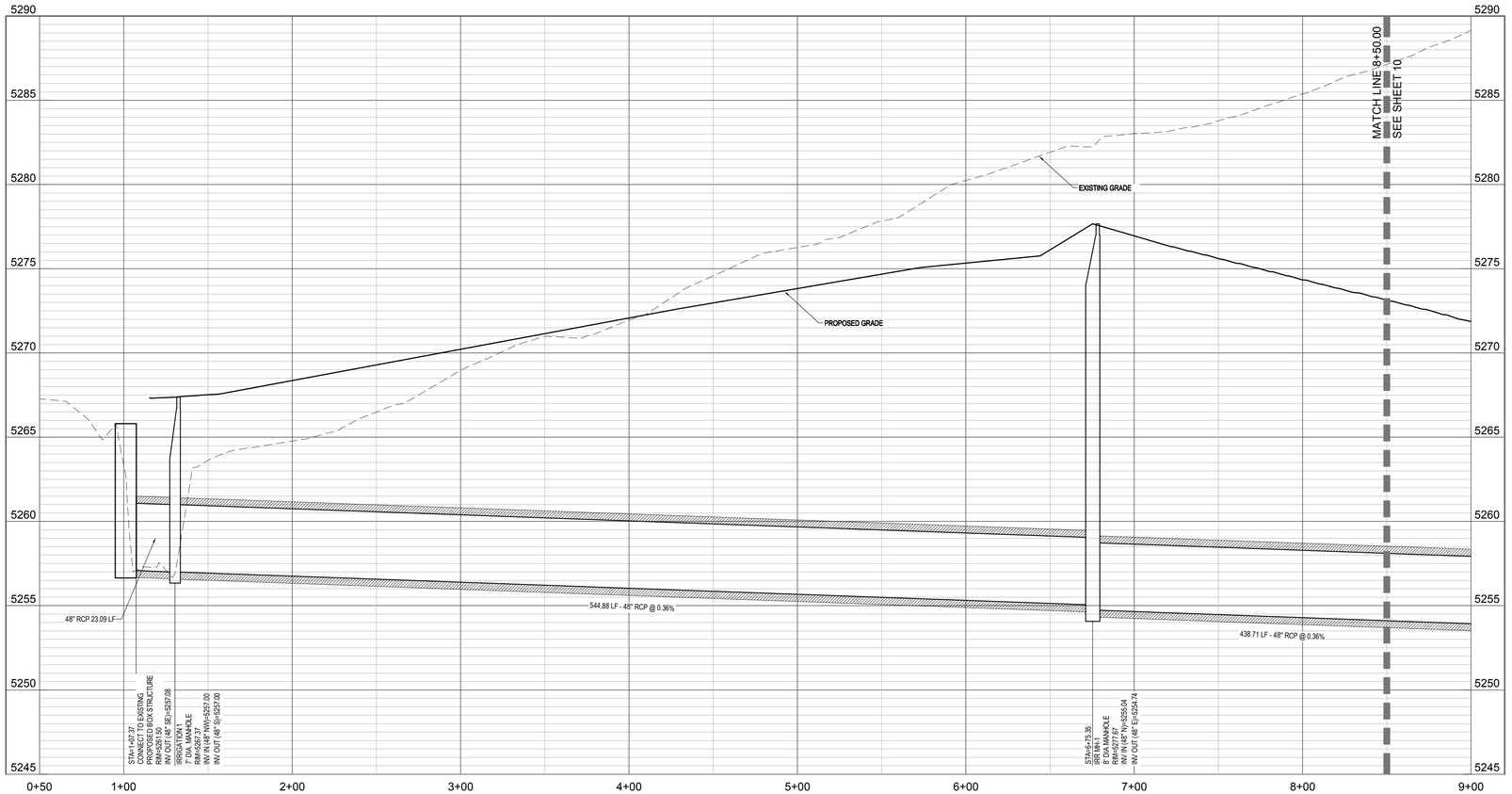




SCALE: 1"=40'

IRRIGATION DITCH - REALIGNMENT PLAN: STA 1+30.46 TO STA 8+50.00

SCALE: 1"=40'



IRRIGATION DITCH - REALIGNMENT PROFILE: STA 1+30.46 TO STA 8+50.00

SCALE: 1"=40'

UTILITY LEGEND

- EXISTING WATER LINE
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING UNDERGROUND GAS LINE
- EXISTING UNDERGROUND ELECTRICAL
- EXISTING UNDERGROUND TELEPHONE
- EXISTING FIBER OPTIC LINE
- WATER LINE (BY OTHERS)
- SANITARY SEWER (BY OTHERS)
- STORM SEWER (LESS THAN 12") (BY OTHERS)
- STORM SEWER (GREATER THAN 12") (BY OTHERS)
- UNDERGROUND GAS LINE (BY OTHERS)
- UNDERGROUND ELECTRICAL (BY OTHERS)
- UNDERGROUND TELEPHONE (BY OTHERS)
- PROPOSED WATER LINE
- PROPOSED SANITARY SEWER
- PROPOSED STORM SEWER (LESS THAN 12")
- PROPOSED STORM SEWER (GREATER THAN 12")
- PROPOSED UNDERGROUND GAS LINE
- PROPOSED UNDERGROUND ELECTRICAL
- PROPOSED UNDERGROUND TELEPHONE
- EXISTING WATER VALVE
- EXISTING MANHOLE
- WATER METER BY OTHERS
- WATER VALVE BY OTHERS
- FIRE HYDRANT BY OTHERS
- MANHOLE BY OTHERS
- UTILITY PEDESTAL BY OTHERS
- ELECTRICAL TRANSFORMER BY OTHERS
- INLET BY OTHERS
- PROPOSED WATER METER
- PROPOSED WATER VALVE
- PROPOSED FIRE HYDRANT
- PROPOSED MANHOLE
- UTILITY PEDESTAL
- PROPOSED ELECTRICAL TRANSFORMER
- PROPOSED INLET

BASIS OF BEARING

BEARINGS ARE BASED ON THE NORTH LINE OF THE NORTHEAST QUARTER OF SECTION 34 AND MONUMENTED ON THE WEST BY A 2.5" ALUMINUM CAP STAMPED "PLS29752" IN A RANGE BOX FOR THE N 1/4 CORNER AND MONUMENTED ON THE EAST BY A 2.5" ALUMINUM CAP STAMPED "PLS12405" FOR THE NE CORNER AND IS ASSUMED TO BEAR S 89°58'01" E.

BENCHMARK

ELEVATIONS SHOWN ARE NAVD 88 AND ARE DERIVED VIA GPS OBSERVATIONS FROM THE LIECA SMARTNET RTK GPS NETWORK AND GEOID 12B.

CAUTION - NOTICE TO CONTRACTOR

1. ALL UTILITY LOCATIONS SHOWN ARE BASED ON MAPS PROVIDED BY THE APPROPRIATE UTILITY COMPANY AND FIELD SURFACE EVIDENCE AT THE TIME OF SURVEY AND IS TO BE CONSIDERED AN APPROXIMATE LOCATION ONLY. IT IS THE CONTRACTORS RESPONSIBILITY TO FIELD VERIFY THE FIELD LOCATION OF ALL UTILITIES, PUBLIC OR PRIVATE, WHETHER SHOWN ON THE PLANS OR NOT, PRIOR TO CONSTRUCTION. REPORT ANY DISCREPANCIES TO THE ENGINEER PRIOR TO CONSTRUCTION.
2. WHERE A PROPOSED UTILITY CROSSES AN EXISTING UTILITY, IT IS THE CONTRACTORS RESPONSIBILITY TO FIELD VERIFY THE HORIZONTAL AND VERTICAL LOCATION OF SUCH EXISTING UTILITY, EITHER THROUGH POTHOLING OR ALTERNATIVE METHOD. REPORT INFORMATION TO THE ENGINEER PRIOR TO CONSTRUCTION.

811 Know what's **below.** **Call** before you dig.

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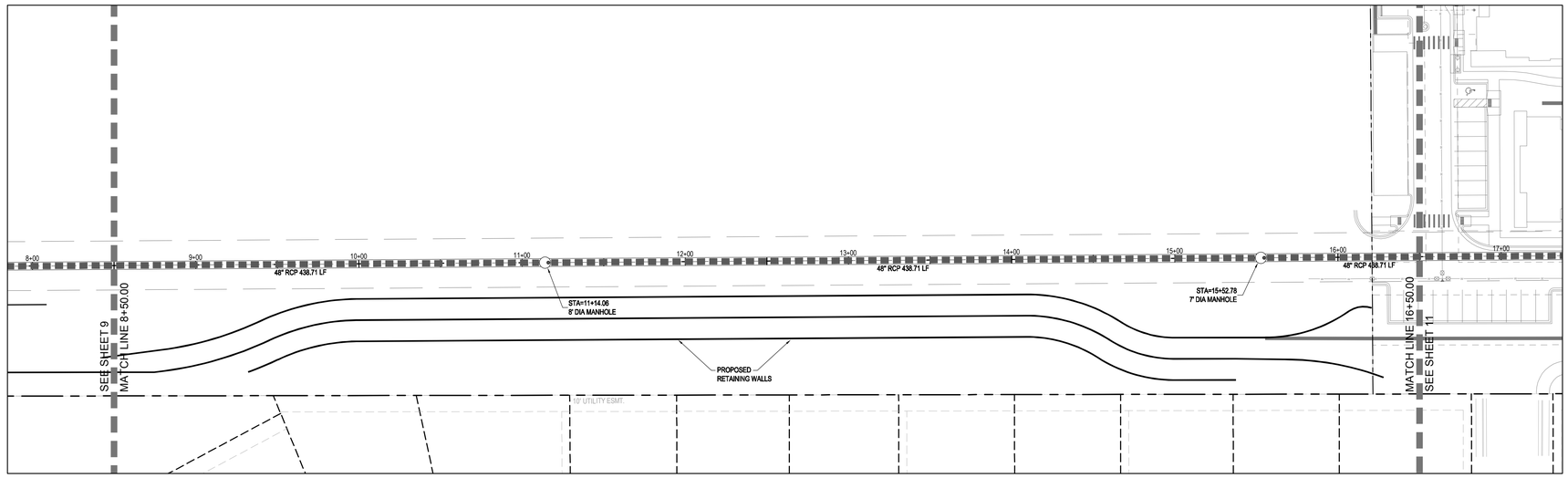
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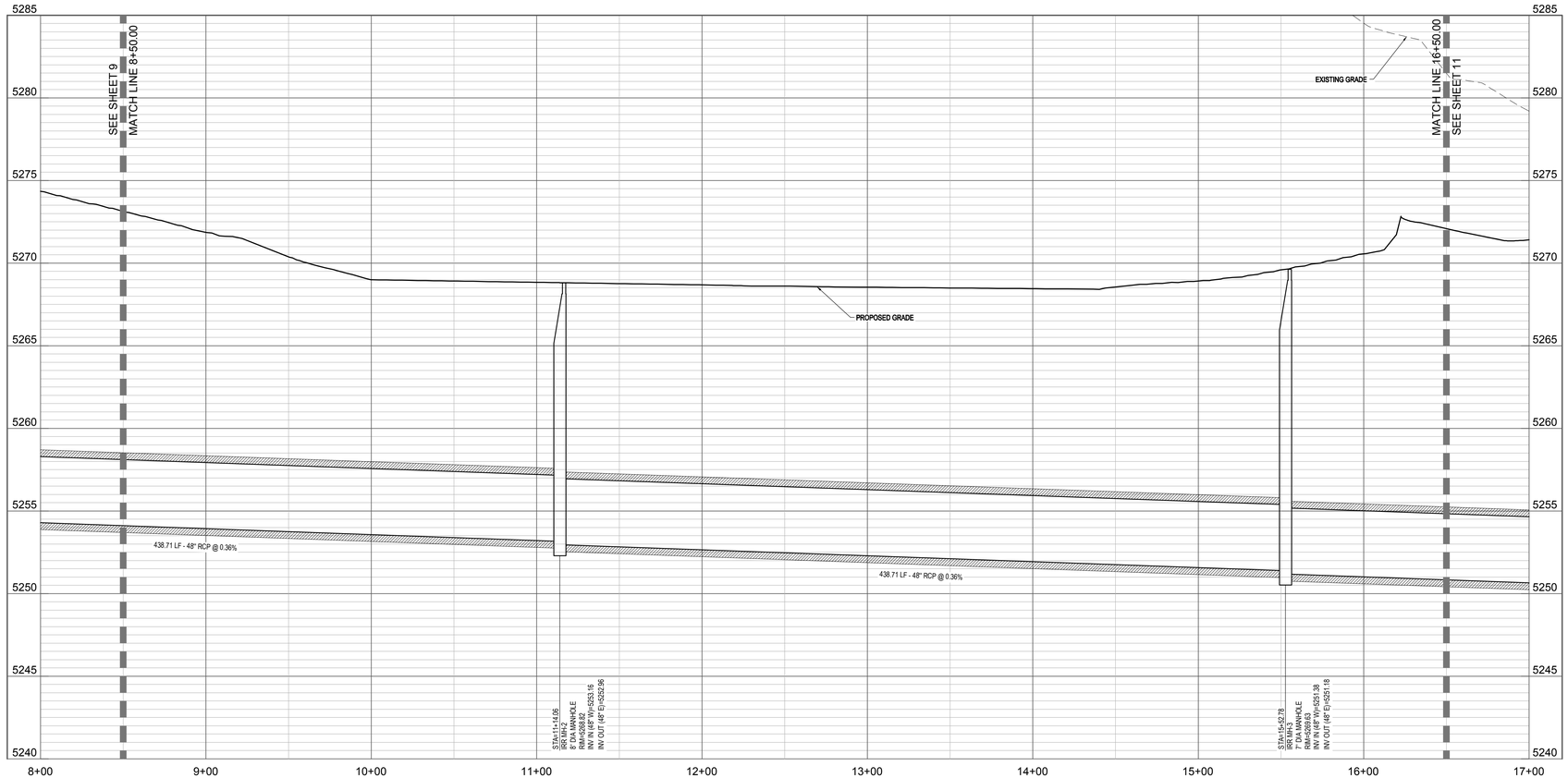
IRRIGATION DITCH - REALIGNMENT PLAN AND PROFILE

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IRRIGATION DITCH - REALIGNMENT PLAN: STA 8+50.00 TO STA 16+50.00

SCALE: 1"=40'



IRRIGATION DITCH - REALIGNMENT PROFILE: STA 8+50.00 TO STA 16+50.00

SCALE: 1"=40' HORIZONTAL, 1"=4' VERTICAL

UTILITY LEGEND

- EXISTING WATER LINE
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING UNDERGROUND GAS LINE
- EXISTING UNDERGROUND ELECTRICAL
- EXISTING UNDERGROUND TELEPHONE
- EXISTING FIBER OPTIC LINE
- WATER LINE (BY OTHERS)
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BENCHMARK

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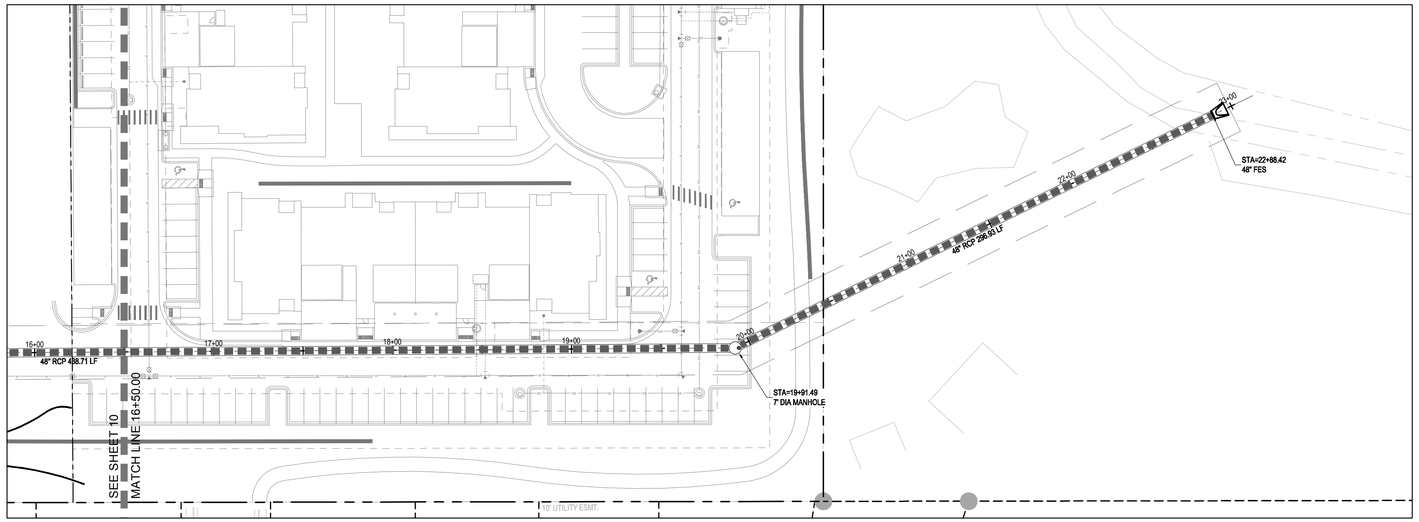
#	Date	Issue / Description	Init.

Project No:	EDI000018
Drawn By:	RDG
Checked By:	BSM
Date:	APRIL 2017

IRRIGATION DITCH - REALIGNMENT PLAN AND PROFILE

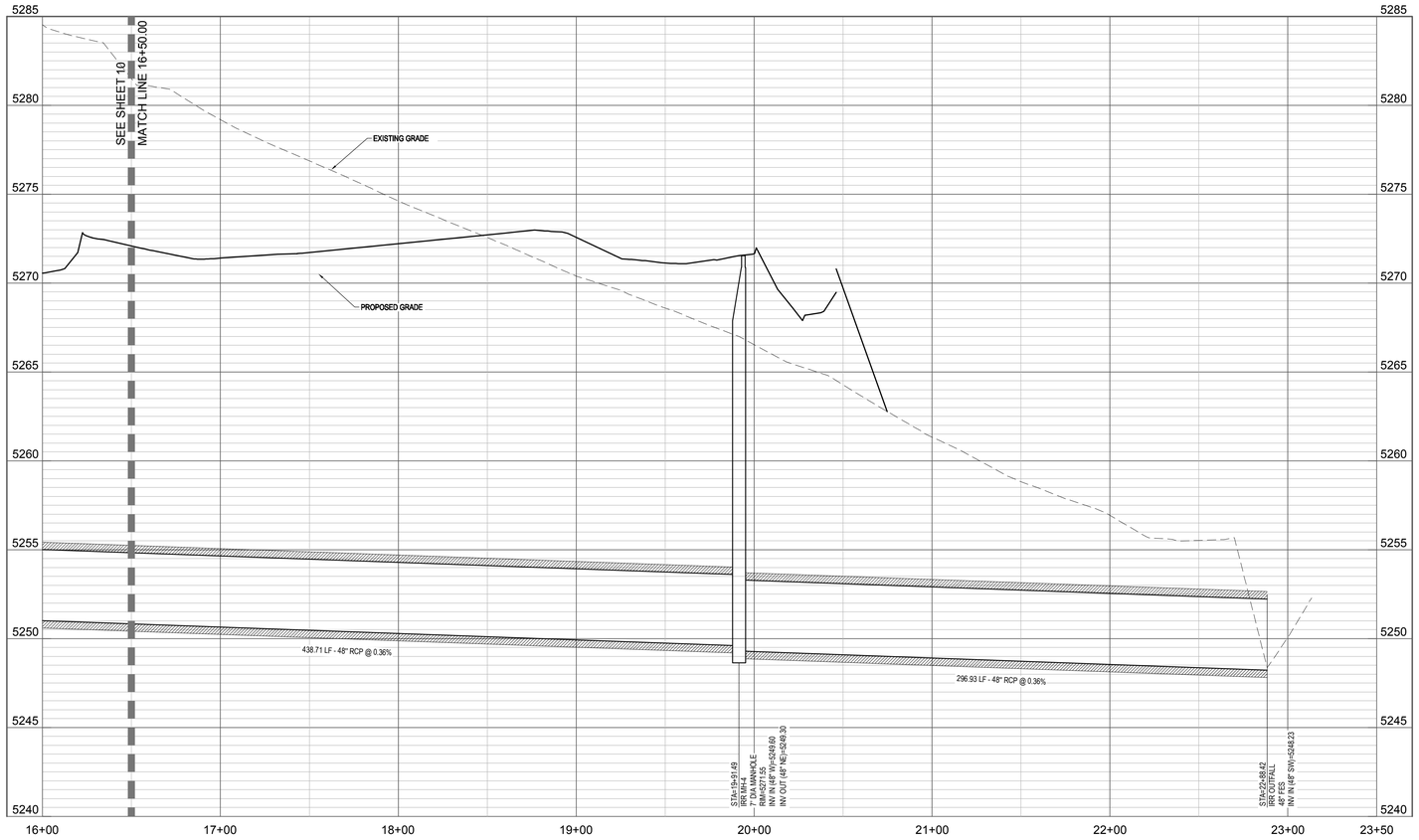
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IRRIGATION DITCH - REALIGNMENT PLAN: STA 8+50.00 TO STA 16+50.00

SCALE: 1"=40'



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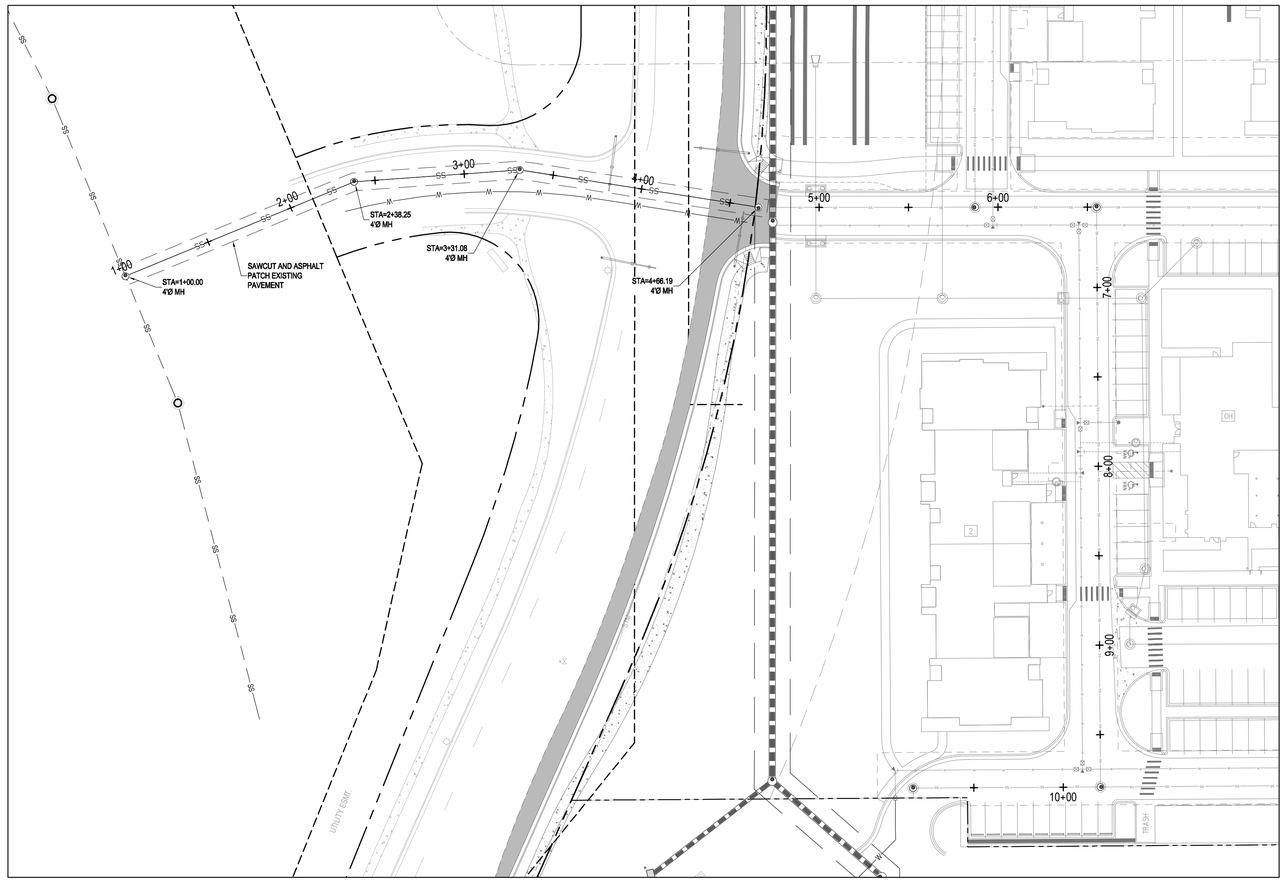
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IRRIGATION DITCH - REALIGNMENT PLAN AND PROFILE

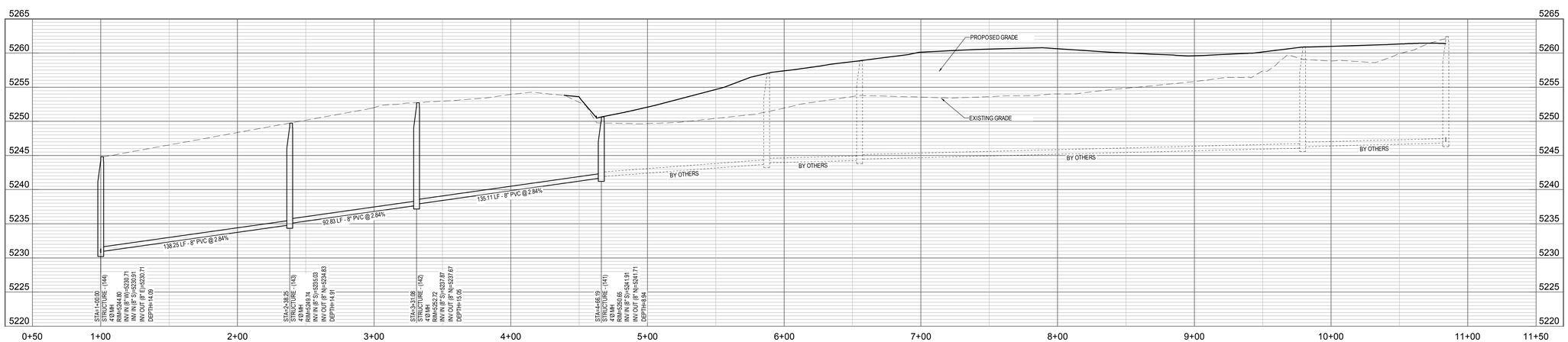
11
OF 26

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SANITARY SEWER PLAN: STA 1+00.00 TO STA 10+38.96

SCALE: 1"=40'



SANITARY SEWER PROFILE: STA 1+00.00 TO STA 10+38.96

SCALE: 1"=40' HORIZ, 1"=8' VERT

UTILITY LEGEND

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EVERGREEN DEVCO INC

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ERIE, COLORADO

#	Date	Issue / Description	Init.

Project No:	EDI000018
Drawn By:	RDG
Checked By:	BSM
Date:	APRIL 2017

PRELIMINARY
SANITARY SEWER
PLAN AND PROFILE

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OF 28

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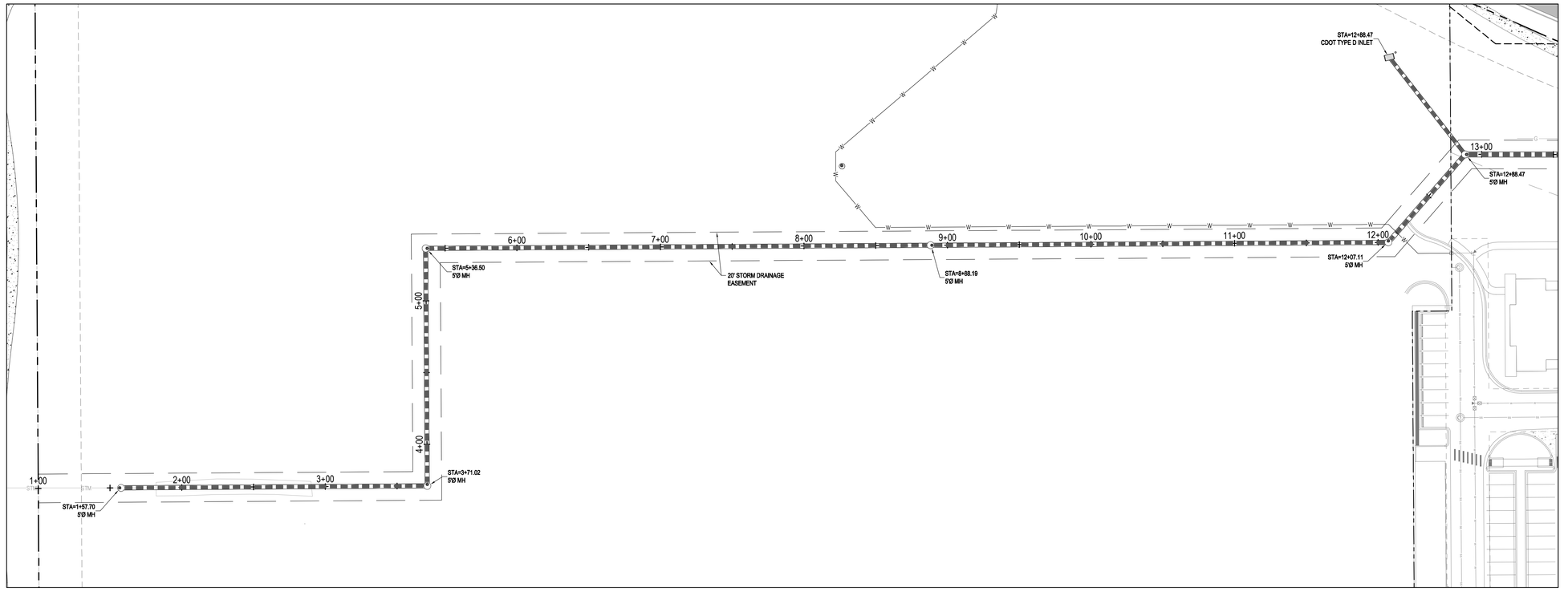
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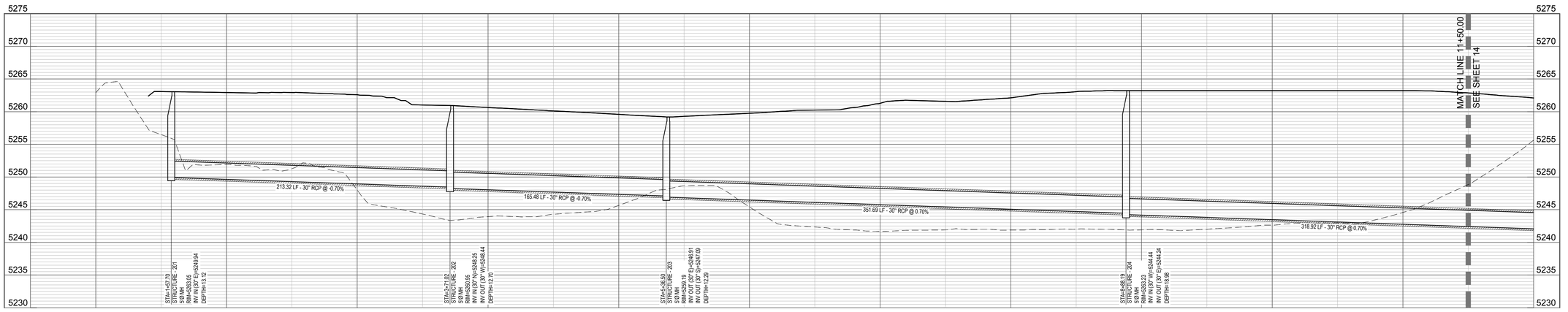
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SCALE: 1"=40'



STORM SEWER PLAN: STA 1+00.00 TO STA 10+38.96

SCALE: 1"=40'



STORM SEWER PROFILE: STA 1+00.00 TO STA 10+38.96

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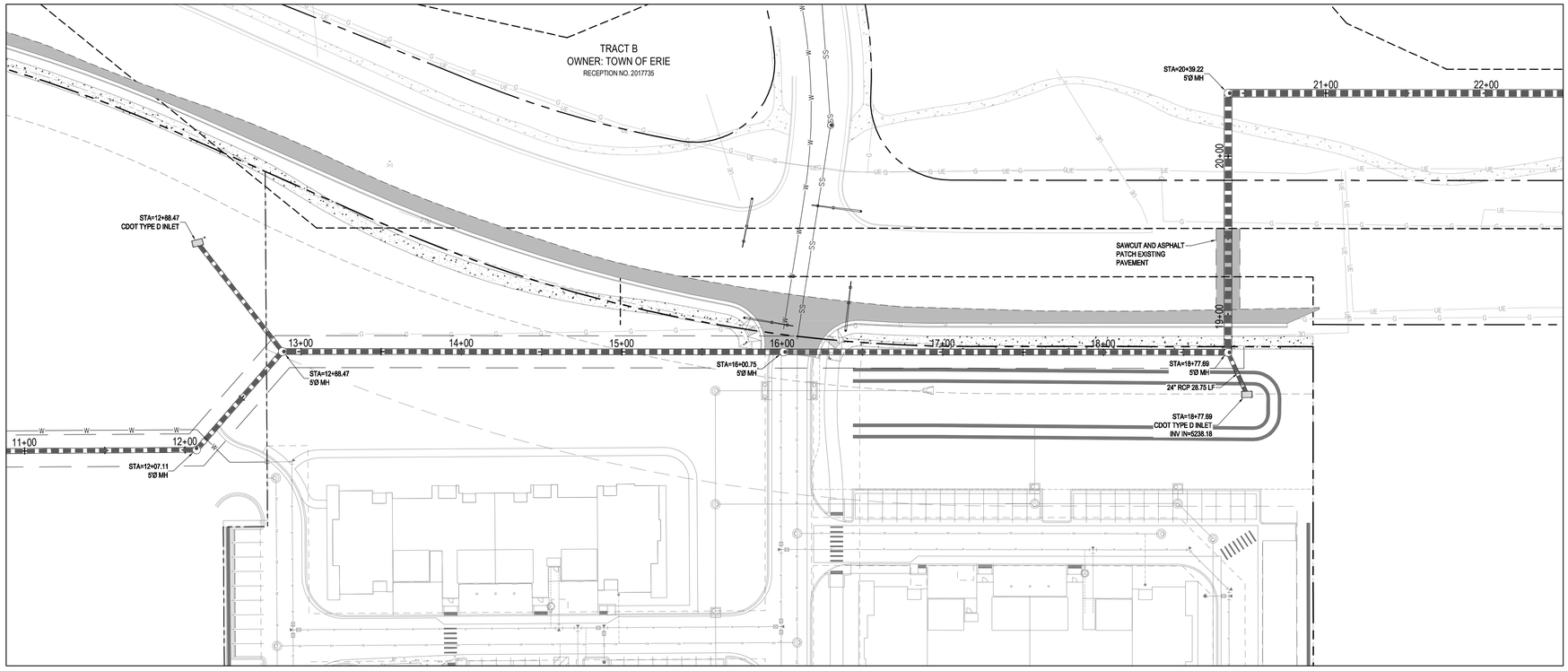
#	Date	Issue / Description	Init.

Project No:	EDI000018
Drawn By:	RDG
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PRELIMINARY
STORM SEWER BYPASS PLAN AND PROFILE

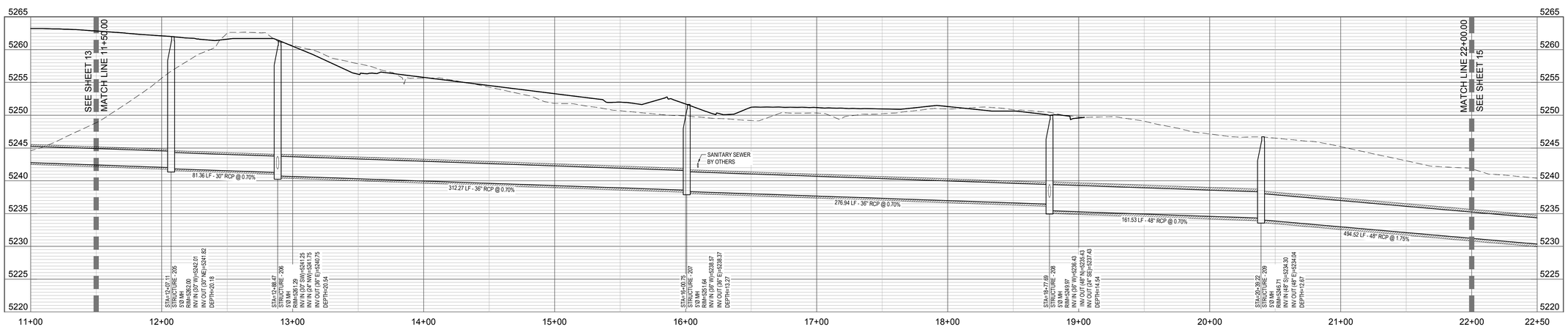
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STORM SEWER PLAN: STA 1+00.00 TO STA 10+38.96

SCALE: 1"=40'



STORM SEWER PROFILE: STA 1+00.00 TO STA 10+38.96

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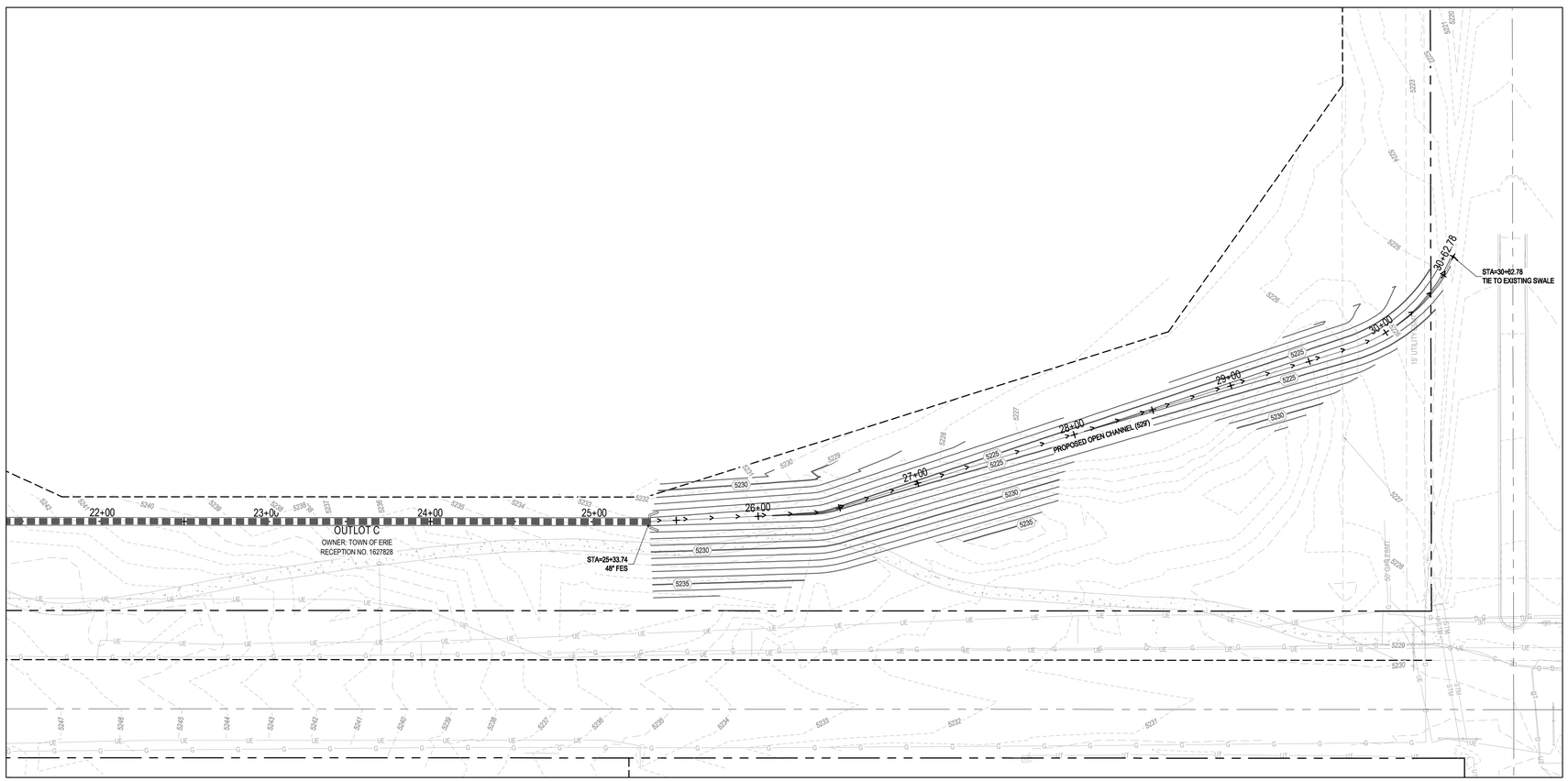
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PRELIMINARY
STORM SEWER OUTFALL
PLAN AND PROFILE

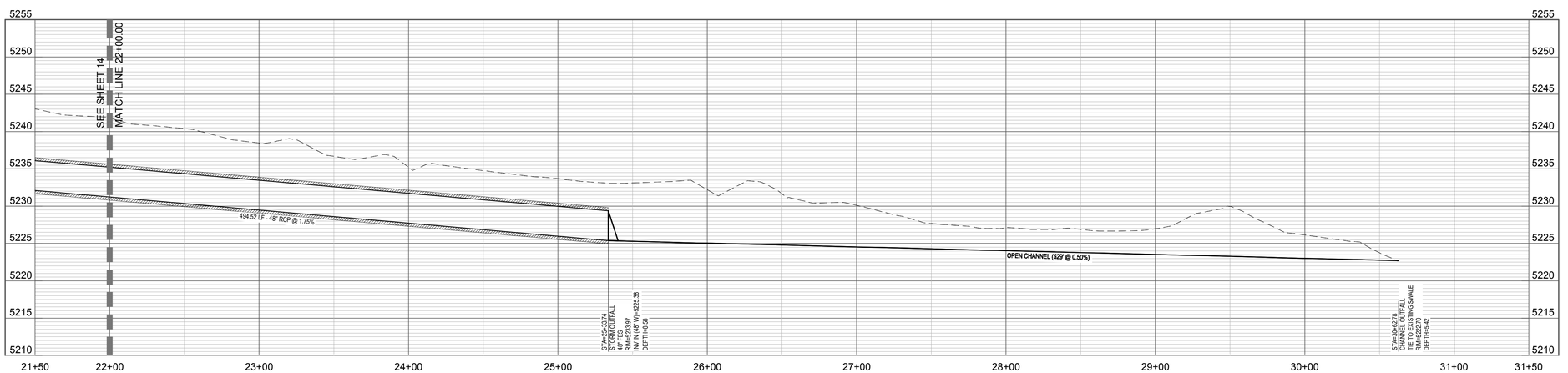
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OF 28

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STORM SEWER PLAN: STA 1+00.00 TO STA 10+38.96

SCALE: 1"=40'



STORM SEWER PROFILE: STA 1+00.00 TO STA 10+38.96

SCALE: 1"=40' HORIZ, 1"=8' VERT

UTILITY LEGEND

- EXISTING WATER LINE
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING UNDERGROUND GAS LINE
- EXISTING UNDERGROUND ELECTRICAL
- EXISTING UNDERGROUND TELEPHONE
- EXISTING FIBER OPTIC LINE
- WATER LINE (BY OTHERS)
- SANITARY SEWER (BY OTHERS)
- STORM SEWER (LESS THAN 12") (BY OTHERS)
- STORM SEWER (GREATER THAN 12") (BY OTHERS)
- UNDERGROUND GAS LINE (BY OTHERS)
- UNDERGROUND ELECTRICAL (BY OTHERS)
- UNDERGROUND TELEPHONE (BY OTHERS)
- PROPOSED WATER LINE
- PROPOSED SANITARY SEWER
- PROPOSED STORM SEWER (LESS THAN 12")
- PROPOSED STORM SEWER (GREATER THAN 12")
- PROPOSED UNDERGROUND GAS LINE
- PROPOSED UNDERGROUND ELECTRICAL
- PROPOSED UNDERGROUND TELEPHONE
- EXISTING WATER VALVE
- EXISTING MANHOLE
- WATER METER BY OTHERS
- WATER VALVE BY OTHERS
- FIRE HYDRANT BY OTHERS
- MANHOLE BY OTHERS
- UTILITY PEDESTAL BY OTHERS
- ELECTRICAL TRANSFORMER BY OTHERS
- INLET BY OTHERS
- PROPOSED WATER METER
- PROPOSED WATER VALVE
- PROPOSED FIRE HYDRANT
- PROPOSED MANHOLE
- UTILITY PEDESTAL
- PROPOSED ELECTRICAL TRANSFORMER
- PROPOSED INLET

BASIS OF BEARING

BEARINGS ARE BASED ON THE NORTH LINE OF THE NORTHEAST QUARTER OF SECTION 34 AND MONUMENTED ON THE WEST BY A 2.5" ALUMINUM CAP STAMPED "PLS29752" IN A RANGE BOX FOR THE N 1/4 CORNER AND MONUMENTED ON THE EAST BY A 2.5" ALUMINUM CAP STAMPED "PLS12405" FOR THE NE CORNER AND IS ASSUMED TO BEAR S 89°58'01" E.

BENCHMARK

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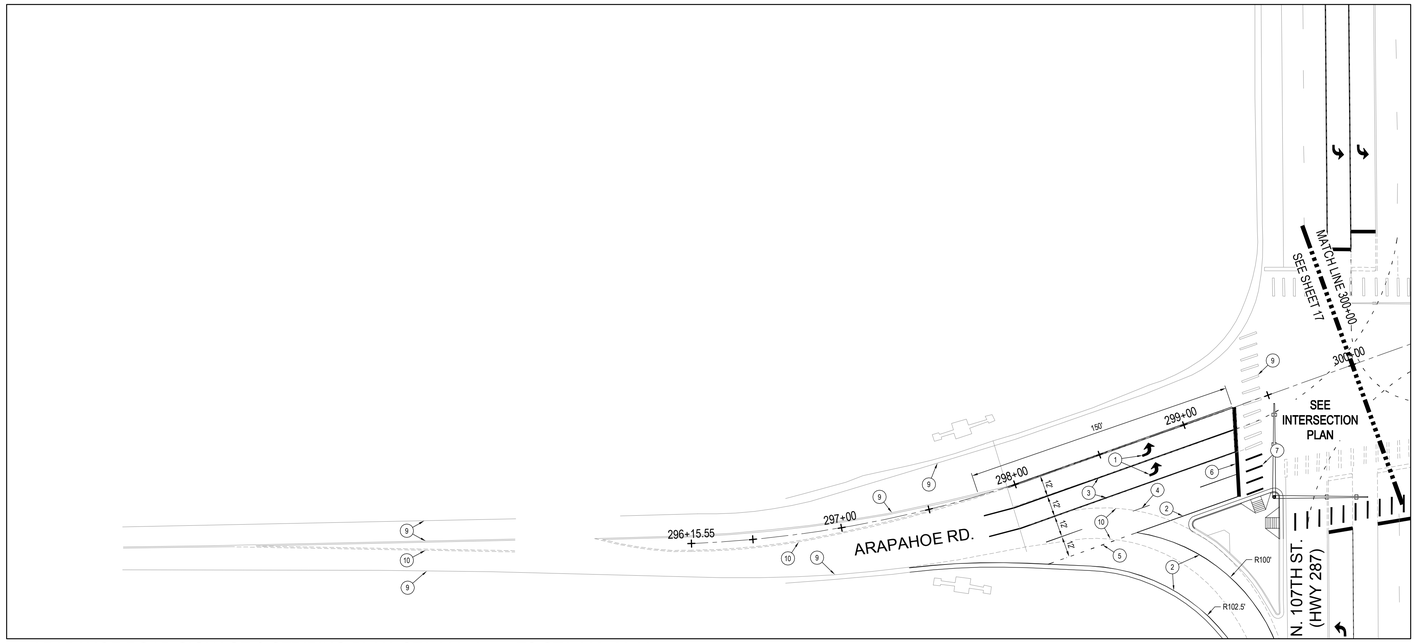
#	Date	Issue / Description	Init.

Project No:	EDI000018
Drawn By:	RDG
Checked By:	BSM
Date:	APRIL 2017

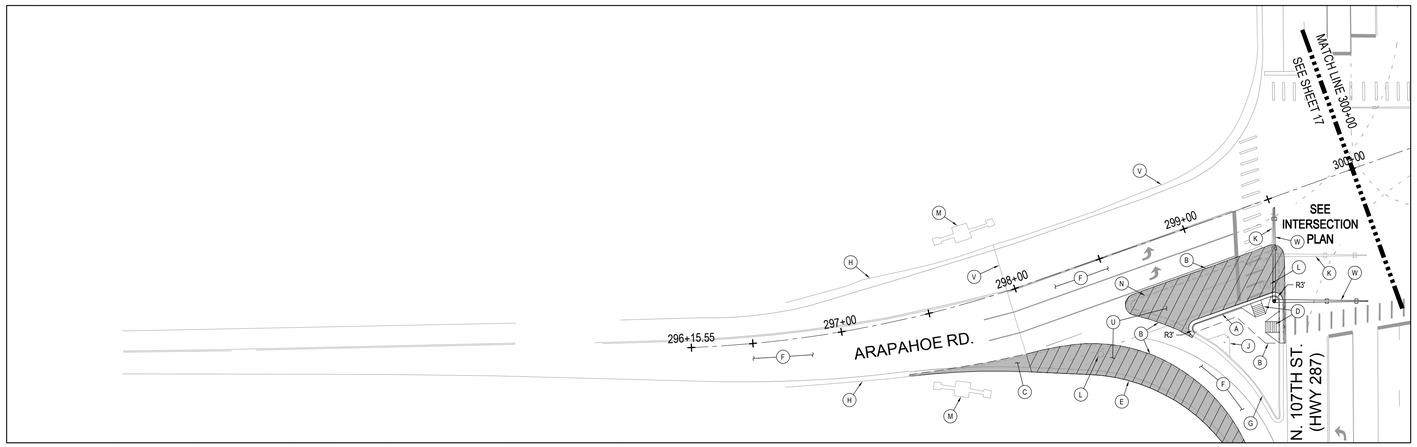
PRELIMINARY
STORM SEWER OUTFALL
PLAN AND PROFILE

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OF 28

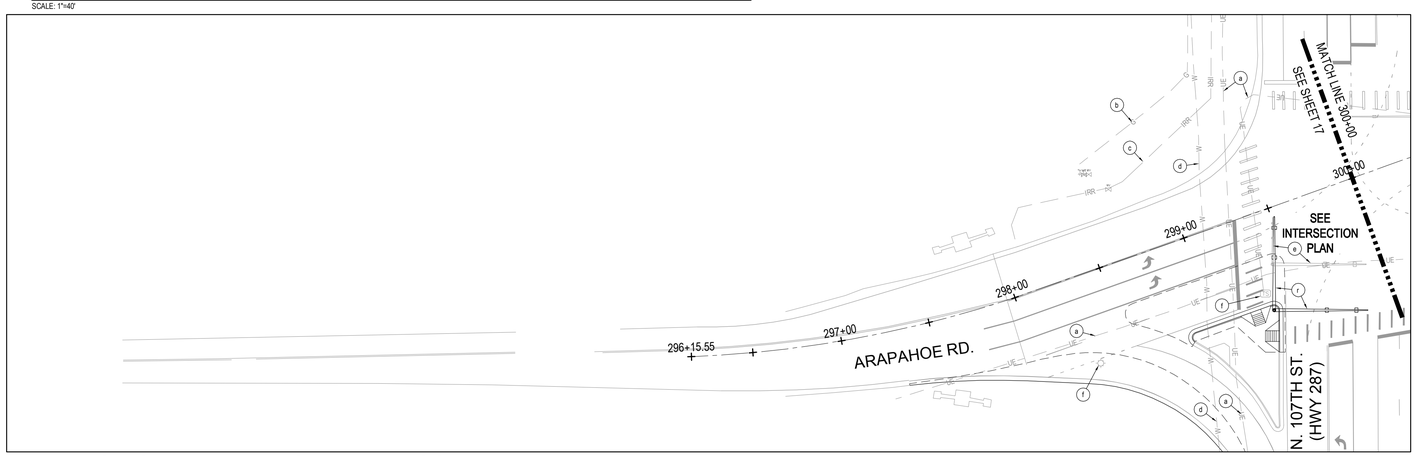
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ARAPAHOE ROAD SIGNAGE & STRIPING PLAN: STA 296+15.55 TO STA 300+00.00
SCALE: 1"=40'



ARAPAHOE ROAD HORIZONTAL CONTROL & PAVING PLAN: STA 296+15.55 TO STA 300+00.00
SCALE: 1"=40'



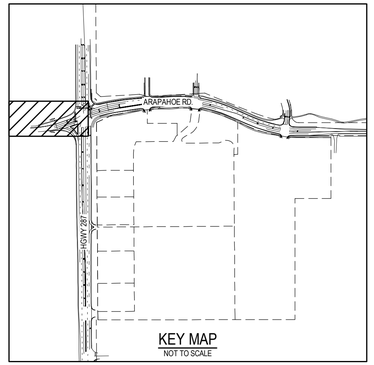
ARAPAHOE ROAD UTILITY PLAN: STA 296+15.55 TO STA 300+00.00
SCALE: 1"=40'

SIGNAGE & STRIPING SCHEDULE

1. PROPOSED LEFT TURN SYMBOL, WHITE
2. PROPOSED 4" WIDE SOLID LINE, WHITE
3. PROPOSED 8" WIDE SOLID LINE, WHITE
4. PROPOSED 4" WIDE SKIP LANE LINE, WHITE
5. PROPOSED 4" WIDE DOTTED EXTENTION LINE, WHITE
6. PROPOSED 24" WIDE STOP BAR, WHITE
7. PROPOSED CROSSWALK STRIPING PER M.U.T.C.D., WHITE
8. PROPOSED 4" DOUBLE SOLID YELLOW LINES
9. EXISTING PAVEMENT MARKING TO REMAIN
10. EXISTING PAVEMENT MARKING TO BE REMOVED
11. PROPOSED "ONLY" TEXT, WHITE
12. PROPOSED "STOP" SIGN
13. PROPOSED "ONE WAY" SIGN
14. PROPOSED 4" WIDE SOLID LINE, YELLOW
15. PROPOSED 8" WIDE DOTTED EXTENSION LINE, WHITE
16. PROPOSED RIGHT TURN SYMBOL, WHITE

N

0 20 40
SCALE: 1"=40'



UTILITY LEGEND

- EXISTING WATER LINE
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING UNDERGROUND GAS LINE
- EXISTING UNDERGROUND ELECTRICAL
- EXISTING UNDERGROUND TELEPHONE
- EXISTING FIBER OPTIC LINE
- WATER LINE (BY OTHERS)
- SANITARY SEWER (BY OTHERS)
- STORM SEWER (LESS THAN 12") (BY OTHERS)
- STORM SEWER (GREATER THAN 12") (BY OTHERS)
- UNDERGROUND GAS LINE (BY OTHERS)
- UNDERGROUND ELECTRICAL (BY OTHERS)
- UNDERGROUND TELEPHONE (BY OTHERS)
- PROPOSED WATER LINE
- PROPOSED SANITARY SEWER
- PROPOSED STORM SEWER (LESS THAN 12")
- PROPOSED STORM SEWER (GREATER THAN 12")
- PROPOSED UNDERGROUND GAS LINE
- PROPOSED UNDERGROUND ELECTRICAL
- PROPOSED UNDERGROUND TELEPHONE
- EXISTING WATER VALVE
- EXISTING MANHOLE
- WATER METER BY OTHERS
- WATER VALVE BY OTHERS
- FIRE HYDRANT BY OTHERS
- MANHOLE BY OTHERS
- UTILITY PEDESTAL BY OTHERS
- ELECTRICAL TRANSFORMER BY OTHERS
- INLET BY OTHERS
- PROPOSED WATER METER
- PROPOSED WATER VALVE
- PROPOSED FIRE HYDRANT
- PROPOSED MANHOLE
- UTILITY PEDESTAL
- PROPOSED ELECTRICAL TRANSFORMER
- PROPOSED INLET

PAVING PLAN SCHEDULE

A. PROPOSED CURB AND GUTTER
B. PROPOSED SAWCUT
C. PROPOSED ASPHALT PAVEMENT
D. PROPOSED ADA RAMP
E. PROPOSED EDGE OF CONCRETE
F. EXISTING ROADWAY PAVEMENT TO REMAIN
G. EXISTING CURB AND GUTTER TO REMAIN
H. EXISTING EDGE OF ASPHALT TO REMAIN
J. EXISTING ADA RAMP TO REMAIN
K. EXISTING TRAFFIC SIGNAL TO BE REMOVED AND RELOCATED
L. EXISTING TRAFFIC SIGNAL EQUIPMENT TO BE REMOVED AND RELOCATED
M. EXISTING MONUMENT TO REMAIN
N. EXISTING CURB AND GUTTER TO BE REMOVED
O. PROPOSED SIDEWALK
P. EXISTING INLET TO REMAIN
Q. EXISTING TRAFFIC SIGNAL TO REMAIN
R. EXISTING STREET LIGHT TO REMAIN
S. EXISTING INLET TO BE REMOVED AND REPLACED WITH TYPE R INLET
T. EXISTING SIDEWALK TO REMAIN
U. PROPOSED CONCRETE PAVEMENT
V. EXISTING EDGE OF CONCRETE TO REMAIN
W. PROPOSED TRAFFIC SIGNAL
X. PROPOSED STAMPED CONCRETE MEDIAN TO MATCH EXISTING

UTILITY PLAN SCHEDULE

a. EXISTING UNDERGROUND ELECTRIC TO REMAIN
b. EXISTING GAS LINE TO REMAIN
c. EXISTING IRRIGATION LINE TO REMAIN
d. EXISTING WATER MAIN TO REMAIN
e. EXISTING TRAFFIC SIGNAL TO BE REMOVED AND RELOCATED
f. EXISTING TRAFFIC SIGNAL EQUIPMENT TO BE REMOVED AND RELOCATED
g. PROPOSED STORM SEWER INLET
h. EXISTING STORM SEWER INLET TO REMAIN
i. EXISTING TRAFFIC SIGNAL TO REMAIN
j. EXISTING STREET LIGHT TO REMAIN
k. EXISTING INLET TO BE REMOVED AND REPLACED WITH TYPE R INLET
l. PROPOSED STORM SEWER
m. EXISTING SANITARY MANHOLE TO REMAIN
n. PROPOSED SANITARY SEWER
o. PROPOSED WATER LINE
p. EXISTING STORM SEWER TO REMAIN
q. EXISTING UNDERGROUND TELEPHONE LINE TO REMAIN
r. PROPOSED TRAFFIC SIGNAL

BASIS OF BEARING

BEARINGS ARE BASED ON THE NORTH LINE OF THE NORTHEAST QUARTER OF SECTION 34 AND MONUMENTED ON THE WEST BY A 2.5" ALUMINUM CAP STAMPED "PLS29752" IN A RANGE BOX FOR THE N 1/4 CORNER AND MONUMENTED ON THE EAST BY A 2.5" ALUMINUM CAP STAMPED "PLS12405" FOR THE NE CORNER AND IS ASSUMED TO BEAR S 89°58'01" E.

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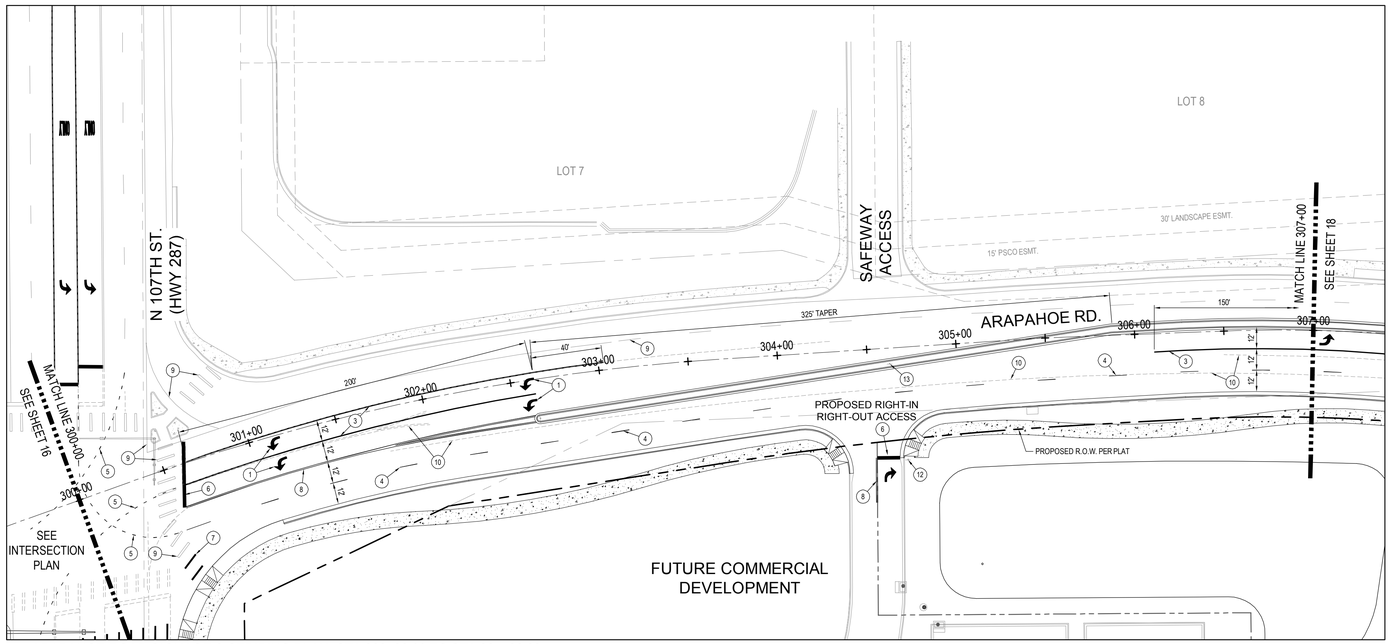
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Drawn By:	RDG
Checked By:	BSM
Date:	APRIL 2017

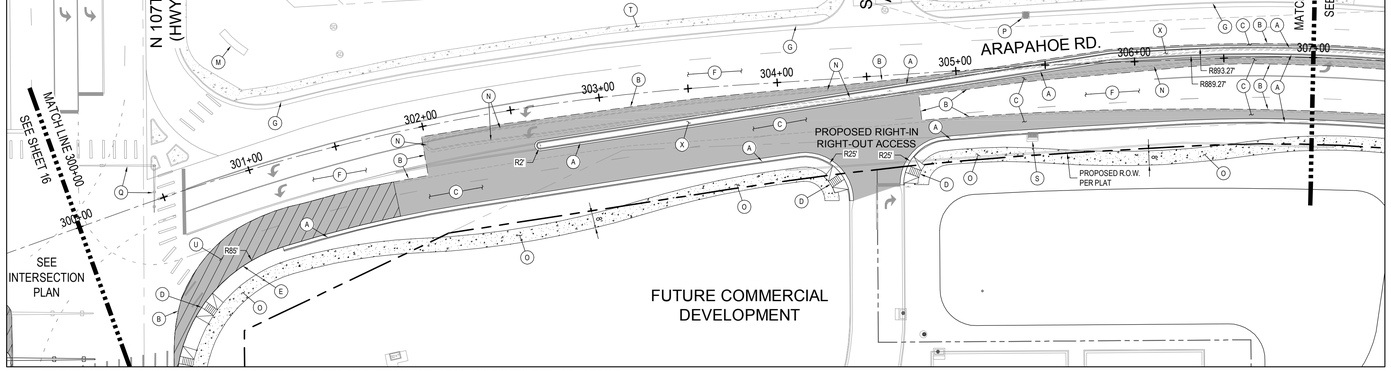
ARAPAHOE ROAD
SITE PLAN

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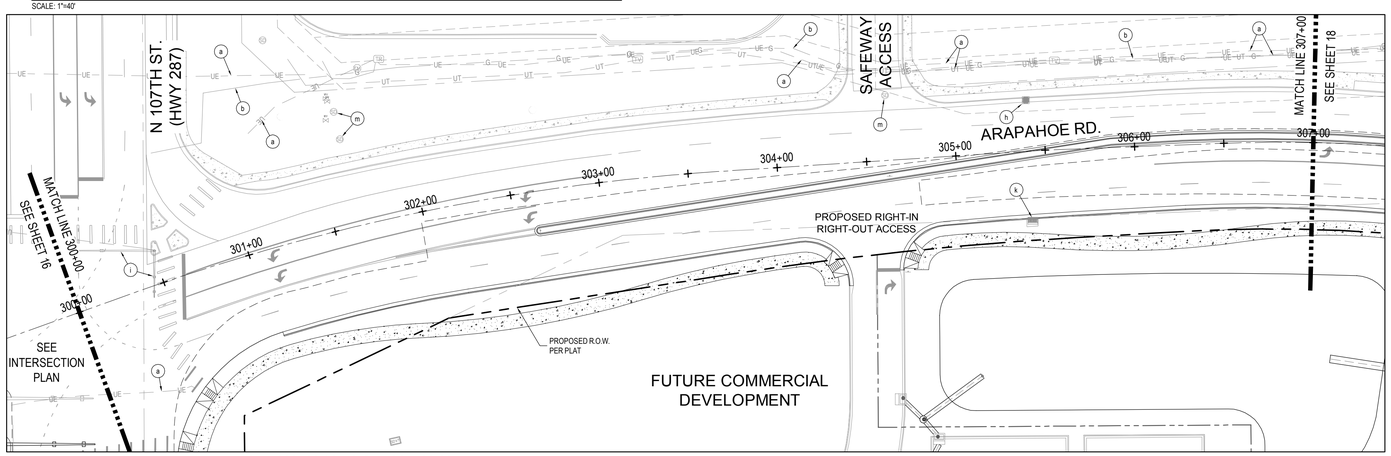
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ARAPAHOE ROAD SIGNAGE & STRIPING PLAN: STA 300+00.00 TO STA 307+00.00
SCALE: 1"=40'



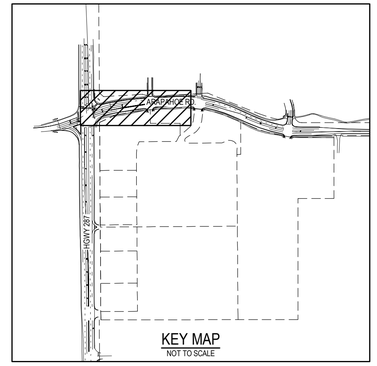
ARAPAHOE ROAD HORIZONTAL CONTROL & PAVING PLAN: STA 300+00.00 TO STA 307+00.00
SCALE: 1"=40'



ARAPAHOE ROAD UTILITY PLAN: STA 300+00.00 TO STA 307+00.00
SCALE: 1"=40'

SIGNAGE & STRIPING SCHEDULE

1. PROPOSED LEFT TURN SYMBOL, WHITE
2. PROPOSED 4" WIDE SOLID LINE, WHITE
3. PROPOSED 8" WIDE SOLID LINE, WHITE
4. PROPOSED 4" WIDE SKIP LANE LINE, WHITE
5. PROPOSED 4" WIDE DOTTED EXTENTION LINE, WHITE
6. PROPOSED 24" WIDE STOP BAR, WHITE
7. PROPOSED CROSSWALK STRIPING PER M.U.T.C.D., WHITE
8. PROPOSED 4" DOUBLE SOLID YELLOW LINES
9. EXISTING PAVEMENT MARKING TO REMAIN
10. EXISTING PAVEMENT MARKING TO BE REMOVED
11. PROPOSED "ONLY" TEXT, WHITE
12. PROPOSED "STOP" SIGN
13. PROPOSED "ONE WAY" SIGN
14. PROPOSED 4" WIDE SOLID LINE, YELLOW
15. PROPOSED 8" WIDE DOTTED EXTENSION LINE, WHITE
16. PROPOSED RIGHT TURN SYMBOL, WHITE



N

0 20 40
SCALE: 1"=40'

UTILITY LEGEND

- EXISTING WATER LINE
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING UNDERGROUND GAS LINE
- EXISTING UNDERGROUND ELECTRICAL
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- EXISTING WATER VALVE
- EXISTING MANHOLE
- WATER METER BY OTHERS
- WATER VALVE BY OTHERS
- FIRE HYDRANT BY OTHERS
- MANHOLE BY OTHERS
- UTILITY PEDESTAL BY OTHERS
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- INLET BY OTHERS
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- PROPOSED WATER VALVE
- PROPOSED FIRE HYDRANT
- PROPOSED MANHOLE
- UTILITY PEDESTAL
- PROPOSED ELECTRICAL TRANSFORMER
- PROPOSED INLET

PAVING PLAN SCHEDULE

A. PROPOSED CURB AND GUTTER
B. PROPOSED SAWCUT
C. PROPOSED ASPHALT PAVEMENT
D. PROPOSED ADA RAMP
E. PROPOSED EDGE OF CONCRETE
F. EXISTING ROADWAY PAVEMENT TO REMAIN
G. EXISTING CURB AND GUTTER TO REMAIN
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J. EXISTING ADA RAMP TO REMAIN
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P. EXISTING INLET TO REMAIN
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R. EXISTING STREET LIGHT TO REMAIN
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U. PROPOSED CONCRETE PAVEMENT
V. EXISTING EDGE OF CONCRETE TO REMAIN
W. PROPOSED TRAFFIC SIGNAL
X. PROPOSED STAMPED CONCRETE MEDIAN TO MATCH EXISTING

UTILITY PLAN SCHEDULE

a. EXISTING UNDERGROUND ELECTRIC TO REMAIN
b. EXISTING GAS LINE TO REMAIN
c. EXISTING IRRIGATION LINE TO REMAIN
d. EXISTING WATER MAIN TO REMAIN
e. EXISTING TRAFFIC SIGNAL TO BE REMOVED AND RELOCATED
f. EXISTING TRAFFIC SIGNAL EQUIPMENT TO BE REMOVED AND RELOCATED
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p. EXISTING STORM SEWER TO REMAIN
q. EXISTING UNDERGROUND TELEPHONE LINE TO REMAIN
r. PROPOSED TRAFFIC SIGNAL

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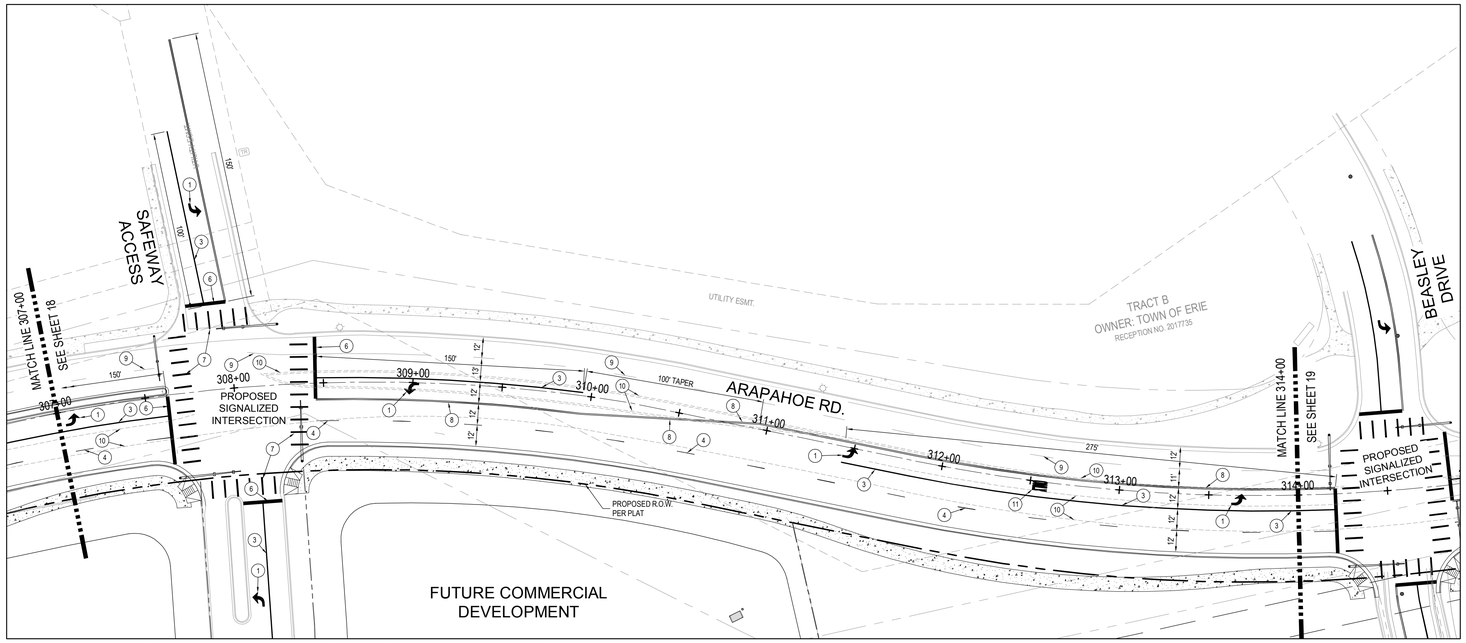
#	Date	Issue / Description	Init.

Project No:	EDI000018
Drawn By:	RDG
Checked By:	BSM
Date:	APRIL 2017

ARAPAHOE ROAD
SITE PLAN

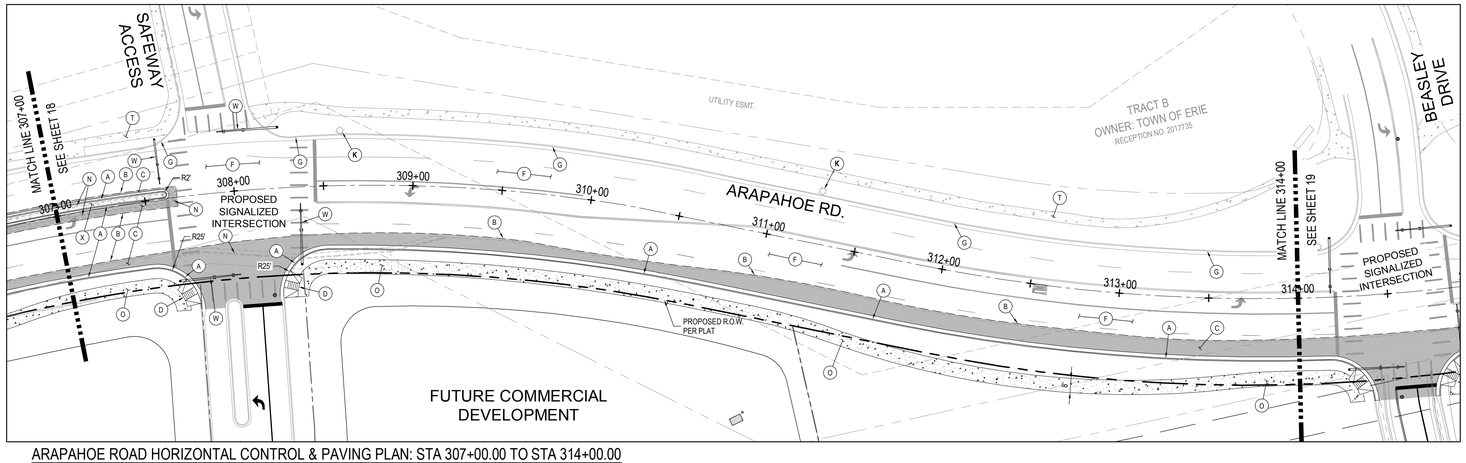
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OF 28

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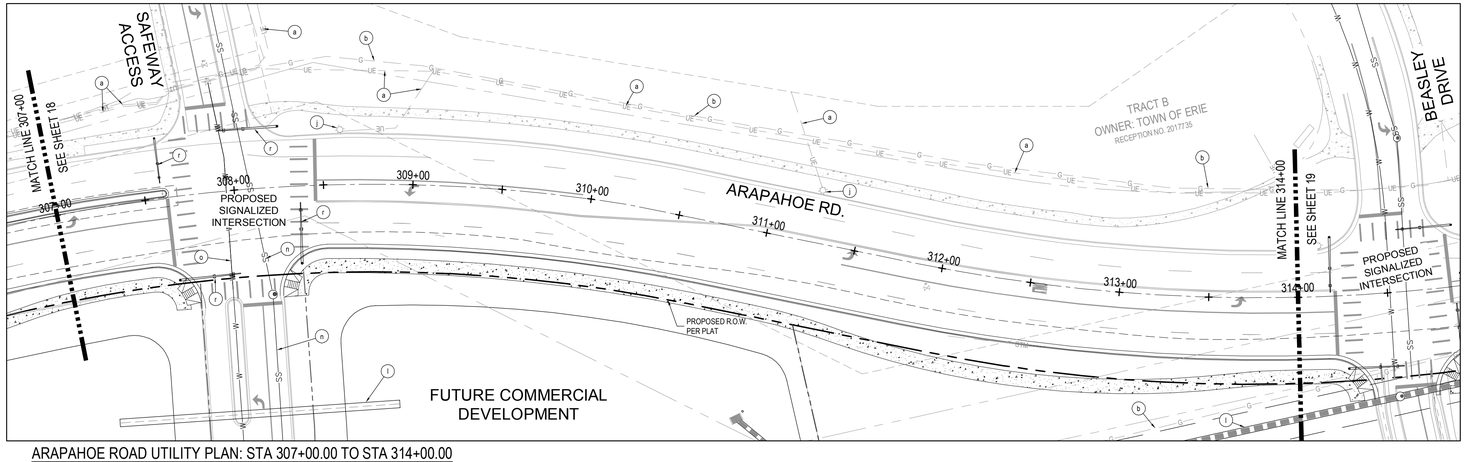
ARAPAHOE ROAD SIGNAGE & STRIPING PLAN: STA 307+00.00 TO STA 314+00.00

SCALE: 1"=40'



ARAPAHOE ROAD HORIZONTAL CONTROL & PAVING PLAN: STA 307+00.00 TO STA 314+00.00

SCALE: 1"=40'

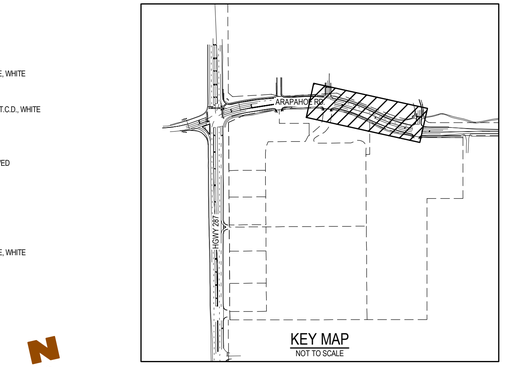


ARAPAHOE ROAD UTILITY PLAN: STA 307+00.00 TO STA 314+00.00

SCALE: 1"=40'

SIGNAGE & STRIPING SCHEDULE

1. PROPOSED LEFT TURN SYMBOL, WHITE
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6. PROPOSED 24" WIDE STOP BAR, WHITE
7. PROPOSED CROSSWALK STRIPING PER M.U.T.C.D., WHITE
8. PROPOSED 4" DOUBLE SOLID YELLOW LINES
9. EXISTING PAVEMENT MARKING TO REMAIN
10. EXISTING PAVEMENT MARKING TO BE REMOVED
11. PROPOSED "ONLY" TEXT, WHITE
12. PROPOSED "STOP" SIGN
13. PROPOSED "ONE WAY" SIGN
14. PROPOSED 4" WIDE SOLID LINE, YELLOW
15. PROPOSED 8" WIDE DOTTED EXTENSION LINE, WHITE
16. PROPOSED RIGHT TURN SYMBOL, WHITE





UTILITY LEGEND

- W — EXISTING WATER LINE
- SS — EXISTING SANITARY SEWER
- STS — EXISTING STORM SEWER
- G — EXISTING UNDERGROUND GAS LINE
- UE — EXISTING UNDERGROUND ELECTRICAL
- UT — EXISTING UNDERGROUND TELEPHONE
- FO — EXISTING FIBER OPTIC LINE
- W — WATER LINE (BY OTHERS)
- SS — SANITARY SEWER (BY OTHERS)
- STS — STORM SEWER (LESS THAN 12") (BY OTHERS)
- STORM SEWER (GREATER THAN 12") (BY OTHERS)
- G — UNDERGROUND GAS LINE (BY OTHERS)
- UE — UNDERGROUND ELECTRICAL (BY OTHERS)
- UT — UNDERGROUND TELEPHONE (BY OTHERS)
- W — PROPOSED WATER LINE
- SS — PROPOSED SANITARY SEWER
- STS — PROPOSED STORM SEWER (LESS THAN 12")
- PROPOSED STORM SEWER (GREATER THAN 12")
- G — PROPOSED UNDERGROUND GAS LINE
- UE — PROPOSED UNDERGROUND ELECTRICAL
- UT — PROPOSED UNDERGROUND TELEPHONE
- EXISTING WATER VALVE
- EXISTING MANHOLE
- WATER METER BY OTHERS
- WATER VALVE BY OTHERS
- FIRE HYDRANT BY OTHERS
- MANHOLE BY OTHERS
- UTILITY PEDESTAL BY OTHERS
- ELECTRICAL TRANSFORMER BY OTHERS
- INLET BY OTHERS
- PROPOSED WATER METER
- PROPOSED WATER VALVE
- PROPOSED FIRE HYDRANT
- PROPOSED MANHOLE
- UTILITY PEDESTAL
- PROPOSED ELECTRICAL TRANSFORMER
- PROPOSED INLET

PAVING PLAN SCHEDULE

A. PROPOSED CURB AND GUTTER
B. PROPOSED SAWCUT
C. PROPOSED ASPHALT PAVEMENT
D. PROPOSED ADA RAMP
E. PROPOSED EDGE OF CONCRETE
F. EXISTING ROADWAY PAVEMENT TO REMAIN
G. EXISTING CURB AND GUTTER TO REMAIN
H. EXISTING EDGE OF ASPHALT TO REMAIN
J. EXISTING ADA RAMP TO REMAIN
K. EXISTING TRAFFIC SIGNAL TO BE REMOVED AND RELOCATED
L. EXISTING TRAFFIC SIGNAL EQUIPMENT TO BE REMOVED AND RELOCATED
M. EXISTING MONUMENT TO REMAIN
N. EXISTING CURB AND GUTTER TO BE REMOVED
O. PROPOSED SIDEWALK
P. EXISTING INLET TO REMAIN
Q. EXISTING TRAFFIC SIGNAL TO REMAIN
R. EXISTING STREET LIGHT TO REMAIN
S. EXISTING INLET TO BE REMOVED AND REPLACED WITH TYPE R INLET
T. EXISTING SIDEWALK TO REMAIN
U. PROPOSED CONCRETE PAVEMENT
V. EXISTING EDGE OF CONCRETE TO REMAIN
W. PROPOSED TRAFFIC SIGNAL
X. PROPOSED STAMPED CONCRETE MEDIAN TO MATCH EXISTING

UTILITY PLAN SCHEDULE

a. EXISTING UNDERGROUND ELECTRIC TO REMAIN
b. EXISTING GAS LINE TO REMAIN
c. EXISTING IRRIGATION LINE TO REMAIN
d. EXISTING WATER MAIN TO REMAIN
e. EXISTING TRAFFIC SIGNAL TO BE REMOVED AND RELOCATED
f. EXISTING TRAFFIC SIGNAL EQUIPMENT TO BE REMOVED AND RELOCATED
g. PROPOSED STORM SEWER INLET
h. EXISTING STORM SEWER INLET TO REMAIN
i. EXISTING TRAFFIC SIGNAL TO REMAIN
j. EXISTING STREET LIGHT TO REMAIN
k. EXISTING INLET TO BE REMOVED AND REPLACED WITH TYPE R INLET
l. PROPOSED STORM SEWER
m. EXISTING SANITARY MANHOLE TO REMAIN
n. PROPOSED SANITARY SEWER
o. PROPOSED WATER LINE
p. EXISTING STORM SEWER TO REMAIN
q. EXISTING UNDERGROUND TELEPHONE LINE TO REMAIN
r. PROPOSED TRAFFIC SIGNAL

BASIS OF BEARING

BEARINGS ARE BASED ON THE NORTH LINE OF THE NORTHEAST QUARTER OF SECTION 34 AND MONUMENTED ON THE WEST BY A 2.5" ALUMINUM CAP STAMPED "PLS29752" IN A RANGE BOX FOR THE N 1/4 CORNER AND MONUMENTED ON THE EAST BY A 2.5" ALUMINUM CAP STAMPED "PLS12405" FOR THE NE CORNER AND IS ASSUMED TO BEAR S 89°58'01" E.

BENCHMARK

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NINE MILE CORNER
EVERGREEN DEVCO INC

N. 107th St. & ARAPAHOE RD.
ERIE, COLORADO

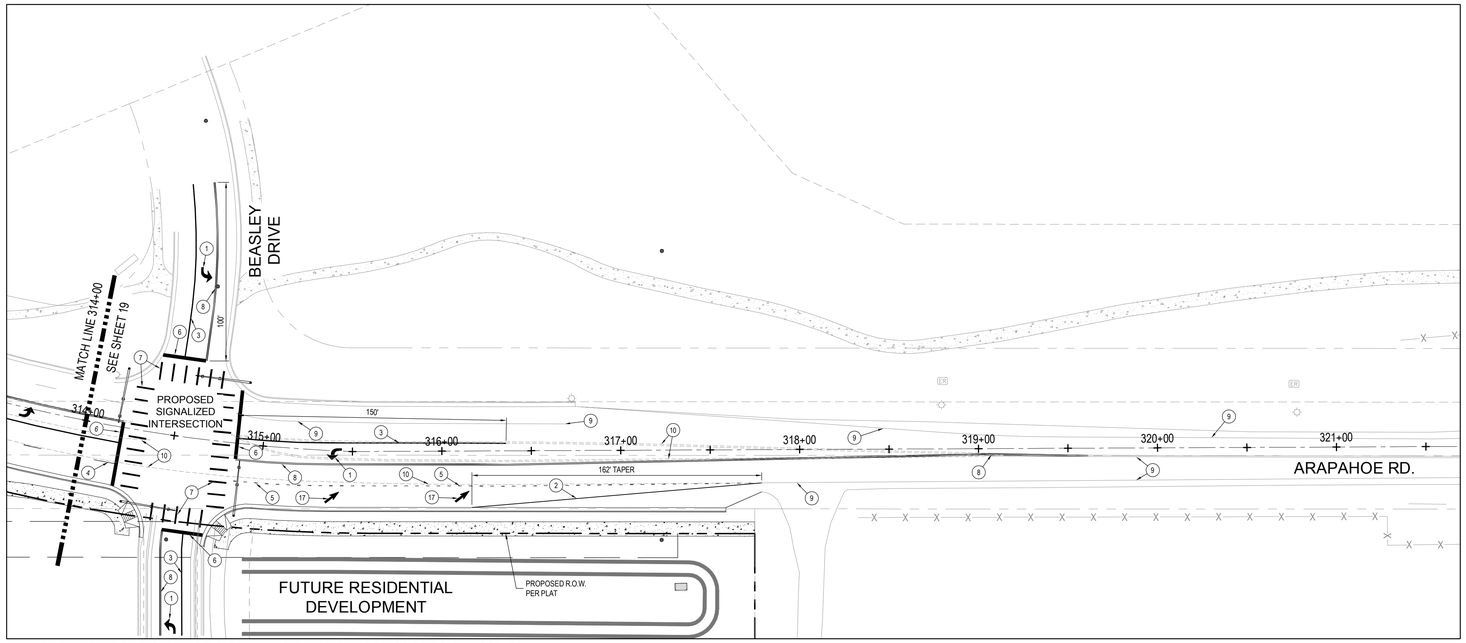
#	Date	Issue / Description	Init.

Project No:	EDI000018
Drawn By:	RDG
Checked By:	BSM
Date:	APRIL 2017

ARAPAHOE ROAD
SITE PLAN

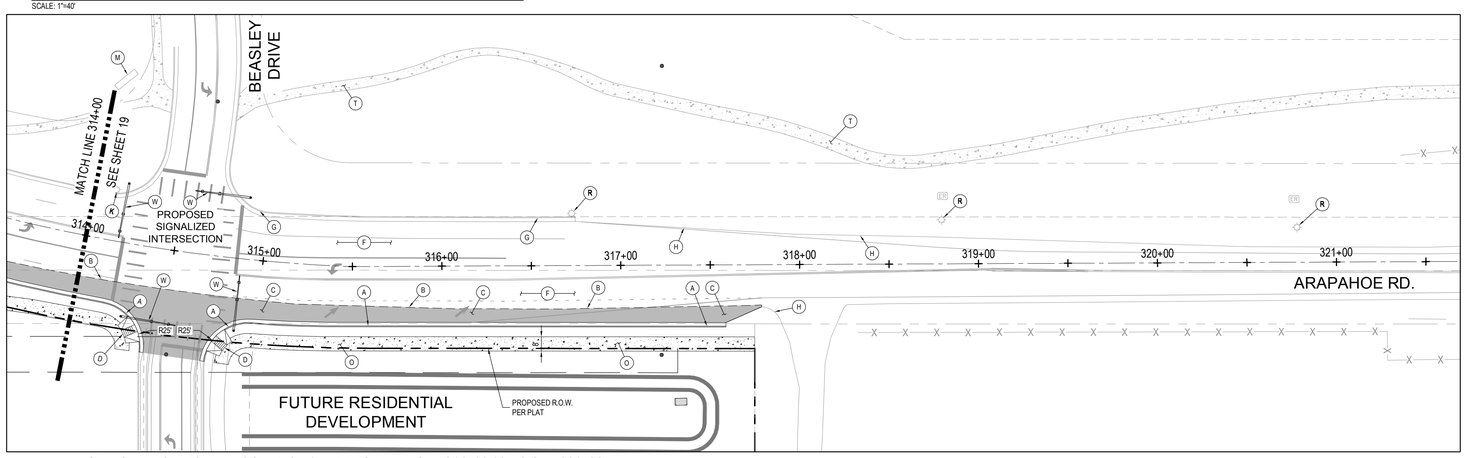
18
OF 28

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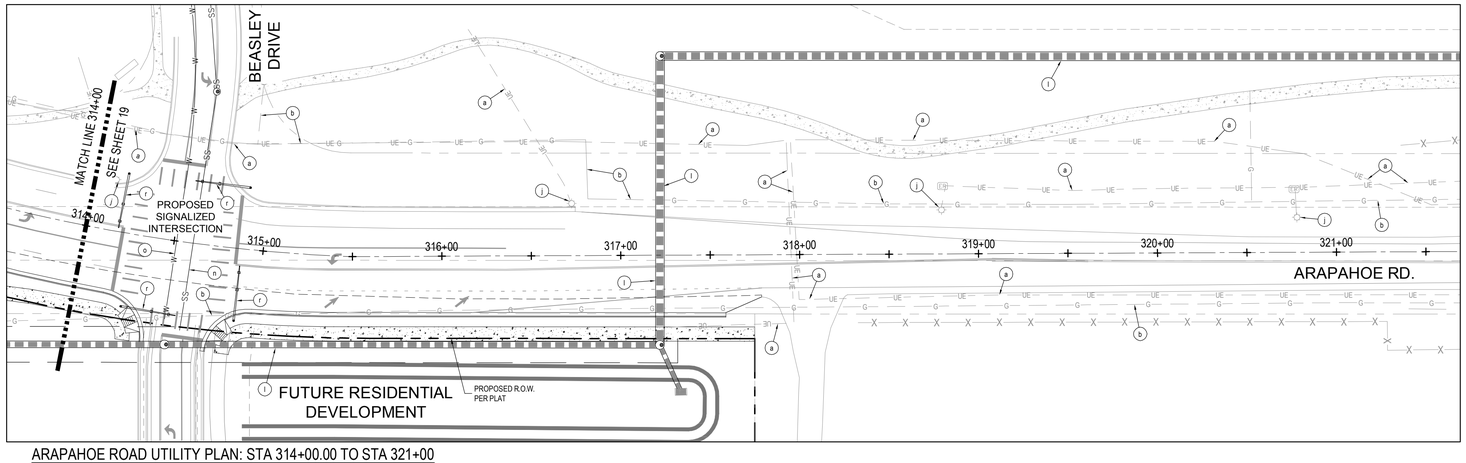
ARAPAHOE ROAD SIGNAGE & STRIPING PLAN: STA 314+00.00 TO STA 321+00

SCALE: 1"=40'



ARAPAHOE ROAD HORIZONTAL CONTROL & PAVING PLAN: STA 314+00.00 TO STA 321+00

SCALE: 1"=40'



ARAPAHOE ROAD UTILITY PLAN: STA 314+00.00 TO STA 321+00

SCALE: 1"=40'

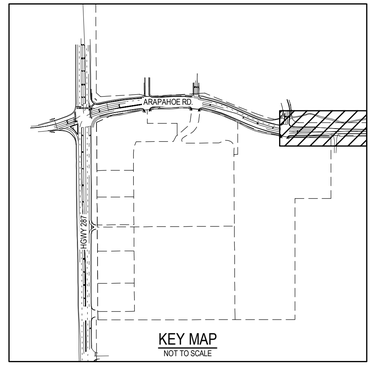
SIGNAGE & STRIPING SCHEDULE

1. PROPOSED LEFT TURN SYMBOL, WHITE
2. PROPOSED 4" WIDE SOLID LINE, WHITE
3. PROPOSED 8" WIDE SOLID LINE, WHITE
4. PROPOSED 4" WIDE SKIP LANE LINE, WHITE
5. PROPOSED 4" WIDE DOTTED EXTENTION LINE, WHITE
6. PROPOSED 24" WIDE STOP BAR, WHITE
7. PROPOSED CROSSWALK STRIPING PER M.U.T.C.D., WHITE
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13. PROPOSED "ONE WAY" SIGN
14. PROPOSED 4" WIDE SOLID LINE, YELLOW
15. PROPOSED 8" WIDE DOTTED EXTENSION LINE, WHITE
16. PROPOSED RIGHT TURN SYMBOL, WHITE
17. PROPOSED MERGE SYMBOL, WHITE

N

0 20 40

SCALE: 1"=40'



PAVING PLAN SCHEDULE

A. PROPOSED CURB AND GUTTER
B. PROPOSED SAWCUT
C. PROPOSED ASPHALT PAVEMENT
D. PROPOSED ADA RAMP
E. PROPOSED EDGE OF CONCRETE
F. EXISTING ROADWAY PAVEMENT TO REMAIN
G. EXISTING CURB AND GUTTER TO REMAIN
H. EXISTING EDGE OF ASPHALT TO REMAIN
J. EXISTING ADA RAMP TO REMAIN
K. EXISTING TRAFFIC SIGNAL TO BE REMOVED AND RELOCATED
L. EXISTING TRAFFIC SIGNAL EQUIPMENT TO BE REMOVED AND RELOCATED
M. EXISTING MONUMENT TO REMAIN
N. EXISTING CURB AND GUTTER TO BE REMOVED
O. PROPOSED SIDEWALK
P. EXISTING INLET TO REMAIN
Q. EXISTING TRAFFIC SIGNAL TO REMAIN
R. EXISTING STREET LIGHT TO REMAIN
S. EXISTING INLET TO BE REMOVED AND REPLACED WITH TYPE R INLET
T. EXISTING SIDEWALK TO REMAIN
U. PROPOSED CONCRETE PAVEMENT
V. EXISTING EDGE OF CONCRETE TO REMAIN
W. PROPOSED TRAFFIC SIGNAL
X. PROPOSED STAMPED CONCRETE MEDIAN TO MATCH EXISTING

UTILITY PLAN SCHEDULE

a. EXISTING UNDERGROUND ELECTRIC TO REMAIN
b. EXISTING GAS LINE TO REMAIN
c. EXISTING IRRIGATION LINE TO REMAIN
d. EXISTING WATER MAIN TO REMAIN
e. EXISTING TRAFFIC SIGNAL TO BE REMOVED AND RELOCATED
f. EXISTING TRAFFIC SIGNAL EQUIPMENT TO BE REMOVED AND RELOCATED
g. PROPOSED STORM SEWER INLET
h. EXISTING STORM SEWER INLET TO REMAIN
i. EXISTING TRAFFIC SIGNAL TO REMAIN
j. EXISTING STREET LIGHT TO REMAIN
k. EXISTING INLET TO BE REMOVED AND REPLACED WITH TYPE R INLET
l. PROPOSED STORM SEWER
m. EXISTING SANITARY MANHOLE TO REMAIN
n. PROPOSED SANITARY SEWER
o. PROPOSED WATER LINE
p. EXISTING STORM SEWER TO REMAIN
q. EXISTING UNDERGROUND TELEPHONE LINE TO REMAIN
r. PROPOSED TRAFFIC SIGNAL

UTILITY LEGEND

- EXISTING WATER LINE
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING UNDERGROUND GAS LINE
- EXISTING UNDERGROUND ELECTRICAL
- EXISTING UNDERGROUND TELEPHONE
- EXISTING FIBER OPTIC LINE
- WATER LINE (BY OTHERS)
- SANITARY SEWER (BY OTHERS)
- STORM SEWER (LESS THAN 12") (BY OTHERS)
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- UNDERGROUND GAS LINE (BY OTHERS)
- UNDERGROUND ELECTRICAL (BY OTHERS)
- UNDERGROUND TELEPHONE (BY OTHERS)
- PROPOSED WATER LINE
- PROPOSED SANITARY SEWER
- PROPOSED STORM SEWER (LESS THAN 12")
- PROPOSED STORM SEWER (GREATER THAN 12")
- PROPOSED UNDERGROUND GAS LINE
- PROPOSED UNDERGROUND ELECTRICAL
- PROPOSED UNDERGROUND TELEPHONE
- EXISTING WATER VALVE
- EXISTING MANHOLE
- WATER METER BY OTHERS
- WATER VALVE BY OTHERS
- FIRE HYDRANT BY OTHERS
- MANHOLE BY OTHERS
- UTILITY PEDESTAL BY OTHERS
- ELECTRICAL TRANSFORMER BY OTHERS
- INLET BY OTHERS
- PROPOSED WATER METER
- PROPOSED WATER VALVE
- PROPOSED FIRE HYDRANT
- PROPOSED MANHOLE
- UTILITY PEDESTAL
- PROPOSED ELECTRICAL TRANSFORMER
- PROPOSED INLET

BASIS OF BEARING

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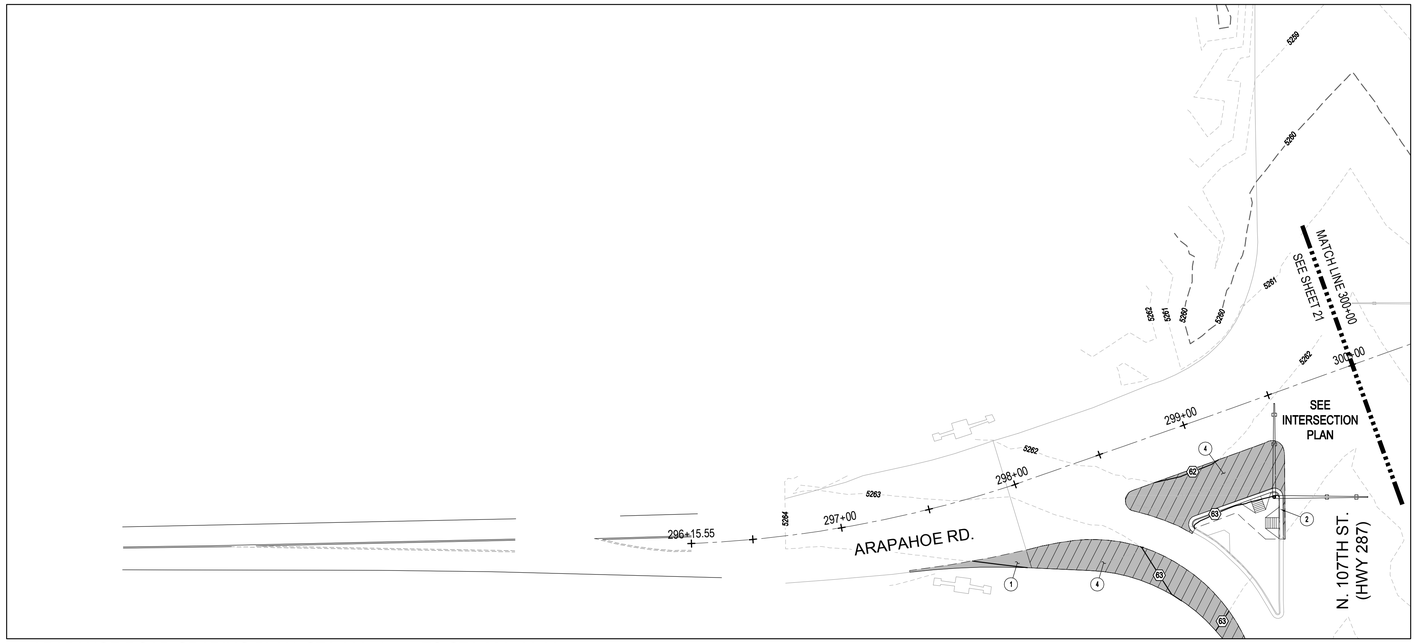
N. 107th St. & ARAPAHOE RD.
ERIE, COLORADO

#	Date	Issue / Description	Init.

Project No:	EDI000018
Drawn By:	RDG
Checked By:	BSM
Date:	APRIL 2017

ARAPAHOE ROAD
SITE PLAN

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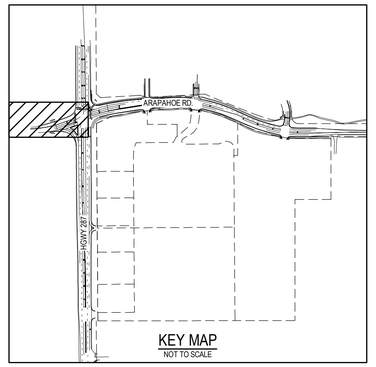


ARAPAHOE ROAD GRADING PLAN: STA 296+15.55 TO STA 300+00.00

SCALE: 1"=40'

GRADING SCHEDULE

1. PROPOSED ASPHALT PAVEMENT
2. PROPOSED CURB AND GUTTER
3. PROPOSED SIDEWALK
4. PROPOSED CONCRETE PAVEMENT



KEY MAP

NOT TO SCALE



SCALE: 1"=40'

GRADING LEGEND

5839	EXISTING MINOR CONTOUR
5840	EXISTING MAJOR CONTOUR
39	PROPOSED MINOR CONTOUR
5440	PROPOSED MAJOR CONTOUR
	PROPOSED GRADE BREAK
	CONSTRUCTION VEHICLE ENTRY
40.0	PROPOSED SPOT ELEVATION
40.5 40.0	PROPOSED TOP OF CURB ELEVATION PROPOSED FLOWLINE ELEVATION
FF	FINISHED FLOOR
TC	TOP OF CURB
TOS	TOP OF SIDEWALK
TOSL	TOP OF SLOPE
TOF	TOP OF FOOTER
FL	FLOWLINE
FG	FINISHED GRADE
HP	HIGH POINT
LP	LOW POINT
ME	MATCH EXISTING
GB	GRADE BREAK
Ⓒ	CATCH CURB AND GUTTER
Ⓢ	SPILL CURB AND GUTTER
+ 4877.57	EXISTING SPOT GRADE

BASIS OF BEARING

BEARINGS ARE BASED ON THE NORTH LINE OF THE NORTHEAST QUARTER OF SECTION 34 AND MONUMENTED ON THE WEST BY A 2.5" ALUMINUM CAP STAMPED "PLS29752" IN A RANGE BOX FOR THE N 1/4 CORNER AND MONUMENTED ON THE EAST BY A 2.5" ALUMINUM CAP STAMPED "PLS12405" FOR THE NE CORNER AND IS ASSUMED TO BEAR S 89°58'01" E.

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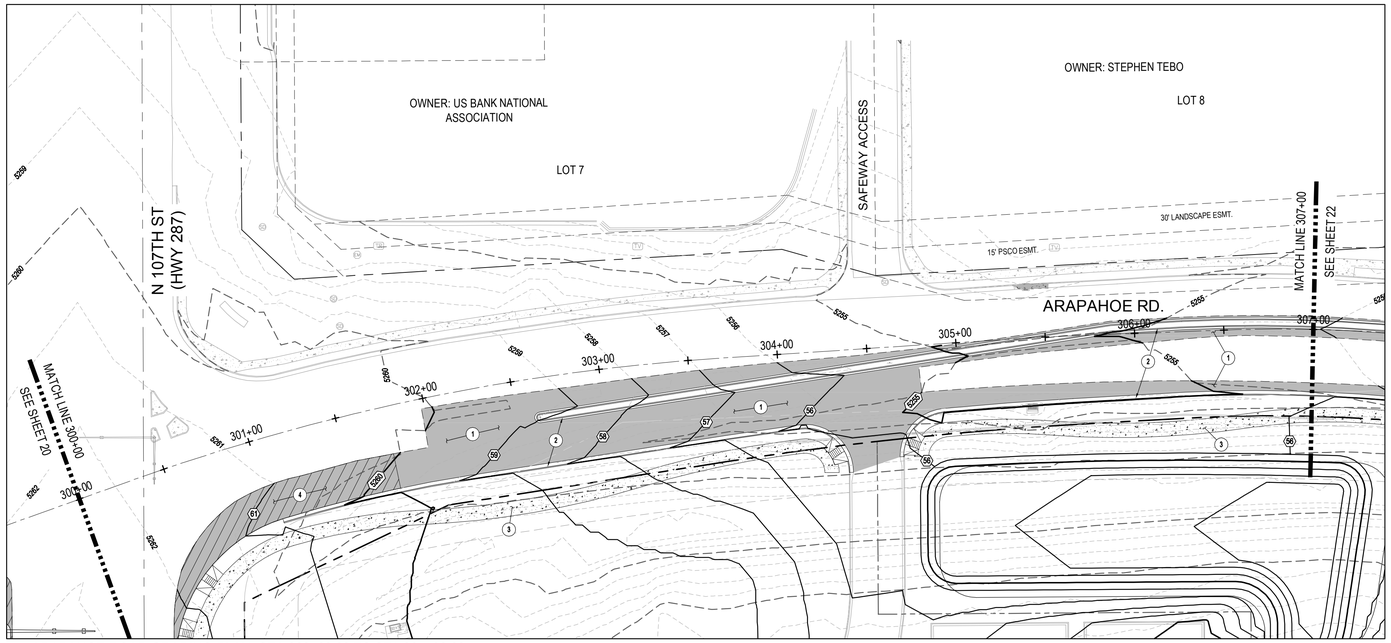
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Drawn By:	RDG
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ARAPAHOE ROAD
GRADING
PLAN & PROFILE

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OF 28

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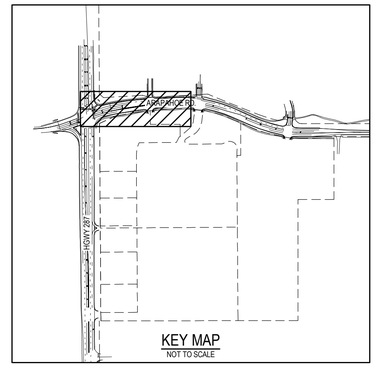
ARAPAHOE ROAD GRADING PLAN: STA 300+00.00 TO STA 307+00.00
SCALE: 1"=40'

GRADING SCHEDULE

1. PROPOSED ASPHALT PAVEMENT
2. PROPOSED CURB AND GUTTER
3. PROPOSED SIDEWALK
4. PROPOSED CONCRETE PAVEMENT

N

0 20 40
SCALE: 1"=40'



KEY MAP
NOT TO SCALE

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5839	EXISTING MINOR CONTOUR
5840	EXISTING MAJOR CONTOUR
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5440	PROPOSED MAJOR CONTOUR
	PROPOSED GRADE BREAK
	CONSTRUCTION VEHICLE ENTRY
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HP	HIGH POINT
LP	LOW POINT
ME	MATCH EXISTING
GB	GRADE BREAK
Ⓒ	CATCH CURB AND GUTTER
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+ 4877.57	EXISTING SPOT GRADE

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SCALE: 1"=40'

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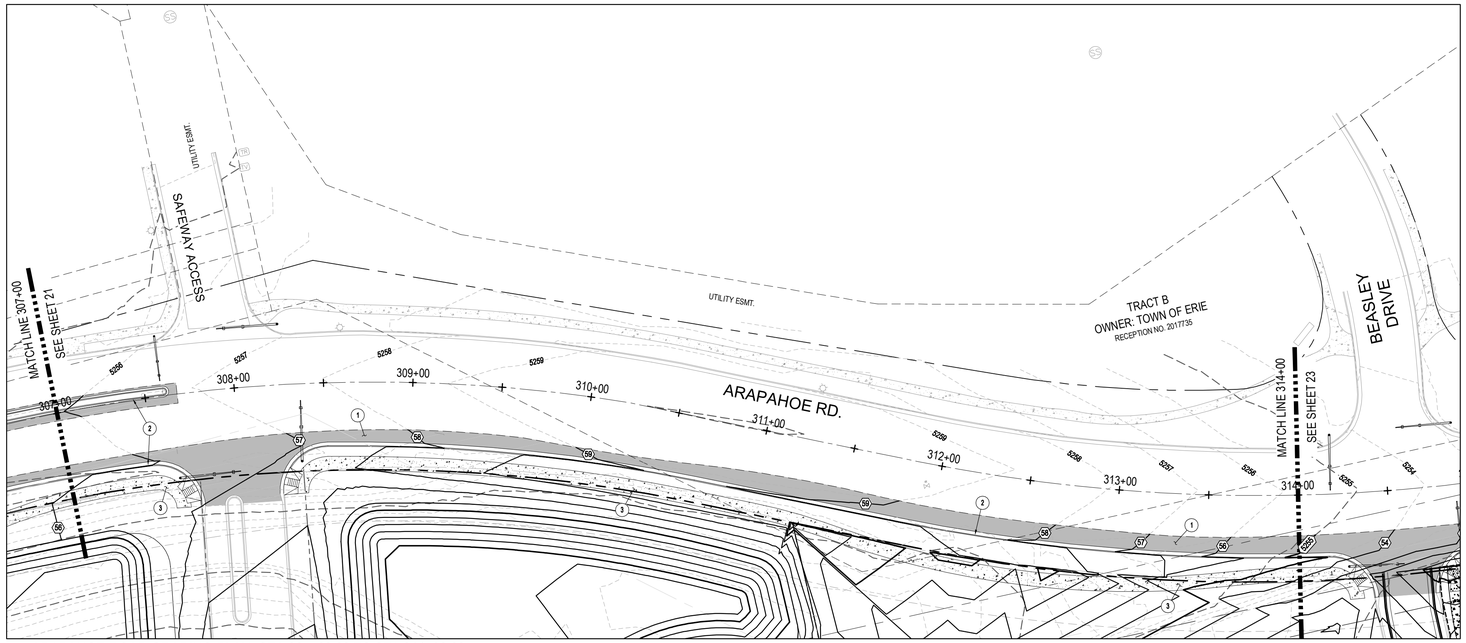
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ARAPAHOE ROAD
GRADING
PLAN & PROFILE

21
OF 28

I:\Evergreen Development\CO_Erie\EDI000018 - Nine Mile Corner - 2016\Arapahoe\CAD\GrPlan\EDI018_SP_SCH.dwg FSP Reg Rob Gordon 4/27/2017



ARAPAHOE ROAD GRADING PLAN: STA 307+00.00 TO STA 314+00.00

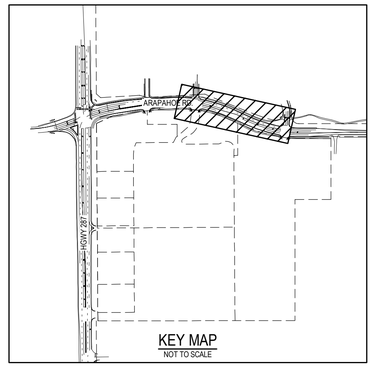
SCALE: 1"=40'

GRADING SCHEDULE

1. PROPOSED ASPHALT PAVEMENT
2. PROPOSED CURB AND GUTTER
3. PROPOSED SIDEWALK
4. PROPOSED CONCRETE PAVEMENT



SCALE: 1"=40'



KEY MAP
NOT TO SCALE

GRADING LEGEND

5839	EXISTING MINOR CONTOUR
5840	EXISTING MAJOR CONTOUR
39	PROPOSED MINOR CONTOUR
5440	PROPOSED MAJOR CONTOUR
	PROPOSED GRADE BREAK
	CONSTRUCTION VEHICLE ENTRY
40.0	PROPOSED SPOT ELEVATION
40.5 / 40.0	PROPOSED TOP OF CURB ELEVATION / PROPOSED FLOWLINE ELEVATION
FF	FINISHED FLOOR
TC	TOP OF CURB
TOS	TOP OF SIDEWALK
TOSL	TOP OF SLOPE
TOF	TOP OF FOOTER
FL	FLOWLINE
FG	FINISHED GRADE
HP	HIGH POINT
LP	LOW POINT
ME	MATCH EXISTING
GB	GRADE BREAK
Ⓒ	CATCH CURB AND GUTTER
Ⓢ	SPILL CURB AND GUTTER
+ 4877.57	EXISTING SPOT GRADE

BASIS OF BEARING

BEARINGS ARE BASED ON THE NORTH LINE OF THE NORTHEAST QUARTER OF SECTION 34 AND MONUMENTED ON THE WEST BY A 2.5" ALUMINUM CAP STAMPED "PLS29752" IN A RANGE BOX FOR THE N 1/4 CORNER AND MONUMENTED ON THE EAST BY A 2.5" ALUMINUM CAP STAMPED "PLS12405" FOR THE NE CORNER AND IS ASSUMED TO BEAR S 89°58'01" E.

BENCHMARK

ELEVATIONS SHOWN ARE NAVD 88 AND ARE DERIVED VIA GPS OBSERVATIONS FROM THE LIECA SMARTNET RTK GPS NETWORK AND GEOID 12B.

CAUTION - NOTICE TO CONTRACTOR

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ARAPAHOE ROAD GRADING PLAN: STA 307+00.00 TO STA 314+00.00
SCALE: 1"=40'

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N. 107th St. & ARAPAHOE RD.
ERIE, COLORADO

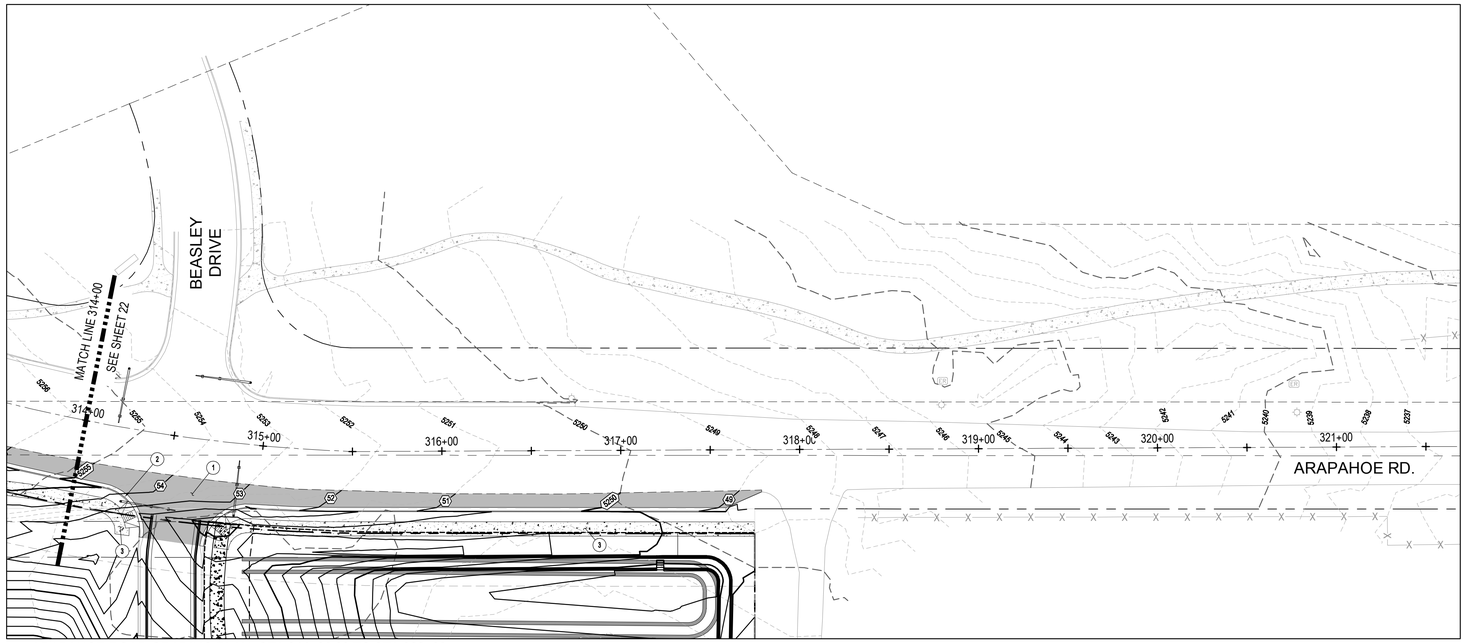
#	Date	Issue / Description	Init.

Project No:	EDI000018
Drawn By:	RDG
Checked By:	BSM
Date:	APRIL 2017

ARAPAHOE ROAD
GRADING
PLAN & PROFILE

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OF 28

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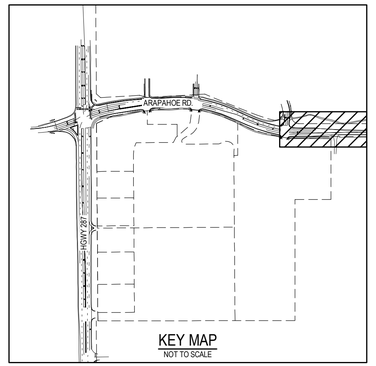


ARAPAHOE ROAD GRADING PLAN: STA 314+00.00 TO STA 322+00

SCALE: 1"=40'

GRADING SCHEDULE

1. PROPOSED ASPHALT PAVEMENT
2. PROPOSED CURB AND GUTTER
3. PROPOSED SIDEWALK
4. PROPOSED CONCRETE PAVEMENT



KEY MAP

NOT TO SCALE

GRADING LEGEND

5839	EXISTING MINOR CONTOUR
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39	PROPOSED MINOR CONTOUR
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	CONSTRUCTION VEHICLE ENTRY
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FG	FINISHED GRADE
HP	HIGH POINT
LP	LOW POINT
ME	MATCH EXISTING
GB	GRADE BREAK
Ⓒ	CATCH CURB AND GUTTER
Ⓢ	SPILL CURB AND GUTTER
+ 4977.57	EXISTING SPOT GRADE

N

0 20 40

SCALE: 1"=40'

BASIS OF BEARING

BEARINGS ARE BASED ON THE NORTH LINE OF THE NORTHEAST QUARTER OF SECTION 34 AND MONUMENTED ON THE WEST BY A 2.5" ALUMINUM CAP STAMPED "PLS29752" IN A RANGE BOX FOR THE N 1/4 CORNER AND MONUMENTED ON THE EAST BY A 2.5" ALUMINUM CAP STAMPED "PLS12405" FOR THE NE CORNER AND IS ASSUMED TO BEAR S 89°58'01" E.

BENCHMARK

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SCALE: 1"=40'

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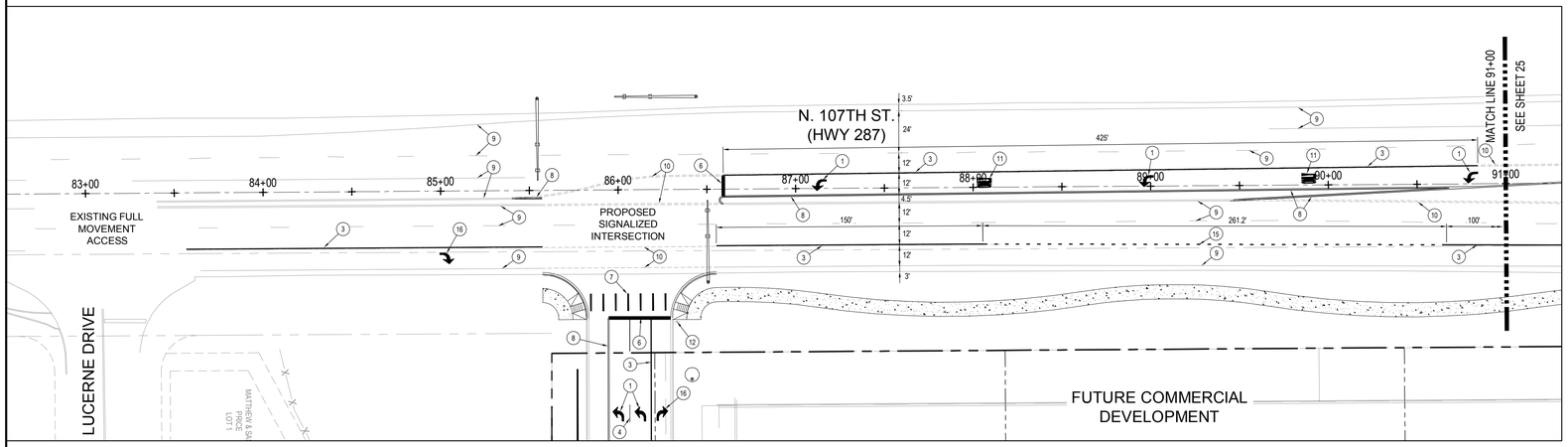
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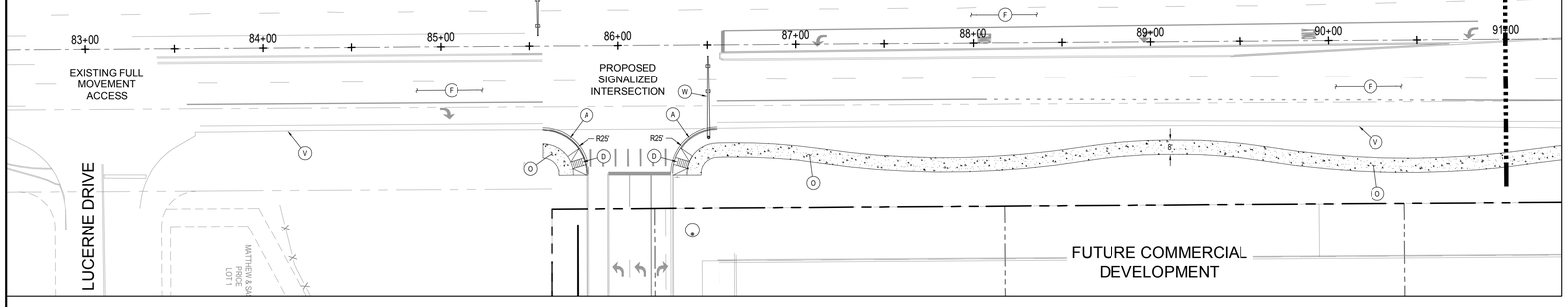
ARAPAHOE ROAD
GRADING
PLAN & PROFILE

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OF 28

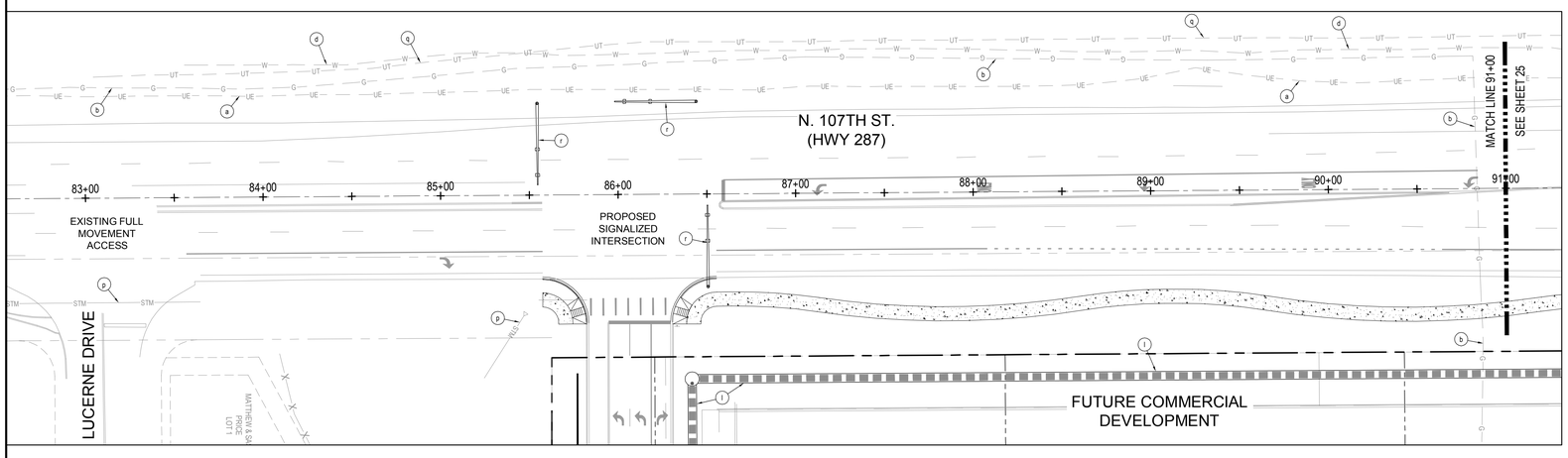
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HIGHWAY 287 SIGNAGE & STRIPING PLAN: STA 83+00.00 TO STA 91+00.00
SCALE: 1"=40'



HIGHWAY 287 HORIZONTAL CONTROL & PAVING PLAN: STA 83+00.00 TO STA 91+00.00
SCALE: 1"=40'



HIGHWAY 287 UTILITY PLAN: STA 83+00.00 TO STA 91+00.00
SCALE: 1"=40'

0 20 40
SCALE: 1"=40'

SIGNAGE & STRIPING SCHEDULE

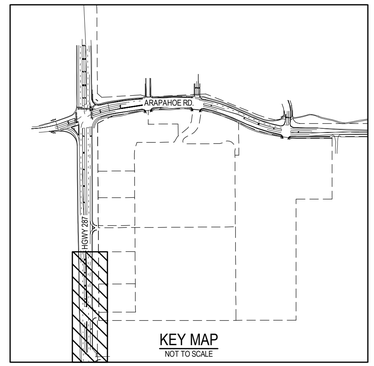
1. PROPOSED LEFT TURN SYMBOL, WHITE
2. PROPOSED 4" WIDE SOLID LINE, WHITE
3. PROPOSED 8" WIDE SOLID LINE, WHITE
4. PROPOSED 4" WIDE SKIP LANE LINE, WHITE
5. PROPOSED 4" WIDE DOTTED EXTENSION LINE, WHITE
6. PROPOSED 24" WIDE STOP BAR, WHITE
7. PROPOSED CROSSWALK STRIPING PER M.U.T.C.D., WHITE
8. PROPOSED 4" DOUBLE SOLID YELLOW LINES
9. EXISTING PAVEMENT MARKING TO REMAIN
10. EXISTING PAVEMENT MARKING TO BE REMOVED
11. PROPOSED "ONLY" TEXT, WHITE
12. PROPOSED "STOP" SIGN
13. PROPOSED "ONE WAY" SIGN
14. PROPOSED 4" WIDE SOLID LINE, YELLOW
15. PROPOSED 8" WIDE DOTTED EXTENSION LINE, WHITE
16. PROPOSED RIGHT TURN SYMBOL, WHITE

PAVING PLAN SCHEDULE

- A PROPOSED CURB AND GUTTER
- B PROPOSED SAWCUT
- C PROPOSED ASPHALT PAVEMENT
- D PROPOSED ADA RAMP
- E PROPOSED EDGE OF CONCRETE
- F EXISTING ROADWAY PAVEMENT TO REMAIN
- G EXISTING CURB AND GUTTER TO REMAIN
- H EXISTING EDGE OF ASPHALT TO REMAIN
- J EXISTING ADA RAMP TO REMAIN
- K EXISTING TRAFFIC SIGNAL TO BE REMOVED AND RELOCATED
- L EXISTING TRAFFIC SIGNAL EQUIPMENT TO BE REMOVED AND RELOCATED
- M EXISTING MONUMENT TO REMAIN
- N EXISTING CURB AND GUTTER TO BE REMOVED
- O PROPOSED SIDEWALK
- P EXISTING INLET TO REMAIN
- Q EXISTING TRAFFIC SIGNAL TO REMAIN
- R EXISTING STREET LIGHT TO REMAIN
- S EXISTING INLET TO BE REMOVED AND REPLACED WITH TYPE R INLET
- T EXISTING SIDEWALK TO REMAIN
- U PROPOSED CONCRETE PAVEMENT
- V EXISTING EDGE OF CONCRETE TO REMAIN
- W PROPOSED TRAFFIC SIGNAL
- X PROPOSED STAMPED CONCRETE MEDIAN TO MATCH EXISTING

UTILITY PLAN SCHEDULE

- a EXISTING UNDERGROUND ELECTRIC TO REMAIN
- b EXISTING GAS LINE TO REMAIN
- c EXISTING IRRIGATION LINE TO REMAIN
- d EXISTING WATER MAIN TO REMAIN
- e EXISTING TRAFFIC SIGNAL TO BE REMOVED AND RELOCATED
- f EXISTING TRAFFIC SIGNAL EQUIPMENT TO BE REMOVED AND RELOCATED
- g PROPOSED STORM SEWER INLET
- h EXISTING STORM SEWER INLET TO REMAIN
- i EXISTING TRAFFIC SIGNAL TO REMAIN
- j EXISTING STREET LIGHT TO REMAIN
- k EXISTING INLET TO BE REMOVED
- l PROPOSED STORM SEWER
- m EXISTING SANITARY MANHOLE TO REMAIN
- n PROPOSED SANITARY SEWER
- o PROPOSED WATER LINE
- p EXISTING STORM SEWER TO REMAIN
- q EXISTING UNDERGROUND TELEPHONE LINE TO REMAIN
- r PROPOSED TRAFFIC SIGNAL



UTILITY LEGEND

- EXISTING WATER LINE
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING UNDERGROUND GAS LINE
- EXISTING UNDERGROUND ELECTRICAL
- EXISTING UNDERGROUND TELEPHONE
- EXISTING FIBER OPTIC LINE
- WATER LINE (BY OTHERS)
- SANITARY SEWER (BY OTHERS)
- STORM SEWER (LESS THAN 12") (BY OTHERS)
- STORM SEWER (GREATER THAN 12") (BY OTHERS)
- UNDERGROUND GAS LINE (BY OTHERS)
- UNDERGROUND ELECTRICAL (BY OTHERS)
- UNDERGROUND TELEPHONE (BY OTHERS)
- PROPOSED WATER LINE
- PROPOSED SANITARY SEWER
- PROPOSED STORM SEWER (LESS THAN 12")
- PROPOSED STORM SEWER (GREATER THAN 12")
- PROPOSED UNDERGROUND GAS LINE
- PROPOSED UNDERGROUND ELECTRICAL
- PROPOSED UNDERGROUND TELEPHONE
- EXISTING WATER VALVE
- EXISTING MANHOLE
- WATER METER BY OTHERS
- WATER VALVE BY OTHERS
- FIRE HYDRANT BY OTHERS
- MANHOLE BY OTHERS
- UTILITY PEDESTAL BY OTHERS
- ELECTRICAL TRANSFORMER BY OTHERS
- INLET BY OTHERS
- PROPOSED WATER METER
- PROPOSED WATER VALVE
- PROPOSED FIRE HYDRANT
- PROPOSED MANHOLE
- UTILITY PEDESTAL
- PROPOSED ELECTRICAL TRANSFORMER
- PROPOSED INLET

BASIS OF BEARING

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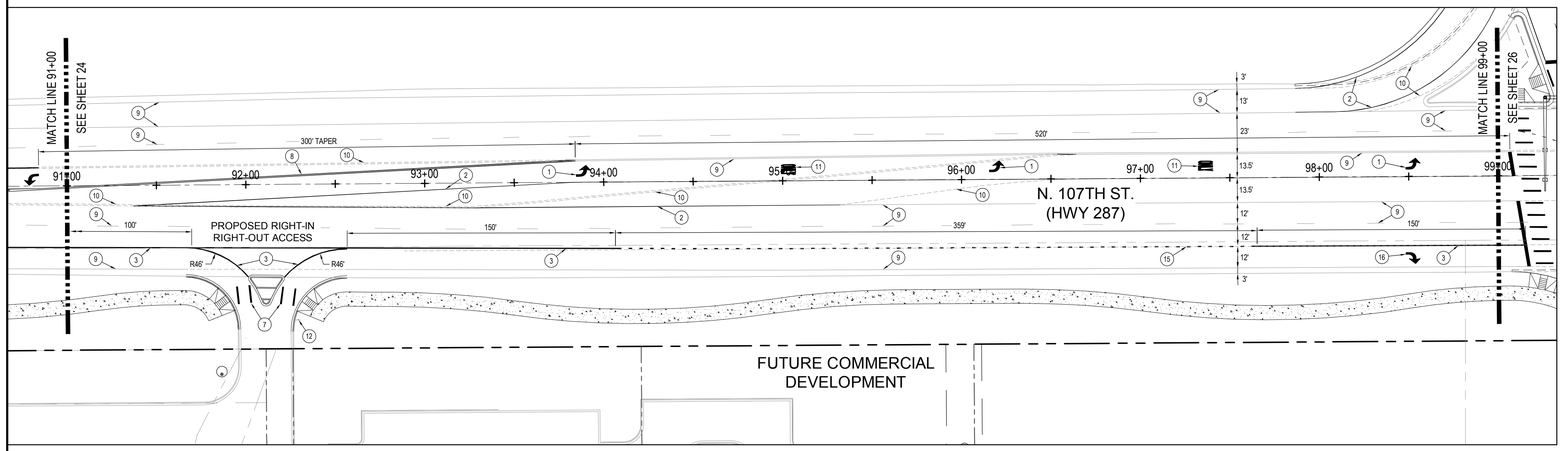
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Project No:	EDI000018
Drawn By:	RDG
Checked By:	BSM
Date:	APRIL 2017

HIGHWAY 287
PLAN

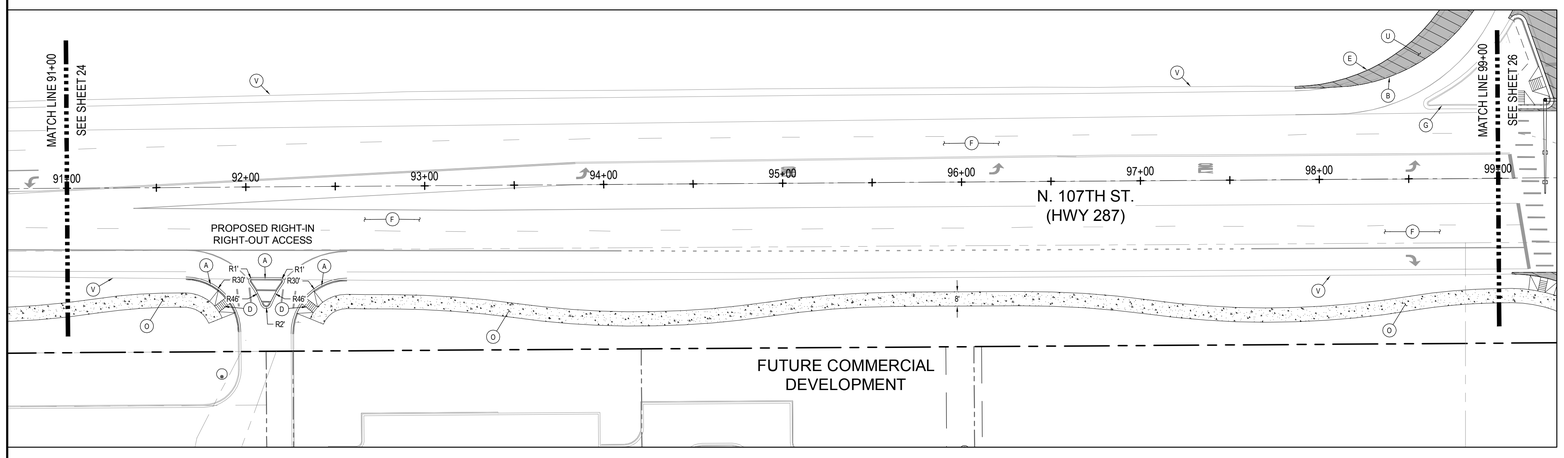
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OF 28

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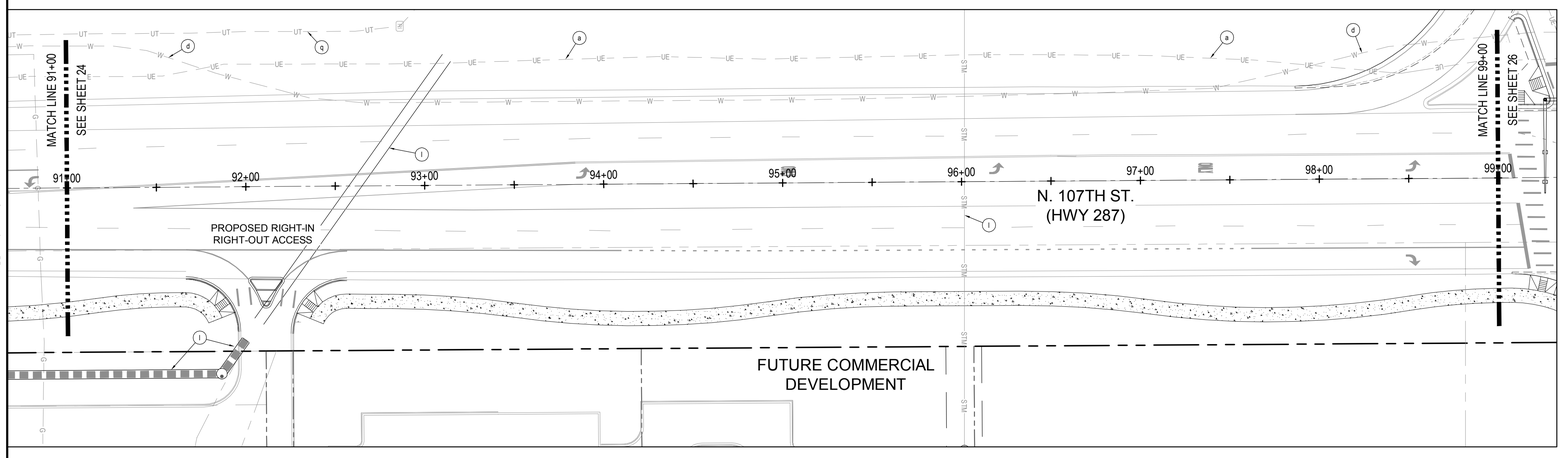
HIGHWAY 287 SIGNAGE & STRIPING PLAN: STA 91+00.00 TO STA 99+00.00

SCALE: 1"=40'



HIGHWAY 287 HORIZONTAL CONTROL & PAVING PLAN: STA 91+00.00 TO STA 99+00.00

SCALE: 1"=40'



HIGHWAY 287 UTILITY PLAN: STA 91+00.00 TO STA 99+00.00

SCALE: 1"=40'

0 20 40

SCALE: 1"=40'

SIGNAGE & STRIPING SCHEDULE

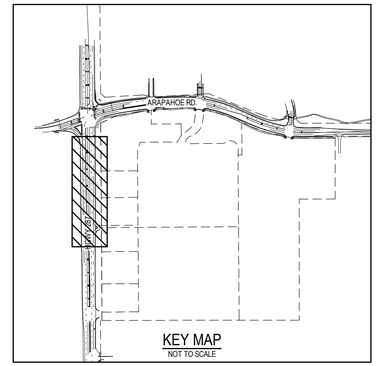
1. PROPOSED LEFT TURN SYMBOL, WHITE
2. PROPOSED 4" WIDE SOLID LINE, WHITE
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12. PROPOSED "STOP" SIGN
13. PROPOSED "ONE WAY" SIGN
14. PROPOSED 4" WIDE SOLID LINE, YELLOW
15. PROPOSED 8" WIDE DOTTED EXTENSION LINE, WHITE
16. PROPOSED RIGHT TURN SYMBOL, WHITE

PAVING PLAN SCHEDULE

- A PROPOSED CURB AND GUTTER
- B PROPOSED SAWCUT
- C PROPOSED ASPHALT PAVEMENT
- D PROPOSED ADA RAMP
- E PROPOSED EDGE OF CONCRETE
- F EXISTING ROADWAY PAVEMENT TO REMAIN
- G EXISTING CURB AND GUTTER TO REMAIN
- H EXISTING EDGE OF ASPHALT TO REMAIN
- J EXISTING ADA RAMP TO REMAIN
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- L EXISTING TRAFFIC SIGNAL EQUIPMENT TO BE REMOVED AND RELOCATED
- M EXISTING MONUMENT TO REMAIN
- N EXISTING CURB AND GUTTER TO BE REMOVED
- O PROPOSED SIDEWALK
- P EXISTING INLET TO REMAIN
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- V EXISTING EDGE OF CONCRETE TO REMAIN
- W PROPOSED TRAFFIC SIGNAL
- X PROPOSED STAMPED CONCRETE MEDIAN TO MATCH EXISTING

UTILITY PLAN SCHEDULE

- a EXISTING UNDERGROUND ELECTRIC TO REMAIN
- b EXISTING GAS LINE TO REMAIN
- c EXISTING IRRIGATION LINE TO REMAIN
- d EXISTING WATER MAIN TO REMAIN
- e EXISTING TRAFFIC SIGNAL TO BE REMOVED AND RELOCATED
- f EXISTING TRAFFIC SIGNAL EQUIPMENT TO BE REMOVED AND RELOCATED
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- j EXISTING STREET LIGHT TO REMAIN
- k EXISTING INLET TO BE REMOVED
- l PROPOSED STORM SEWER
- m EXISTING SANITARY MANHOLE TO REMAIN
- n PROPOSED SANITARY SEWER
- o PROPOSED WATER LINE
- p EXISTING STORM SEWER TO REMAIN
- q EXISTING UNDERGROUND TELEPHONE LINE TO REMAIN
- r PROPOSED TRAFFIC SIGNAL



UTILITY LEGEND

- EXISTING WATER LINE
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING UNDERGROUND GAS LINE
- EXISTING UNDERGROUND ELECTRICAL
- EXISTING UNDERGROUND TELEPHONE
- EXISTING FIBER OPTIC LINE
- WATER LINE (BY OTHERS)
- SANITARY SEWER (BY OTHERS)
- STORM SEWER (LESS THAN 12") (BY OTHERS)
- STORM SEWER (GREATER THAN 12") (BY OTHERS)
- UNDERGROUND GAS LINE (BY OTHERS)
- UNDERGROUND ELECTRICAL (BY OTHERS)
- UNDERGROUND TELEPHONE (BY OTHERS)
- PROPOSED WATER LINE
- PROPOSED SANITARY SEWER
- PROPOSED STORM SEWER (LESS THAN 12")
- PROPOSED STORM SEWER (GREATER THAN 12")
- PROPOSED UNDERGROUND GAS LINE
- PROPOSED UNDERGROUND ELECTRICAL
- PROPOSED UNDERGROUND TELEPHONE
- EXISTING WATER VALVE
- EXISTING MANHOLE
- WATER METER BY OTHERS
- WATER VALVE BY OTHERS
- FIRE HYDRANT BY OTHERS
- MANHOLE BY OTHERS
- UTILITY PEDESTAL BY OTHERS
- ELECTRICAL TRANSFORMER BY OTHERS
- INLET BY OTHERS
- PROPOSED WATER METER
- PROPOSED WATER VALVE
- PROPOSED FIRE HYDRANT
- PROPOSED MANHOLE
- UTILITY PEDESTAL
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PUBLIC & SITE INFRASTRUCTURE PLANS
NINE MILE CORNER
EVERGREEN DEVCO INC

N. 107th St. & ARAPAHOE RD.
ERIE, COLORADO

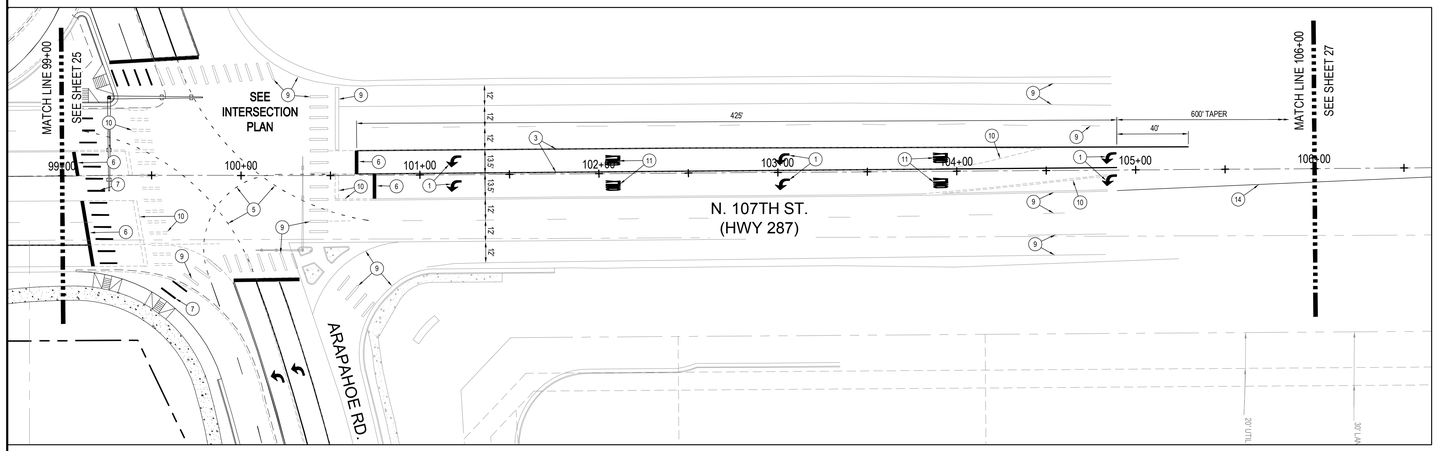
#	Date	Issue / Description	Init.

Project No:	EDI000018
Drawn By:	RDG
Checked By:	BSM
Date:	APRIL 2017

HIGHWAY 287
PLAN

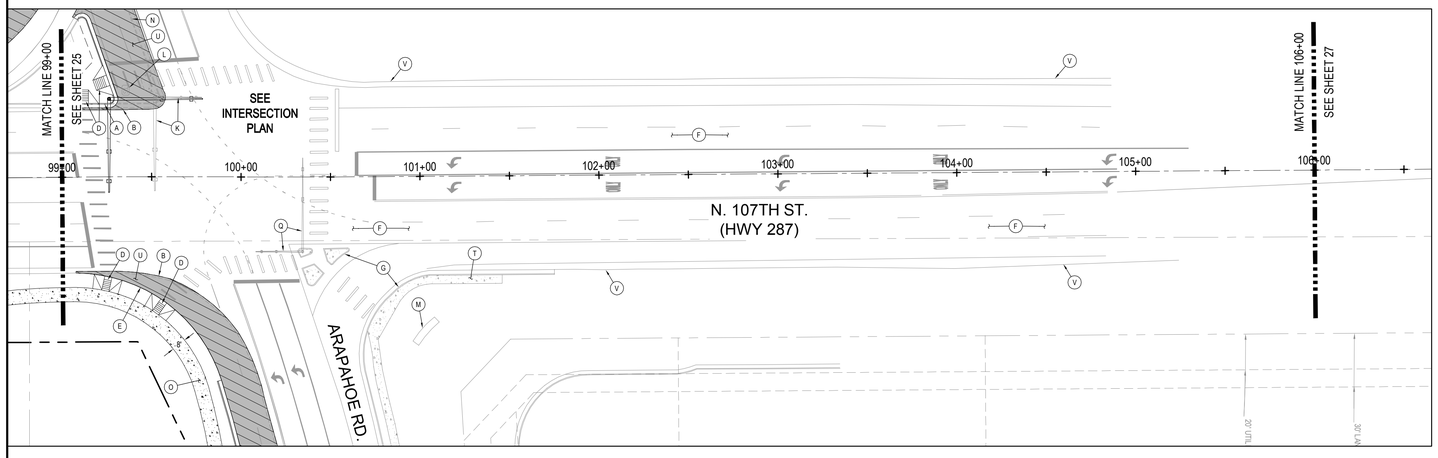
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OF 28

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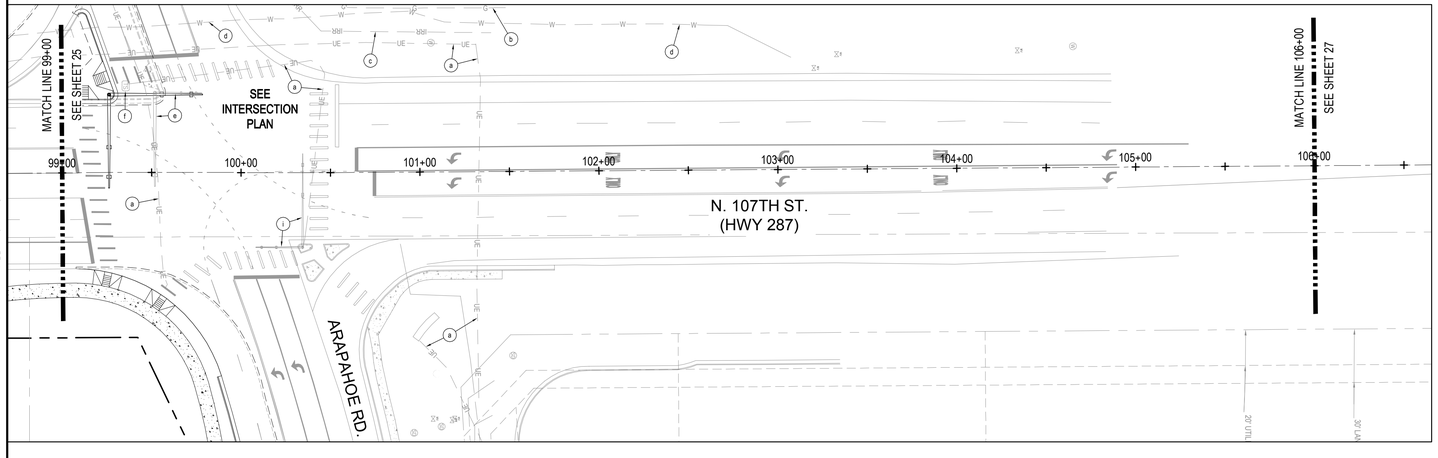
HIGHWAY 287 SIGNAGE & STRIPING PLAN: STA 99+00.00 TO STA 106+00.00

SCALE: 1"=40'



HIGHWAY 287 HORIZONTAL CONTROL & PAVING PLAN: STA 99+00.00 TO STA 106+00.00

SCALE: 1"=40'



HIGHWAY 287 UTILITY PLAN: STA 99+00.00 TO STA 106+00.00

SCALE: 1"=40'

0 20 40

SCALE: 1"=40'

SIGNAGE & STRIPING SCHEDULE

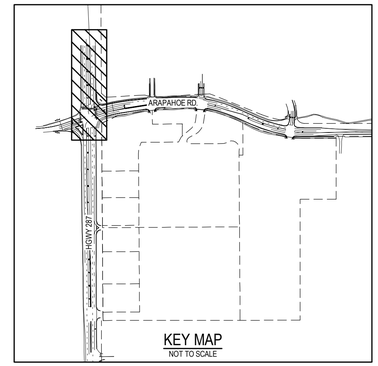
1. PROPOSED LEFT TURN SYMBOL, WHITE
2. PROPOSED 4" WIDE SOLID LINE, WHITE
3. PROPOSED 8" WIDE SOLID LINE, WHITE
4. PROPOSED 4" WIDE SKIP LANE LINE, WHITE
5. PROPOSED 4" WIDE DOTTED EXTENTION LINE, WHITE
6. PROPOSED 24" WIDE STOP BAR, WHITE
7. PROPOSED CROSSWALK STRIPING PER M.U.T.C.D., WHITE
8. PROPOSED 4" DOUBLE SOLID YELLOW LINES
9. EXISTING PAVEMENT MARKING TO REMAIN
10. EXISTING PAVEMENT MARKING TO BE REMOVED
11. PROPOSED "ONLY" TEXT, WHITE
12. PROPOSED "STOP" SIGN
13. PROPOSED "ONE WAY" SIGN
14. PROPOSED 4" WIDE SOLID LINE, YELLOW
15. PROPOSED 8" WIDE DOTTED EXTENSION LINE, WHITE
16. PROPOSED RIGHT TURN SYMBOL, WHITE

PAVING PLAN SCHEDULE

A. PROPOSED CURB AND GUTTER
B. PROPOSED SAWCUT
C. PROPOSED ASPHALT PAVEMENT
D. PROPOSED ADA RAMP
E. PROPOSED EDGE OF CONCRETE
F. EXISTING ROADWAY PAVEMENT TO REMAIN
G. EXISTING CURB AND GUTTER TO REMAIN
H. EXISTING EDGE OF ASPHALT TO REMAIN
J. EXISTING ADA RAMP TO REMAIN
K. EXISTING TRAFFIC SIGNAL TO BE REMOVED AND RELOCATED
L. EXISTING TRAFFIC SIGNAL EQUIPMENT TO BE REMOVED AND RELOCATED
M. EXISTING MONUMENT TO REMAIN
N. EXISTING CURB AND GUTTER TO BE REMOVED
O. PROPOSED SIDEWALK
P. EXISTING INLET TO REMAIN
Q. EXISTING TRAFFIC SIGNAL TO REMAIN
R. EXISTING STREET LIGHT TO REMAIN
S. EXISTING INLET TO BE REMOVED AND REPLACED WITH TYPE R INLET
T. EXISTING SIDEWALK TO REMAIN
U. PROPOSED CONCRETE PAVEMENT
V. EXISTING EDGE OF CONCRETE TO REMAIN
W. PROPOSED TRAFFIC SIGNAL
X. PROPOSED STAMPED CONCRETE MEDIAN TO MATCH EXISTING

UTILITY PLAN SCHEDULE

a. EXISTING UNDERGROUND ELECTRIC TO REMAIN
b. EXISTING GAS LINE TO REMAIN
c. EXISTING IRRIGATION LINE TO REMAIN
d. EXISTING WATER MAIN TO REMAIN
e. EXISTING TRAFFIC SIGNAL TO BE REMOVED AND RELOCATED
f. EXISTING TRAFFIC SIGNAL EQUIPMENT TO BE REMOVED AND RELOCATED
g. PROPOSED STORM SEWER INLET
h. EXISTING STORM SEWER INLET TO REMAIN
i. EXISTING TRAFFIC SIGNAL TO REMAIN
j. EXISTING STREET LIGHT TO REMAIN
k. EXISTING INLET TO BE REMOVED
l. PROPOSED STORM SEWER
m. EXISTING SANITARY MANHOLE TO REMAIN
n. PROPOSED SANITARY SEWER
o. PROPOSED WATER LINE
p. EXISTING STORM SEWER TO REMAIN
q. EXISTING UNDERGROUND TELEPHONE LINE TO REMAIN
r. PROPOSED TRAFFIC SIGNAL



UTILITY LEGEND

- EXISTING WATER LINE
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING UNDERGROUND GAS LINE
- EXISTING UNDERGROUND ELECTRICAL
- EXISTING UNDERGROUND TELEPHONE
- EXISTING FIBER OPTIC LINE
- WATER LINE (BY OTHERS)
- SANITARY SEWER (BY OTHERS)
- STORM SEWER (LESS THAN 12") (BY OTHERS)
- STORM SEWER (GREATER THAN 12") (BY OTHERS)
- UNDERGROUND GAS LINE (BY OTHERS)
- UNDERGROUND ELECTRICAL (BY OTHERS)
- UNDERGROUND TELEPHONE (BY OTHERS)
- PROPOSED WATER LINE
- PROPOSED SANITARY SEWER
- PROPOSED STORM SEWER (LESS THAN 12")
- PROPOSED STORM SEWER (GREATER THAN 12")
- PROPOSED UNDERGROUND GAS LINE
- PROPOSED UNDERGROUND ELECTRICAL
- PROPOSED UNDERGROUND TELEPHONE
- EXISTING WATER VALVE
- EXISTING MANHOLE
- WATER METER BY OTHERS
- WATER VALVE BY OTHERS
- FIRE HYDRANT BY OTHERS
- MANHOLE BY OTHERS
- UTILITY PEDESTAL BY OTHERS
- ELECTRICAL TRANSFORMER BY OTHERS
- INLET BY OTHERS
- PROPOSED WATER METER
- PROPOSED WATER VALVE
- PROPOSED FIRE HYDRANT
- PROPOSED MANHOLE
- UTILITY PEDESTAL
- PROPOSED ELECTRICAL TRANSFORMER
- PROPOSED INLET

BASIS OF BEARING

BEARINGS ARE BASED ON THE NORTH LINE OF THE NORTHEAST QUARTER OF SECTION 34 AND MONUMENTED ON THE WEST BY A 2.5" ALUMINUM CAP STAMPED "PLS29752" IN A RANGE BOX FOR THE N 1/4 CORNER AND MONUMENTED ON THE EAST BY A 2.5" ALUMINUM CAP STAMPED "PLS12405" FOR THE NE CORNER AND IS ASSUMED TO BEAR S 89°58'01" E.

BENCHMARK

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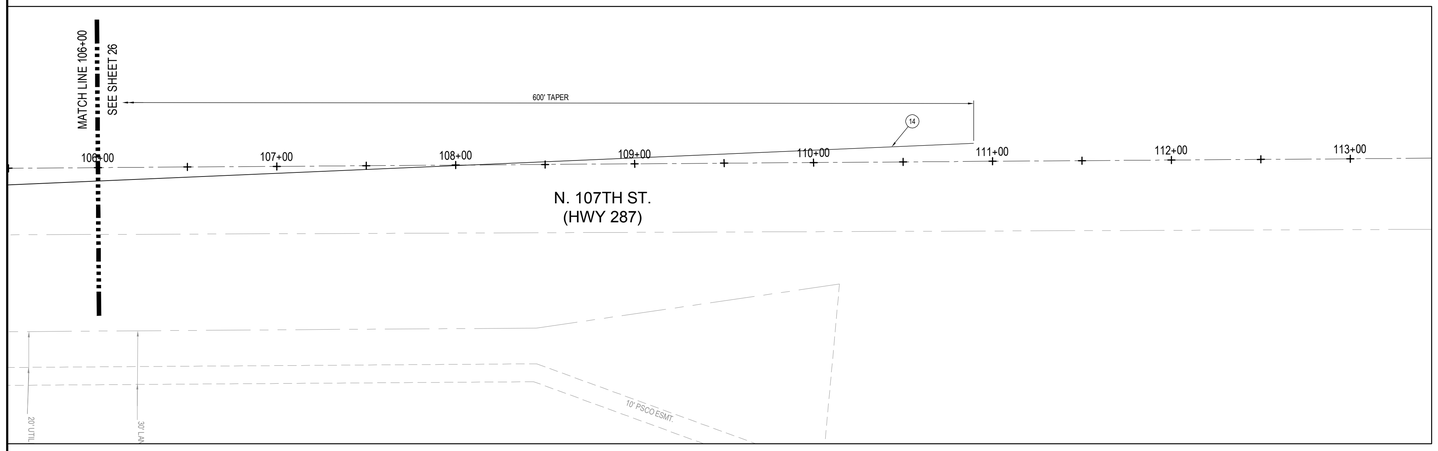
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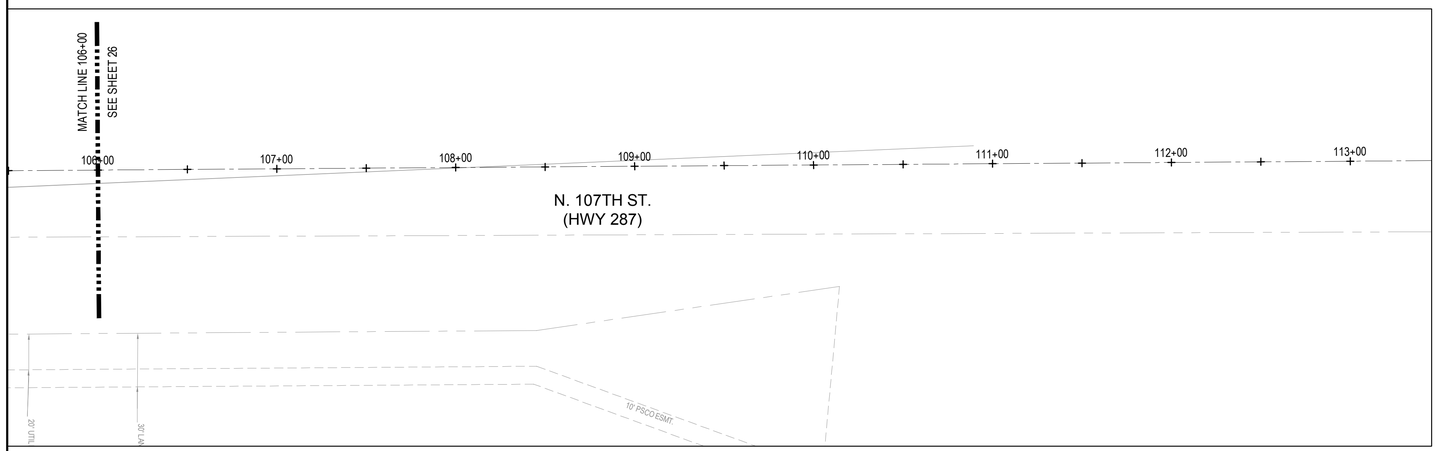
Project No:	EDI000018
Drawn By:	RDG
Checked By:	BSM
Date:	APRIL 2017

HIGHWAY 287
PLAN

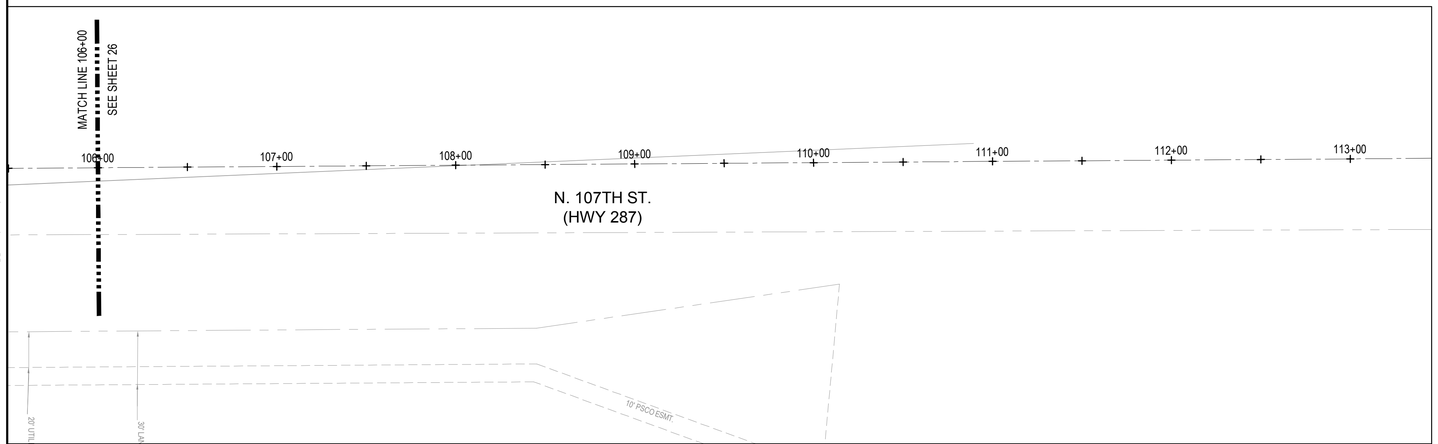
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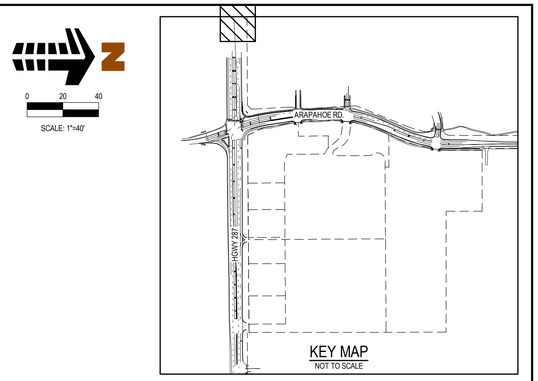
HIGHWAY 287 SIGNAGE & STRIPING PLAN: STA 106+00.00 TO STA 113+00.00
SCALE: 1"=40'



HIGHWAY 287 HORIZONTAL CONTROL & PAVING PLAN: STA 106+00.00 TO STA 113+00.00
SCALE: 1"=40'



HIGHWAY 287 UTILITY PLAN: STA 106+00.00 TO STA 113+00.00
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SIGNAGE & STRIPING SCHEDULE

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n. PROPOSED SANITARY SEWER
o. PROPOSED WATER LINE
p. EXISTING STORM SEWER TO REMAIN
q. EXISTING UNDERGROUND TELEPHONE LINE TO REMAIN
r. PROPOSED TRAFFIC SIGNAL

UTILITY LEGEND

- EXISTING WATER LINE
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING UNDERGROUND GAS LINE
- EXISTING UNDERGROUND ELECTRICAL
- EXISTING UNDERGROUND TELEPHONE
- EXISTING FIBER OPTIC LINE
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- PROPOSED UNDERGROUND ELECTRICAL
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- EXISTING WATER VALVE
- EXISTING MANHOLE
- WATER METER BY OTHERS
- WATER VALVE BY OTHERS
- FIRE HYDRANT BY OTHERS
- MANHOLE BY OTHERS
- UTILITY PEDESTAL BY OTHERS
- ELECTRICAL TRANSFORMER BY OTHERS
- INLET BY OTHERS
- PROPOSED WATER METER
- PROPOSED WATER VALVE
- PROPOSED FIRE HYDRANT
- PROPOSED MANHOLE
- UTILITY PEDESTAL
- PROPOSED ELECTRICAL TRANSFORMER
- PROPOSED INLET

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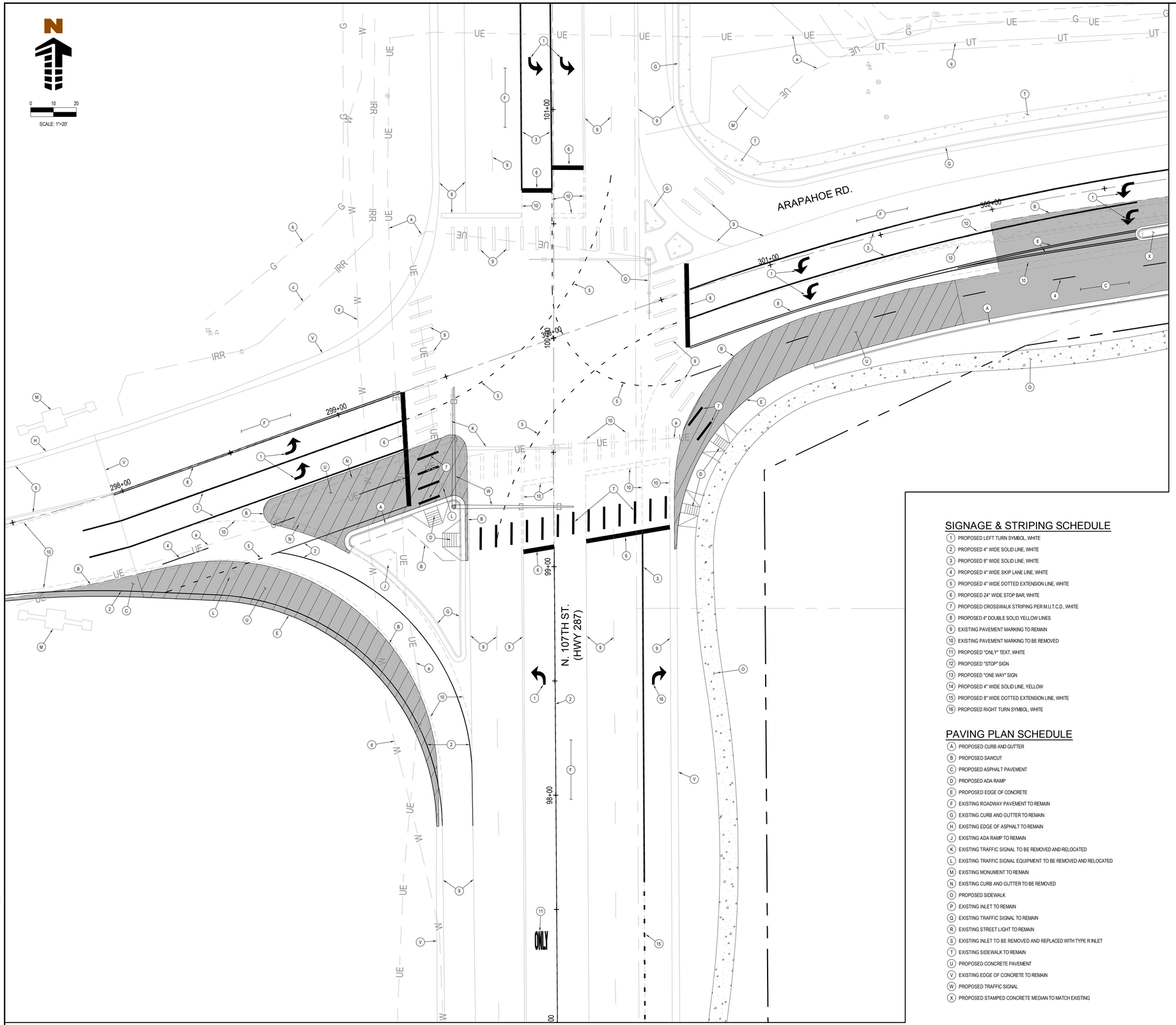
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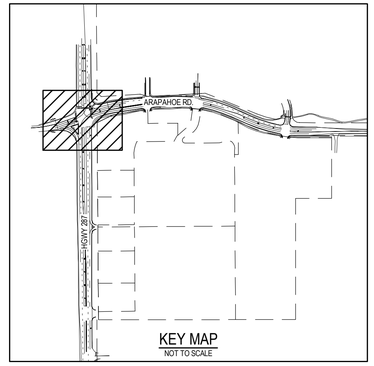
HIGHWAY 287
PLAN

27
OF 28

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HIGHWAY 287 & ARAPAHOE RD INTERSECTION PLAN
SCALE: 1"=20'



SIGNAGE & STRIPING SCHEDULE

1. PROPOSED LEFT TURN SYMBOL, WHITE
2. PROPOSED 4" WIDE SOLID LINE, WHITE
3. PROPOSED 8" WIDE SOLID LINE, WHITE
4. PROPOSED 4" WIDE SKIP LANE LINE, WHITE
5. PROPOSED 4" WIDE DOTTED EXTENSION LINE, WHITE
6. PROPOSED 24" WIDE STOP BAR, WHITE
7. PROPOSED CROSSWALK STRIPING PER M.U.T.C.D., WHITE
8. PROPOSED 4" DOUBLE SOLID YELLOW LINES
9. EXISTING PAVEMENT MARKING TO REMAIN
10. EXISTING PAVEMENT MARKING TO BE REMOVED
11. PROPOSED "ONLY" TEXT, WHITE
12. PROPOSED "STOP" SIGN
13. PROPOSED "ONE WAY" SIGN
14. PROPOSED 4" WIDE SOLID LINE, YELLOW
15. PROPOSED 8" WIDE DOTTED EXTENSION LINE, WHITE
16. PROPOSED RIGHT TURN SYMBOL, WHITE

PAVING PLAN SCHEDULE

- A PROPOSED CURB AND GUTTER
- B PROPOSED SAWCUT
- C PROPOSED ASPHALT PAVEMENT
- D PROPOSED ADA RAMP
- E PROPOSED EDGE OF CONCRETE
- F EXISTING ROADWAY PAVEMENT TO REMAIN
- G EXISTING CURB AND GUTTER TO REMAIN
- H EXISTING EDGE OF ASPHALT TO REMAIN
- J EXISTING ADA RAMP TO REMAIN
- K EXISTING TRAFFIC SIGNAL TO BE REMOVED AND RELOCATED
- L EXISTING TRAFFIC SIGNAL EQUIPMENT TO BE REMOVED AND RELOCATED
- M EXISTING MONUMENT TO REMAIN
- N EXISTING CURB AND GUTTER TO BE REMOVED
- O PROPOSED SIDEWALK
- P EXISTING INLET TO REMAIN
- Q EXISTING TRAFFIC SIGNAL TO REMAIN
- R EXISTING STREET LIGHT TO REMAIN
- S EXISTING INLET TO BE REMOVED AND REPLACED WITH TYPE R INLET
- T EXISTING SIDEWALK TO REMAIN
- U PROPOSED CONCRETE PAVEMENT
- V EXISTING EDGE OF CONCRETE TO REMAIN
- W PROPOSED TRAFFIC SIGNAL
- X PROPOSED STAMPED CONCRETE MEDIAN TO MATCH EXISTING

UTILITY LEGEND

- EXISTING WATER LINE
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING UNDERGROUND GAS LINE
- EXISTING UNDERGROUND ELECTRICAL
- EXISTING UNDERGROUND TELEPHONE
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- PROPOSED FIRE HYDRANT
- PROPOSED MANHOLE
- UTILITY PEDESTAL
- PROPOSED ELECTRICAL TRANSFORMER
- PROPOSED INLET

UTILITY PLAN SCHEDULE

- a EXISTING UNDERGROUND ELECTRIC TO REMAIN
- b EXISTING GAS LINE TO REMAIN
- c EXISTING IRRIGATION LINE TO REMAIN
- d EXISTING WATER MAIN TO REMAIN
- e NOT USED
- f NOT USED
- g PROPOSED STORM SEWER INLET
- h EXISTING STORM SEWER INLET TO REMAIN
- i NOT USED
- j EXISTING STREET LIGHT TO REMAIN
- k EXISTING INLET TO BE REMOVED
- l PROPOSED STORM SEWER
- m EXISTING SANITARY MANHOLE TO REMAIN
- n PROPOSED SANITARY SEWER
- o PROPOSED WATER LINE
- p EXISTING STORM SEWER TO REMAIN
- q EXISTING UNDERGROUND TELEPHONE LINE TO REMAIN
- r NOT USED

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BENCHMARK

ELEVATIONS SHOWN ARE NAVD 88 AND ARE DERIVED VIA GPS OBSERVATIONS FROM THE LIECA SMARTNET RTK GPS NETWORK AND GEOID 12B.

CAUTION - NOTICE TO CONTRACTOR

1. ALL UTILITY LOCATIONS SHOWN ARE BASED ON MAPS PROVIDED BY THE APPROPRIATE UTILITY COMPANY AND FIELD SURFACE EVIDENCE AT THE TIME OF SURVEY AND IS TO BE CONSIDERED AN APPROXIMATE LOCATION ONLY. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE FIELD LOCATION OF ALL UTILITIES, PUBLIC OR PRIVATE, WHETHER SHOWN ON THE PLANS OR NOT, PRIOR TO CONSTRUCTION. REPORT ANY DISCREPANCIES TO THE ENGINEER PRIOR TO CONSTRUCTION.
2. WHERE A PROPOSED UTILITY CROSSES AN EXISTING UTILITY, IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE HORIZONTAL AND VERTICAL LOCATION OF SUCH EXISTING UTILITY, EITHER THROUGH POTHOLING OR ALTERNATIVE METHOD. REPORT INFORMATION TO THE ENGINEER PRIOR TO CONSTRUCTION.

811 Know what's below. Call before you dig.

Galloway
Planning. Architecture. Engineering.
6162 S. Willow Drive, Suite 320
Greenwood Village, CO 80111
303.770.8884 O
www.gallowayUS.com

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Evergreen
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PUBLIC & SITE INFRASTRUCTURE PLANS
NINE MILE CORNER
EVERGREEN DEVCO INC

N. 107th St. & ARAPAHOE RD.
ERIE, COLORADO

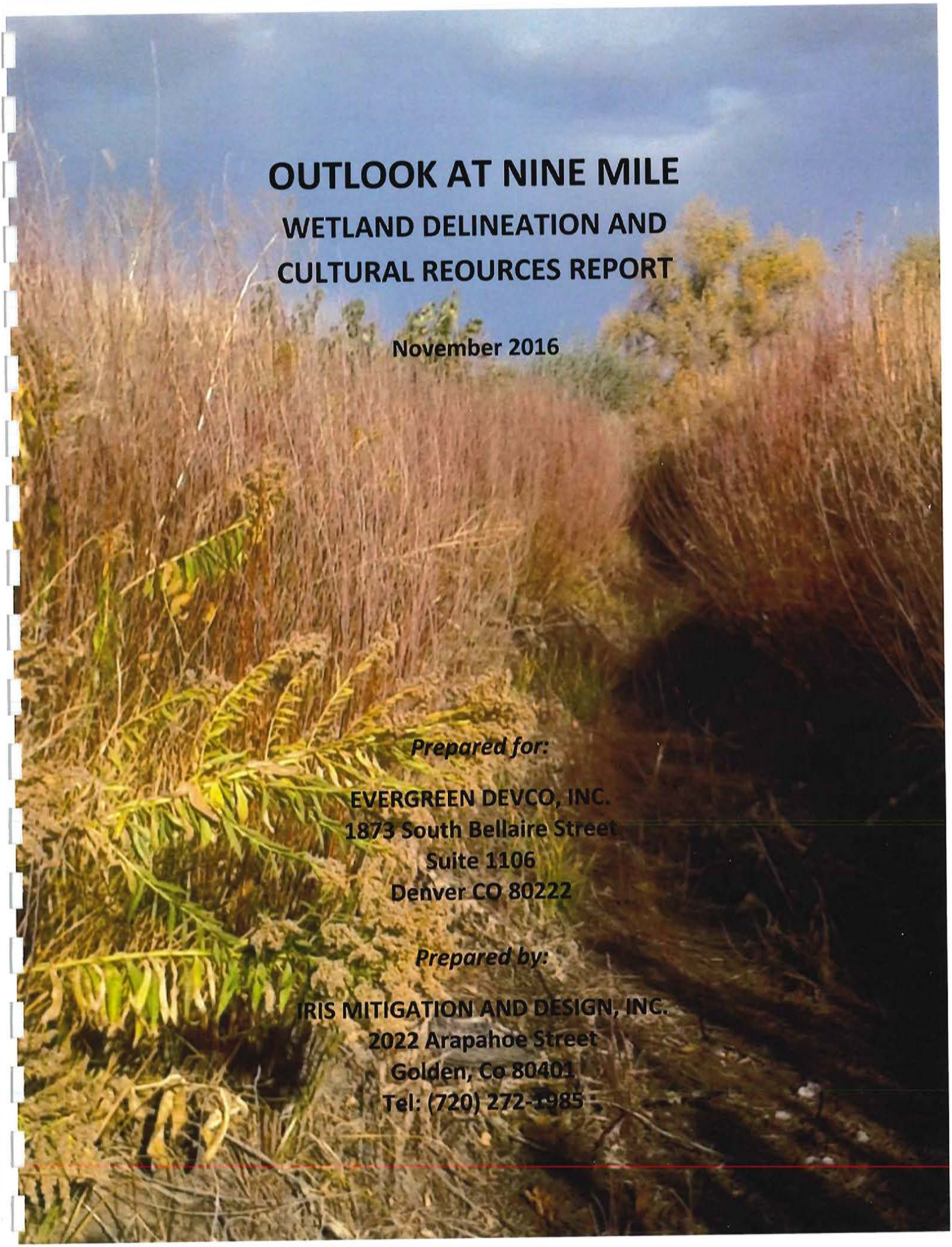
#	Date	Issue / Description	Init.

Project No:	EDI000018
Drawn By:	RDG
Checked By:	BSM
Date:	APRIL 2017

HIGHWAY 287 &
ARAPAHOE ROAD
INTERSECTION PLAN

28
OF 28

W:\Evergreen Development\CO_Erie EDI000018 - Nine Mile Corner 2016\Arapahoe\ADO\Sheet\EDI18_P_28 Intersection Plan - Rob Gordon - 4/27/2017



OUTLOOK AT NINE MILE

WETLAND DELINEATION AND CULTURAL REOURCES REPORT

November 2016

Prepared for:

EVERGREEN DEVCO, INC.
1873 South Bellaire Street
Suite 1106
Denver CO 80222

Prepared by:

IRIS MITIGATION AND DESIGN, INC.
2022 Arapahoe Street
Golden, Co 80401
Tel: (720) 272-1985

IRIS
MITIGATION AND DESIGN, INC.
Environmental Consulting

IRIS MITIGATION AND DESIGN, INC.
2022 Arapahoe Street
Golden, Colorado 80401
Phone: 720-272-1985
bleisure@irismitigation.com

OUTLOOK AT NINE MILE

2016 WETLAND DELINEATION REPORT

AND CULTURAL RESOURCES REPORT

On behalf of the Town of Erie, Colorado, IRIS Mitigation and Design, Inc. (IRIS) completed a wetland delineation at the Outlook at Nine Mile (Project Area) located in Erie, Colorado (see Figures 1 and 2). This 47.15-acre Project Area is bordered to the west by North 107th Avenue, and to the north by Arapahoe Road in Boulder County. Prince Lake #1 (also known as Parcel C1) is located in the northwestern section of the property. This man-made reservoir has been drained and is currently a dry upland area (see Appendix A - Photo Log). South Boulder Canyon Ditch runs east/west through the Project Area just south of Prince Lake. A wetland delineation of the Project area was completed by IRIS between October 17 through October 20, 2016. A Cultural Resources Survey was also completed in October and November 2016 for this Project Area and results are discussed at the end of this report.

The Project Area is largely an undeveloped upland field dominated by native and non-native upland grasses, shrubs, and herbaceous species (see Appendix A - Photo Log). Approximately 30 percent of the Project Area contains a drained reservoir (Prince Lake) located in the northwestern section of the property. The remaining 70 percent of the Project Area is an undeveloped upland field with a remnant home site and outbuildings. The home, outbuildings, and all associated residential material have been removed from the Project Area.

IRIS MITIGATION AND DESIGN, INC.
2022 Arapahoe Street
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bleisure@irismitigation.com

South Boulder Canyon Ditch runs for approximately 1,900 linear feet, east/west through the middle of the property. This ditch has occasional wetland pockets and wetland benching on either side, but is largely an approximately 5-foot wide "Waters of the U.S." with no wetlands (see Appendix A - Photo Log).

An approximately 400 linear foot concrete-lined ditch approximately 2-feet wide is located just east of the drained lake running north/south (see Appendix A - Photo Log). This ditch is dry and contains mainly upland grasses and other herbaceous species. Willows have sporadically established along the ditch. This man-made ditch is neither a wetland channel nor a jurisdictional "Waters of the U.S.".

The Project Area is shown on the U.S. Geological Survey (USGS) quadrangle map for Erie, Colorado (1967-Photo revised 1979) within the northern 1/4 of Section 34, Township 1 North, Range 69 West of the 6th Principal Meridian (see Figure 3). It is located in the Town of Erie, in Boulder County, Colorado: Latitude 40°00'64" N and Longitude 105°06'03" W (see Figure 3). The center of the Project Area is located at elevation 5,265 feet above sea level.

Background

The Project Area is currently an undeveloped upland grassland with South Boulder Canyon Ditch running east/west through the center of the property. The Project Area is owned by the Town of Erie. The proposed development for the property is a mixed-use project which consists of commercial/retail on the western half of the site, and multi-family residential on the eastern half.

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Wetland Delineation

IRIS Senior Scientist Blair Leisure completed a wetland delineation on the Project Area between October 17-20, 2016. The wetlands and "Waters of the U.S." were sequentially flagged and GPS surveyed with survey-grade equipment on October 27, 2016. The wetland and "Waters of the U.S." delineation is shown on Figures 4 to 14. The following subsections document the methodology, results, and conclusions of the wetland delineation.

Methods

IRIS reviewed background information for the Project Area (e.g., aerial photography, National Wetlands Inventory, USGS topographic, soil and floodplain mapping, etc.). In mid-October 2016, IRIS completed a wetland and other "Waters of the U.S." delineation using currently accepted methods and criteria included in the Regional Supplement to the U.S. Army Corps of Engineers (USACE) Wetland Delineation Manual: Great Plains Region (USACE 2010) (Supplement) and the USACE Wetlands Delineation Manual (U.S. Department of the Army 1987) (Manual). Other "Waters of the U.S." were identified using the guidance provided in the U.S. Environmental Protection Agency and USACE guidance memorandum titled Clean Water Act Jurisdiction Following the U.S. Supreme Court's Decision in Rapanos v. United States & Carabell v. United States.

IRIS sequentially flagged and GPS surveyed the flagged wetland areas using a sub-centimeter accuracy (survey grade) global positioning system (GPS) system. Photographs were taken and forms were completed to document conditions as included in Appendices A and B, respectively. The sampling locations are shown on Figures 4 to 14.

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Setting

The following paragraphs describe the setting of the Project Area.

Topography

The USGS quadrangle map for Erie, Colorado provides topographic information for the Project Area (see Figure 3). The property is mainly an upland field sloping downhill to the northeast. The USGS map shows that a body of water exists in the northwestern corner of the Property (see Figure 3). This feature (Prince Lake) was constructed as a reservoir and has recently been drained and is now a dry upland area. The USGS map shows a blue line feature indicating the South Boulder Canyon Ditch which flows east/west through the Project Area.

National Wetlands Inventory

The USFWS National Wetlands Inventory (http://www.fws.gov/wetlands/Data/Mapper.html) designates Prince Lake located along the northern boundary of the Project Area as a freshwater pond (PUBG) (see Appendix C). A PUBG is a freshwater lake less than 20 acres in size and less than 8.2 feet deep in its deepest area. This feature is also covered by water throughout the average year except during extreme drought. Since Prince Lake has been drained, it is now an upland dry field and no longer a PUBG.

The other feature located on the NWI map is South Boulder Canyon Ditch which runs east/west through the middle of the Project Area. This ditch is mapped as a riverine feature as it flows for a certain amount of time per year based on irrigation needs and demand. This flow is sufficient to maintain some wetlands within and adjacent to the ditch within the Project Area as detailed further in this report.



1:24,000

N W E S

0 0.4 0.8 Miles

OUTLOOK AT NINE MILE

Vicinity Map

Town of Erie, Colorado

IRIS Mitigation and Design, Inc.
Environmental Consulting

Drafted by: CGR
November 14, 2016

Figure
1

FIGURE 2

Site Map



1:5,000

N W E S

0 450 900 Feet

OUTLOOK AT NINE MILE

Project Area

Town of Erie, Colorado

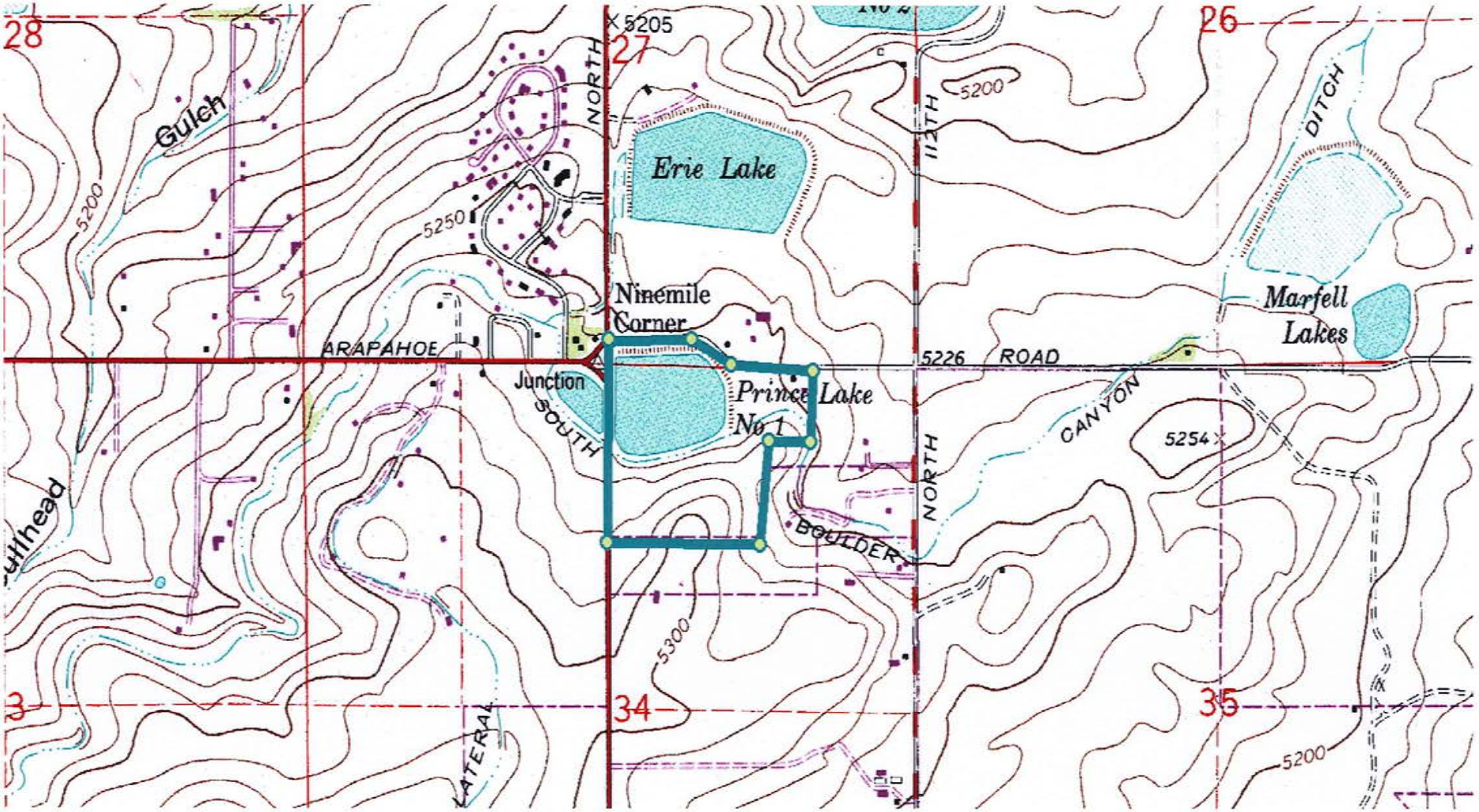
IRIS Mitigation and Design, Inc.
Environmental Consulting

Drafted by: CGR
November 15, 2016

Figure
2

FIGURE 3

USGS Map



IRIS **MITIGATION AND DESIGN, INC.** Environmental Consulting 2022 Arapahoe Street Golden Colorado 80401 Phone: 720-272-1985	**FIGURE 3** **USGS Map** Outlook at Nine Mile Project Area	USGS Map for Erie, CO 1967 Photo revised 1979

FIGURE 4

South Boulder Canyon Ditch
Wetlands Overview



1:1,800

N W E S

0 175 350 Feet

OUTLOOK AT NINE MILE

South Boulder Canyon Ditch Wetlands Overview

Town of Erie, Colorado

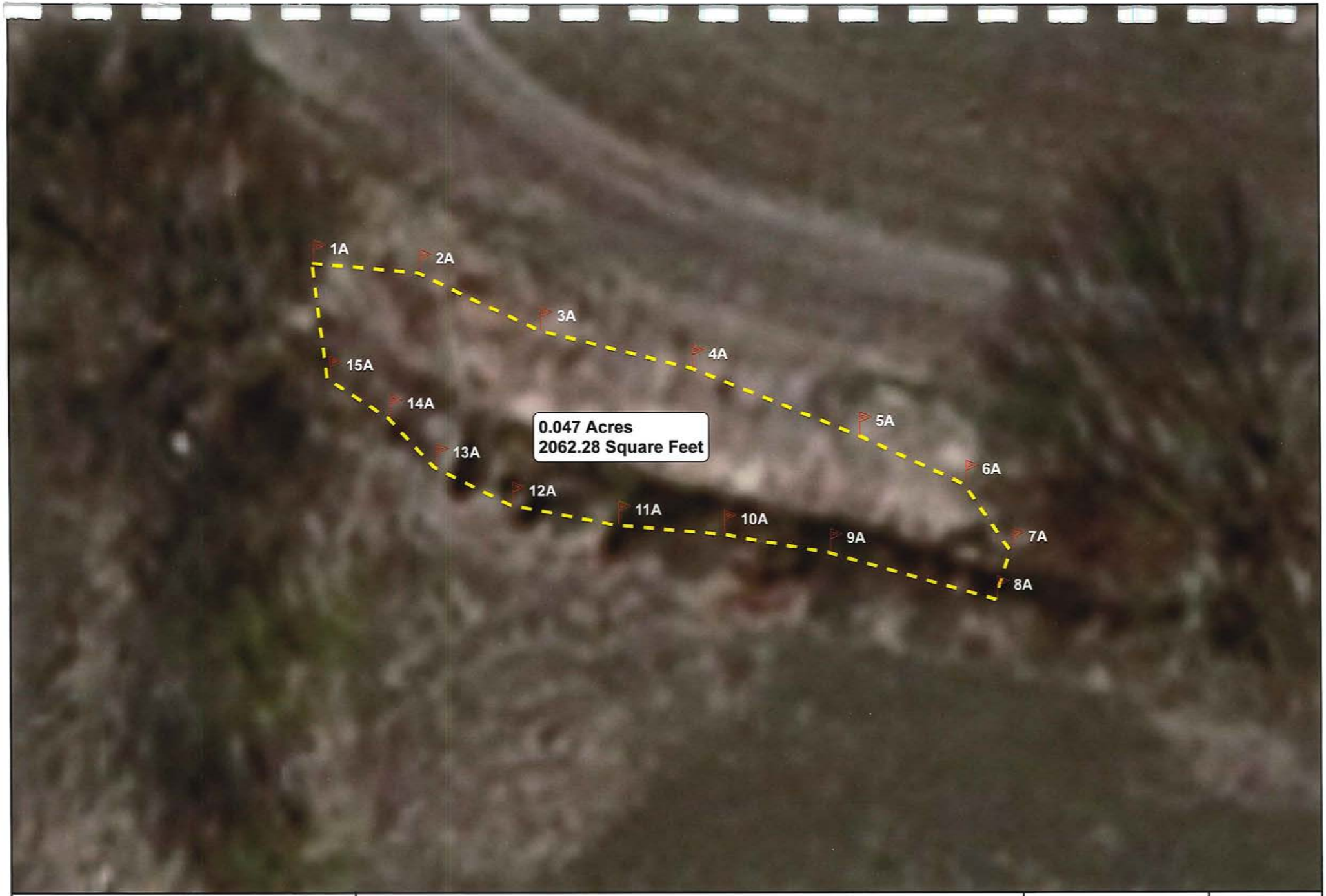
IRIS Mitigation and Design, Inc.
Environmental Consulting

Drafted by: CGR
November 14, 2016

Figure
4

FIGURES 5 - 15

WETLAND AREAS A-K



1:210

N
W E
S

0 15 30 Feet

OUTLOOK AT NINE MILE

Wetland Area A

Town of Erie, Colorado

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Figure
5



1:535

N W E S

0 40 80 Feet

OUTLOOK AT NINE MILE

Wetland Area B

Town of Erie, Colorado

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November 14, 2016

Figure
6



1:210

N
W E
S

0 15 30 Feet

OUTLOOK AT NINE MILE

Wetland Area C

Town of Erie, Colorado

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November 14, 2016

Figure
7



1:210

N
W E
S

0 15 30 Feet

OUTLOOK AT NINE MILE

Wetland Area D

Town of Erie, Colorado

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Drafted by: CGR
November 14, 2016

Figure
8



1:210

N
W E
S

0 15 30 Feet

OUTLOOK AT NINE MILE

Wetland Area E

Town of Erie, Colorado

IRIS Mitigation and Design, Inc.
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November 14, 2016

Figure
9



1:210

N
W E
S

0 15 30 Feet

OUTLOOK AT NINE MILE

Wetland Area E

Town of Erie, Colorado

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Figure
10



1:210

N
W E
S

0 15 30 Feet

OUTLOOK AT NINE MILE

Wetland Area G

Town of Erie, Colorado

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Figure
11



1:210

N W E S

0 15 30 Feet

OUTLOOK AT NINE MILE

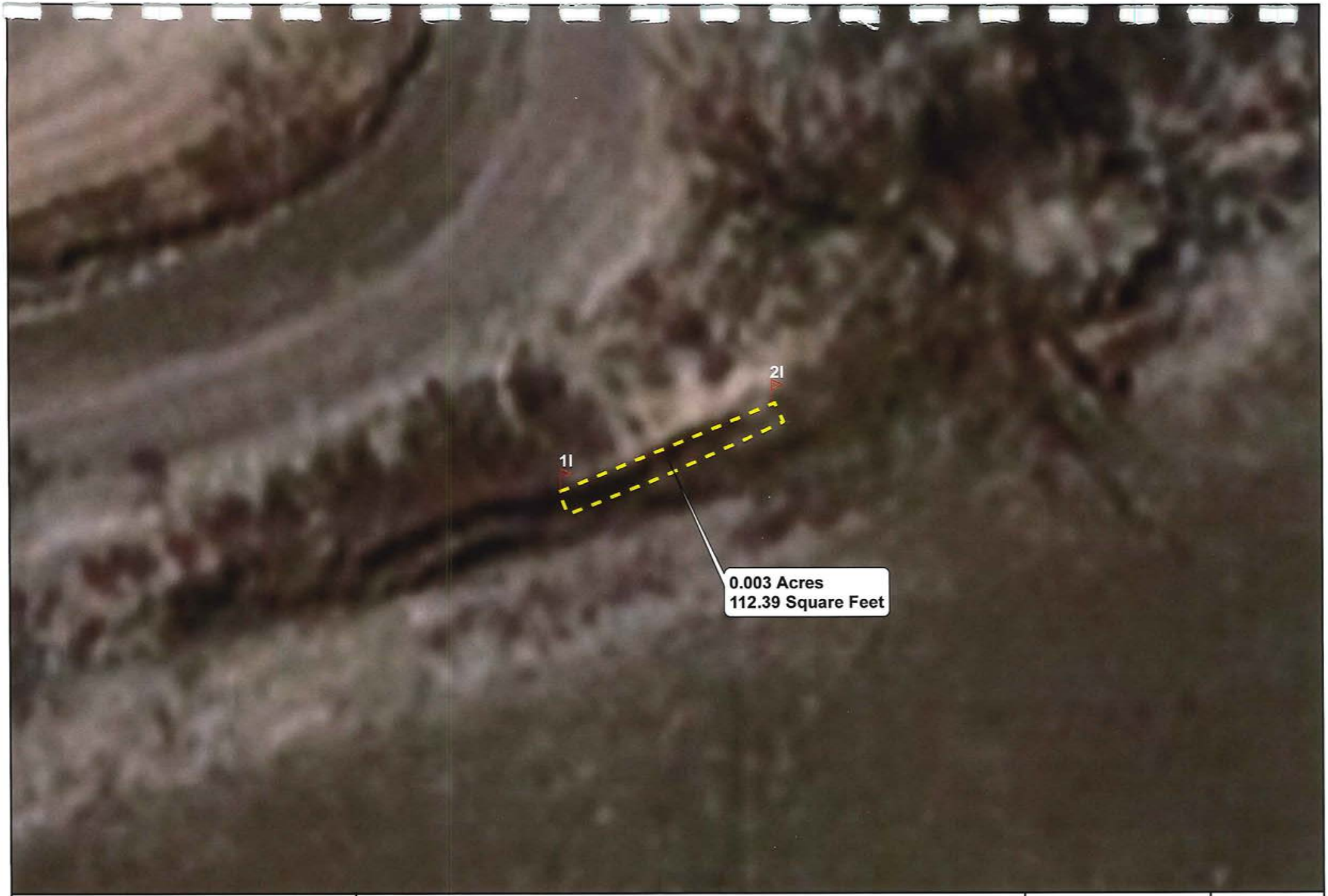
Wetland Area H

Town of Erie, Colorado

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Drafted by: CGR
November 14, 2016

Figure
12



1:210

N
W E
S

0 15 30 Feet

OUTLOOK AT NINE MILE

Wetland Area I

Town of Erie, Colorado

IRIS Mitigation and Design, Inc.
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Figure
13



1:210

N
W E
S

0 15 30 Feet

OUTLOOK AT NINE MILE

Wetland Area J

Town of Erie, Colorado

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Figure
14



1:210

N
W E
S

0 15 30 Feet

OUTLOOK AT NINE MILE

Wetland Area K

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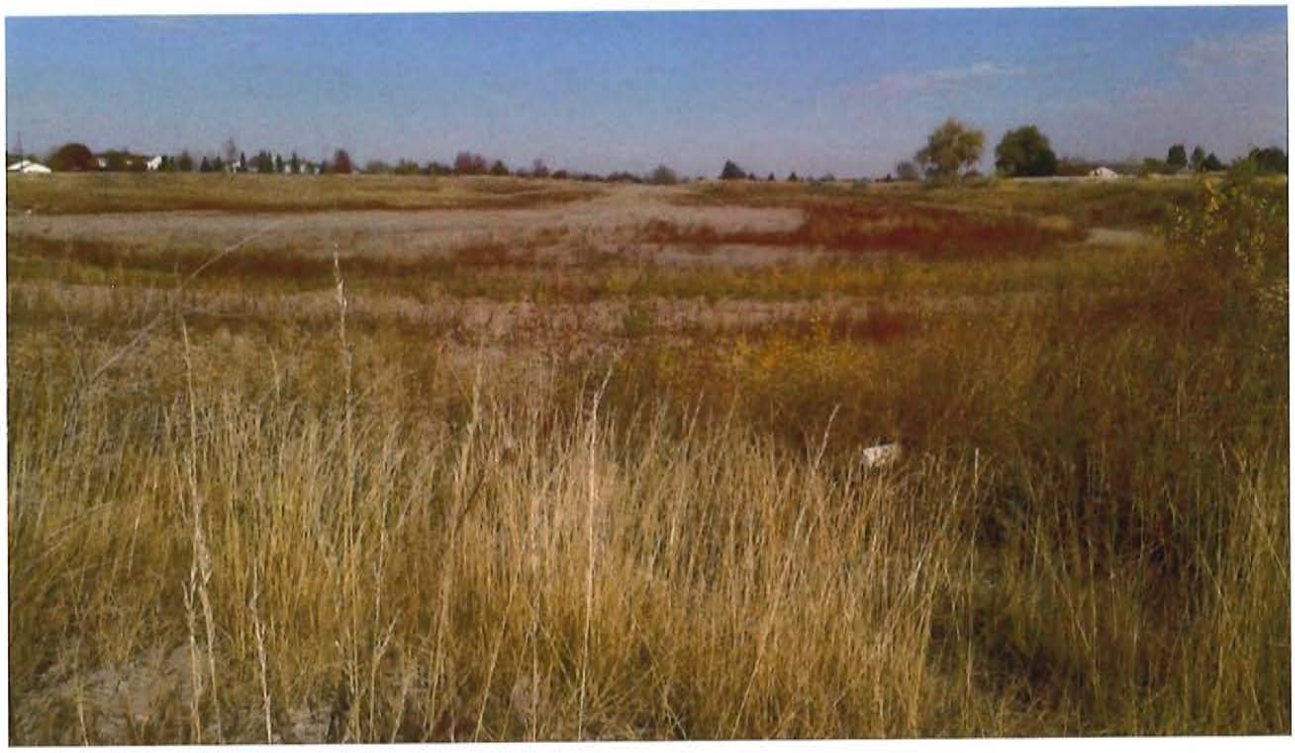
Figure
15

APPENDIX A

Photo Log

Outlook at Nine Mile Photo-Log

2016 Wetland Delineation



Photograph 1: Drained Prince Lake - Looking East



Photograph 2: Drained Prince Lake – Looking Southwest



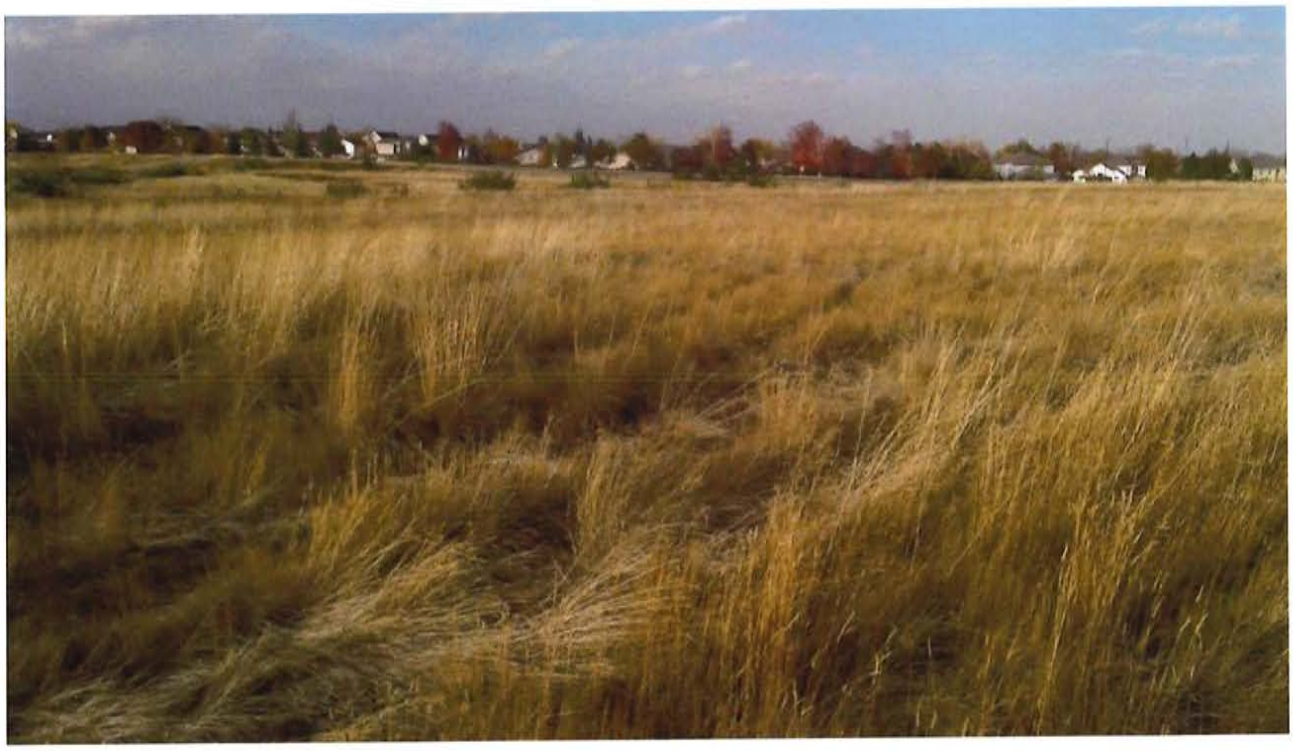
Photograph 3: Concrete-lined 2-foot wide ditch Looking South



Photograph 4: Upland Field and Drained Prince Lake – Looking North



Photograph 5: Upland Field – Looking Southeast



Photograph 6: Upland Field – Looking Southwest

Outlook at Nine Mile Photo-Log

2016 Wetland Delineation



Photograph 7: Upland Field Looking West



Photograph 8: Upland Field - Looking South



Photograph 9: South Boulder Canyon Ditch – Looking West



Photograph 10: Sedge on Benching adjacent to South Boulder Canyon Ditch - Looking East

Outlook at Nine Mile Photo-Log

2016 Wetland Delineation



Photo 11: Sedge in South Boulder Canyon Ditch - Looking West



Photograph 12: Sedge on Benching adjacent to South Boulder Canyon Ditch - Looking East



Photograph 13: South Boulder Canyon Ditch with little Vegetation Establishment – Looking East



Photo 14: Sedge in South Boulder Canyon Ditch - Looking West

Outlook at Nine Mile Photo-Log

2016 Wetland Delineation



Photo 15: Sandy Soil with Mottling dug from within South Boulder Canyon Ditch



Photo 16: South Boulder Canyon Ditch at Outlet from Project Area – Looking East

APPENDIX B

Wetland Delineation Forms

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Outlook at Nine Mile City/County: Erie/Boulder Sampling Date: 10/18/16
Applicant/Owner: Town of Erie State: CO Sampling Point: 1
Investigator(s): Bair Leisure – IRIS Section, Township, Range: SE Section 27, NE Section 34 T1N, R69W
Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): concave Slope (%): 0-10%
Subregion (LRR): Lat: 40°00'64"N Long: 105°06'03"W Datum:
Soil Map Unit Name: Ascalon Sandy Loams, Ascalon-Otero Complex, Water NWI classification: Riverine, PUBG
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? No Are "Normal Circumstances" present? Yes ✓ No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? No (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No ✓	Is the Sampled Area within a Wetland? Yes ____ No ✓
Hydric Soil Present?	Yes ____	No ✓	
Wetland Hydrology Present?	Yes ____	No ✓	

Remarks: Remnant man-made reservoir (Prince Lake) – been drained – vegetation hanging on but would dry out over time

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
	____ = Total Cover		
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
	____ = Total Cover		
Herb Stratum (Plot size: ____)			
1. Polygonum persicaria	35	✓	FACW
2. Kochia scoparia	15	✓	UPL
3. Cirsium arvense	10	✓	FACU
4. Conyza canadensis	5		
5. Medicago sativa	5		
6. Brassica spp	5		
7.			
8.			
9.			
10.			
	75 = Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum 25

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC–): 1 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 33% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species ____	x 1 = ____	
FACW species ____	x 2 = ____	
FAC species ____	x 3 = ____	
FACU species ____	x 4 = ____	
UPL species ____	x 5 = ____	
Column Totals: ____ (A)	____ (B)	

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:
___ Dominance Test is >50%
___ Prevalence Index is ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No ✓

Remarks: On west side of pond edge in smartweed

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Outlook at Nine Mile City/County: Erie/Boulder Sampling Date: 10/18/16
Applicant/Owner: Town of Erie State: CO Sampling Point: (2)
Investigator(s): Bair Leisure – JRIS Section, Township, Range: SE Section 27, NE Section 34 T1N, R69W
Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): convex Slope (%): 0-10%
Subregion (LRR): Lat: 40°00'64"N Long: 105°06'03"W Datum:
Soil Map Unit Name: Ascalon Sandy Loams, Ascalon-Otero Complex, Water NWI classification: Riverine, PUBG
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? No Are "Normal Circumstances" present? Yes ✓ No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? No (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	Is the Sampled Area within a Wetland? Yes ____ No ✓
Hydric Soil Present?	Yes ____	No ✓	
Wetland Hydrology Present?	Yes ____	No ✓	

Remarks: Remnant wetland pocket → adjoined remnant lake

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: ____)			
1. Salix amygdaloides	20	✓	OBL
2. Salix exigua	10	✓	OBL
3.			
4.			
5.			
	30 = Total Cover		
Herb Stratum (Plot size: ____)			
1. Schoenoplectus acutus	40	✓	OBL
2. Cirsium arvense	15	✓	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	55 = Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 40 (+ litter)

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC-): 3 (A)
Total Number of Dominant Species Across All Strata: 4 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 75% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:
✓ Dominance Test is >50%
__ Prevalence Index is ≤3.0[1]
__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Outlook at Nine Mile City/County: Erie/Boulder Sampling Date: 10/18/16
Applicant/Owner: Town of Erie State: CO Sampling Point: 3
Investigator(s): Bair Leisure – TRIS Section, Township, Range: SE Section 27, NE Section 34 T1N, R69W
Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): concave Slope (%): 0-10%
Subregion (LRR): Lat: 40°00'64"N Long: 105°06'03"W Datum:
Soil Map Unit Name: Ascalon Sandy Loams, Ascalon-Otero Complex, Water NWI classification: Riverine, PUBG
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? No Are "Normal Circumstances" present? Yes ✓ No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? No (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No ✓	Is the Sampled Area within a Wetland? Yes ____ No ✓
Hydric Soil Present?	Yes ____	No ✓	
Wetland Hydrology Present?	Yes ____	No ✓	

Remarks: Upland – up from #2 location

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
	____ = Total Cover		
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
	____ = Total Cover		
Herb Stratum (Plot size: ____)			
1. Cirsium arvense	40	✓	FACU
2. Helianthus spp.	10	✓	UPL
3. Elymus spp.	10	✓	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	60 = Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum 40

Remarks: (+ litter)

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC-): 0 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:
__ Dominance Test is >50%
__ Prevalence Index is ≤3.0[1]
__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No ✓

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Outlook at Nine Mile City/County: Erie/Boulder Sampling Date: 10/18/16
Applicant/Owner: Town of Erie State: CO Sampling Point: (4)
Investigator(s): Bair Leisure - IRIS Section, Township, Range: SE Section 27, NE Section 34 T1N, R69W
Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): concave Slope (%): 0-10%
Subregion (LRR): Lat: 40°00'64" N Long: 105°06'03" W Datum:
Soil Map Unit Name: Ascalon Sandy Loams, Ascalon-Otero Complex, Water NWI classification: Riverine, PUBG
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? No Are "Normal Circumstances" present? Yes ✓ No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? No (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ___	Is the Sampled Area within a Wetland? Yes ✓ No ___
Hydric Soil Present?	Yes ___	No ✓	
Wetland Hydrology Present?	Yes ✓	No ___	

Remarks:
West end of ditch - north side of ditch - 2-3 feet wide, therefore when running, banks are inundated and maintain sedge
Wetland Area A would need mapping

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ___)			
1.			
2.			
3.			
4.			
	___ = Total Cover		
Sapling/Shrub Stratum (Plot size: ___)			
1.			
2.			
3.			
4.			
5.			
	___ = Total Cover		
Herb Stratum (Plot size: ___)			
1. Carex spp	70	✓	UPL
2. Phalaris arundinacea	10	✓	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	80 = Total Cover		
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
	___ = Total Cover		
Litter 10			
% Bare Ground in Herb Stratum 10			

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC-): 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ___	x 1 = ___
FACW species ___	x 2 = ___
FAC species ___	x 3 = ___
FACU species ___	x 4 = ___
UPL species ___	x 5 = ___
Column Totals: ___ (A)	___ (B)

Prevalence Index = B/A = ___

Hydrophytic Vegetation Indicators:
✓ Dominance Test is >50%
___ Prevalence Index is ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Outlook at Nine Mile City/County: Erie / Boulder Sampling Date: 10/18/16
Applicant/Owner: Town of Erie State: CO Sampling Point: 5
Investigator(s): Blair Leisure - JRJS Section, Township, Range: SE Section 27; NE Section 34 T1N, R69W
Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): convex Slope (%): 0-10%
Subregion (LRR): Lat: 40° 00' 64" N Long: 105° 06' 03" W Datum:
Soil Map Unit Name: Ascalon Sandy Loam, Ascalon-Otero complex, Water NWI classification: Riverine, PBBG
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? No Are "Normal Circumstances" present? Yes ____ No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? NO (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No ✓	Is the Sampled Area within a Wetland? Yes ____ No ✓
Hydric Soil Present?	Yes ____	No ✓	
Wetland Hydrology Present?	Yes ____	No ✓	

Remarks: Upland adjacent to #4

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
	____ = Total Cover		
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
	____ = Total Cover		
Herb Stratum (Plot size: ____)			
1. Bromus inermis	35	✓	UPL
2. Elymus spp.	20	✓	FACU
3. Phalaris arundinacea	15	✓	FACW
4. Conyza canadensis	5		UPL
5. Cirsium arvense	5		FACU
6.			
7.			
8.			
9.			
10.			
	____ = Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum 20

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC-): 1 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 33% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	____	x 1 =	____
FACW species	____	x 2 =	____
FAC species	____	x 3 =	____
FACU species	____	x 4 =	____
UPL species	____	x 5 =	____
Column Totals:	____ (A)		____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:
__ Dominance Test is >50%
__ Prevalence Index is ≤3.0[1]
__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No ✓

Remarks: + litter

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Outlook at Nine Mile City/County: Erie/Boulder Sampling Date: 10/18/16
Applicant/Owner: Town of Erie State: CO Sampling Point: 6
Investigator(s): Bair Leisure – IRIS Section, Township, Range: SE Section 27, NE Section 34 T1N, R69W
Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): convex Slope (%): 0-10%
Subregion (LRR): Lat: 40°00'64"N Long: 105°06'03"W Datum:
Soil Map Unit Name: Ascalon Sandy Loams, Ascalon-Otero Complex, Water NWI classification: Riverine, PUBG
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? No Are "Normal Circumstances" present? Yes ✓ No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? No (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	Is the Sampled Area within a Wetland? Yes ✓ No ____
Hydric Soil Present?	Yes ✓	No ____	
Wetland Hydrology Present?	Yes ✓	No ____	

Remarks:
In creek – wetland pocket along creek
Wetland Area F-O new mapping

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
	____ = Total Cover		
Sapling/Shrub Stratum (Plot size: ____)			
1. Salix exigua	20	✓	OBL
2.			
3.			
4.			
5.			
	20 = Total Cover		
Herb Stratum (Plot size: ____)			
1. Carex spp	35	✓	OBL
2. Phalaris arundinacea	25	✓	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	60 = Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum 40

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC–): 3 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:
✓ Dominance Test is >50%
___ Prevalence Index is ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Outlook at Nine Mile City/County: Erie/Boulder Sampling Date: 10/19/16
Applicant/Owner: Town of Erie State: CO Sampling Point: 7
Investigator(s): Bair Leisure – JR, IS Section, Township, Range: SE Section 27, NE Section 34 T1N, R69W
Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): concave Slope (%): 0-10%
Subregion (LRR): Lat: 40°00'64"N Long: 105°06'03"W Datum:
Soil Map Unit Name: Ascalon Sandy Loams, Ascalon-Otero Complex, Water NWI classification: Riverine, PUBG
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? No Are "Normal Circumstances" present? Yes ✓ No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? No (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No ✓	Is the Sampled Area within a Wetland? Yes ____ No ✓
Hydric Soil Present?	Yes ____	No ✓	
Wetland Hydrology Present?	Yes ____	No ✓	

Remarks: Upland from #5 – extremely dry – hard to dig

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
	____ = Total Cover		
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
	____ = Total Cover		
Herb Stratum (Plot size: ____)			
1. Dimeyron spp	✓	25	FACU
2. Bromus inermis	✓	15	UPL
3. Conyza canadensis		5	UPL
4. Lactuca serriola		5	FAC
5. Cirsium arvense	✓	10	FACU
6. Phalaris arundinacea	✓	15	FACW
7.			
8.			
9.			
10.			
	75 = Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum 25%

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC–): 0 (A)
Total Number of Dominant Species Across All Strata: 6 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL species	x 5 =	
Column Totals: (A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:
__ Dominance Test is >50%
__ Prevalence Index is ≤3.0[1]
__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No ✓

Remarks: (+ litter)

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Outlook at Nine Mile City/County: Erie/Boulder Sampling Date: 10/19/16
Applicant/Owner: Town of Erie State: CO Sampling Point: (8)
Investigator(s): Bair Leisure – IRIS Section, Township, Range: SE Section 27, NE Section 34 T1N, R69W
Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): concave Slope (%): 0-10%
Subregion (LRR): Lat: 40°00'64"N Long: 105°06'03"W Datum:
Soil Map Unit Name: Ascalon Sandy Loams, Ascalon-Otero Complex, Water NWI classification: Riverine, PUBG
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? No Are "Normal Circumstances" present? Yes ✓ No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? No (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ___	Is the Sampled Area within a Wetland? Yes ✓ No ___
Hydric Soil Present?	Yes ___	No ✓	
Wetland Hydrology Present?	Yes ✓	No ___	

Remarks: In creek - wetland Area G (see mapping)

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ___)			
1.			
2.			
3.			
4.			
	___ = Total Cover		
Sapling/Shrub Stratum (Plot size: ___)			
1. Salix exigua	5		
2.			
3.			
4.			
5.			
	5 = Total Cover		
Herb Stratum (Plot size: ___)			
1. Carex spp	25	✓	OBL
2. Phalaris arundinacea	35	✓	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	60 = Total Cover		
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
	___ = Total Cover		

% Bare Ground in Herb Stratum 40

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC–): 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL species	x 5 =	
Column Totals:	(A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:
✓ Dominance Test is >50%
___ Prevalence Index is ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Outlook at Nine Mile City/County: Erie/Boulder Sampling Date: 10/19/16
Applicant/Owner: Town of Erie State: CO Sampling Point: (9)
Investigator(s): Bair Leisure – JR, IS Section, Township, Range: SE Section 27, NE Section 34 T1N, R69W
Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): Convex Slope (%): 0-10%
Subregion (LRR): Lat: 40°00'64"N Long: 105°06'03"W Datum:
Soil Map Unit Name: Ascalan Sandy Loams, Ascalan-Otero Complex, Water NWI classification: Riverine, PUBG
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? No Are "Normal Circumstances" present? Yes ✓ No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? No (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No ✓	Is the Sampled Area within a Wetland? Yes ____ No ✓
Hydric Soil Present?	Yes ____	No ✓	
Wetland Hydrology Present?	Yes ____	No ✓	

Remarks:
Upland – up from #7

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
	____ = Total Cover		
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
	____ = Total Cover		
Herb Stratum (Plot size: ____)			
1. Bromus inermis	35	✓	UPL
2. Phalaris arundinacea	15	✓	FACW
3. Cirsium arvense	10	✓	FACU
4. Conyza canadensis	5		UPL
5. Rumex crispus	5		FAC
6.			
7.			
8.			
9.			
10.			
	70 = Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum 30

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC–): 1 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 33 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:
__ Dominance Test is >50%
__ Prevalence Index is ≤3.0[1]
__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No ✓

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Outlook at Nine Mile City/County: Erie/Boulder Sampling Date: 10/19/16
Applicant/Owner: Town of Erie State: CO Sampling Point: (10)
Investigator(s): Bair Leisure – IRIS Section, Township, Range: SE Section 27, NE Section 34 T1N, R69W
Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): concave Slope (%): 0-10%
Subregion (LRR): Lat: 40°00'64"N Long: 105°06'03"W Datum:
Soil Map Unit Name: Ascalan Sandy Loams, Ascalan-Otero Complex, Water NWI classification: Riverine, PUBG
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? No Are "Normal Circumstances" present? Yes ✓ No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? No (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No ____	Is the Sampled Area within a Wetland? Yes ✓ No ____
Hydric Soil Present?	Yes ✓	No ____	
Wetland Hydrology Present?	Yes ✓	No ____	

Remarks:
Wetland Area I and now mapped – is creek 5' wide

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
	____ = Total Cover		
Sapling/Shrub Stratum (Plot size: ____)			
1. Salix exigua	5	✓	OBL
2.			
3.			
4.			
5.			
	5 = Total Cover		
Herb Stratum (Plot size: ____)			
1. Carex spp	60	✓	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	____ = Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	60 = Total Cover		

% Bare Ground in Herb Stratum + litter 40

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC–): 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:
✓ Dominance Test is >50%
__ Prevalence Index is ≤3.0[1]
__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks:

APPENDIX C

National Wetlands Inventory

U.S. Fish and Wildlife Service

National Wetlands Inventory

Outlook at Nine Mile Project



November 9, 2016

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

National Wetlands Inventory (NWI)
This page was produced by the NWI mapper

APPENDIX D

Soil Survey

Soil Map—Boulder County Area, Colorado
(Outlook at Nine Mile)



Map Scale: 1:3,910 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 150 300 600 900

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Boulder County Area, Colorado
Survey Area Data: Version 12, Sep 22, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 30, 2014—Sep 18, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Boulder County Area, Colorado (CO643)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
AcA	Ascalon sandy loam, 0 to 3 percent slopes	3.6	7.2%
AcC	Ascalon sandy loam, 3 to 5 percent slopes	18.7	36.9%
AcD	Ascalon sandy loam, 5 to 9 percent slopes	14.4	28.5%
AoC	Ascalon-Otero complex, 3 to 5 percent slopes	0.2	0.3%
W	Water	13.8	27.2%
Totals for Area of Interest		**50.6**	**100.0%**

APPENDIX E

CULTURAL RESOURCES SURVEY AND REPORT

HISTORIC PRESERVATION CONSULTANTS
7876 SOUTH NIAGARA WAY, CENTENNIAL, COLORADO 80112
Ph: 303-220-7646 Email: jfhoffeck@msn.com

17 November 2016

Richard B. Valdez
RMC Consultants Inc.
12295 West 48th Avenue
Wheat Ridge, CO 80033

RE: Cultural Resources Survey of a 47-Acre Development Site near Erie, Boulder County CO

A mixed-use development project (including retail outlets and multifamily residences) is proposed for a 47-acre site near Erie in Boulder County. The legal description of the site is NE ¼ of Section 34 in 6th P.M., T 1 N R 69 W. A cultural resources survey of the parcel was requested by the Town of Erie.

The cultural resources survey has been performed in accordance with standard guidelines and procedures for the inventory and evaluation of historic properties for compliance with Section 106 of the National Historic Preservation Act of 1966. The survey and documentation was undertaken by a person who: (a) meets the *Secretary of Interior's Professional Qualifications Standards* for archaeology and history; (b) holds a valid statewide permit for archaeological survey in Colorado issued by the state (#2016-37); and (c) has more than 30 years' experience in cultural resources management, including more than 20 years of experience in Colorado.

A search of the online database (*Compass*) maintained by the Colorado State Historic Preservation Officer (SHPO) was performed on 3 October 2016 and indicated that less than 10% of the 47-acre parcel had been surveyed for cultural resources. A 1990 survey for the Lafayette By-Pass covered the western and northern margins of the project area.

The database search also revealed that one linear resource and one residence in the project area had previously been recorded. They include the *South Boulder Canyon Ditch* (5BL.750), which was officially determined "not eligible" for the National Register of Historic Places (NRHP) in 1990 by the Colorado SHPO. A house and outbuildings (*Kuhl Property* [5BL.2724]) formerly were located along Arapahoe Road in the NE corner of the project area, and were inventoried in 1990 (during the Lafayette By-Pass survey) and officially determined "not eligible" for the NRHP by the Colorado SHPO.

The house and outbuildings have been demolished. In addition to these resources, the former Prince Lake No. 1 (now drained) was inventoried in 1981 as part of the *Erie Water Supply* (5BL.5041) and also officially determined "not eligible" for the NRHP by the Colorado SHPO in 1990.

A Class III intensive pedestrian archaeology survey was performed of the 47-acre site. Pedestrian transects were spaced at intervals of 12 meters (~40 feet) or less. The orientation and length of individual transects varied according to the landscape and vegetation. No subsurface testing was performed and no artifacts were collected. Ground surface visibility was highly variable, but averaged roughly 25%. Ditches and other areas of high disturbance were not surveyed. The total acreage surveyed is estimated at ~44 acres. Because of the small area involved (i.e., less than 160 acres), an OAHP 1420 form (*Limited-Results Cultural Resources Survey* form) with attachments was completed for the survey, and a copy is attached to this memorandum.

The archaeology survey yielded two prehistoric isolated finds (and site numbers were issued for these by the Colorado SHPO). One isolated find (5BL.13601) was located on the current surface of the northwest margin of the former Prince Lake No. 1 and consists of a single stone flake (petrified wood). Its highly disturbed setting (for prehistoric artifact) indicates that it has been secondarily redeposited from its original context. The other isolated find (5BL.13602) was located on the highest point of the project area (i.e., the hill on the south-central margin of the proposed development site) and comprises the fragment of a small bifacial tool (petrified wood).

The location and contents of 5BL.13601 and 5BL.13602 were recorded with a GPS unit and digital photos, and the appropriate form (OAHP 1408) with attachments was completed for each find (copies are attached to this memorandum). Neither prehistoric isolated find yielded items diagnostic of any specific period or culture-stratigraphic unit in Colorado prehistory, and neither 5BL.13601 or 5BL.13602 meets any of the criteria listed in 36 CFR 60 for inclusion in the NRHP. They are recommended as "not eligible" for the NRHP.

In addition to the field survey, a cultural resources inventory requires an update and assessment of the previously recorded resources in the project area (described above), each of which has been documented with a *Cultural Resources Re-visitation Form* (OAHP 1405) and attachments (copies attached to this memorandum). The Kuhl Property house and outbuildings (5BL.2724) have been demolished. The ditch (5BL.750) is in good condition, but Prince Lake No. 1 (5BL.5041) has been drained. No changes in their eligibility status (officially "not eligible" for the NRHP) are recommended.

In sum, there are no historic properties (i.e., sites or structures that are either listed on or eligible for the NRHP) on the 47-acre parcel that would be affected by the proposed mixed use development of this site.

Sincerely,



John F Hoffecker
Historic Preservation Consultants/303-220-7646

Attachments: limited-results survey form (OAHP 1420)
re-visitation forms (x3) (OAHP 1405)
isolated find forms (x2) (OAHP 1408)

Colorado Historical Society - Office of Archaeology and Historic Preservation
COLORADO CULTURAL RESOURCE SURVEY

OAHP 1420
Revised 9/98

LIMITED-RESULTS CULTURAL RESOURCE SURVEY FORM

This form (#1420) is for small scale limited results projects - block surveys less than 160 acres with linear surveys under four miles. Additionally, there should be no sites and a maximum of four Isolated Finds. This form must be typed.

I. IDENTIFICATION

1. Report Title (include County): *Class III Archaeology Survey for Proposed Development on an 47-Acre Parcel near Erie, Boulder County, Colorado*
2. Date of Field Work: 13 – 14 November 2016
3. Form completed by: John F Hoffecker Date: 14 November 2016
4. Survey Organization/Agency: *Historic Preservation Consultants*
   Principal Investigator: John F Hoffecker
   Principal Investigator's Signature: 
   Other Crew: [none]
   Address: 7876 South Niagara Way, Centennial, CO 80112
5. Lead Agency / Land Owner: Town of Erie
   Contact: Blair Leisure
   Address: Iris Mitigation and Design, Inc., 2022 Arapahoe Street, Golden CO 80401
6. Client: *RMC Consultants*
7. Permit Type and Number: statewide survey non-collection 2016-37
8. Report / Contract Number: N/A
9. Comments: survey requested by Town of Erie

II. DESCRIPTION OF UNDERTAKING / PROJECT

10. Type of Undertaking: mixed use development (retail, multi-family residential)
11. Size of Undertaking (acres): 47 acres Size of Project (if different) (same)
12. Nature of the Anticipated Disturbance: surface and subsurface disturbance
13. Comments:

III. PROJECT LOCATION

Please attach a photocopy of USGS Quad clearly showing the project location. The Quad should be clearly labeled with the Prime Meridian, Township, Range, Section(s), Quad map name, size, and date. Please do not reduce or enlarge the photocopy.

14. Description: The project location can be accessed from Arapahoe Road.

15. Legal Location: Quad. Map: *Erie* Date(s): 1979

Principal Meridian: 6th x NM ___ Ute __

NOTE: Only generalized subdivision ("quarter quarters") within each section is needed

Township: 1 N Range: 69 W Sec.: 34 1/4s NE ; of ___ ;

Township: 1 N Range: 69 W Sec.: 27 1/4s SW ; of SE ;

Township:_____ Range:_____ Sec.:___ 1/4s ____ ; of ___ ;

Township:_____ Range:_____ Sec.:___ 1/4s ____ ; of ___ ;

If section(s) is irregular, explain alignment method: N/A

16. Total number of acres surveyed: ~44 acres

17. Comments:

IV. ENVIRONMENT

18. General Topographic Setting: High Plains

Current Land Use: vacant

19. Flora: grasses and weedy forbs, isolated cottonwood (ditch margin)

20. Soils/Geology: *Ascalon sandy loam* 0-9% slopes (topsoil = 6 inches sandy loam)

21. Ground Visibility: variable, averaging ~25%

22. Comments:

V. LITERATURE REVIEW

23. Location of File Search: *Compass* Date: 3 Oct 2016

24. Previous Survey Activity - In the project area: Crum (1990) *Lafayette Bypass*

In the general region: Gerstle and Mehls (1995) *Southern Water Supply Pipeline*

III. LITERATURE REVIEW (continued)

25. Known Cultural Resources - In the project area: 5BL.2724 (Kuhl property); 5BL.750 (*South Boulder Canyon Ditch*); 5BL.5041 (*Erie Water Supply*)
    In the general region (summarize): ditches, canals, houses, farms, prehistoric isolated finds
26. Expected Results: The project area has moderate potential for archaeological remains, including prehistoric remains.

VI. STATEMENT OF OBJECTIVES

27. The objective is an intensive and comprehensive pedestrian surface survey of the project area.

VII. FIELD METHODS

28. Definitions: Site 10 or more artifacts and/or feature/structure

    IF less than 10 artifacts
29. Describe Survey Method: pedestrian transects spaced at intervals of 12 meters or less

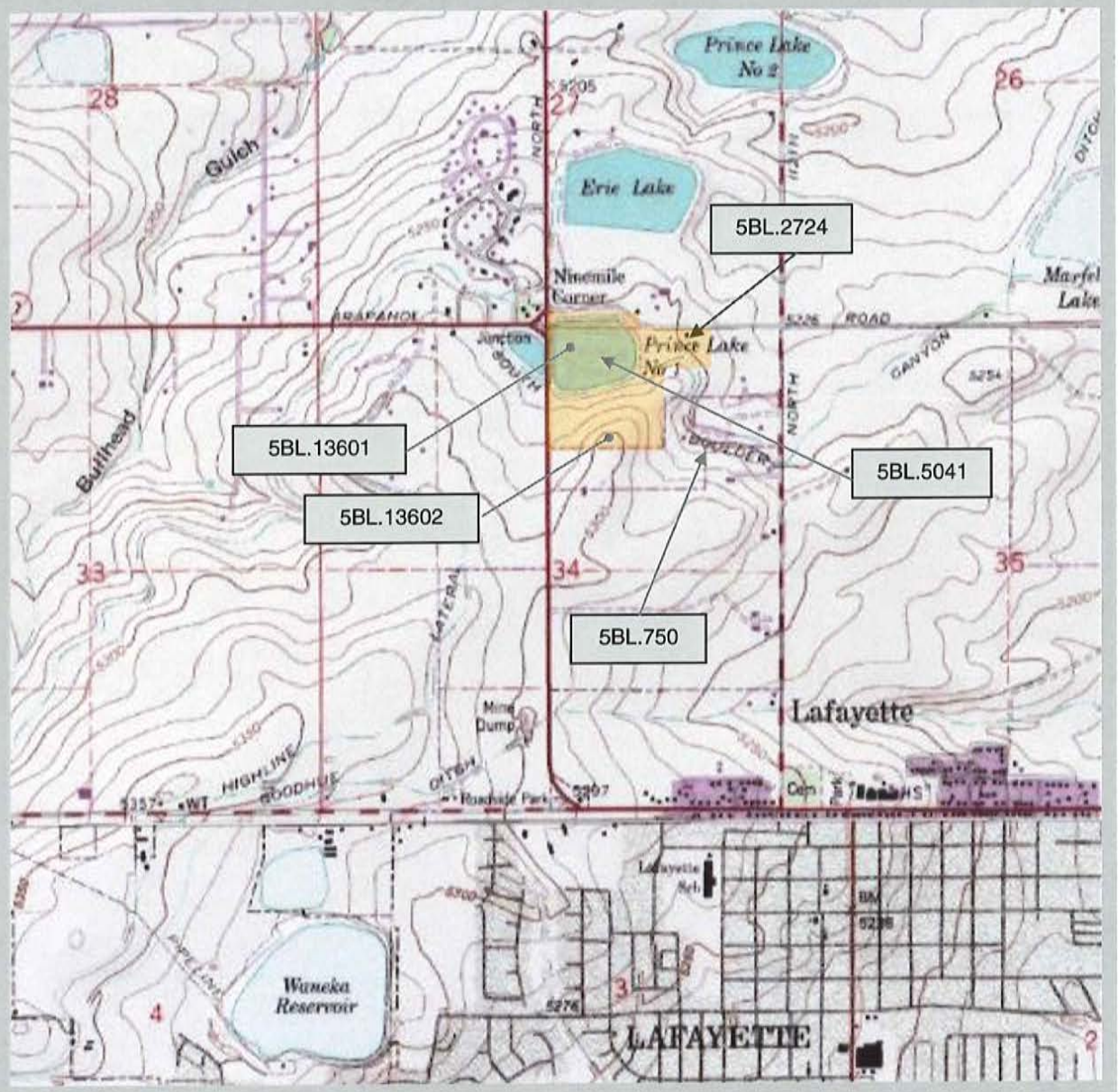
VIII. RESULTS

30. List IFs if applicable. Indicate IF locations on the map completed for Part III.
    A. Smithsonian Number: 5BL.13601 Description: isolated stone flake (unretouched)
    B. Smithsonian Number: 5BL.13602 Description: biface fragment
    C. Smithsonian Number: _____ Description: _____
    D. Smithsonian Number: _____ Description: _____

31. Using your professional knowledge of the region, why are there none or very limited cultural remains in the project area? Is there subsurface potential?

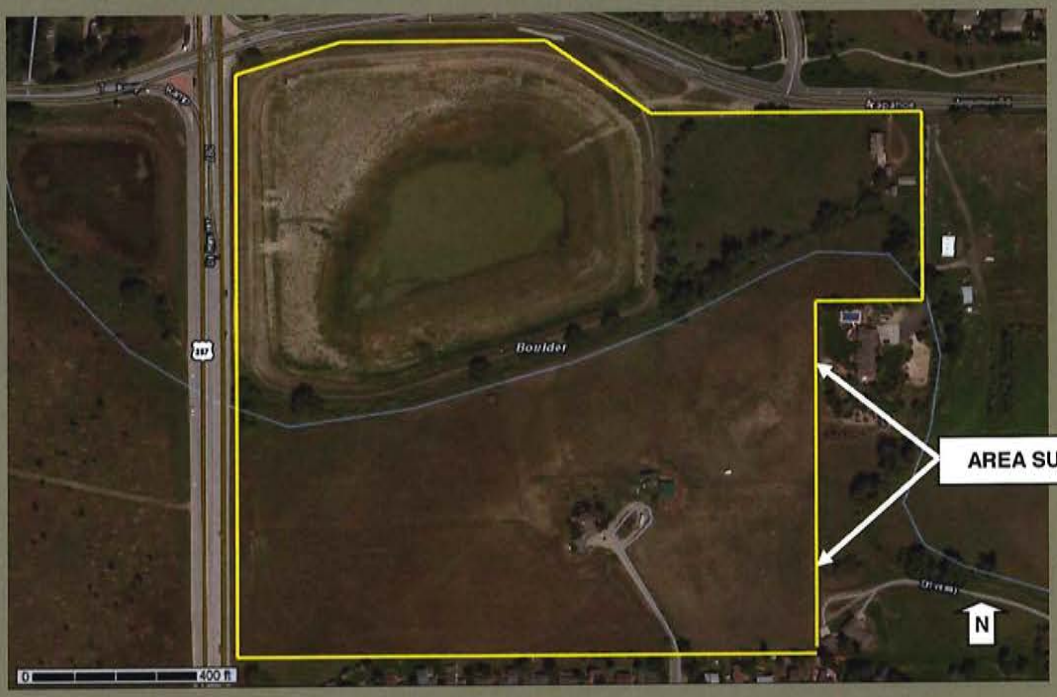
    The scarcity of prehistoric cultural remains probably reflects the heavy disturbance to many portions of the ground surface during historic and recent times.

6th P.M., T 1 N, R 69 W, Section 34 NE ¼



USGS Quadrangle Map (Topographic Series): *Erie* (1979)

Satellite image of the project location showing surveyed area



source: http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

Photographs of Project Area



Project area, former Prince Lake No. 1, looking E
(photographed by JF Hoffecker on 11/13/2016)

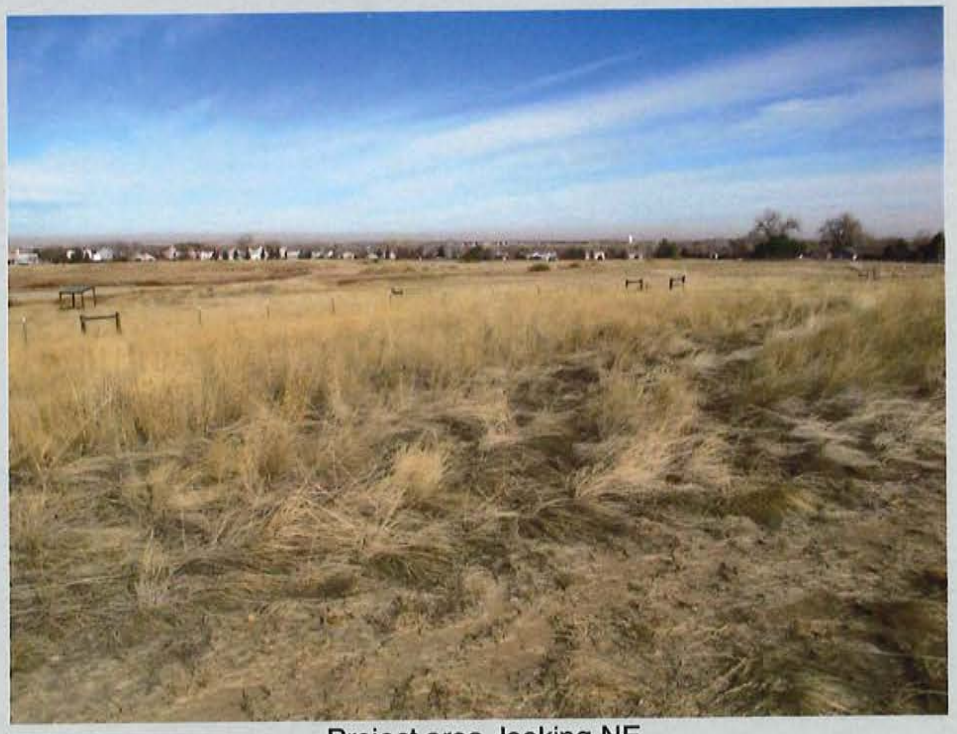


Project area, southern portion, looking E
(photographed by JF Hoffecker on 11/13/2016)

Photographs of Project Area



Project area, western portion, 5BL.750, looking E
(photographed by JF Hoffecker on 11/13/2016)



Project area, looking NE
(photographed by JF Hoffecker on 11/14/2016)

COLORADO CULTURAL RESOURCE SURVEY

Cultural Resource Re-Visitation Form

OAHP1405
Rev. 11/10

A Re-Visitation Form can only be used when a Management Data Form and component forms have been previously filed with the land managing agency and/or the Colorado Office of Archaeology and Historic Preservation and no substantive changes to the character of the site are required as a result of the current re-visitation. Please use the Management Data Form and supporting forms (archaeological component, linear, vandalism, etc.) when changes are required to:

- Site type
- Linear resources
- Additional artifact assemblages and/or features
- Boundary size
- Vandalism
- NRHP recommendations

Official determination (OAHP use only)

☐ Determined Eligible NR\SR
☐ Determined Not Eligible NR\SR
☐ Nominated
☐ Need Data NR\SR
☐ Contributing to NR Dist.\SR Dist.
☐ Not Contributing to NR Dist.\SR Dist.
☐ Supports overall linear eligibility NR\SR
☐ Does not support overall linear eligibility NR\SR

1. **Resource Number**: 5BL.750 2. **Temporary Resource Number**: N/A
3. **Resource Name**: South Boulder Canyon Ditch
4. **Project Name/Number**: ALTA 9 Mile
5. **Government Involvement**: ☒ Local ☐ State ☐ Federal
   Agency: City of Erie
6. **Site Categories**: (Check as many as apply)
   Prehistoric: ☐ Archaeological site ☐ Paleontological site
   In existing National Register District? ☐ Yes ☐ No Name:
   Local Landmark? ☐ Yes ☒ No Name:
   Historic: ☐ Archaeological site ☐ Building (s) ☒ Structure(s) ☐ Object(s)
   In existing National Register District? ☐ Yes ☒ No Name:
   Local Landmark? ☐ Yes ☒ No Name:
7. **Owner(s) Name and Address**: South Boulder Canyon Ditch Company (Corey Peterson, president)
8. **Was the site relocated?** ☒ Yes ☐ No If no, why? (100% collected in previous recording, ground disturbance, etc.)
9. **Previous recordings**: Gerstle, Andrea I. (1995) Cultural Resource Inventory of the Southern Water Supply Pippeline, Superior Branch, Boulder County, CO, Vol. I: Report and Addendum. Western Cultural Resource Management, Inc. for BLM. Copy on file at History Colorado, Denver CO.
10. **Most recent National Register Eligibility Assessment**: ☐ Eligible ☒ Not Eligible ☐ Need Data
    Explain: South Boulder Canyon Ditch was officially determined not eligible on 3/14/1990.
11. **Listed on Register**: ☐ National ☐ State ☒ None
    Date Listed:
12. **Condition (describe)**: The ditch is in operating condition.
13. **Threats to Resource**: ☐ Water Erosion ☐ Wind Erosion ☐ Grazing ☐ Neglect ☐ Vandalism ☐ Recreation ☒ Construction ☐ Other (specify):
14. **Existing Protection**: ☐ None ☐ Marked ☒ Fenced ☐ Patrolled ☐ Access controlled ☐ Other (specify):
    Comments: This segment is protected by fencing.
15. **Recorder's Management Recommendations**: no further work

Cultural Resource Re-Visitation Form

Resource Number: 5BL.750 **Temporary Resource Number**: N/A

16. **Known Collections, Reports, or Interviews**: Gerstle, Andrea I. (1995) Cultural Resource Inventory of the Southern Water Supply Pippeline, Superior Branch, Boulder County, CO, Vol. I: Report and Addendum. Western Cultural Resource Management, Inc. for BLM. Copy on file at History Colorado, Denver CO.

17. **Site Description/Update**: The South Boulder Canyon Ditch was constructed in 1870 with a headgate on South Boulder Creek. The segment that extends through the NE corner of Section 34 (T 1 N R 69 W) is approximately 12 feet in width and is an earthen unlined ditch. The ditch segment is lined with isolated trees (cottonwood and elm) and thick riparian vegetation and grass. The segment is in good condition with evidence of recent water flow. There is a wooden footbridge (deteriorated) in the NE quadrant of Section 34.

18. **Photograph Numbers**: IMG_3868.JPG - IMG_3879.JPG
Digital files at: Historic Preservation Consultants

19. **Artifact and Field Documentation Storage Location**: Historic Preservation Consultants
7876 South Niagara Way, Centennial CO 80112

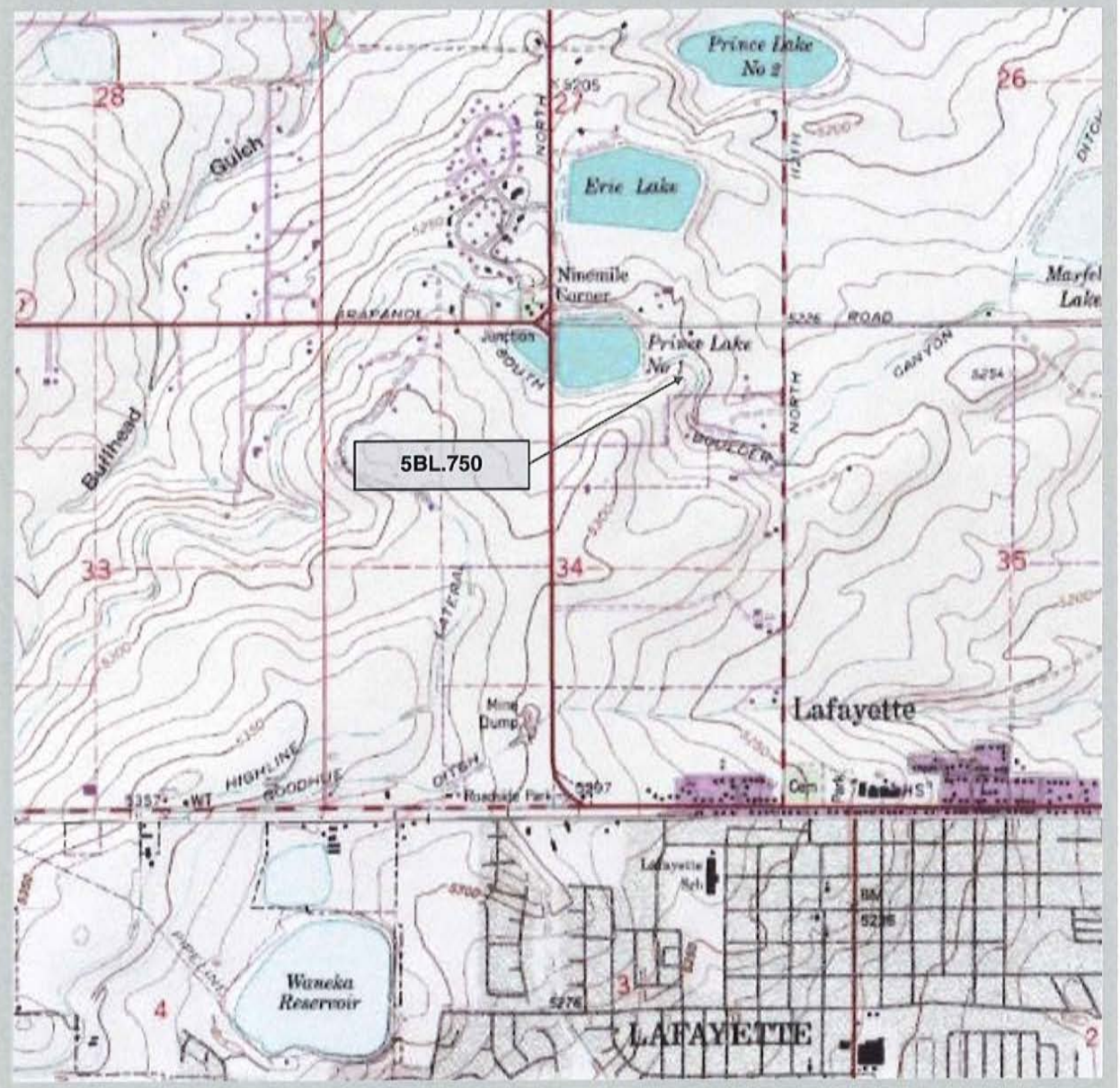
20. **Report Title**: Class III Archaeology Survey for Proposed Development on a 47-Acre Parcel near Erie, Boulder County, Colorado

21. **Recorder(s)**: John F Hoffecker
Date: 11/14/2016

22. **Recorder Affiliation**: Historic Preservation Consultants
Phone Number/Email: 303/220-7646/jfhoffeck@msn.com

Note: Please attach a sketch map, a photocopy of the USGS quad. map indicating resource location, and photographs.

6th P.M., T 1 N, R 69 W, Section 34 NE ¼

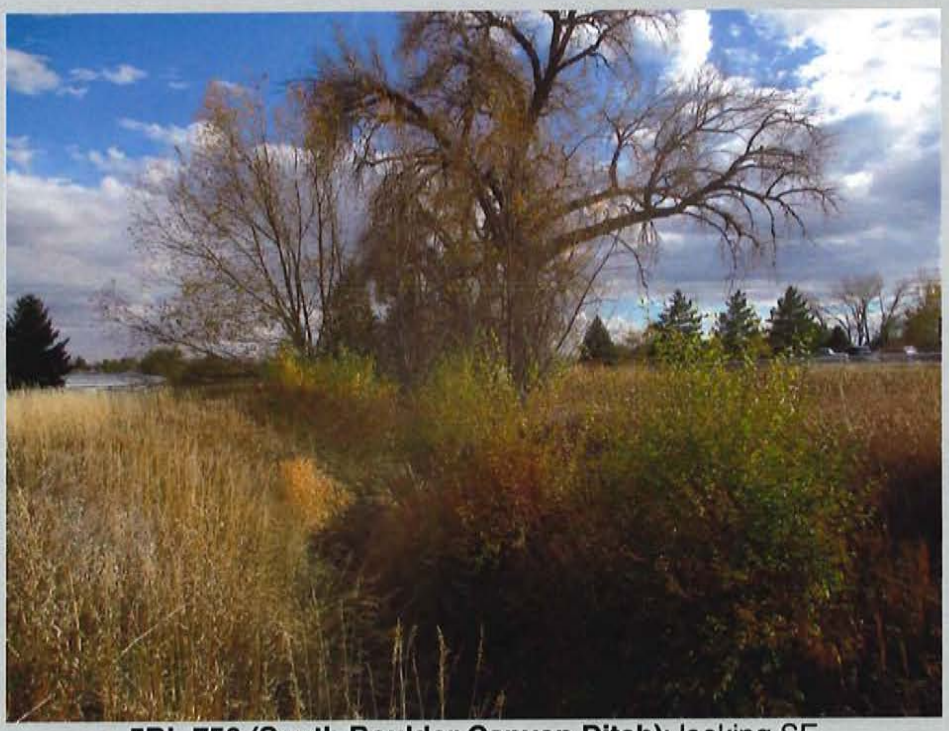


USGS Quadrangle Map (Topographic Series): *Erie* (1979)

Photographs of 5BL.750



5BL.750 (South Boulder Canyon Ditch): looking E
(photographed by JF Hoffecker on 11/13/2016)



5BL.750 (South Boulder Canyon Ditch): looking SE
(photographed by JF Hoffecker on 11/13/2016)

COLORADO CULTURAL RESOURCE SURVEY

Cultural Resource Re-Visitation Form

OAHP1405
Rev. 11/10

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- Site type
- Linear resources
- Additional artifact assemblages and/or features
- Boundary size
- Vandalism
- NRHP recommendations

Official determination (OAHP use only)

☐ Determined Eligible NR\SR
☐ Determined Not Eligible NR\SR
☐ Nominated
☐ Need Data NR\SR
☐ Contributing to NR Dist.\SR Dist.
☐ Not Contributing to NR Dist.\SR Dist.
☐ Supports overall linear eligibility NR\SR
☐ Does not support overall linear eligibility NR\SR

1. **Resource Number**: 5BL.2724 2. **Temporary Resource Number**: N/A
3. **Resource Name**: Kuhl Property
4. **Project Name/Number**: ALTA 9 Mile
5. **Government Involvement**: ☒ Local ☐ State ☐ Federal
   Agency: Town of Erie
6. **Site Categories**: (Check as many as apply)
   Prehistoric: ☐ Archaeological site ☐ Paleontological site
   In existing National Register District? ☐ Yes ☐ No Name:
   Local Landmark? ☐ Yes ☒ No Name:
   Historic: ☐ Archaeological site ☒ Building (s) ☐ Structure(s) ☐ Object(s)
   In existing National Register District? ☐ Yes ☒ No Name:
   Local Landmark? ☐ Yes ☒ No Name:
7. **Owner(s) Name and Address**: Town of Erie, Boulder County, Colorado
8. **Was the site relocated?** ☒ Yes ☐ No If no, why? (100% collected in previous recording, ground disturbance, etc.)
9. **Previous recordings**: The property was inventoried by the Colorado Department of Highways and reported by Sally Pearce (1990) Survey Report, CDOH Project FC 287-3(50) Lafayette Bypass. Colorado Department of Highways. Copy on file at History Colorado, Denver CO.
10. **Most recent National Register Eligibility Assessment**: ☐ Eligible ☒ Not Eligible ☐ Need Data
    Explain: The Kuhl Property was officially determined not eleigible for the NRHP on 3/14/1990.
11. **Listed on Register**: ☐ National ☐ State ☒ None
    Date Listed:
12. **Condition (describe)**: The house and outbuildings have been demolished.
13. **Threats to Resource**: ☐ Water Erosion ☐ Wind Erosion ☐ Grazing ☐ Neglect ☐ Vandalism ☐ Recreation ☒ Construction ☐ Other (specify):
14. **Existing Protection**: ☒ None ☐ Marked ☐ Fenced ☐ Patrolled ☐ Access controlled ☐ Other (specify):
    Comments:
15. **Recorder's Management Recommendations**: no further work

Cultural Resource Re-Visitation Form

Resource Number: 5BL.2724 **Temporary Resource Number:** N/A

16. **Known Collections, Reports, or Interviews**: Pearce, Sally (1990) Survey Report, CDOH Project FC 287-3(50) Lafayette Bypass. Colorado Department of Highways. Copy on file at History Colorado, Denver CO.

17. **Site Description/Update**: The house (single dwelling) and outbuildings (garage, barn, and milk house) have been demolished. No standing structures of the Kuhl property are present.

18. **Photograph Numbers**: IMG_3837. JPG
Digital files at: Historic Preservation Consultants

19. **Artifact and Field Documentation Storage Location**: Historic Preservation Consultants
7876 South Niagara Way, Centennial CO 80112

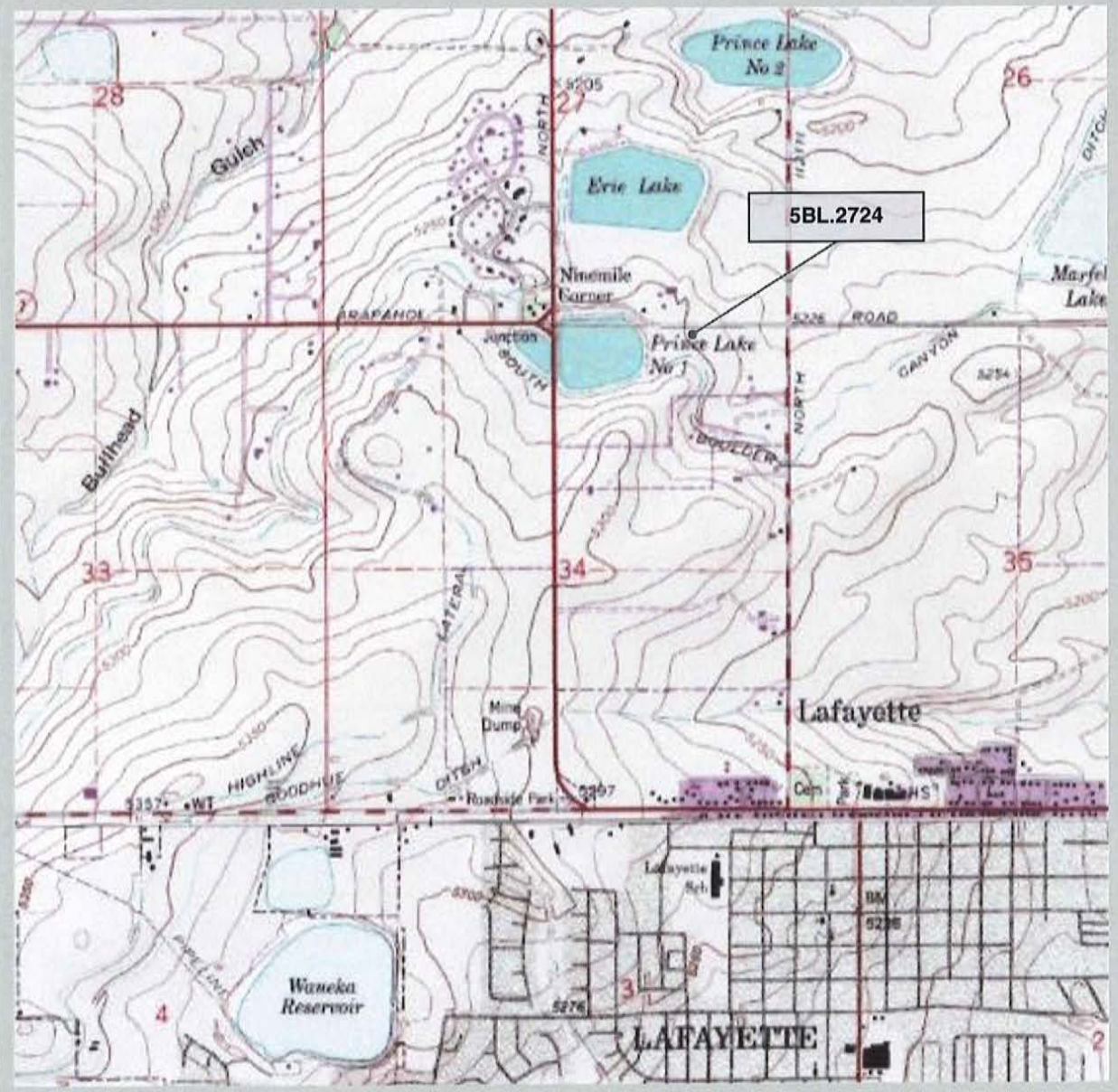
20. **Report Title**: Class III Archaeology Survey for Proposed Development on a 47-Acre Parcel near Erie, Boulder County, Colorado

21. **Recorder(s)**: John F Hoffecker
Date: 11/14/2016

22. **Recorder Affiliation**: Historic Preservation Consultants
Phone Number/Email: 303/220-7646/jfhoffeck@msn.com

Note: Please attach a sketch map, a photocopy of the USGS quad. map indicating resource location, and photographs.

6th P.M., T 1 N, R 69 W, Section 34 NE ¼



USGS Quadrangle Map (Topographic Series): *Erie* (1979)

Photograph of 5BL.2724



5BL.2724: looking NE at former location of house and outbuildings (photographed by JF Hoffecker on 11/13/2016)

COLORADO CULTURAL RESOURCE SURVEY

Cultural Resource Re-Visitation Form

OAHP1405
Rev. 11/10

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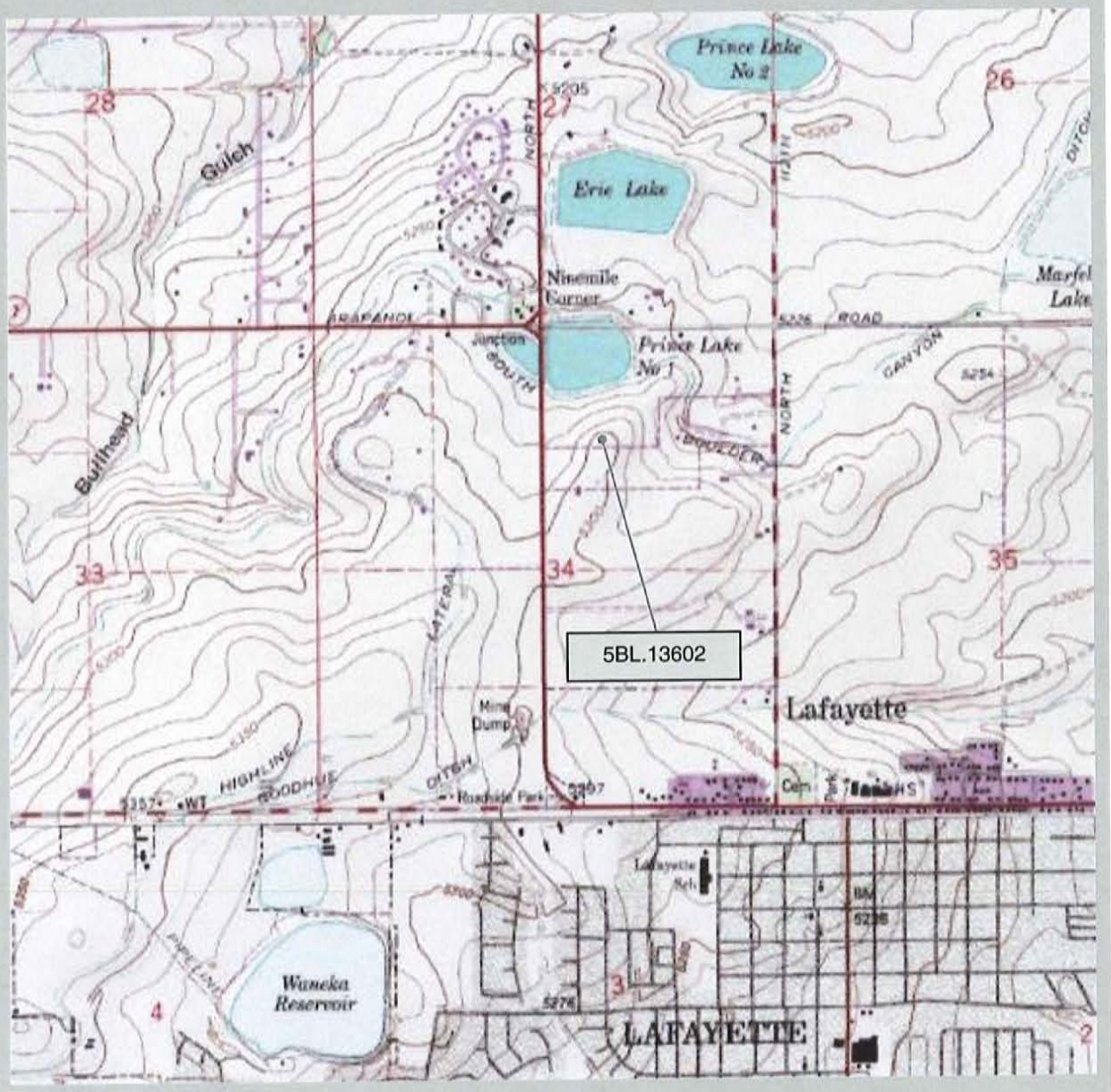
- Site type
- Linear resources
- Additional artifact assemblages and/or features
- Boundary size
- Vandalism
- NRHP recommendations

Official determination (OAHP use only)

☐ Determined Eligible NR\SR
☐ Determined Not Eligible NR\SR
☐ Nominated
☐ Need Data NR\SR
☐ Contributing to NR Dist.\SR Dist.
☐ Not Contributing to NR Dist.\SR Dist.
☐ Supports overall linear eligibility NR\SR
☐ Does not support overall linear eligibility NR\SR

1. **Resource Number:** 5BL.5041 2. **Temporary Resource Number:** N/A
3. **Resource Name:** Prince Lake No. 1 (Erie Water Supply)
4. **Project Name/Number:** ALTA 9 Mile
5. **Government Involvement:** ☒ Local ☐ State ☐ Federal
   Agency: Town of Erie
6. **Site Categories:** (Check as many as apply)
   Prehistoric: ☐ Archaeological site ☐ Paleontological site
   In existing National Register District? ☐ Yes ☐ No Name:
   Local Landmark? ☐ Yes ☒ No Name:
   Historic: ☐ Archaeological site ☐ Building (s) ☒ Structure(s) ☐ Object(s)
   In existing National Register District? ☐ Yes ☒ No Name:
   Local Landmark? ☐ Yes ☒ No Name:
7. **Owner(s) Name and Address:** Town of Erie, Boulder County, Colorado
8. **Was the site relocated?** ☒ Yes ☐ No If no, why? (100% collected in previous recording, ground disturbance, etc.)
9. **Previous recordings:** Gleichman, Peter J. and Frances M. Black (2001). Cultural Resources of Open Space, East Boulder County, Colorado. Native Cultural Servives for the City of Boulder (March 2001). Copy on file at History Colorado, Denver CO.
10. **Most recent National Register Eligibility Assessment:** ☐ Eligible ☐ Not Eligible ☐ Need Data
    Explain: The Erie Water Supply has not been officially evaluated for the NRHP.
11. **Listed on Register:** ☐ National ☐ State ☒ None
    Date Listed:
12. **Condition (describe):** Prince Lake No. 1 has been completely drained of water.
13. **Threats to Resource:** ☐ Water Erosion ☐ Wind Erosion ☐ Grazing ☐ Neglect ☐ Vandalism ☐ Recreation ☒ Construction ☐ Other (specify):
14. **Existing Protection:** ☐ None ☐ Marked ☒ Fenced ☐ Patrolled ☐ Access controlled ☐ Other (specify):
    Comments:
15. **Recorder's Management Recommendations:** no further work

6th P.M., T 1 N, R 69 W, Section 34 NE ¼



USGS Quadrangle Map (Topographic Series): *Erie* (1979)

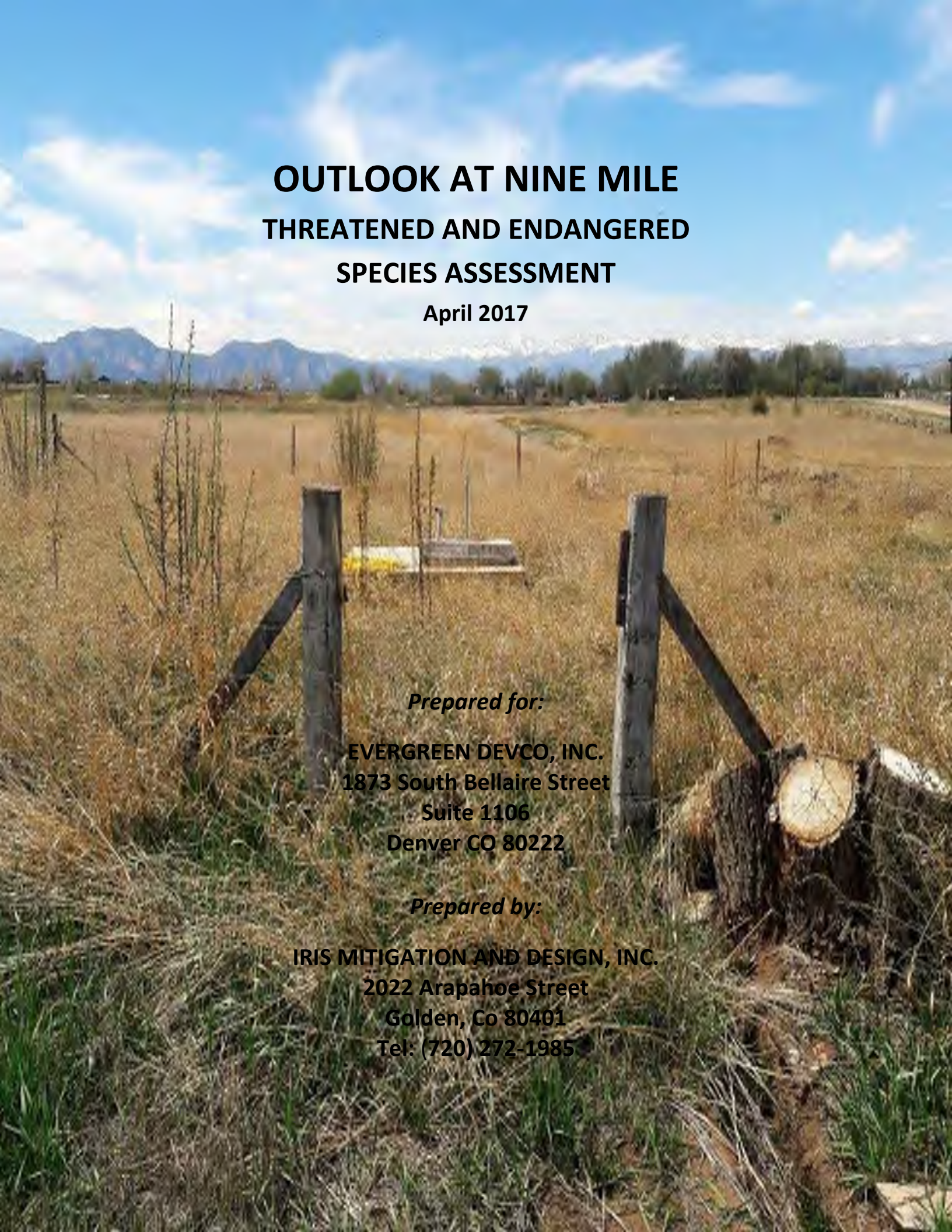
Photographs of 5BL.13602



5BL.13602: site setting, looking east/southeast (photographed by JF Hoffecker on 11/14/2016)



5BL.13602: biface fragment (petrified wood) (photographed by JF Hoffecker on 11/14/2016)



OUTLOOK AT NINE MILE

THREATENED AND ENDANGERED SPECIES ASSESSMENT

April 2017

Prepared for:

EVERGREEN DEVCO, INC.
1873 South Bellaire Street
Suite 1106
Denver CO 80222

Prepared by:

IRIS MITIGATION AND DESIGN, INC.
2022 Arapahoe Street
Golden, Co 80401
Tel: (720) 272-1985

IRIS
MITIGATION AND DESIGN, INC.
Environmental Consulting

IRIS MITIGATION AND DESIGN, INC.
2022 Arapahoe Street
Golden, Colorado 80401
Phone: 720-272-1985
bleisure@irismitigation.com

Outlook at Nine Mile

THREATENED & ENDANGERED SPECIES

AND WILDLIFE ASSESSMENT

On behalf of the Town of Erie, Colorado, IRIS Mitigation and Design, Inc. (IRIS) has completed the enclosed Threatened and Endangered (T&E) Species Assessment for the Outlook at Nine Mile (Project Area) located in Erie, Colorado (see Figures 1 and 2).

SITE DESCRIPTION

This 47.15-acre Project Area is bordered to the west by North 107th Avenue, and to the north by Arapahoe Road in Boulder County. Prince Lake #1 (also known as Parcel C1) is located in the northwestern section of the property. This man-made reservoir has been drained and is currently a dry upland (see Appendix A - Photo Log). South Boulder Canyon Ditch runs west to east through the Project Area just south of Prince Lake. A wetland delineation of the Project Area was completed by IRIS from October 17 through October 20, 2016.

The Project Area is largely an undeveloped upland field dominated by native and non-native upland grasses, shrubs, and herbaceous species (see Appendix A - Photo Log). Approximately 30 percent of the Project Area contains Prince Lake (currently drained) located in the northwestern section of the property. The remaining 70 percent of the Project Area is an undeveloped upland field with two remnant home sites. The homes, outbuildings, and all associated residential material have been entirely removed from the Project Area.

The Project Area is shown on the U.S. Geological Survey (USGS) quadrangle map for Erie,

IRIS MITIGATION AND DESIGN, INC.
2022 Arapahoe Street
Golden, Colorado 80401
Phone: 720-272-1985
bleisure@irismitigation.com

Colorado (1967-Photo revised 1979) within the northern 1/4 of Section 34, Township 1 North, Range 69 West of the 6th Principal Meridian (see Figure 3). It is located in the Town of Erie, in Boulder County, Colorado: Latitude 40°00'64" N and Longitude 105°06'03" W (see Figure 3). The center of the Project Area is located at elevation 5,265 feet above sea level and is surrounded by suburban residential, commercial, and office building development to the west, south and north.

The proposed development for the property is a mixed-use project which consists of commercial/retail on the western half of the site, and multi-family residential on the eastern half.

METHODS

This T&E and Wildlife Assessment was completed by reviewing USGS topographical mapping, aerial photographs, and through conducting field assessments at the site. The Colorado Natural Heritage Program (CNHP) and the Colorado Parks and Wildlife (CPW) were notified about the proposed project in this location and have visited and/or reported on any T&E species or other wildlife concerns that they may have (see Appendix B – CNHP Response). The U.S. Fish and Wildlife Service (USFWS) Information, Planning, and Conservation System (IPaC) was reviewed for federally listed T&E species in the Project Area (see Appendix C - USFWS Report).

FINDINGS

IRIS Senior Scientist Blair Leisure visited the Project Area in October 2016 and again on April 18, 2017, in the early afternoon (see Figures 1 and 2). The weather in April was sunny with no wind. Blair walked the entire 47.15-acre area and found that the Project Area is mainly an undeveloped upland sloping field dominated by upland native and non-native grasses, shrubs and herbaceous species. The man-made Prince Lake is located in the northwest corner of the site and is currently an upland with little vegetation (see Appendix A -Photo Log). South Boulder Canyon Ditch runs for approximately 1,900 linear feet, west to east through the middle of the property. This ditch has occasional wetland pockets and

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wetland benching on either side, but is largely an approximately 5-foot wide "Waters of the U.S." with few to no wetlands (see Appendix A - Photo Log).

An approximately 400 linear foot concrete-lined ditch approximately 2-feet wide is located just east of the drained lake running north/south. This ditch is dry and contains mainly upland grasses and other herbaceous species. Willows have sporadically established along the ditch.

There are several smaller sized saplings located on the site and occasional willow located along South Boulder Canyon Ditch. The only larger trees include one mature Plains cottonwood (*Populus deltoides*) and several Siberian elms (*Ulmus pumila*) located on the eastern end of South Boulder Canyon Ditch (see Appendix A- Photo Log). IRIS scientist Blair Leisure observed a red-tailed hawk (*Buteo jamaicensis*) perched on the top of the cottonwood on April 17, 2017. No raptor nests were observed in the cottonwood or smaller adjacent elm trees. The hawk did not display nesting behavior and flew away from the tree once approached with no alarm.

There were approximately 12 prairie dog burrows observed in the northeastern corner of the property at the remnant house site. No prairie dogs were observed and the burrows appeared to be abandoned.

AGENCY REVIEW

U.S. Fish and Wildlife Service (USFWS)

IRIS reviewed the USFWS Information, Planning, and Conservation System for this Project Area which lists federally listed T&E species for this Project Area that might be of concern in a specific project area. The list of potential T&E species is shown on Table 1 and in Appendix C – USFWS Report. South Boulder Canyon Ditch flows during high water spring run-off and irrigation delivery time periods only. Therefore, federally listed T&E fish species were not considered in Table 1.

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Table 1

Federally Listed Threatened and Endangered Species at Outlook at Nine Mile

Common Name	Scientific Name	U.S. Fish and Wildlife Service Status	Likely to Occur at Site	Habitat Type
Mammals				
Preble's Meadow Jumping Mouse	*Zapus hudsonius preblei*	Threatened	No	Front Range riparian areas with multi-story riparian vegetation. Project site is located in Preble's mouse metro block clearance area.
Canada Lynx	*Lynx canadensis*	Threatened	No	Associated with dense subalpine forest and willow-choked corridors along mountain streams and avalanche chutes.
Birds				
Mexican Spotted Owl	*Strix occidentalis lucida*	Threatened	No	Associated with mixed conifer forests and rocky canyons with cliff ledges.
Least Tern	*Sterna antillarum*	Endangered	No	Associated with larger rivers, sandbars and landfills. Potential concern downstream on the South Platte River.
Piping Plover	*Charadrius melodus*	Threatened	No	Associated with larger rivers/coastal areas/sandbars/beaches. Potential concern downstream on the South Platte River.
Whooping crane	*Grus americana*	Endangered	No	Associated with marshes/shallow lakes/lagoons. Potential concern downstream on the South Platte River.
Flowering Plants				
Colorado Butterfly Plant	*Gaura neomexicana var. coloradensis*	Threatened	No	Found in moist prairie meadows – transition area between wet stream bottoms and rich flood plain areas.
Ute Ladies'-Tresses	*Spiranthes diluvialis*	Threatened	No	Found near major streams along abandoned meadows with ample subsurface H2O percolating high gravel or in running water.
Western Prairie Fringed Orchid	*Platanthera praeclara*	Threatened	No	Associated with mesic to wet unplowed tallgrass meadows and prairies and sedge meadows.

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There are no federally listed T&E species from Table 1 that would be expected to utilize the Project Area. All listed bird species from Table 1, excluding the Mexican spotted owl, are associated with moist to wet habitat along larger stream systems. The Mexican spotted owl is associated with mixed conifer forests or rocky canyons with cliff ledges. The Project Area has neither a large consistent stream system nor rocky canyons with cliff ledges. Although the Preble's meadow jumping mouse (PMJM) is listed on Table 1, the Project Area is mapped by the USFWS as not containing PMJM critical habitat and as being part of municipal lands (see Appendix D – PMJM Critical Habitat Mapping). In addition, there is limited riparian or typical PMJM habitat located along South Boulder Canyon Ditch in the Project Area.

The Project Area does not contain the type of wetland or moist habitat known to support any of the three federally listed plant species. These plants are associated with moist to wet habitat, along larger stream systems. Although there are sporadic wetlands located on the bottom and along the side slopes of South Boulder Canyon Ditch in small patches, these areas are too dry to maintain any of these federally listed plants. The ditch is dry for the majority of the year except for high spring runoff or when irrigation flows are delivered.

There are therefore no federally listed T&E species of concern from the USFWS search for the general project area that would likely occur on the site. In addition, there are no critical habitats within the Project Area.

Colorado Natural Heritage Program (CNHP)

The CNHP reviewed information in the vicinity of the Project Area for the presence of natural heritage elements and T&E species through their Biodiversity Tracking and Conservation System (see Appendix B – CNHP Response). The result of this review reveals no federal or state-listed T&E species which have been recorded at the Project Area. There are no designated Potential Conservation Areas and no Network of

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Conservation Areas in the project vicinity. Therefore, the CNHP has no record of any federal or state T&E species of concern in the Project Area.

Colorado Parks and Wildlife (CPW)

CPW District Wildlife Manager Kristin Cannon was contacted by email regarding this proposed project in March 2016. She responded that the CPW would only need to be contacted if the proposed project had significant impacts beyond filling Prince Lake and the actual loss of open land/habitat that will result from project development. Since these described impacts are the impacts proposed by this development, IRIS did not pursue further contact with the CPW.

State of Colorado Protected Species

The state threatened burrowing owl (*Athene cunicularia*) nests in prairie dog or other suitable burrows when they migrate north into Colorado for the summer nesting season. The burrowing owl is a migratory species that breeds in Colorado and winters in the Southern United States and throughout Mexico. It nests in Colorado between mid-March to late October. Because it is illegal to kill or harm this bird or its nests under Federal and State law, the CPW recommends surveying prairie dog and other burrows for the presence of nesting burrowing owls. This survey should be completed before any poisoning, destruction, or removal of the prairie dogs or burrows or construction activities commence if activities occur between mid-March through late October. If the activities commence between early November to mid-March, then no burrowing owl survey would be required.

In addition, the CPW and USFWS recommend that the Project Area be checked for any nesting raptors or other migratory birds before work commences. Raptors and migratory birds are protected from take, harassment, and nest disruption under both state and federal regulation. If any raptors or migratory birds are nesting, then project activities would be set-back a certain distance from the nest until the young have fledged.

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As long as nesting burrowing owls, raptors, and migratory birds are surveyed for and protected as required, the USFWS and CPW should have no objections to the proposed project moving forward as planned at this site.

SUMMARY

On behalf of the Town of Erie, IRIS has completed a T&E Species and Wildlife Assessment for the proposed Outlook at Nine Mile site located in Boulder County, Colorado. IRIS has determined that the Project Area is mainly a sloping upland field with seasonal flow in the South Boulder Canyon Ditch running west to east on the property just south of Prince Lake. The Project Area is surrounded by suburban residential, commercial, and office building development to the west, south and north.

State and federal wildlife agencies were contacted to search their biological databases and to conduct field visits as necessary to the Project Area. These agencies include the USFWS, the CNHP and CPW. After reviewing all agency responses, it is evident that there are no federal or state listed T&E species of concern in the Project Area. The following recommendations are made before construction commences:

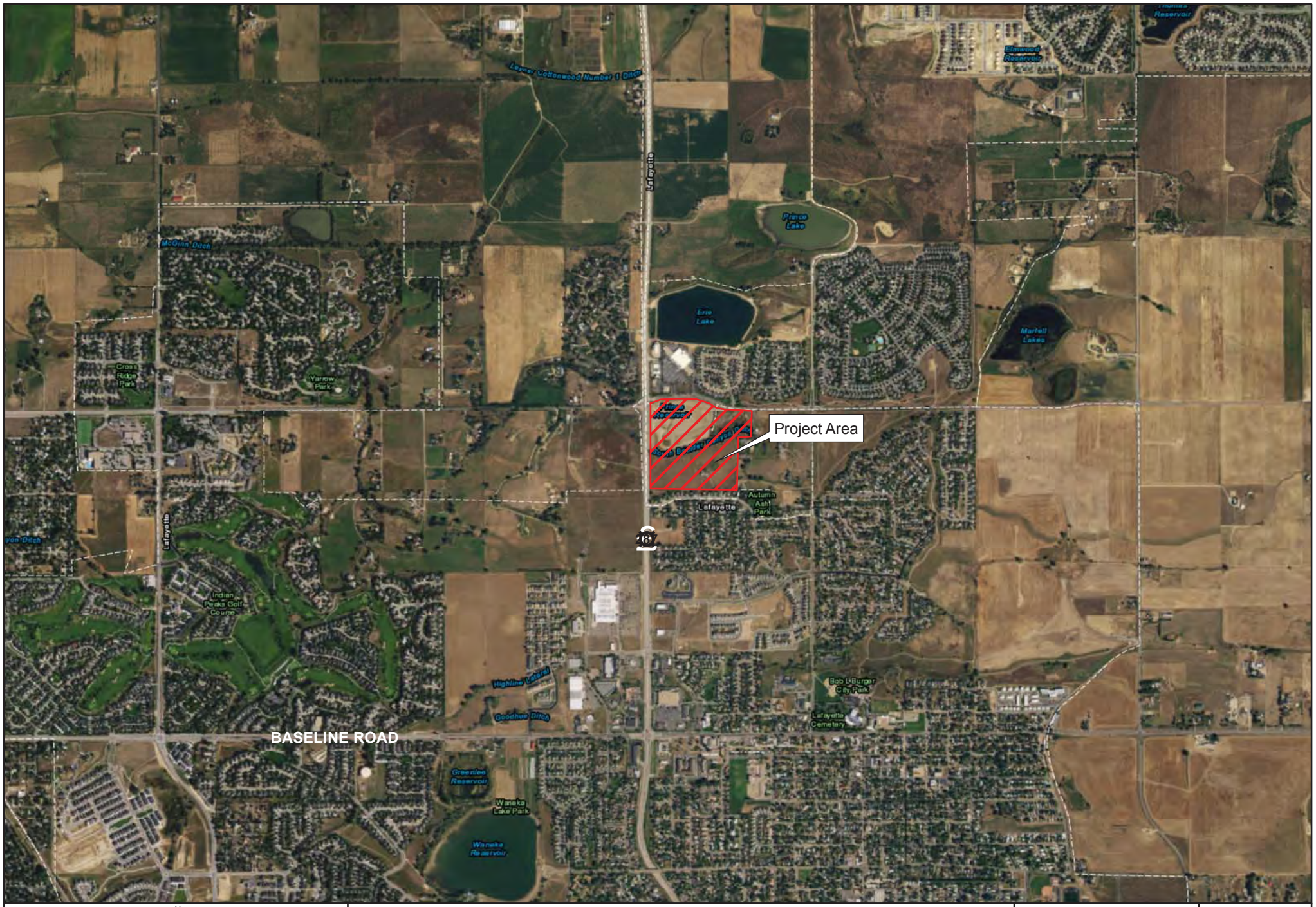
- Survey for any active prairie dog burrows before work commences. If active prairie dogs are found, a survey of their burrows should be completed between mid-March through late October in case the state threatened burrowing owl might be nesting in a prairie dog burrow. If the prairie dogs are moved and/or treated between early November and mid-March, no burrowing owl survey would be required.

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- Survey the Project Area if work commences during the nesting season (early spring into mid-summer) for any nesting raptors as their nests and eggs are protected under both federal and state regulations.

On April 17, 2017 (the date of the IRIS T&E field survey) there were no active prairie dogs nor raptor nests observed in the Project Area.

There are no other federal or state listed T&E species known to occur within the Project Area. Please feel free to call for any additional information or to discuss the project further.



1:24,000

0 0.4 0.8 Miles

OUTLOOK AT NINE MILE

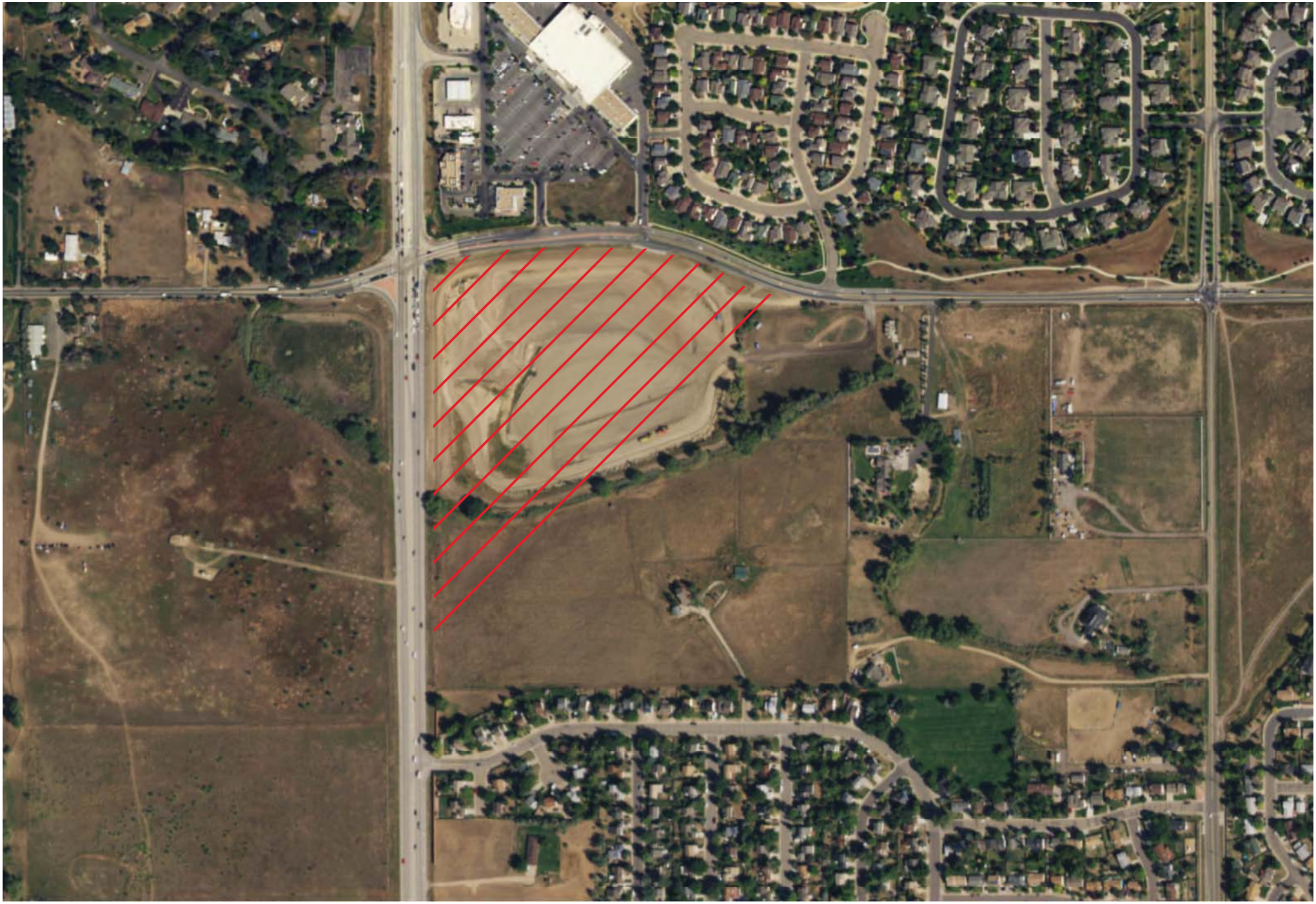
Vicinity Map

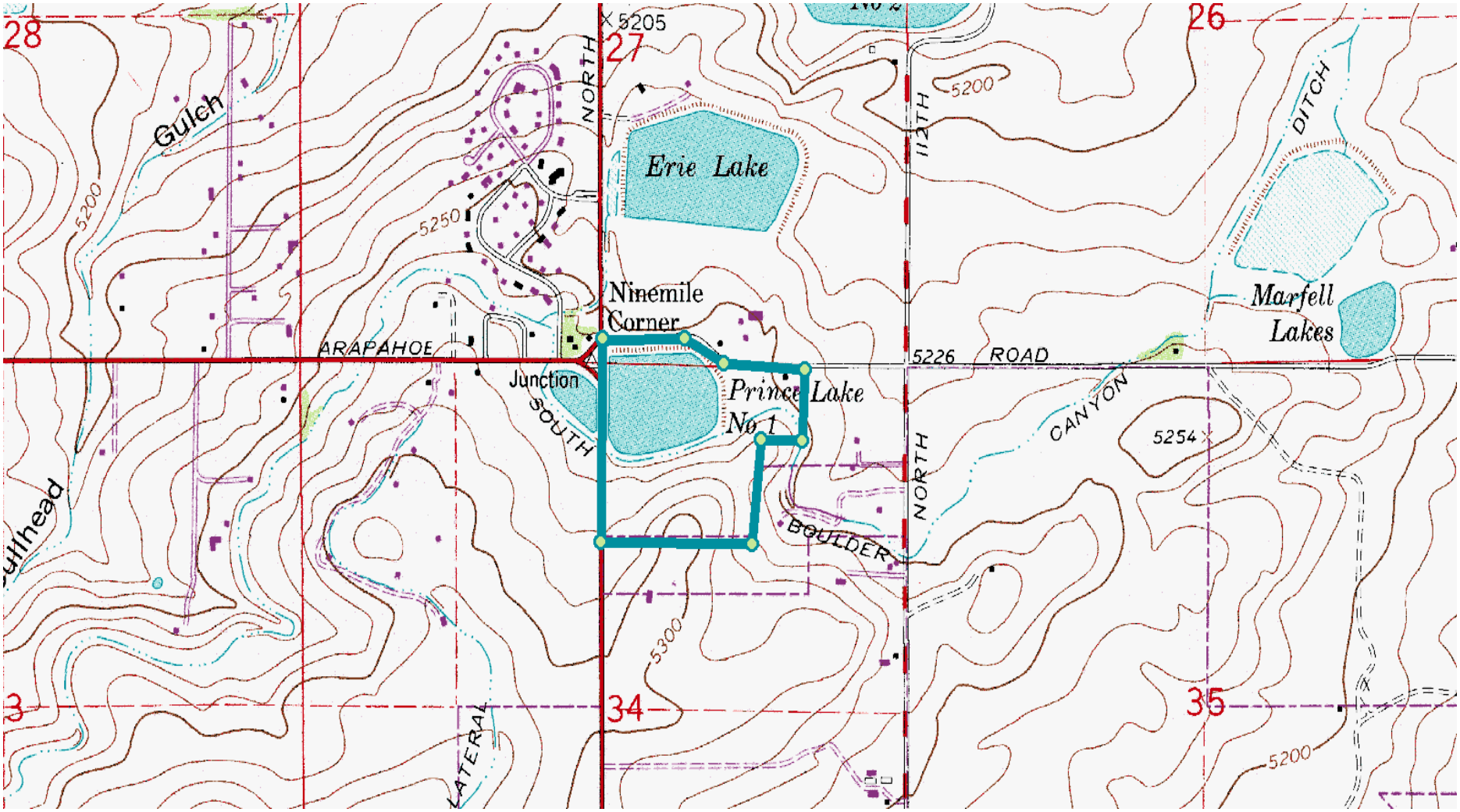
Town of Erie, Colorado

IRIS Mitigation and Design, Inc.
Environmental Consulting

Drafted by: CGR
November 14, 2016

Figure
1





IRIS **MITIGATION AND DESIGN, INC.** Environmental Consulting 2022 Arapahoe Street Golden Colorado 80401 Phone: 720-272-1985	**FIGURE 3** **USGS Map** Outlook at Nine Mile Project Area	USGS Map for Erie, CO 1967 Photo revised 1979

Outlook at Nine Mile Photo-Log

2017 Threatened and Endangered Species Assessment



Photograph 1: Drained Prince Lake - Looking East



Photograph 2: Southern Part of Project Area - Looking North past Prince Lake



Photograph 3: Southern Part of Project Area - Looking East



Photograph 4: Central Part of Project Area - Looking East



Photograph 5: Remnant House Site - Looking Northeast



Photograph 6: Southeastern Part of Project Area - Looking East



Photograph 7: Large Cottonwood at Eastern End of South Boulder Canyon Ditch - Looking East



Photograph 8: Eastern End of South Boulder Canyon Ditch – Looking East



Photograph 9: Remnant Home site in Northeast Corner of Project Area with Abandoned Prairie Dog Burrows Looking North



Photograph 10: Southern Part of Project Area Looking West

Colorado Natural Heritage Program
1475 Campus Delivery
Colorado State University
Fort Collins, CO 80523-1475

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March 31, 2017

Blair Leisure, M.Sc.
Senior Scientist
IRIS Mitigation and Design Inc.
2022 Arapahoe Street
Golden Colorado 80401

Dear Blair:

The Colorado Natural Heritage Program (CNHP) is in receipt of your request for information regarding the proposed Outlook at Nine Mile Project located in Boulder County, Colorado. In response, I have searched our Biodiversity Tracking and Conservation System (BIOTICS) for natural heritage elements (occurrences of significant natural communities and rare, threatened or endangered plants and animals) documented from the vicinity of the area specified in your request, specifically within a two-mile radius of project area as described by the legal description and map Iris Mitigation and Design Inc. provided for the project area.

The enclosed report describes natural heritage resources known from this area and gives location (by Township, Range, and Section), precision information, and the date of last observation of the element at that location. This report includes elements known to occur within the specified project site, as well as elements known from similar landscapes near the site. Please note that "precision" reflects the resolution of original data. For example, an herbarium record from "4 miles east of Colorado Springs" provides much less spatial information than a topographic map showing the exact location of the occurrence. "Precision" codes of Seconds, Minutes, and General are defined in the footer of the enclosed report.

The report also outlines the status of known elements. We have included status according to Natural Heritage Program methodology and legal status under state and federal statutes. Natural Heritage ranks are standardized across the Heritage Program network, and are assigned for global and state levels of rarity. They range from "1" for critically imperiled or extremely rare elements, to "5" for those that are demonstrably secure.

You may notice that some occurrences do not have sections listed. Those species have been designated as "sensitive" due to their rarity and threats by human activity. Peregrine falcons, for example, are susceptible to human breeders removing falcon eggs from their nests. For these species, CNHP does not normally provide location information beyond township and range. Please contact us should you require more detailed information for sensitive occurrences.

There are no CNHP designated Potential Conservation Areas (PCAs) in the general project vicinity and no Network of Conservation Areas (NCAs). In order to successfully protect populations or occurrences, it is necessary to delineate conservation areas. These conservation areas focus on capturing the ecological processes that are necessary to support the continued existence of a particular element of natural heritage significance. Conservation areas may include a single occurrence of a rare element or a suite of rare elements or significant features.

The goal of the process is to identify a land area that can provide the habitat and ecological processes upon which a particular element or suite of elements depends for their continued existence. The best available knowledge of each species' life history is used in conjunction with information about topographic, geomorphic, and hydrologic features, vegetative cover, as well as current and potential land uses. The proposed boundary does not automatically exclude all activity. It is hypothesized that some activities will cause degradation to the element or the process on which they depend, while others will not. Consideration of specific activities or land use changes proposed within or adjacent to the preliminary conservation planning boundary should be carefully considered and evaluated for their consequences to the element on which the conservation unit is based.

The Colorado Division of Wildlife has legal authority over wildlife in the state. CDOW would therefore be responsible for the evaluation of and final decisions regarding any potential effects a proposed project may have on wildlife. If you would like more specific information regarding these or other vertebrate species in the vicinity of the area of interest, please contact the Colorado Division of Wildlife.

The information contained herein represents the results of a search of Colorado Natural Heritage Program's (CNHP) Biodiversity Tracking and Conservation System (BIOTICS), and can be used as notice to anticipate possible impacts or identify areas of interest. Care should be taken in interpreting these data. **No sensitive elements were found to directly overlap with the project area, however sensitive elements were found from within a two-mile radius of the proposed project area, and additional observations were found for CNHP watch-listed species within the search radius (see enclosed species and observation reports).** Please note that the absence of data for a particular area, species, or habitat does not necessarily mean that these natural heritage resources do not occur on or adjacent to the project site, rather that our files do not currently contain information to document their presence. CNHP information should not replace field studies necessary for more localized planning efforts, especially if impacts to wildlife habitat are possible.

Although every attempt is made to provide the most current and precise information possible, please be aware that some of our sources provide a higher level of accuracy than others, and some interpretation may be required. CNHP's data system is constantly updated and revised. Please contact CNHP for an update or assistance with interpretation of this natural heritage information.

The data contained in the report is the product and property of the Colorado Natural Heritage Program (CNHP), a sponsored program at Colorado State University (CSU). The data contained herein are provided on an as is, as available basis without warranties of any kind, expressed or implied, including (but not limited to) warranties of merchantability, fitness for a particular purpose, and non-infringement. CNHP, CSU and the state of Colorado further expressly disclaim any warranty that the data are error free or current as of the date supplied.

Sincerely,



Michael Menefee

Locations and Status of Rare and/or Imperiled Species and Natural Communities known from or likely to occur within a two-mile raidus of the Outlook at Nine Mile Project Area in Boulder County, Colorado (No Occurrences Directly Overlap with the Proposed Project Area)

Report generated: 31 March 2017

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EO_ID	major group	scientific name	common name	Prec	last obs	Town/ Range	Sec	TRS Note	grank	srank	eo-rank	ESA	fed stat	st stat
12,598	Natural Communities	*Typha (latifolia, angustifolia) Western Herbaceous Vegetation*	Narrow-leaf Cattail Marsh	S	1982-09-26	001N069W	36		G5	S5	E	-		

precision codes: S = "seconds", location known within 100m; M = "minutes", location known within 1 mile; G = "general", location known within 5 miles

	GNAME	SNAME	GCOMNAME	SCOMNAME	GRANK	SRANK	FEDSENS	SPROT	MAJORGRP
1	Lithobates pipiens	Lithobates pipiens	Northern Leopard Frog	Northern Leopard Frog	G5	S3	BLM/USFS	SC	Amphibians
2	Lithobates pipiens	Lithobates pipiens	Northern Leopard Frog	Northern Leopard Frog	G5	S3	BLM/USFS	SC	Amphibians
3	Lithobates pipiens	Lithobates pipiens	Northern Leopard Frog	Northern Leopard Frog	G5	S3	BLM/USFS	SC	Amphibians
4	Lithobates pipiens	Lithobates pipiens	Northern Leopard Frog	Northern Leopard Frog	G5	S3	BLM/USFS	SC	Amphibians
5	Lithobates pipiens	Lithobates pipiens	Northern Leopard Frog	Northern Leopard Frog	G5	S3	BLM/USFS	SC	Amphibians

	LABEL	USE_CLASS	TYPE	DISTANCE	UNIT	DIGI_COM	MAP_COM
1	UCM museum specimens	Undetermined	Estimated	100.00000000000	Meters	Mapped to UTMs.	UTMs provided. Accuracy of UTMs provided is unknown.
2	UCM museum specimens	Undetermined	Estimated	100.00000000000	Meters	Mapped to UTMs.	UTMs provided. Accuracy of UTMs provided is unknown.
3	CDOW herp database 010304	Undetermined	Estimated	50.00000000000	Meters	Mapped to UTMs.	UTMs provided.
4	CDOW herp database 010304	Undetermined	Estimated	50.00000000000	Meters	Mapped to UTMs.	UTMs provided.
5		Not applicable	Negligible	0.00000000000			Imprecise location. Mapped to LaFayette.

	DIGI_BASE	TWP	TDIR	RNG	RDIR	GITISEC	MERIDIAN	TOWNRANGE	SECTION	TRS
1	Accuracy Unknown	1.0	S	69.0	W	1	6	1.0S 69.0W	1	1.0S 69.0W 1
2	Accuracy Unknown	1.0	S	69.0	W	4	6	1.0S 69.0W	4	1.0S 69.0W 4
3	GPS - 25 meter accuracy	1.0	N	69.0	W	26	6	1.0N 69.0W	26	1.0N 69.0W26
4	GPS - 25 meter accuracy	1.0	N	69.0	W	27	6	1.0N 69.0W	27	1.0N 69.0W27
5	1:24,000 Quad - Digital	1.0	S	69.0	W	3	6	1.0S 69.0W	3	1.0S 69.0W 3

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Colorado Ecological Services Field Office
134 UNION BOULEVARD, SUITE 670
LAKEWOOD, CO 80228
PHONE: (303)236-4773 FAX: (303)236-4005
URL: www.fws.gov/coloradoES; www.fws.gov/platteriver

Consultation Code: 06E24000-2017-SLI-0655 March 16, 2017
Event Code: 06E24000-2017-E-01675
Project Name: Outlook at Nine Mile

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment

United States Department of Interior
Fish and Wildlife Service

Project name: Outlook at Nine Mile

Official Species List

Provided by:

Colorado Ecological Services Field Office
DENVER FEDERAL CENTER
P.O. BOX 25486
DENVER, CO 80225
(303) 236-4773
http://www.fws.gov/coloradoES
http://www.fws.gov/platteriver

Consultation Code: 06E24000-2017-SLI-0655
Event Code: 06E24000-2017-E-01675

Project Type: FIRE

Project Name: Outlook at Nine Mile
Project Description: This is a 47 acre proposed development in Boulder County at this property as mapped. It is in the early planning stages and I am doing wetland and T&E studies on the land itself.

Please Note: The FWS office may have modified the Project Name and/or Project Description, so it may be different from what was submitted in your previous request. If the Consultation Code matches, the FWS considers this to be the same project. Contact the office in the 'Provided by' section of your previous Official Species list if you have any questions or concerns.

Project Location Map:



Project Coordinates: MULTIPOLYGON (((-105.10274648666382 40.015027221583274, -105.10253190994264 40.01508474025258, -105.10125517845155 40.01520799438074, -105.10025739669801 40.01524907904065, -105.09961366653442 40.01515047581529, -105.09826183319092 40.014714976532545, -105.09663105010988 40.01459993852217, -105.0965988636017 40.01324411878978, -105.09745717048646 40.01324411878978, -105.0974464416504 40.01082822778672, -105.10024666786195 40.01083644524799, -105.10289669036867 40.01080357539697, -105.10290741920473 40.014977919828134, -105.10274648666382 40.015027221583274)))

Project Counties: Boulder, CO

Endangered Species Act Species List

There are a total of 12 threatened or endangered species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 5 of these species should be considered only under certain conditions. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

Birds	Status	Has Critical Habitat	Condition(s)
Least tern *(Sterna antillarum)* Population: interior pop.	Endangered		Water-related activities/use in the N. Platte, S. Platte and Laramie River Basins may affect listed species in Nebraska.
Mexican Spotted owl *(Strix occidentalis lucida)* Population: Wherever found	Threatened	Final designated	
Piping Plover *(Charadrius melodus)* Population: except Great Lakes watershed	Threatened	Final designated	Water-related activities/use in the N. Platte, S. Platte and Laramie River Basins may affect listed species in Nebraska.
Whooping crane *(Grus americana)* Population: Wherever found, except where listed as an experimental population	Endangered	Final designated	Water-related activities/use in the N. Platte, S. Platte and Laramie River Basins may affect listed species in Nebraska.

Fishes			
Greenback Cutthroat trout *(Oncorhynchus clarki stomias)* Population: Wherever found	Threatened		
Pallid sturgeon *(Scaphirhynchus albus)* Population: Wherever found	Endangered		Water-related activities/use in the N. Platte, S. Platte and Laramie River Basins may affect listed species in Nebraska.
Flowering Plants			
Colorado Butterfly plant *(Gaura neomexicana var. coloradensis)* Population: Wherever found	Threatened	Final designated	
Ute ladies'-tresses *(Spiranthes diluvialis)* Population: Wherever found	Threatened		
Western Prairie Fringed Orchid *(Platanthera praeclara)* Population: Wherever found	Threatened		Water-related activities/use in the N. Platte, S. Platte and Laramie River Basins may affect listed species in Nebraska.
Mammals			
Canada Lynx *(Lynx canadensis)* Population: Contiguous U.S. DPS	Threatened	Final designated	
North American wolverine *(Gulo gulo luscus)* Population: Wherever found	Proposed Threatened		

Preble's meadow jumping mouse *(Zapus hudsonius preblei)* Population: wherever found	Threatened	Final designated	

Critical habitats that lie within your project area

There are no critical habitats within your project area.

Appendix A: FWS National Wildlife Refuges and Fish Hatcheries

There are no refuges or fish hatcheries within your project area.

Appendix B: FWS Migratory Birds

The protection of birds is regulated by the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA). Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). The MBTA has no otherwise lawful activities. For more information regarding these Acts see:
http://www.fws.gov/birds/policies-and-regulations/laws-legislations/migratory-bird-treaty-act.php
http://www.fws.gov/birds/policies-and-regulations/laws-legislations/bald-and-golden-eagle-protection-act.php

All project proponents are responsible for complying with the appropriate regulations protecting birds when planning and developing a project. To meet these conservation obligations, proponents should identify potential or existing project-related impacts to migratory birds and their habitat and develop and implement conservation measures that avoid, minimize, or compensate for these impacts. The Service's Birds of Conservation Concern (2008) report identifies species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become listed under the Endangered Species Act as amended (16 U.S.C 1531 et seq.).

For information about Birds of Conservation Concern, go to:
http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php

For information about conservation measures that help avoid or minimize impacts to birds, please visit:
http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php

To search and view summaries of year-round bird occurrence data within your project area, go to the Avian Knowledge Network Histogram Tools at:
http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/akn-histogram-tools.php

Migratory birds that may be affected by your project:

There are 25 birds on your migratory bird list. The list may include birds occurring outside this FWS office jurisdiction.

Species Name	Bird of Conservation Concern (BCC)	Seasonal Occurrence in Project Area
American bittern *(Botaurus lentiginosus)*	Yes	Breeding
Bald eagle *(Haliaeetus leucocephalus)*	Yes	Year-round
Black Rosy-Finch *(Leucosticte atrata)*	Yes	Year-round
Black Swift *(Cypseloides niger)*	Yes	Breeding
Brewer's Sparrow *(Spizella breweri)*	Yes	Breeding
Burrowing Owl *(Athene cunicularia)*	Yes	Breeding
Cassin's Finch *(Carpodacus cassinii)*	Yes	Year-round
Dickcissel *(Spiza americana)*	Yes	Breeding
Ferruginous hawk *(Buteo regalis)*	Yes	Year-round
Flammulated owl *(Otus flammeolus)*	Yes	Breeding
Golden eagle *(Aquila chrysaetos)*	Yes	Year-round
Lark Bunting *(Calamospiza melanocorys)*	Yes	Breeding
Lewis's Woodpecker *(Melanerpes lewis)*	Yes	Breeding
Loggerhead Shrike *(Lanius ludovicianus)*	Yes	Breeding
Long-Billed curlew *(Numenius americanus)*	Yes	Breeding
Mountain plover *(Charadrius montanus)*	Yes	Breeding

Peregrine Falcon *(Falco peregrinus)*	Yes	Breeding
Prairie Falcon *(Falco mexicanus)*	Yes	Year-round
Sage Thrasher *(Oreoscoptes montanus)*	Yes	Breeding
Short-eared Owl *(Asio flammeus)*	Yes	Wintering
Swainson's hawk *(Buteo swainsoni)*	Yes	Breeding
Virginia's Warbler *(Vermivora virginiae)*	Yes	Breeding
Western grebe *(aechmophorus occidentalis)*	Yes	Breeding
Williamson's Sapsucker *(Sphyrapicus thyroideus)*	Yes	Breeding
Willow Flycatcher *(Empidonax traillii)*	Yes	Breeding

Appendix C: NWI Wetlands

The U.S. Fish and Wildlife Service is the principal Federal agency that provides information on the extent and status of wetlands in the U.S., via the National Wetlands Inventory Program (NWI). In addition to impacts to wetlands within your immediate project area, wetlands outside of your project area may need to be considered in any evaluation of project impacts, due to the hydrologic nature of wetlands (for example, project activities may affect local hydrology within, and outside of, your immediate project area). It may be helpful to refer to the USFWS National Wetland Inventory website. The designated FWS office can also assist you. Impacts to wetlands and other aquatic habitats from your project may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal Statutes. Project Proponents should discuss the relationship of these requirements to their project with the Regulatory Program of the appropriate U.S. Army Corps of Engineers District.

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery and/or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Exclusions - Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Precautions - Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of

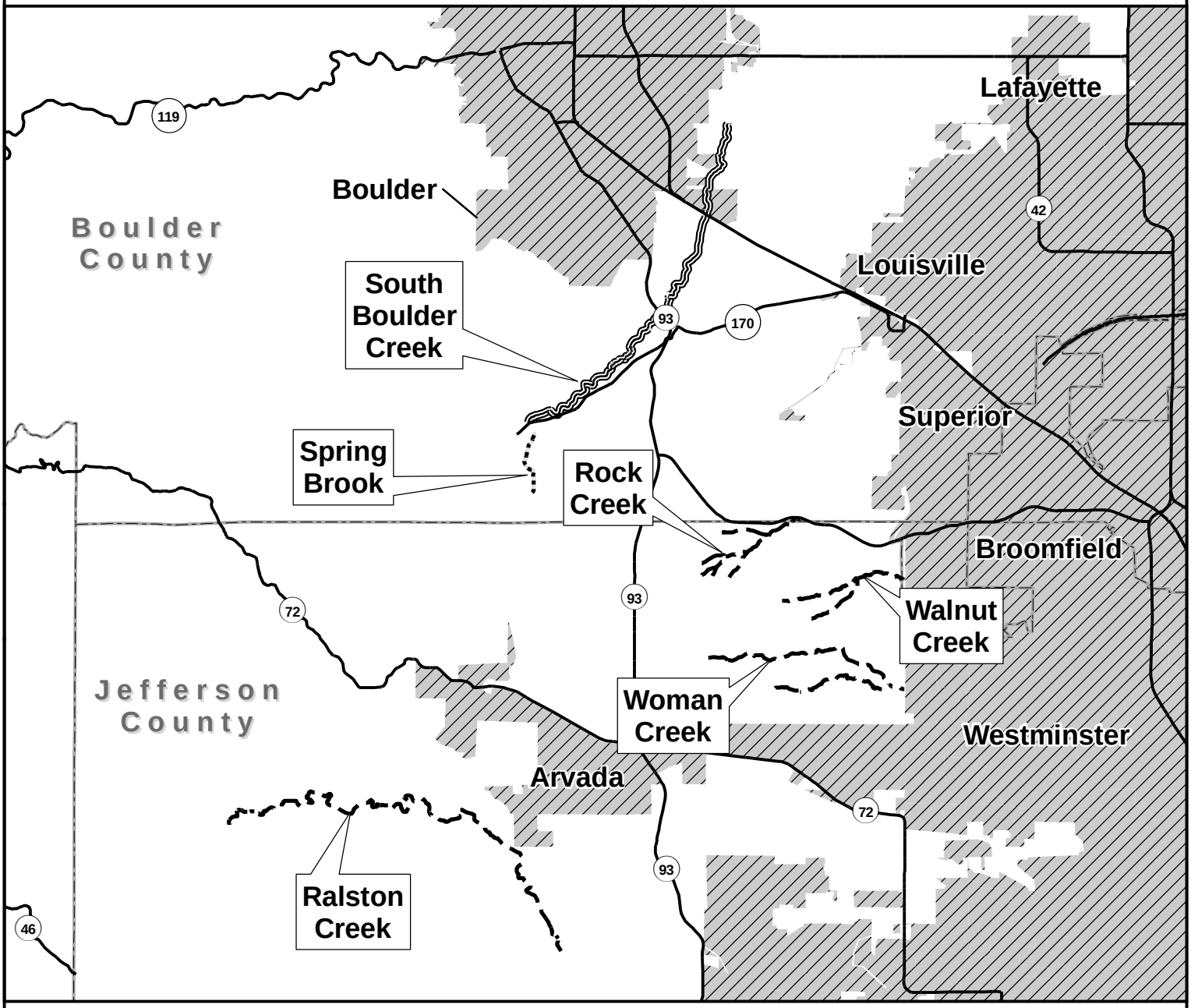
this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

The following NWI Wetland types intersect your project area in one or more locations. To understand the NWI Classification Code, see https://ecos.fws.gov/ipac/wetlands/decoder. To view the National Wetlands Inventory on a map go to http://www.fws.gov/wetlands/Data/Mapper.html.

Wetland Types	NWI Classification Code
Freshwater Pond	PUBG

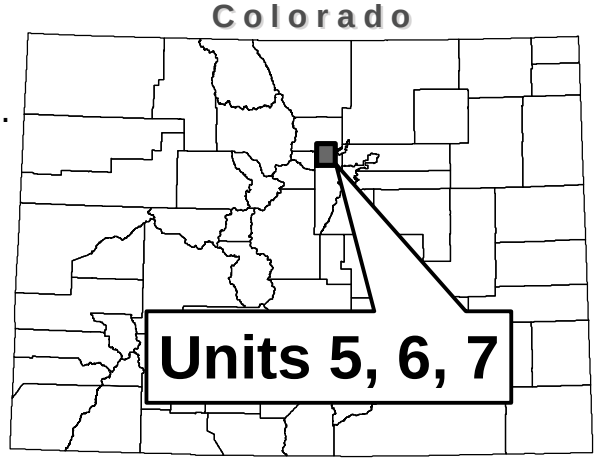
Critical Habitat for the Preble's Meadow Jumping Mouse

Unit 5 - South Boulder Creek, Unit 6 - Rocky Flats Site, Unit 7 - Ralston Creek



Critical habitat equals the stream plus the following distance outward on each side.

- 110 meters (361 ft)
- 120 meters (394 ft)
- 140 meters (459 ft)
- Major Roads
- Municipal Lands



0 1 2 3
Miles

N

0 1 2 3 4 5
Kilometers

Note: Critical Habitat without name labels are unnamed tributaries.

Traffic Impact Study

Nine Mile
Erie, Colorado

Prepared for:

Evergreen Devco, Inc.

Kimley»Horn

T R A F F I C I M P A C T S T U D Y

Nine Mile

Erie, Colorado

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April 2017

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1.0 EXECUTIVE SUMMARY

Nine Mile, a residential and commercial development, is proposed to be located on the southeast corner of the Arapahoe Road and US-287 intersection in Erie, Colorado. The project includes an approximate 130,000 square foot grocery marketplace, 130,000 square foot home improvement store, 308 apartments, a 7,150-square foot high turnover sit down restaurant, two fast food restaurants (8,300 square feet total), an 18 fueling position gas station, and 20,350 square feet of retail. The apartments are anticipated to be constructed by 2019 and the commercial portion of the project by 2020. Analysis was completed for the anticipated build out of the development in 2019 and 2020, as well as the 2040 long-term horizon to determine intersection and roadway configurations needed at all three planning horizons per the Town of Eire and State of Colorado Department of Transportation (CDOT) requirements.

The purpose of this study is to identify project traffic generation characteristics, to identify potential project traffic related impacts on the local street system, and to develop mitigation measures required for identified impacts. The following intersections were incorporated into this traffic study based on the Town of Erie and CDOT requirements:

- Arapahoe Road and US-287
- Arapahoe Road Full Movement Access (Safeway)
- Arapahoe Road and Beasley Drive
- Lucerne Drive and US-287

The proposed project access intersections along Arapahoe Road and US-287 were also studied.

Regional access to the project site is expected from Baseline Road, Arapahoe Road, and US-287. Primary access to the project will be provided by Arapahoe Road and US-287. With the completion of the project, direct access is proposed from a right-in/right-out and two full movement access intersections along Arapahoe Road, and a right-in/right-out access intersection and full movement access intersection along US-287. The two full movement access intersections along Arapahoe Road are proposed to align with the Safeway full movement and Beasley Drive intersections. The right-in/right-out access along Arapahoe Road is proposed approximately half way between US-287 and the existing Safeway access. The right-in/right-out access along US-287 is proposed approximately 800 feet, measured center to

center, south of Arapahoe Road. The full movement access along US-287 is proposed approximately one-quarter mile (1,320 feet), measured center to center, south of Arapahoe Road.

Build out of the Nine Mile residential portion of the development in 2019 is expected to generate approximately 1,990 daily weekday trips. Of these, 155 trips are expected to occur during the morning peak hour, while 187 trips are expected during the afternoon peak hour. Full build out of Nine Mile residential/commercial development on the southeast corner of the Arapahoe Road and US-287 intersection in 2020 is expected to generate approximately 18,184 daily weekday driveway trips. Of these, 1,143 driveway trips are expected to occur during the morning peak hour, while 1,466 driveway trips are expected during the afternoon peak hour. Since the project is a commercial development, pass-by trips are expected. These pass-by trips are vehicles already on the street network that will be attracted to the grocery store, adjacent retail, and gas station. With pass-by, expected net new trips to the surrounding street network results in an anticipated 11,882 weekday daily trips, of which 701 and 990 trips are anticipated to be new (non pass-by) during the weekday morning and afternoon peak hours, respectively.

Distribution of site traffic on the street system was based on the area street characteristics, existing traffic patterns, demographic information, anticipated surrounding development areas, and the proposed access system for the project. Assignment of project traffic was based upon the trip generation described previously and the distributions developed. The traffic assignment was added to the background traffic volumes to determine future traffic with the project.

Based on the analysis presented in this report, Kimley-Horn believes the traffic anticipated from the proposed Nine Mile project on the southeast corner of the Arapahoe Road and US-287 intersection will be incorporated into the existing and future roadway network. Analysis of the existing street network, the proposed project development, and expected traffic volumes resulted in the following recommendations:

2019 Horizon Recommendations

With development of the multi-family portion of Nine Mile, access improvements are recommended to serve this portion of development. It is proposed that full movement access will be provided by both Arapahoe Road and US-287.

- A new south leg is recommended to be constructed at the Arapahoe Road and Beasley Drive intersection to provide access to the project. With this new access, it is recommended that this intersection be signalized. It is recommended that a westbound left turn lane of 150 feet in length plus 100-foot taper be designated along Arapahoe Road. The new northbound approach is recommended to include separate left turn and through/right turn lanes. A northbound left turn lane of 100 feet with 50-foot taper is recommended. The southbound approach of Beasley Drive to the intersection is recommended to also be striped to include a separate left turn lane and shared through/right turn lane as well to provide for more efficient signal operations. Separate right turn lanes are not anticipated to be needed for any approach to this intersection.
- A new full movement access is recommended along US-287, approximately ¼-mile south of the Arapahoe Road intersection. This access intersection is recommended to operate with stop control with a R1-1 "STOP" sign installed on the westbound approach. It is recommended that this westbound approach include separate left turn (200 feet in length) and right turn lanes, with enough pavement width for future westbound dual left turn lanes.
- A southbound left turn lane, length of 500 feet (to accommodate the full buildout 2020 traffic volume) plus 300-foot taper (725-foot total length), is recommended to be designated along US-287 at the proposed full movement access. The existing painted full lane width double yellow centerline striped median is recommended to be restriped to accommodate this southbound left turn lane.
- A northbound right turn deceleration lane is recommended to be designated for the full movement access along US-287. Adequate pavement width exists for this turn lane today. Therefore, it is recommended that northbound US-287 be restriped to account for this recommended northbound right turn deceleration lane back to the Lucerne Drive intersection located approximately 350 feet to the south.
- To improve operations of the existing westbound left turn at the Lucerne Drive/US-287 intersection, the City of Lafayette and/or CDOT could consider designating separate left turn and right turn lanes on this approach. If a separate left turn lane were designated, it is recommended that it include a length of 75 feet with a 50-foot taper to not impact the Lucerne Drive/Sedge Way intersection to the east.

2020 Horizon Recommendations

With development of the commercial portion of Nine Mile on the southeast corner of the Arapahoe Road and US-287 intersection, several improvements are recommended to improve traffic operations. The improvements recommended are those that are believed to be feasible to construct with the development of the project.

- It is recommended that Arapahoe Road be widened to include two eastbound through lanes adjacent to the project.
- It is recommended that the Arapahoe Road/US-287 signalized intersection include dual westbound left turn lanes, dual eastbound left turn lanes, two eastbound through lanes, and dual southbound left turn lanes. The widening of Arapahoe Road along the south side of the roadway adjacent to the project will allow for the eastbound and westbound dual left turn lanes along with the two eastbound through lanes. The southbound dual left turn lanes can be designated within the existing striped out area along US-287. A traffic signal modification will be needed at the intersection to accommodate these additional turn lanes.
- The proposed right-in/right-out access along Arapahoe Road is recommended to operate with stop control on the new northbound exiting access approach with the installation of a R1-1 "STOP" sign. A separate right turn lane is not anticipated to be needed on the eastbound approach. To provide signage for the proposed right-in/right-out restricted access along Arapahoe Road, it is recommended that a R6-1(R) "ONE WAY" sign be installed within the raised median in alignment of exiting traffic from the proposed access.
- It is recommended that the northbound right turn movement at the Arapahoe Road right-in/right-out intersection provide a minimum throat depth of 50 feet (2 vehicles).
- The full movement access proposed along Arapahoe Road to align with the existing full movement access for Safeway is recommended to be signalized. The new northbound approach to the intersection is recommended to include separate left turn and shared through/right turn lanes. The southbound approach should also be designated with this configuration if possible to provide the most efficient signal operations. Northbound and southbound left turn lanes of 100 feet with 50-foot tapers is recommended. A westbound left turn lane of 150 feet with 100-foot taper is recommended along Arapahoe Road for the new access. Separate right turn lanes are not anticipated to be needed on any approaches.

- The proposed full movement access intersection along US-287 is recommended to be signalized. With signalization, the westbound approach is recommended to include dual left turn lanes and a separate right turn lane.
- A new right-in/right-out access along US-287 is recommended to be constructed to serve the commercial property, to be located approximately 800 feet, measured center to center, south of Arapahoe Road. It is recommended that the existing third northbound auxiliary lane along US-287 be restriped to include continuous auxiliary acceleration to deceleration lanes between the accesses and Arapahoe Road. With the presence of a northbound acceleration lane along US-287 for westbound to northbound right turn exiting vehicles to turn into, stop control isn't necessarily needed, although it may still be recommended to identify control by installing either a R1-1 "STOP" or R1-2 "YIELD" sign. To further identify this proposed access along US-287 to right turn movements only it is recommended that a R3-2 No Left Turn sign be placed underneath the STOP sign. An additional R3-2 No Left Turn sign could be located so it is visible to southbound drivers along US-287 (on the southeast corner of the right-in/right-out access intersection) to restrict left turn entrance movements as well.
- It is recommended that the westbound right turn movement at the US-287 right-in/right-out intersection provide a minimum throat depth of 50 feet (2 vehicles).

2040 Horizon Recommendations

Based on the conservative annual traffic volume growth rate of three percent per year, several capacity improvements may be needed in the future to accommodate traffic within the area. Although the likely possible and planned street network improvements will still not adequately accommodate traffic if volumes actually double within the next 23 years to the 2040 horizon as a three percent annual growth rate would indicate. The following provides recommendations that will likely be needed to accommodate future traffic volumes:

- If future projected traffic volume growth is realized, US-287 may need to provide three or four through lanes in each direction, northbound and southbound. It is recommended that CDOT continue to monitor traffic volumes in the future to determine if and when the highway may need to include capacity improvements for possible increased through lane capacity in each direction.
- Arapahoe Road is anticipated to require two through lanes in each direction, eastbound and westbound, through the study area and further to the east and west. When Arapahoe Road is improved to include two westbound through lanes, it is

recommended that dual northbound left turn lanes be implemented at the existing Arapahoe Road and US-287 signalized intersection.

- A new west leg is anticipated to be constructed for the development area along the west side of US-287 to align with the Nine Mile full movement signalized access. It is recommended that the eastbound approach also include dual left turn lanes and a separate right turn lane. Whenever this area develops and a new west leg is constructed at the intersection, a northbound left turn lane will be required, which will precipitate the need for the existing Lucerne Drive/US-287 intersection to be restricted to right-in/right-out movements only. There is a limited westbound left turn volume, so restriction of the westbound left out from Lucerne Drive to southbound US-287 isn't anticipated to have a significant impact and will improve safety of the intersection. Street network connections exist that will allow traffic to reroute through the neighborhood for traffic wishing to turn left at this intersection.

General Recommendation

- All on-site and off-site roadway improvements should be incorporated into the Civil Drawings, and conform to standards of the Town of Erie and CDOT (as appropriate), American Association of State Highway and Transportation Officials (AASHTO) Geometric Design of Highways and Streets, Institute of Transportation Engineers (ITE), and the Manual on Uniform Traffic Control Devices (MUTCD) – 2009 Edition.

2.0 INTRODUCTION

Kimley-Horn and Associates, Inc. has prepared this report to document the results of a Traffic Impact Study of future traffic conditions associated with the proposed Nine Mile project to be located on the southeast corner of the Arapahoe Road and US-287 intersection in Erie, Colorado. A vicinity map illustrating the project location with respect to the surrounding area is shown in **Figure 1**.

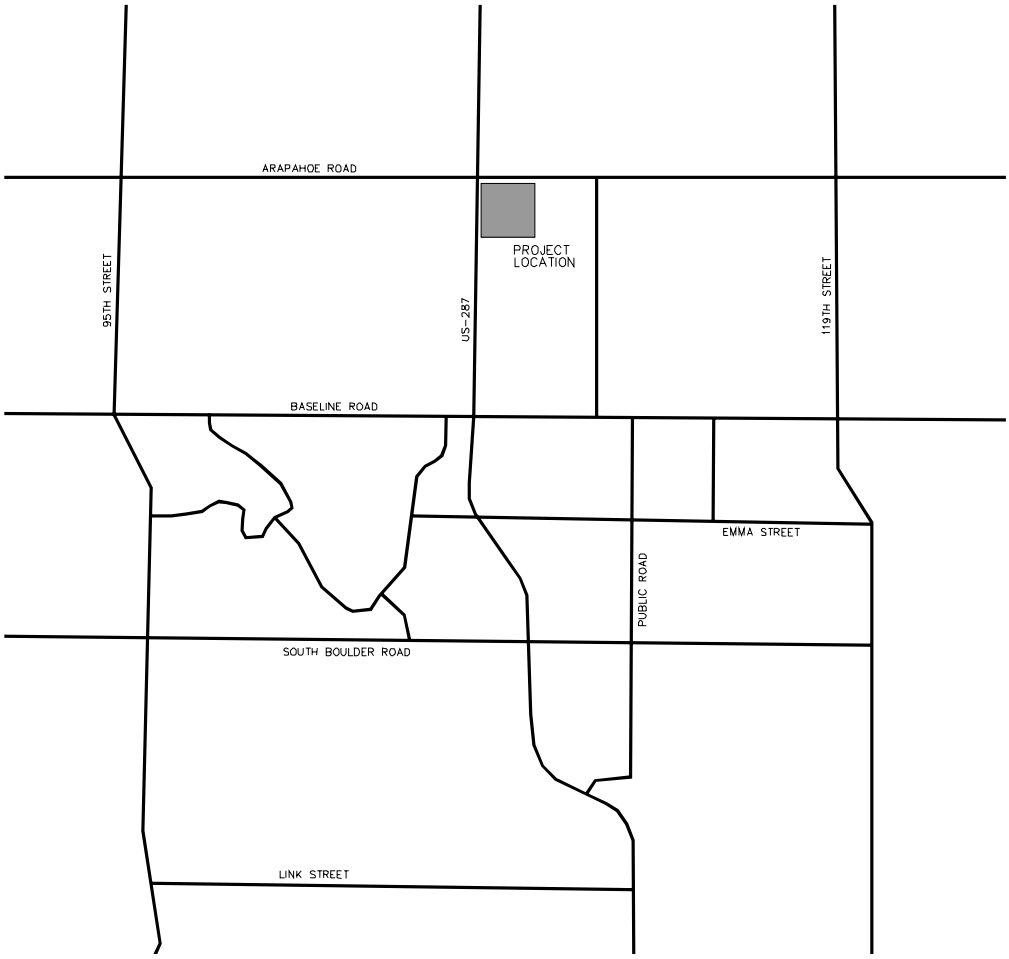
The Nine Mile project includes an approximate 130,000 square foot grocery marketplace, 130,000 square foot home improvement store, 308 apartments, a 7,150-square foot high turnover sit down restaurant, two fast food restaurants (8,300 square feet total), an 18 fueling position gas station, and 20,350 square feet of retail. The apartments are anticipated to be constructed by 2019 and the commercial portion of the project by 2020. Analysis was completed for the anticipated build out of the development in 2019 and 2020, as well as the 2040 long-term horizon to determine intersection and roadway configurations needed at all three planning horizons per the Town of Eire and State of Colorado Department of Transportation (CDOT) requirements. A site plan illustrating the proposed development is provided in **Appendix F**.

The purpose of this study is to identify project traffic generation characteristics, to identify potential project traffic related impacts on the local street system, and to develop mitigation measures required for identified impacts. The following intersections were incorporated into this traffic study based on the Town of Erie and CDOT requirements:

- Arapahoe Road and US-287
- Arapahoe Road Full Movement Access (Safeway)
- Arapahoe Road and Beasley Drive
- Lucerne Drive and US-287

The proposed project access intersections along Arapahoe Road and US-287 were also studied.

NTS 096266012



NINE MILE
ERIE, COLORADO
VICINITY MAP

FIGURE 1

3.0 EXISTING AND FUTURE CONDITIONS

3.1 Existing Study Area

The existing site is comprised of vacant land, previously containing Prince Lake Number 1. The surrounding area contains a mix of uses; primarily vacant land, residential, and commercial. Adjacent to the proposed project site to the west, vacant land exists. To the east and south residential uses exist. To the north, a Safeway anchored shopping center and residential uses exist.

3.2 Existing and Future Roadway Network

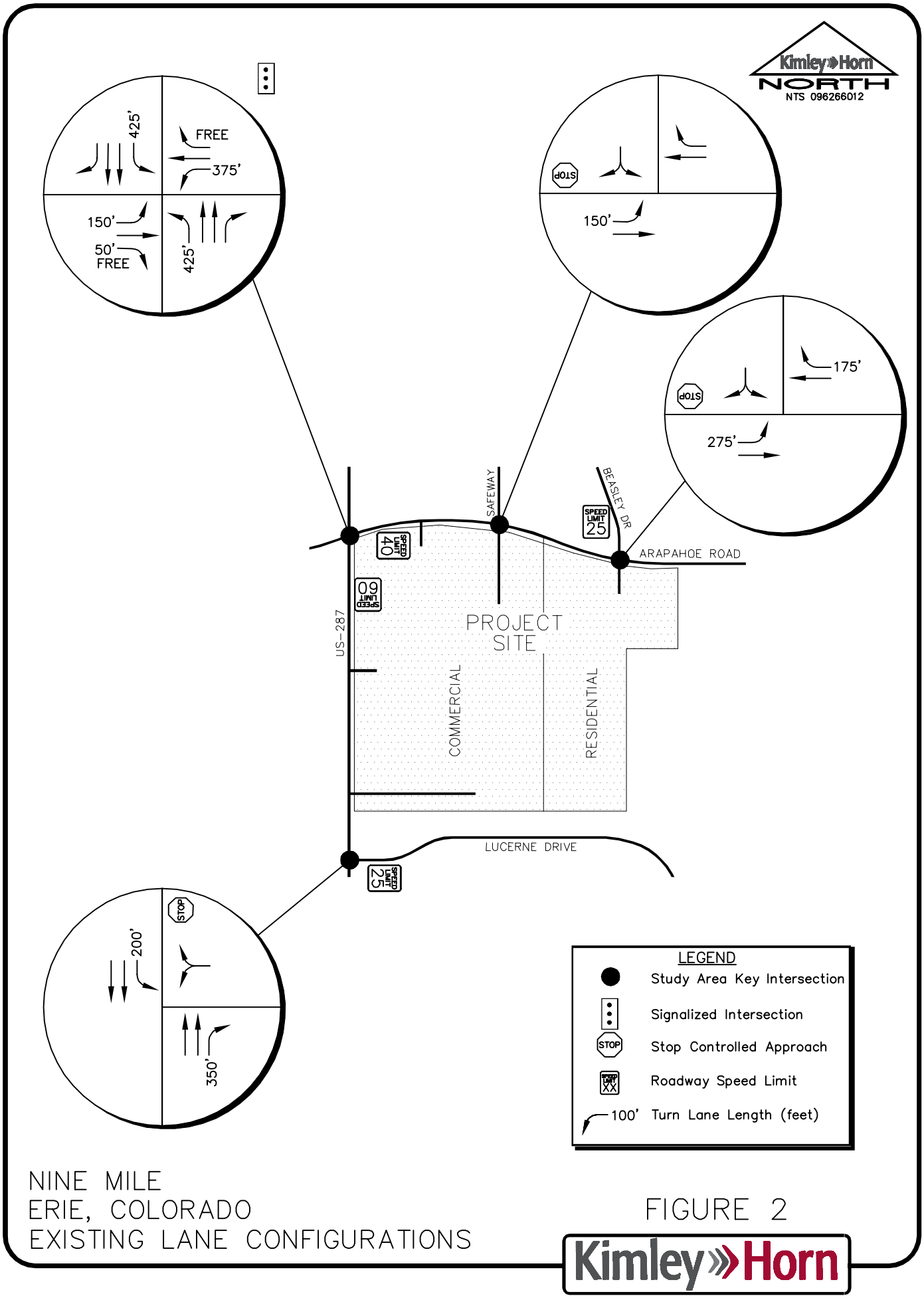
Regional access to the project site is expected from Baseline Road, Arapahoe Road, and US-287. Primary access to the project will be provided by Arapahoe Road and US-287. With the completion of the project, direct access is proposed from a right-in/right-out and two full movement access intersections along Arapahoe Road, and a right-in/right-out access intersection and full movement access intersection along US-287. The two full movement access intersections along Arapahoe Road are proposed to align with the Safeway full movement and Beasley Drive intersections. The right-in/right-out access along Arapahoe Road is proposed approximately half way between US-287 and the existing Safeway access. The right-in/right-out access along US-287 is proposed approximately 800 feet, measured center to center, south of Arapahoe Road. The full movement access along US-287 is proposed approximately one-quarter mile (1,320 feet), measured center to center, south of Arapahoe Road.

Arapahoe Road includes one lane of travel each direction, eastbound and westbound, with the westbound direction including one through lane and a continuous right turn lane between US-287 and Beasley Drive. Arapahoe Road has a posted speed limit of 40 miles per hour. Lucerne Drive provides one lane of travel each direction, eastbound and westbound, and has a 25 mile per hour posted speed limit. US-287 is a Colorado Department of Transportation (CDOT) highway designated as an NR-A: Non-Rural Principal Highway. US-287 provides two lanes of travel each direction, northbound and southbound, with a 60 mile per hour posted speed limit. A continuous acceleration/deceleration lane is present adjacent to the project along US-287. Beasley Drive provides one lane of travel each direction, northbound and southbound, and has a 25 mile per hour posted speed limit.

The existing intersection of Arapahoe Road and US-287 is signalized and operates with protected left turn phasing on the northbound and southbound approaches and protected-permitted left turn phasing on the eastbound and westbound approaches. The eastbound and westbound approaches consist of a left turn lane, one through lane, and a "free" channelized right turn lane. The northbound and southbound approaches consist of a left turn lane, two through lanes, and a right turn lane. The existing Arapahoe Road and Safeway access is a "T"-intersection with stop control on the southbound approach. The eastbound approach consists of a left turn lane and one through lane while the westbound approach consists of one through lane and a right turn lane. The southbound approach consists of a single approach lane. The existing Arapahoe Road and Beasley Drive intersection is a "T"-intersection with stop control on the southbound approach. The eastbound approach consists of a left turn lane and one through lane, while the westbound approach consists of one through lane and a right turn lane. The southbound approach consists of a single approach lane. The existing intersection of Lucerne Drive and US-287 is a "T"-intersection with stop control on the westbound approach. The westbound approach consists of a single approach lane. The northbound approach consists of two through lanes and a right turn lane while the southbound approach consists of a left turn lane and two through lanes. The intersection lane configuration and control for the existing study area key intersection is shown in **Figure 2**.

3.3 Existing Traffic Volumes

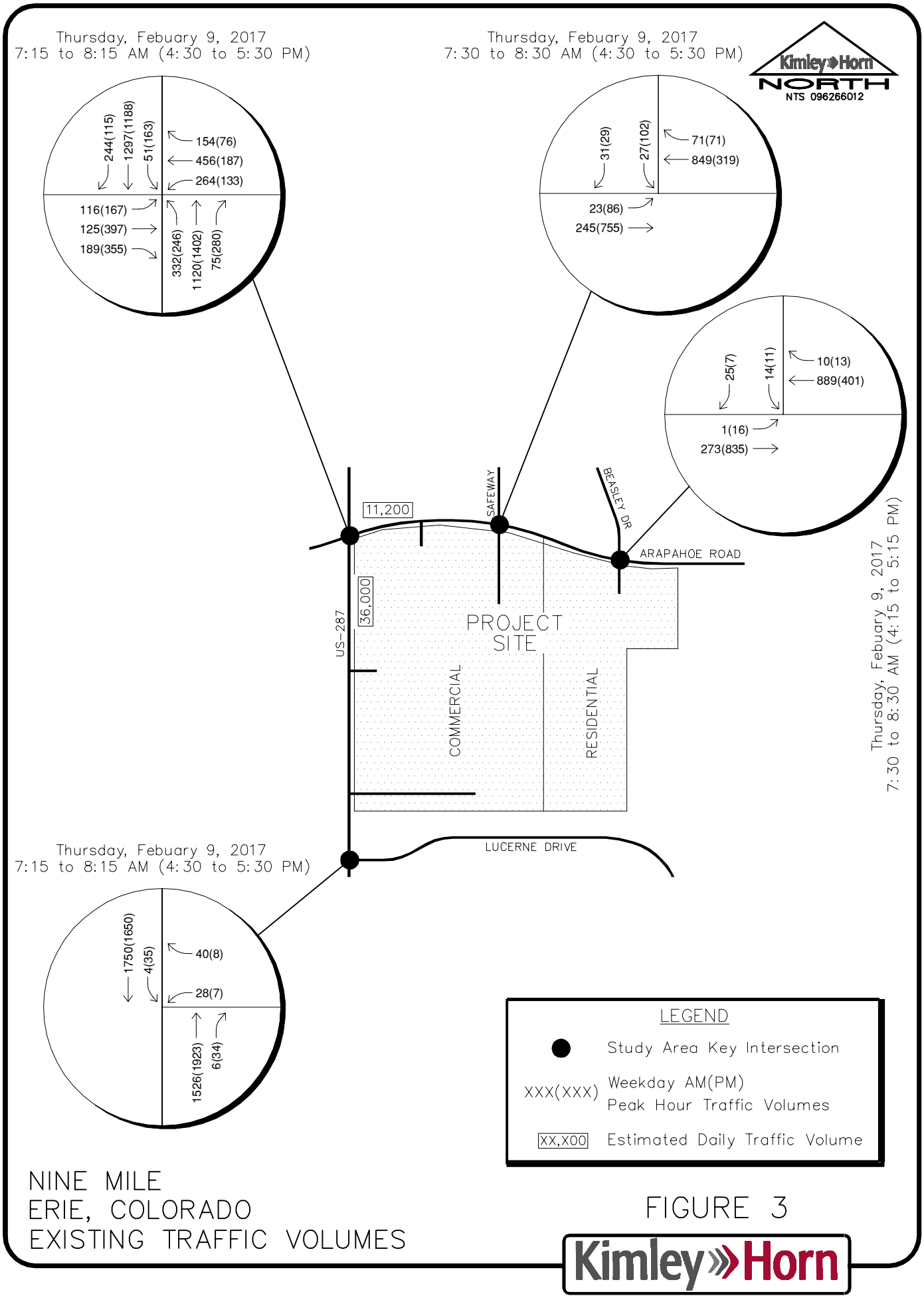
Existing peak hour turning movement counts were conducted at the existing study key intersection on Thursday, February 9, 2017 for the morning and afternoon peak hours. The counts were obtained in 15-minute intervals during the AM peak hour and PM peak hour of adjacent street traffic from 7:00 AM to 9:00 AM and 4:00 PM to 6:00 PM, respectively. The peak hour volumes from these counts are shown in **Figure 3** with the data count sheets provided in **Appendix A**.



NINE MILE
ERIE, COLORADO
EXISTING LANE CONFIGURATIONS

FIGURE 2

Kimley»Horn



NINE MILE
ERIE, COLORADO
EXISTING TRAFFIC VOLUMES

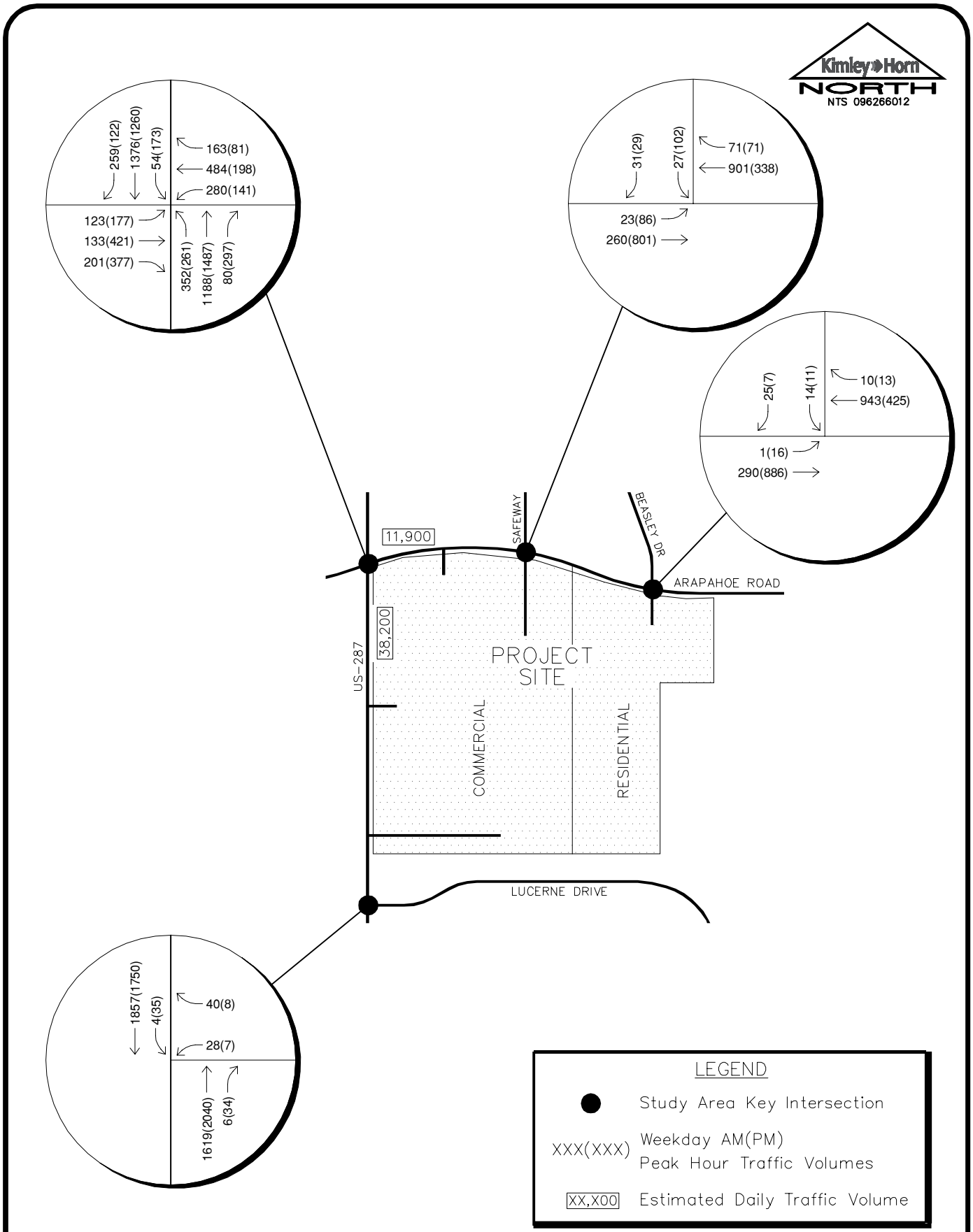
FIGURE 3

Kimley»Horn

3.4 Unspecified Development Traffic Growth

According to information provided on the website for the Colorado Department of Transportation (CDOT), the 20-year growth factor along US-287 is 1.79 just south of Arapahoe Road. This value equates to annual growth rates of approximately three percent. Traffic information from the CDOT Online Transportation Information System (OTIS) website is included in **Appendix B**. Based on this, an annual growth rate of three (3) percent was used to calculate future traffic volumes. This annual growth rate was used to estimate near term 2019 and 2020 scenarios, as well as the long term 2040 traffic volume projections at the key intersections without construction of the project.

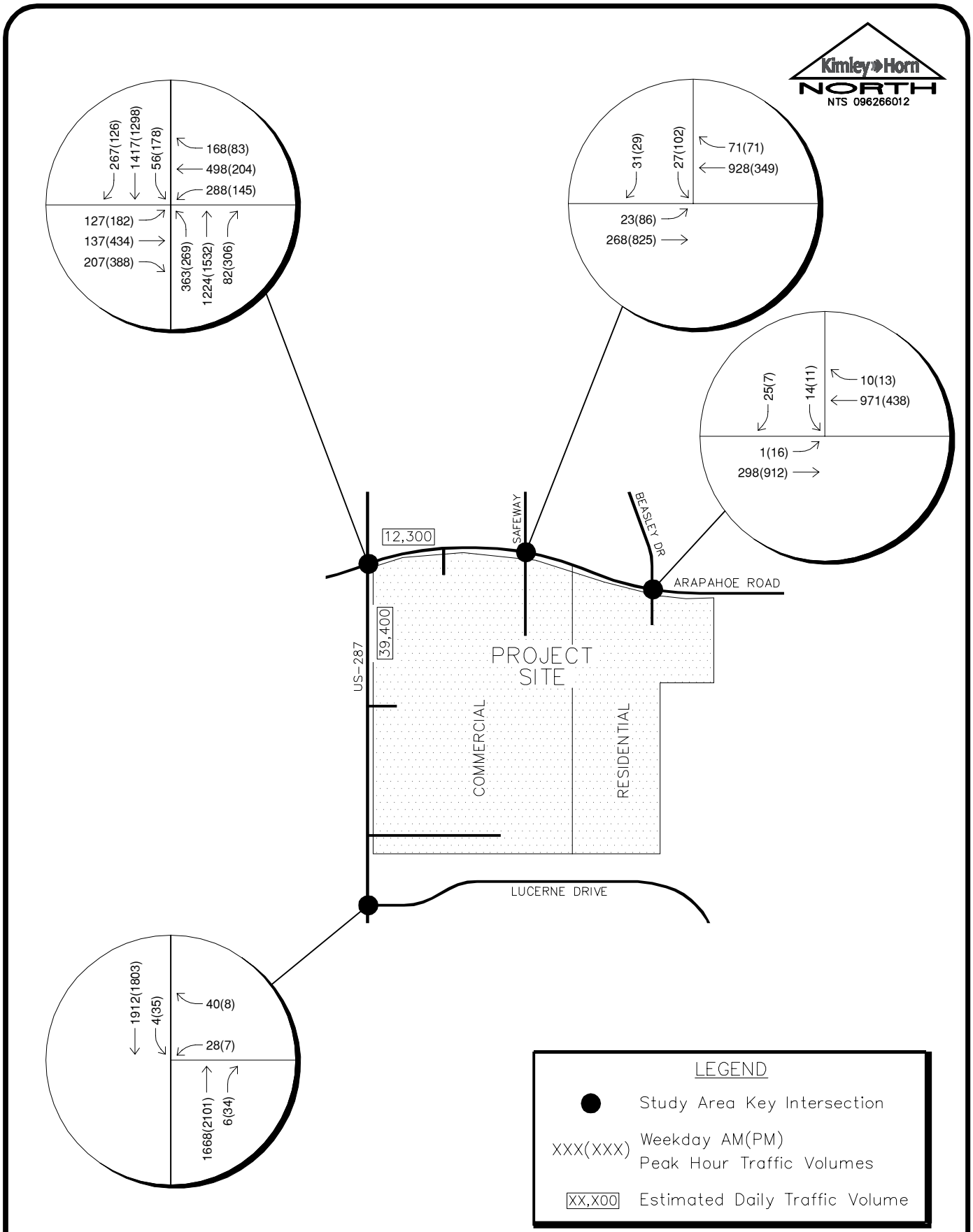
In addition, traffic for the developments anticipated to occur on the southwest corner of the Arapahoe Road and US-287 intersection were included in the 2040 study horizon. These developments include the Lafayette Promenade, Tractor Supply, SILO (Weems or HeartEye Village), and the vacant land directly located on the southwest corner of the Arapahoe Road and US-287 intersection. Background traffic volumes for the near term 2019 and 2020 scenarios, as well as the long term 2040 horizon are shown in **Figures 4** through **6**, respectively.



NINE MILE
ERIE, COLORADO
2019 BACKGROUND TRAFFIC VOLUMES

FIGURE 4

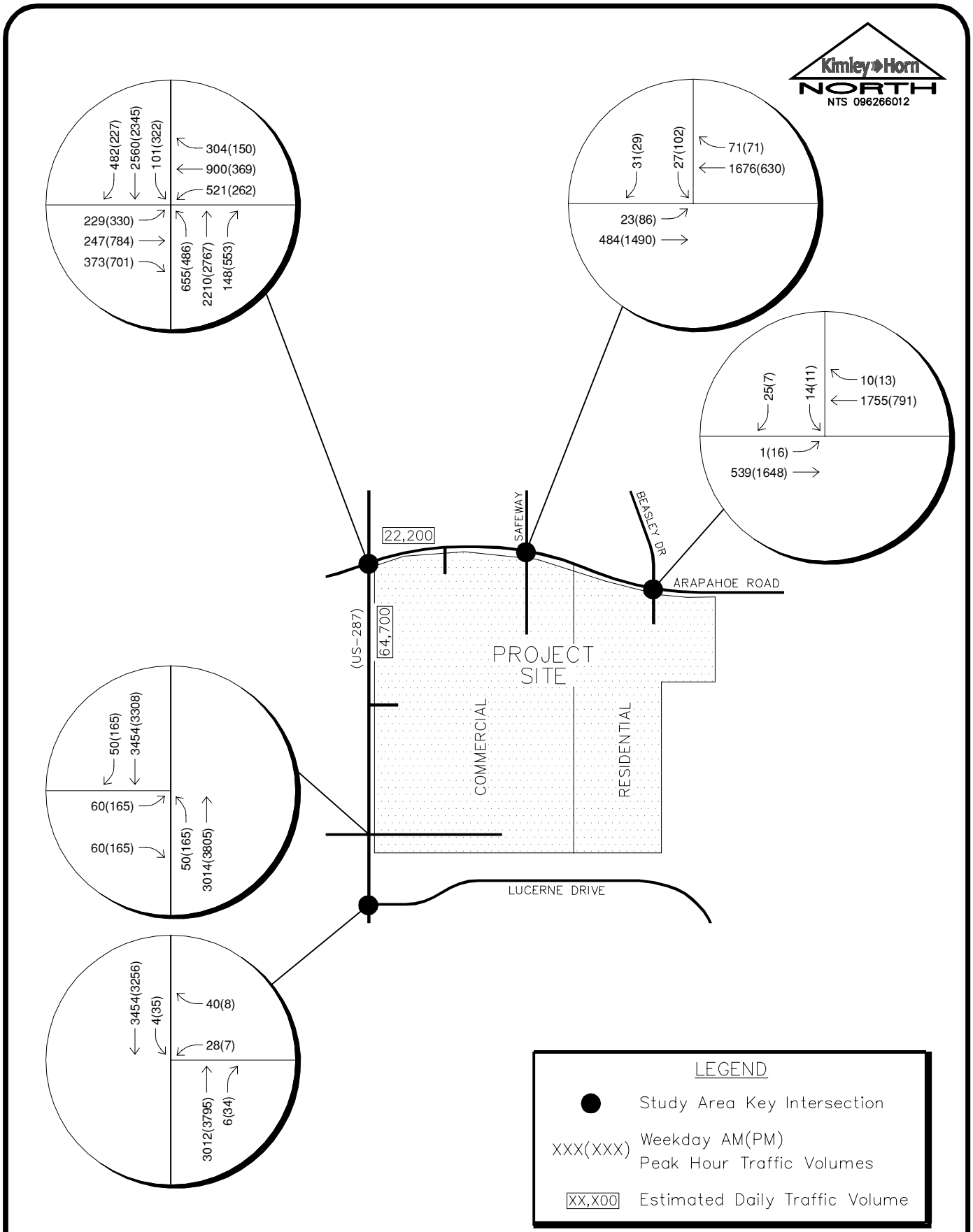
Kimley»Horn



NINE MILE
ERIE, COLORADO
2020 BACKGROUND TRAFFIC VOLUMES

FIGURE 5

Kimley»Horn



NINE MILE
ERIE, COLORADO
2040 BACKGROUND TRAFFIC VOLUMES

FIGURE 6

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4.0 PROJECT TRAFFIC CHARACTERISTICS

4.1 Trip Generation

Site-generated traffic estimates are determined through a process known as trip generation. Rates and equations are applied to the proposed land uses to estimate traffic generated by the development during a specific time interval. The acknowledged source for trip generation rates is the *Trip Generation*[1] report published by the Institute of Transportation Engineers (ITE). ITE has established trip rates in nationwide studies of similar land uses. The Nine Mile project includes an approximate 130,000 square foot grocery marketplace, 130,000 square foot home improvement store, 308 apartments, a 7,150-square foot high turnover sit down restaurant, two fast food restaurants (8,300 square feet total), an 18 fueling position gas station, and 20,350 square feet of retail. The apartments are anticipated to be constructed by 2019 and the commercial portion of the project by 2020.

The ITE Trip Generation fitted curve and average trip rates that apply to Apartments (ITE Code 220), Free-Standing Discount Superstore (813), Specialty Retail Center (826), Home Improvement Superstore (862), High Turnover Sit-Down Restaurant (932), Fast Food Restaurant with Drive-Through Window (934), and Gasoline Service Station (944) were used to estimate traffic generated by the proposed development. Of note, the Discount Superstore land use was chosen as this grocery store is proposed as the large marketplace store that includes grocery items and dry goods. Therefore, the Discount Superstore is believed to be the more applicable data use for estimating trip generation.

Since a mix of uses, grocery store marketplace, retail, restaurants, and gas station are all proposed within the same development, it is anticipated that traffic will be shared between the uses. Therefore, the ITE internal capture procedure was used to determine the amount of traffic that may be shared, which thereby determines the number of external trips. The internal capture methodology and procedure as well as the pass-by percentages for each use were obtained from the ITE “Trip Generation Manual, Ninth Edition Volume 1, Users Guide and Handbook” 2012.

[1] Institute of Transportation Engineers, *Trip Generation: An Information Report*, Ninth Edition, Washington DC, 2012.

Based on this, build out of the Nine Mile residential portion of the development in 2019 is expected to generate approximately 1,990 daily weekday trips. Of these, 155 trips are expected to occur during the morning peak hour, while 187 trips are expected during the afternoon peak hour. The full build out of Nine Mile residential/commercial development on the southeast corner of the Arapahoe Road and US-287 intersection in 2020 is expected to generate approximately 18,184 daily weekday driveway trips. Of these, 1,143 driveway trips are expected to occur during the morning peak hour, while 1,466 driveway trips are expected during the afternoon peak hour. Since the project is a commercial development, pass-by trips are expected. These pass-by trips are vehicles already on the street network that will be attracted to the grocery store, adjacent retail, and gas station. With pass-by, expected net new trips to the surrounding street network results in an anticipated 11,882 weekday daily trips, of which 701 and 990 trips are anticipated to be new (non pass-by) during the weekday morning and afternoon peak hours, respectively.

The pass-by percentages for each use were obtained from the ITE “Trip Generation Manual, Ninth Edition Volume 1, Users Guide and Handbook” 2012. Of note, the afternoon peak hour pass-by rates were applied to the morning peak hour and daily if data wasn’t available as these rates are anticipated to be similar throughout the day. **Table 1** summarizes the estimated traffic generation for the proposed development. Trip generation worksheets are included in **Appendix C**. These calculations illustrate the equations used and directional distribution of trips based on the published ITE Trip Generation Report.

Table 1 – Nine Mile Project Trip Generation

	Size (sf)	Vehicles Trips						
		Daily	Weekday AM Peak Hour			Weekday PM Peak Hour		
			In	Out	Total	In	Out	Total
2019								
Non Pass By								
Apartments (220)	308 Units	1,990	31	124	155	122	65	187
2020								
Non Pass By								
Superstore (813)	130,000	4200	89	66	156	185	181	366
Retail (826)	20,350	797	11	7	18	21	28	50
Home Improvement (862)	130,000	1838	53	37	91	68	73	142
HTSD Restaurant (932)	7,150	345	20	17	37	17	9	26
Fast Food w/ Drive Through (934)	8,300	1369	81	81	163	50	38	88
Gas Station (944)	18 FP	1342	43	39	82	64	66	130
Total	-	9892	298	248	546	406	397	803
Pass By								
Superstore (813)	130,000	1633	35	26	61	72	71	143
Home Improvement (862)	130,000	1697	49	35	84	63	68	131
HTSD Restaurant (932)	7,150	260	15	13	28	13	7	20
Fast Food w/ Drive Through (934)	8,300	1369	78	78	156	50	38	88
Gas Station (944)	18 FP	1342	60	54	114	47	48	94
Total	-	6302	236	206	442	245	231	476
Total Trips	**-**	**18184**	**565**	**578**	**1143**	**773**	**693**	**1466**
Total Non Pass By Trips	**-**	**11882**	**329**	**372**	**701**	**528**	**462**	**990**
Total Pass By Trips	**-**	**6302**	**236**	**206**	**442**	**245**	**231**	**476**

4.2 Trip Distribution

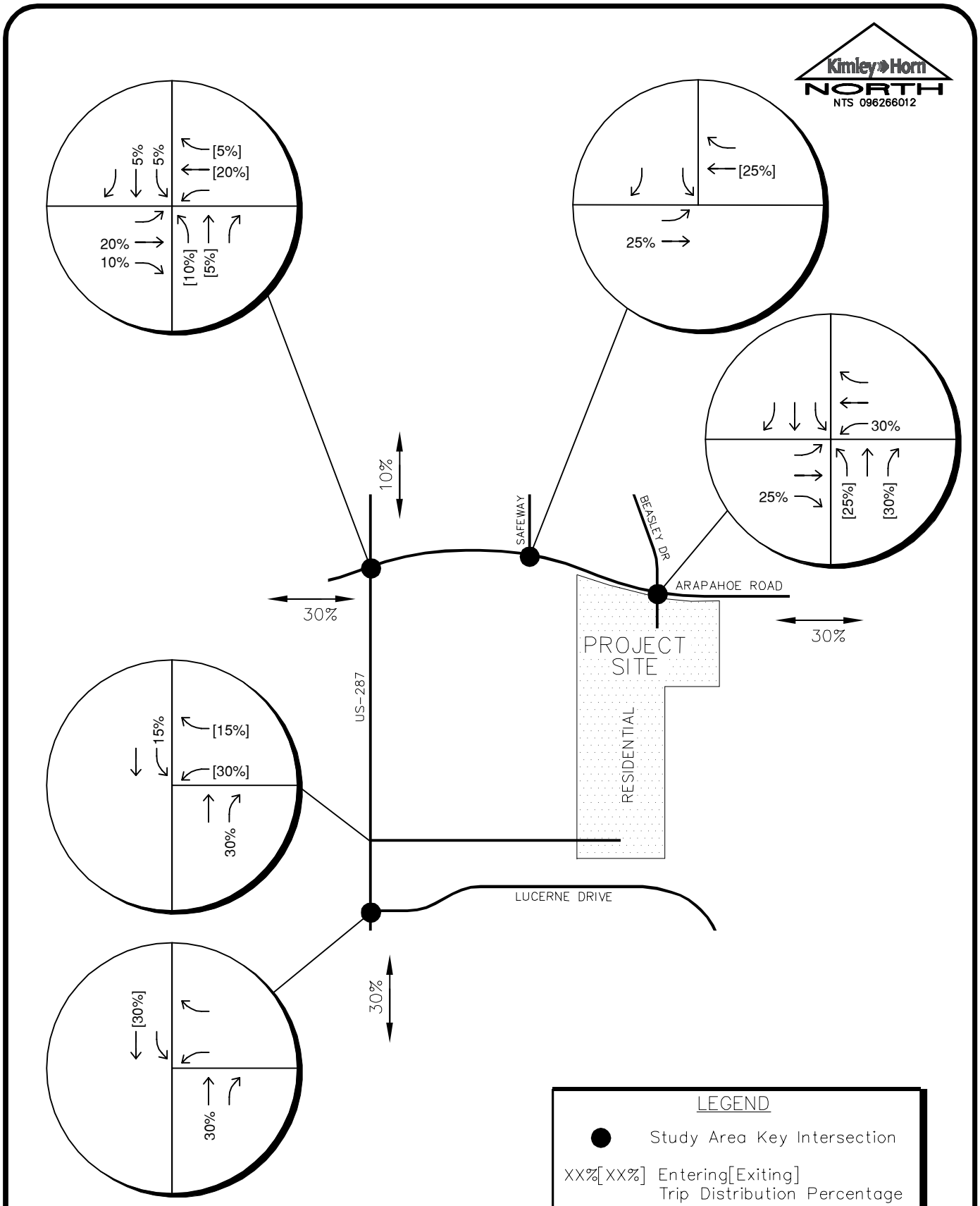
Distribution of site traffic was based on the area street system characteristics, existing traffic patterns and volumes, existing demographic information, and the proposed access system for the project. The directional distribution of traffic is a means to quantify the percentage of site-generated traffic that approaches the site from a given direction and departs the site back to the original source. Since the travel patterns are anticipate to be different for the residential development (2019) and commercial development (2020 and 2040), separate distributions were developed. The separate distributions account for these differences. **Figure 7** illustrates the expected trip distribution for the residential portion of the project in 2019, while **Figure 8** illustrates the expected trip distribution for the commercial portion of the project in 2020 and 2040.

Since Nine Mile is a commercial development, a certain amount of traffic attracted to the project will be passing by the site. This pass-by distribution is a means to quantify the amount of traffic arriving to the site from a given direction and then leaving the site in the same original direction of travel, continuing the driver's trip. The expected weekday morning and afternoon peak hour pass-by trip distributions were calculated based on actual traffic volumes. Directional differences in the morning and afternoon peak hours were accounted for in the pass-by distributions as shown in **Figures 9** and **10**, respectively.

4.3 Traffic Assignment and Total (Background Plus Project) Traffic

Traffic assignment was obtained by applying the project trip distribution to the estimated traffic generation of the development shown in **Table 1**. Project traffic assignment for the Nine Mile development project for the non-pass-by conditions during the peak hours studied for the residential and commercial portions of the project are shown in **Figures 11** and **12**. Project traffic assignment for the Nine Mile Development project for the pass-by conditions during the peak hours studied for the commercial portion for the project is shown in **Figure 13**. A total traffic assignment for the entire Nine Mile project is shown in **Figure 14**.

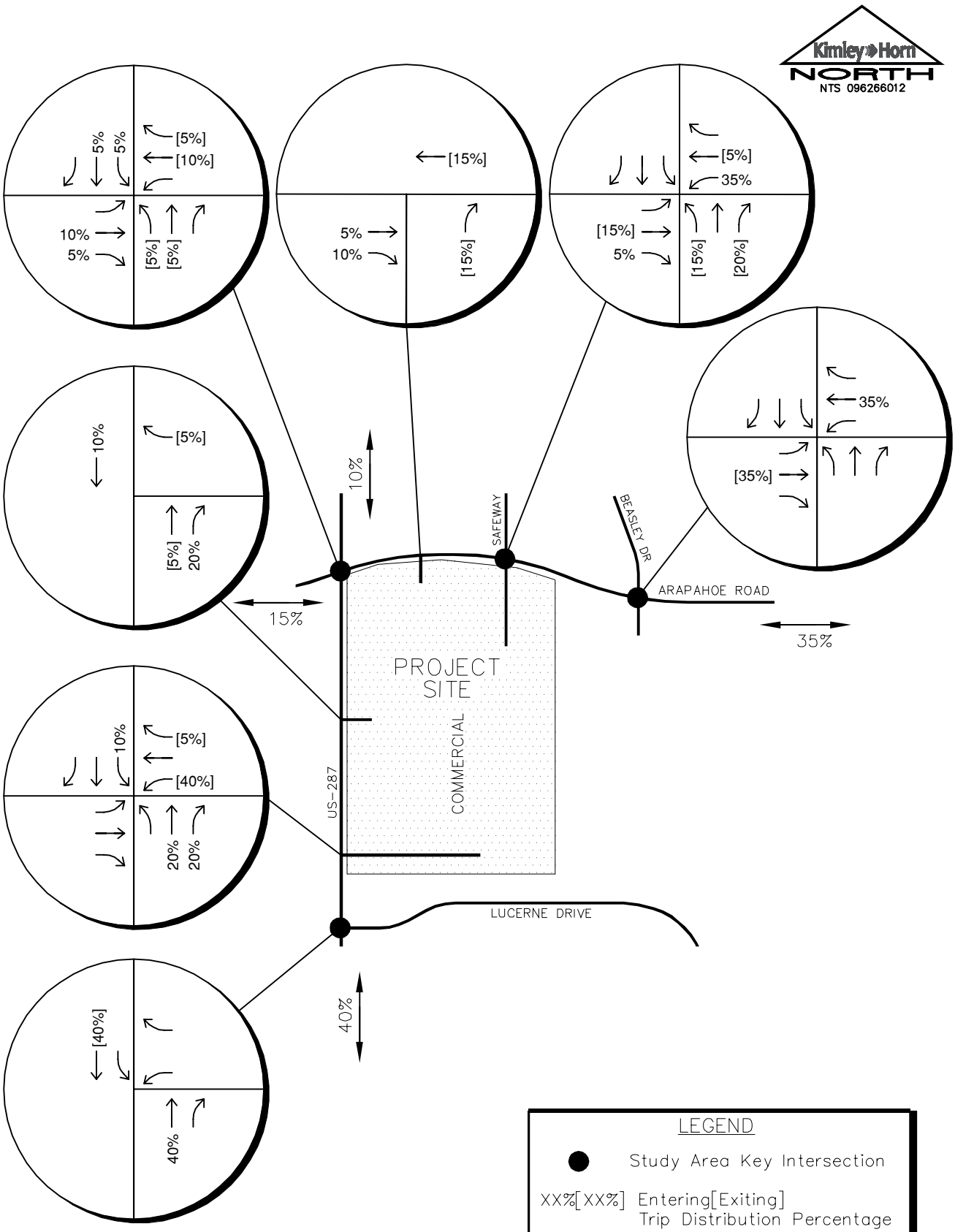
Project traffic volumes were added to the background volumes to represent estimated traffic conditions for the short term 2019 and 2020 horizons, as well as the long term 2040 horizon. These background plus project (total) traffic volumes for the project are illustrated for the 2019, 2020, and 2040 horizon years in **Figures 15** through **17**, respectively.



NINE MILE
ERIE, COLORADO
RESIDENTIAL
2019 TRIP DISTRIBUTION

FIGURE 7

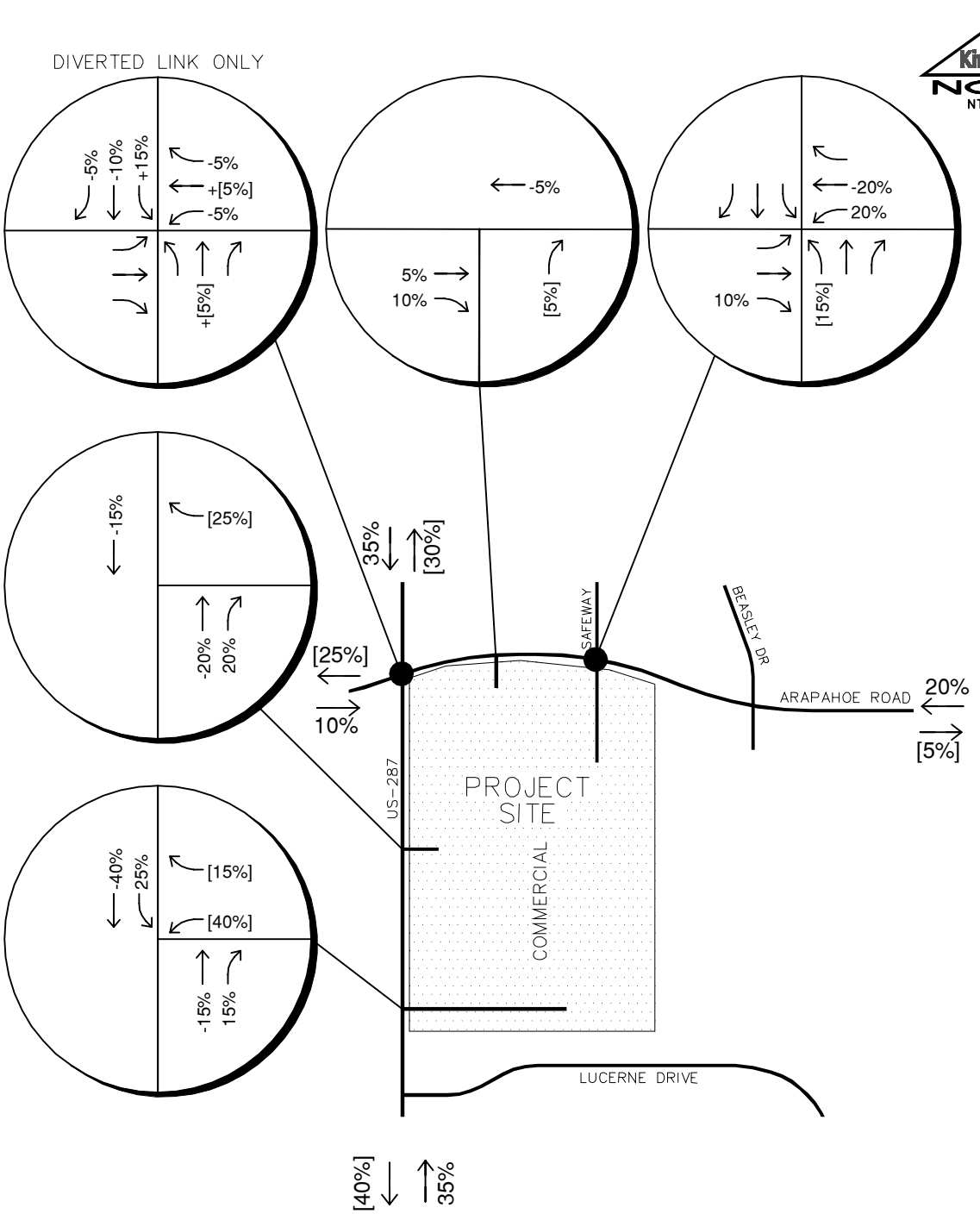
Kimley»Horn



NINE MILE
ERIE, COLORADO
COMMERCIAL
2020/2035 TRIP DISTRIBUTION

FIGURE 8

Kimley»Horn



LEGEND

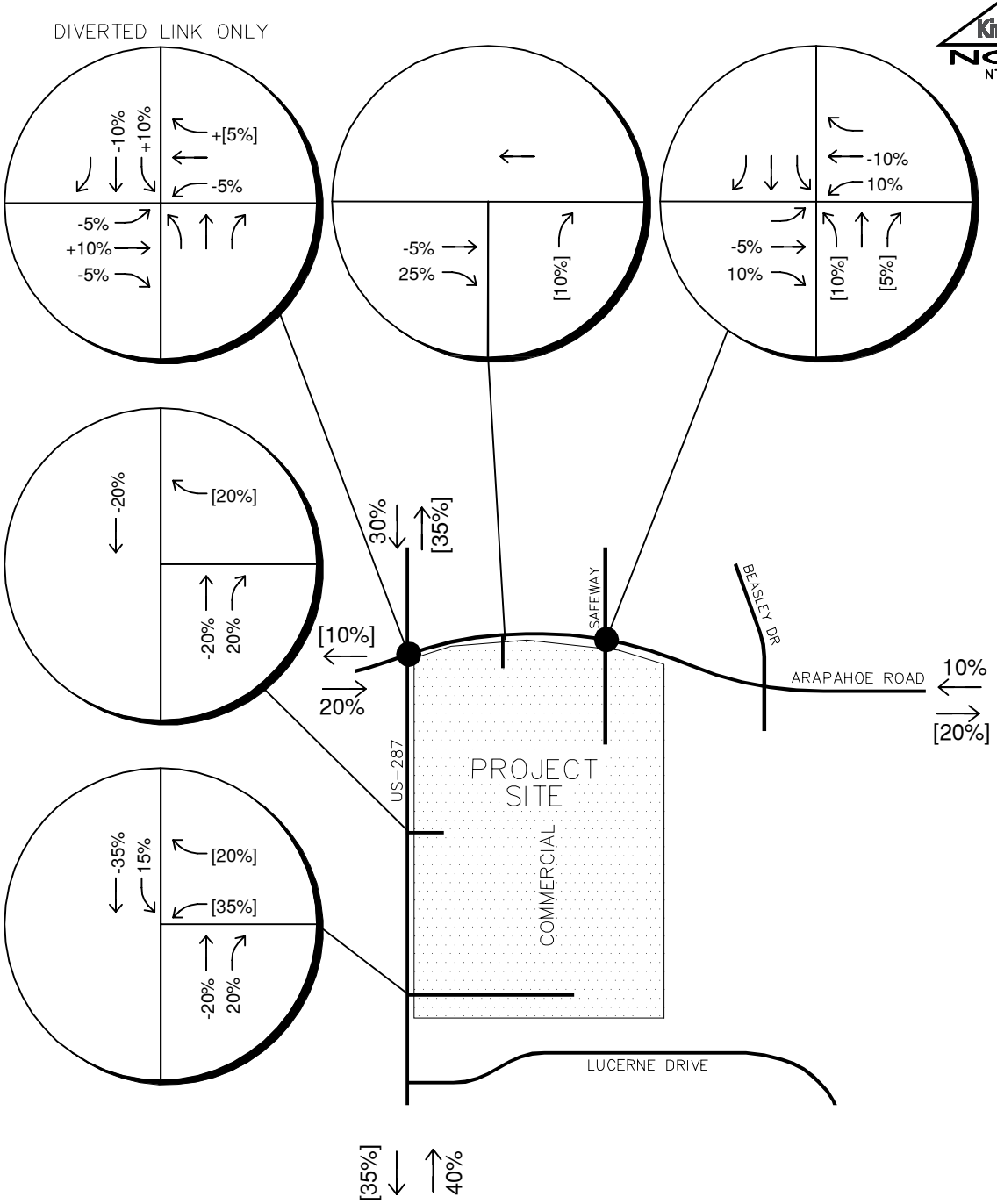
● Study Area Key Intersection

XX%[XX%] Entering[Exiting] Trip Distribution Percentage

NINE MILE
ERIE, COLORADO
COMMERCIAL
AM PEAK PASS-BY TRIP DISTRIBUTION

FIGURE 9

Kimley»Horn



LEGEND

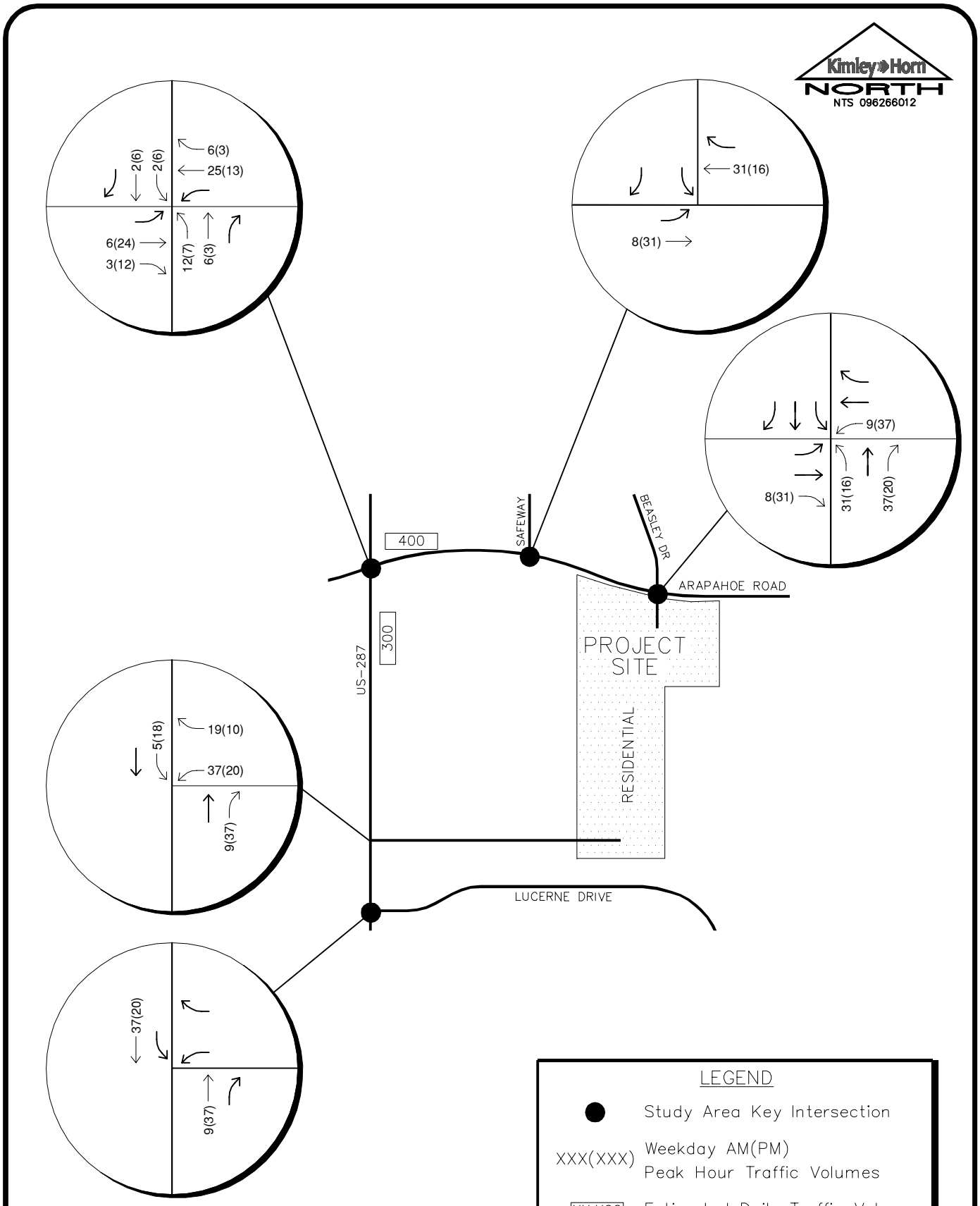
● Study Area Key Intersection

XX%[XX%] Entering[Exiting] Trip Distribution Percentage

NINE MILE
ERIE, COLORADO
COMMERCIALL
PM PEAK PASS-BY TRIP DISTRIBUTION

FIGURE 10

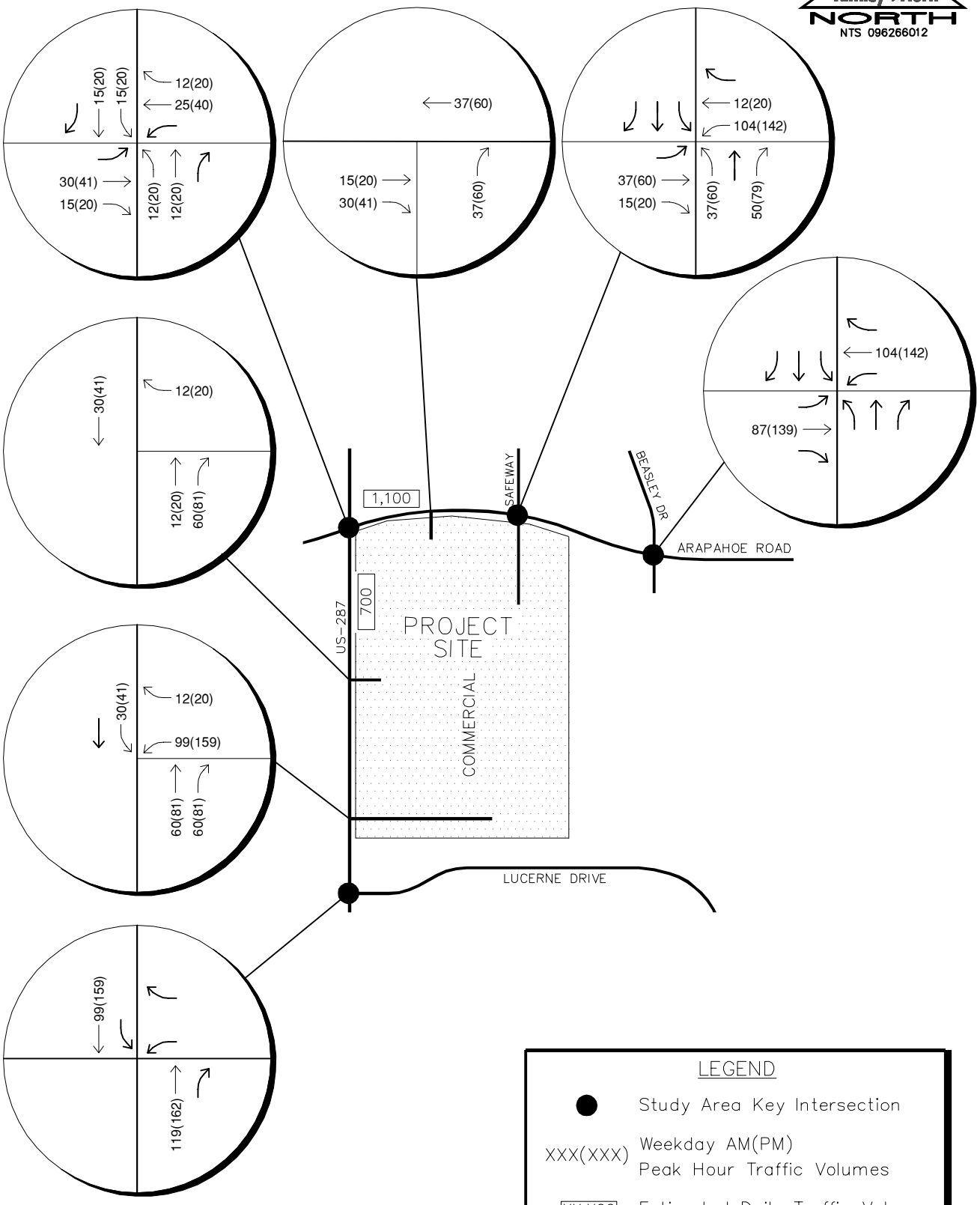
Kimley»Horn



NINE MILE
ERIE, COLORADO
2019 RESIDENTIAL
NON PASS BY TRAFFIC ASSIGNMENT

FIGURE 11

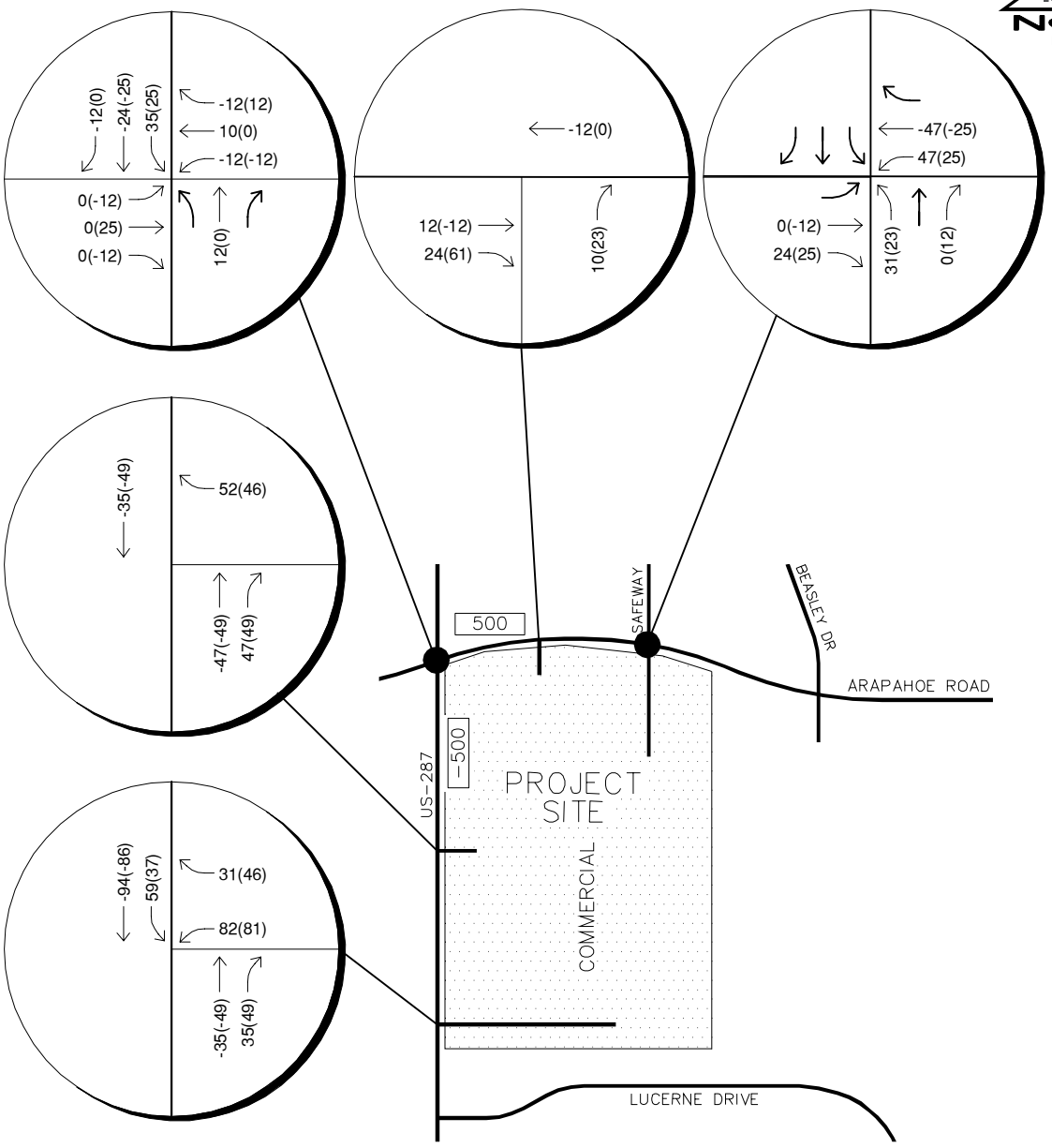
Kimley»Horn



NINE MILE
ERIE, COLORADO
2020/2035 COMMERCIAL
NON PASS BY TRAFFIC ASSIGNMENT

FIGURE 12

Kimley»Horn



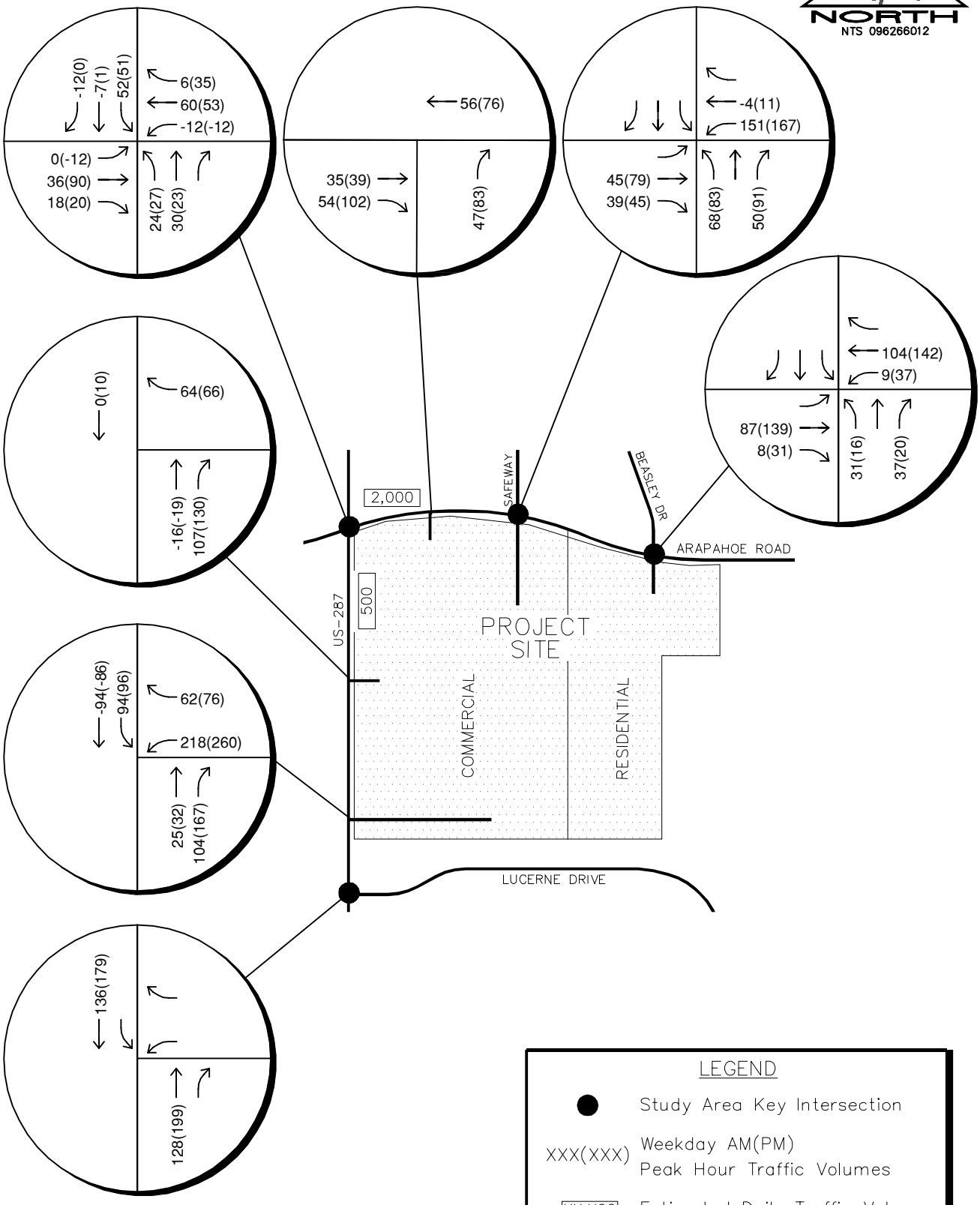
LEGEND

- ● Study Area Key Intersection
- XXX(XXX) Weekday AM(PM) Peak Hour Traffic Volumes
- XX,X00 Estimated Daily Traffic Volume

NINE MILE
ERIE, COLORADO
2020/2035 COMMERCIAL
PASS-BY TRAFFIC ASSIGNMENT

FIGURE 13

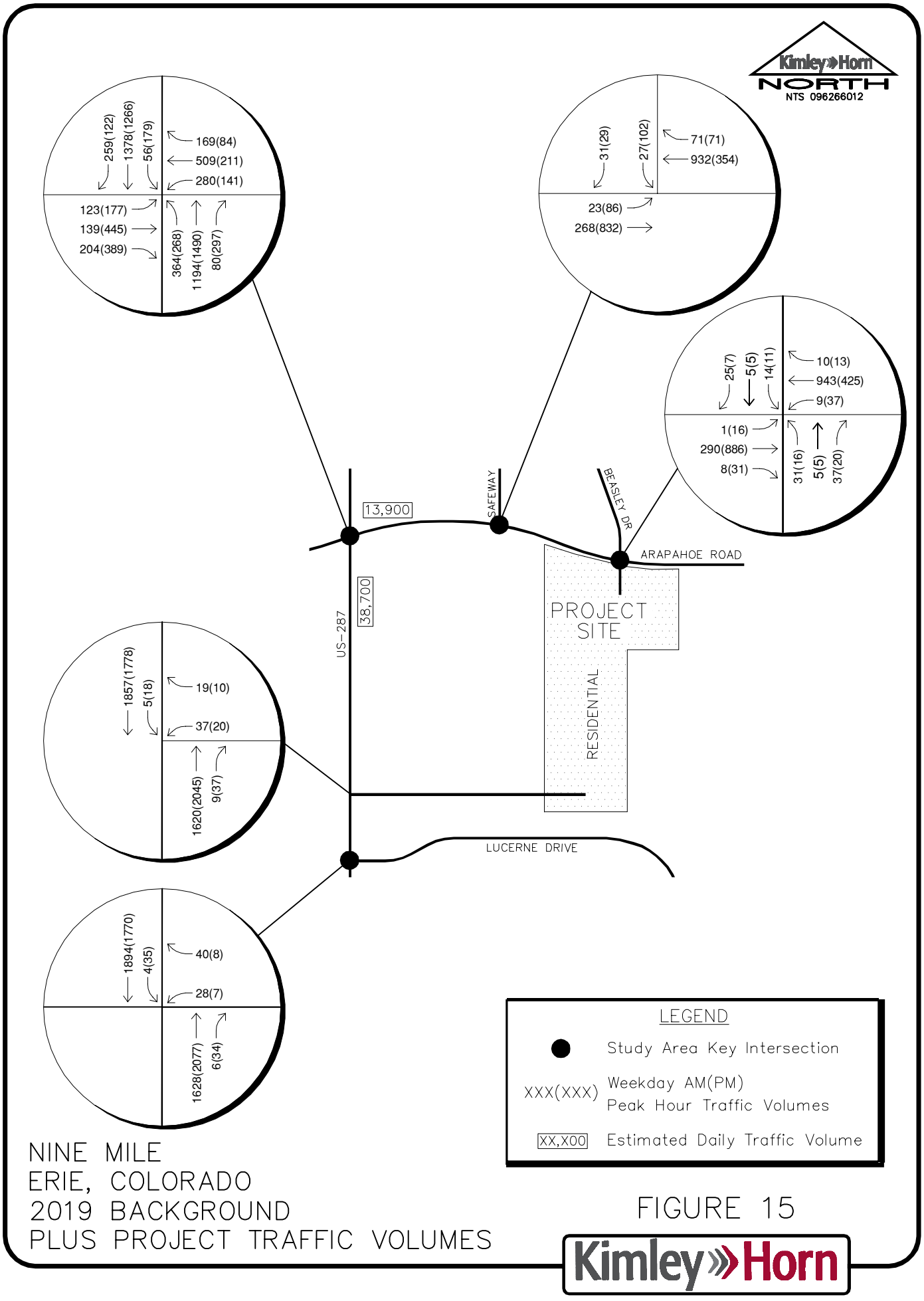
Kimley»Horn



NINE MILE
ERIE, COLORADO
TOTAL TRAFFIC ASSIGNMENT

FIGURE 14

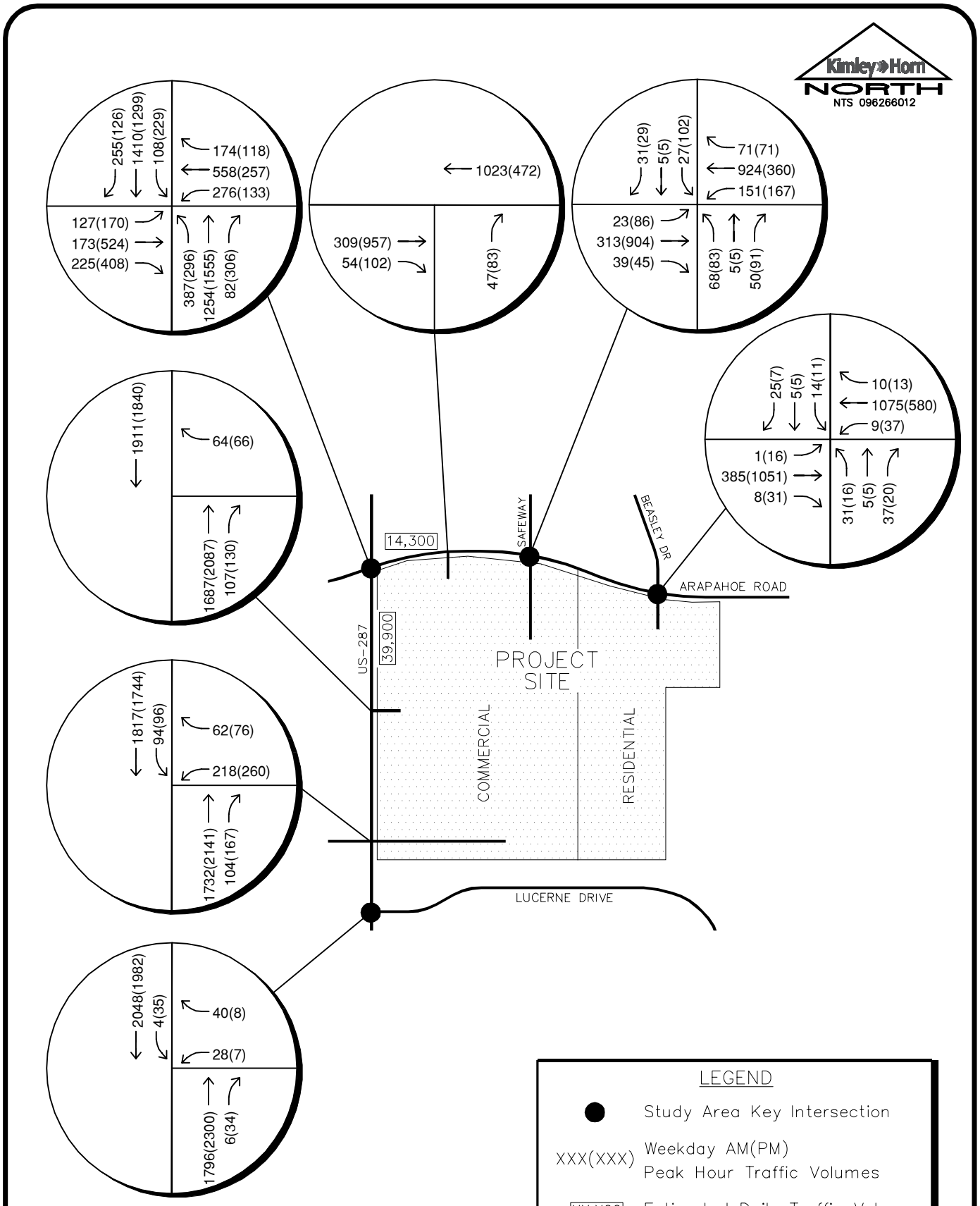
Kimley»Horn



NINE MILE
ERIE, COLORADO
2019 BACKGROUND
PLUS PROJECT TRAFFIC VOLUMES

FIGURE 15

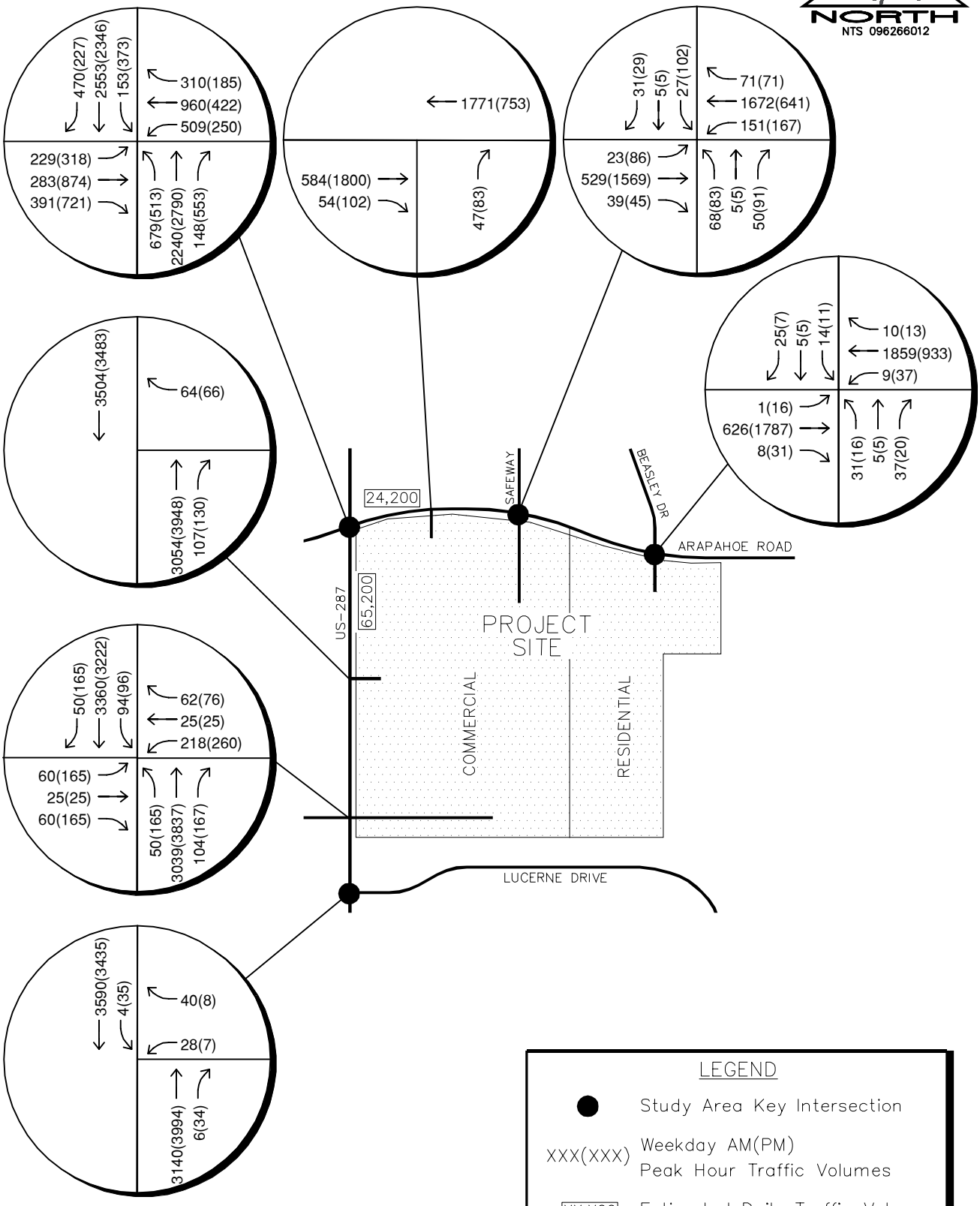
Kimley»Horn



NINE MILE
ERIE, COLORADO
2020 BACKGROUND
PLUS PROJECT TRAFFIC VOLUMES

FIGURE 16

Kimley»Horn



NINE MILE
ERIE, COLORADO
2040 BACKGROUND
PLUS PROJECT TRAFFIC VOLUMES

FIGURE 17

Kimley»Horn

5.0 TRAFFIC OPERATIONS ANALYSIS

Kimley-Horn's analysis of traffic operations in the site vicinity was conducted to determine potential capacity deficiencies in the 2019, 2020 and 2040 development horizons at the identified key intersections. The acknowledged source for determining overall capacity is the current edition *Highway Capacity Manual*[2] (HCM).

5.1 Analysis Methodology

Capacity analysis results are listed in terms of Level of Service (LOS). LOS is a qualitative term describing operating conditions a driver will experience while traveling on a particular street or highway during a specific time interval. It ranges from A (very little delay) to F (long delays and congestion). For intersections and roadways in this study area, standard traffic engineering procedure recommends intersection LOS D as the minimum threshold for acceptable operations for signalized intersections and LOS E for movements or approaches of unsignalized intersections. **Table 2** shows the definition of level of service for signalized and unsignalized intersections.

Table 2 – Level of Service Definitions

Level of Service	Signalized Intersection Average Total Delay (sec/veh)	Unsignalized Intersection Average Total Delay (sec/veh)
A	≤ 10	≤ 10
B	> 10 and ≤ 20	> 10 and ≤ 15
C	> 20 and ≤ 35	> 15 and ≤ 25
D	> 35 and ≤ 55	> 25 and ≤ 35
E	> 55 and ≤ 80	> 35 and ≤ 50
F	> 80	> 50

Definitions provided from the Highway Capacity Manual, Special Report 209, Transportation Research Board, 2010.

Study area intersections were analyzed based on average total delay analysis for signalized and unsignalized intersections. Under the unsignalized analysis, the level of service (LOS) for a two-way stop controlled intersection is determined by the computed or measured control delay and is defined for each minor movement. Level of service for a two-way stop-controlled intersection is not defined for the intersection as a whole. Level of service for a signalized and all-way stop controlled intersection is defined for each approach and for the overall intersection.

[2] Transportation Research Board, *Highway Capacity Manual*, Special Report 209, Washington DC, 2010.

5.2 Key Intersection Operational Analysis

Calculations for the level of service at the key intersections and project access driveways for the study area are provided in **Appendix D**. The signalized intersection analysis utilizes the observed cycle lengths for the morning and afternoon peak hours with existing phasing and timing splits. The existing year analysis is based on the lane geometry and intersection control shown in **Figure 2.** The existing peak hour factors are also used in the existing and short term horizons (2019 & 2020) analysis. The recommended HCM urban area peak hour factor of 0.92 was used for the 2040 horizon analysis. LOS for the intersections was calculated using Synchro software presenting the HCM results.

Arapahoe Road and US-287

The existing intersection of Arapahoe Road and US-287 is signalized and operates with protected left turn phasing on the northbound and southbound approaches and protected-permitted left turn phasing on the eastbound and westbound approaches. With the existing configuration, the intersection operates with LOS E during both the morning and afternoon peak hours. With or without project traffic in 2019, the intersection is anticipated to operate with LOS F during the morning peak hour and LOS E during the afternoon peak hour. With or without the addition of project traffic in 2020, the intersection is anticipated to continue operating with LOS F during the morning peak hour and LOS E/F during the afternoon peak hour. With construction of the commercial portion of the project in 2020, it is recommended that the intersection be improved to include dual left turn lanes eastbound, two through lanes eastbound, dual left turn lanes westbound, and dual left turn lanes southbound. With these improvements, the intersection is anticipated to operate with improved LOS F during the morning peak hour and LOS E during the afternoon peak hour. Although the intersection is still operating with LOS E/F, these are the only feasible improvements that can be implemented at the intersection until Arapahoe Road is improved to include two through lanes in each direction.

If two through lanes were provided along Arapahoe Road, acceptable level of service would result. However, this would require right of way acquisition along Arapahoe Road west of US-287 with the existing right of way only being 50 feet. With this improvement, the intersection would operate with LOS D during both the morning and afternoon peak hours. The intersection was also analyzed with US-287 having three through lanes each direction northbound and southbound. With this improvement, the intersection is anticipated to operate with LOS E during the morning peak hour and LOS D during the afternoon peak hour. Therefore, improving the

east-west capacity along Arapahoe Road to include two through lanes would provide a greater benefit for the intersection.

By 2040, the intersection may need to be fully built out including dual left turn lanes, two through lanes, and right turn lanes eastbound and westbound, as well as dual left turn lanes, three through lanes, and right turn lanes northbound and southbound. With these improvements though, the intersection would operate with LOS F during both the morning and afternoon peak hours if the high conservative background traffic growth is realized. This and the daily traffic volume along US-287 of 65,000 vehicles per day indicates that additional through lane capacity is needed if these volumes are ever realized. **Table 3** provides the results of the level of service analysis at this intersection.

Table 3 – Arapahoe Road and US-287 LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
2017 Existing	71.5	E	58.3	E
2019 Background	82.9	F	67.7	E
2019 Background Plus Project	89.9	F	72.2	E
2020 Background	89.1	F	74.6	E
2020 Background Plus Project	119.7	F	91.7	F
2020 Background Plus Project #	99.5	F	56.8	E
2020 Background Plus Project ##	49.0	D	48.3	D
2020 Background Plus Project ###	71.4	E	47.2	D
2040 Background ####	116.0	F	126.1	F
2040 Background Plus Project ####	131.8	F	149.3	F

= Dual Left Turn Lanes Eastbound, Westbound, and Southbound. Two Eastbound Through Lanes
= Dual Left Turn Lanes All Approaches. Two Eastbound and Westbound Through Lanes.
= Dual Left Turn Lanes Eastbound, Westbound, and Southbound. Two Eastbound Through Lanes. Three Through Lanes Northbound and Southbound.
= Full buildout. Dual Left Turn Lanes, Two Through Lanes, and a Right Turn Lane Eastbound and Westbound. Dual Left Turn Lanes, Three Through Lanes, and a Right Turn Lane Northbound and Southbound.

Arapahoe Road Full Movement Access (Safeway)

The existing Arapahoe Road and Safeway access is a "T"-intersection with stop control on the southbound approach. With the existing configuration, all movements at this intersection operate with LOS D or better during both the morning and afternoon peak hours. With or without project traffic in 2019, all movements at this intersection are anticipated to continue operating acceptably with LOS D or better during both the morning and afternoon peak hours. Prior to the addition of project traffic in 2020, all movements at this intersection are anticipated to continue operating acceptably with LOS E or better during both the morning and afternoon peak hours. With completion of the project in 2020, it is anticipated that the intersection will need and warrant signalization. With signalization and the addition of project traffic in 2020, the intersection is anticipated to operate with LOS C during both the morning and afternoon peak hours. With signalization and the addition of project traffic in 2040, the intersection is anticipated to operate at LOS D during both the morning and afternoon peak hours. **Table 4** provides the results of the level of service analysis at this intersection.

Table 4 – Arapahoe Road Full Movement Access (Safeway) LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
2017 Existing				
Eastbound Left	10.0	B	8.2	A
Southbound Approach	20.5	C	28.4	D
2019 Background				
Eastbound Left	10.2	B	8.3	A
Southbound Approach	22.0	C	31.0	D
2019 Background Plus Project				
Eastbound Left	10.4	B	8.3	A
Southbound Approach	23.0	C	33.3	D
2020 Background				
Eastbound Left	10.4	B	8.3	A
Southbound Approach	22.9	C	47.9	E
2020 Background Plus Project #	22.7	C	21.3	C
2040 Background				
Eastbound Left	16.6	C	9.4	A
Southbound Approach	82.5	F	43.5	E
2040 Background Plus Project #	45.2	D	35.1	D

= Signal

Arapahoe Road and Beasley Drive

The existing Arapahoe Road and Beasley Drive intersection is a "T"-intersection with stop control on the southbound approach. With the existing configuration, all movements at this intersection operate with LOS C or better during both the morning and afternoon peak hours. Prior to the addition of Nine Mile project traffic throughout the long term 2040 study horizon, all movements at this intersection are anticipated to continue operating acceptably with a LOS E or better during both the morning and afternoon peak hours.

Upon construction of the residential portion of the Nine Mile project in 2019, a new south leg will be constructed at this intersection. With this construction, it is recommended that this Arapahoe Road and Beasley Drive intersection be signalized. It is recommended that both the northbound and southbound approaches consist of a separate left turn lane and shared through/right turn lane. With this improvement and the addition of project traffic throughout 2040, the intersection is anticipated to operate acceptably at LOS C or better during the morning and afternoon peak hours. **Table 5** provides the results of the level of service analysis at this intersection.

Table 5 – Arapahoe Road and Beasley Drive LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
2017 Existing				
Eastbound Left	9.8	A	8.2	A
Southbound Approach	20.0	C	16.2	C
2019 Background				
Eastbound Left	10.1	B	8.3	A
Southbound Approach	21.5	C	19.3	C
2019 Background Plus Project #	27.8	C	26.1	C
2020 Background				
Eastbound Left	10.2	B	8.4	A
Southbound Approach	22.2	C	17.4	C
2020 Background Plus Project #	30.4	C	29.0	C
2040 Background				
Eastbound Left	16.8	C	9.8	A
Southbound Approach	37.6	E	20.0	C
2040 Background Plus Project #	20.4	C	15.7	B

= Signalized with Northbound and Southbound Left Turn and Shared Through/Right Lanes

Lucerne Drive and US-287

The existing intersection of Lucerne Drive and US-287 is a "T"-intersection with stop control on the westbound approach. With the existing configuration, the westbound approach operates

with LOS F during both the morning and afternoon peak hours. With or without project traffic in 2019, the westbound approach is anticipated to continue to operate with LOS F during both the morning and afternoon peak hours. It is recommended that the City of Lafayette and/or CDOT consider the westbound approach for separate left turn and right turn lanes. Adequate pavement width exists today (approximately 36 feet) and would only require striping modifications. With this improvement, the westbound left turn movement is anticipated to operate with LOS F during the morning and afternoon peak hours, however the westbound right turn movement would operate at LOS C and would not be potentially blocked by left turning vehicles. With or without project traffic in 2020, the westbound approach is anticipated to continue operating at LOS F during both the morning and afternoon peak hours. If the conservative traffic growth and long delays are realized, it is anticipated that traffic will reroute on the street network.

By 2040, it is recommended that the intersection be restricted to right-in/right-out movements due to the proximity to the proposed project full movement signalized intersection to the north, once the west leg of the intersection is constructed for the development west of US-287. If the conservative traffic growth and long delays are realized, it is anticipated that traffic will reroute on the street network. **Table 6** provides the results of the level of service analysis at this intersection.

Table 6 – Lucerne Drive and US-287 LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
2017 Existing				
Westbound Approach	57.7	F	67.6	F
Southbound Left	14.3	B	20.4	C
2019 Background				
Westbound Approach	72.4	F	137.4	F
Southbound Left	15.2	C	22.6	C
2019 Background Plus Project				
Westbound Approach	74.5	F	86.4	F
Southbound Left	15.3	C	23.4	C
2019 Background Plus Project #				
Westbound Left	143.7	F	109.4	F
Westbound Right	20.0	C	23.3	C
Southbound Left	15.3	C	23.4	C
2020 Background				
Westbound Approach	81.9	F	91.9	F
Southbound Left	15.7	C	24.0	C
2020 Background Plus Project #				
Westbound Left	119.0	F	170.2	F
Westbound Right	22.8	C	27.2	D
Southbound Left	17.1	C	29.0	D
2040 Background				
Westbound Approach	2274.6	F	163.9	F
Southbound Left	162.4	F	266.0	F
2040 Background Plus Project #				
Westbound Left	3681.3	F	+	F
Westbound Right	124.5	F	161.4	F
Southbound Left	194.9	F	3018.3	F
2040 Background Plus Project ##				
Westbound Right	124.5	F	161.4	F

= Separate Westbound Left Turn and Right Turn Lanes
= Right-In/Right-Out

Arapahoe Road Right-In/Right-Out Access

With development of the commercial portion of the project in 2020, a right-in/right-out access is proposed along Arapahoe Road approximately half way between US-287 and the existing Safeway access. It is recommended that the northbound approach of the access include a single right turn lane and operate with stop control with the installation of an R1-1 “STOP” sign. To provide signage for the proposed right-in/right-out restricted access along Arapahoe Road, it is recommended that a R6-1(R) “ONE WAY” sign be installed within the raised median in alignment of exiting traffic from the proposed access. With this configuration, all movements at the unsignalized access are anticipated to operate acceptably throughout the 2040 horizon. **Table 7** provides the results of the level of service at this intersection.

Table 7 – Arapahoe Road Right-In/Right-Out Access LOS Results

	AM Peak Hour		PM Peak Hour	
Scenario	**Delay (sec)**	**LOS**	**Delay (sec)**	**LOS**
2020 Total Northbound Right	9.7	A	14.7	B
2040 Total Northbound Right	11.0	B	30.6	D

US-287 Right-In/Right-Out Access

With development of the commercial portion of the project in 2020, a right-in/right-out access is proposed along US-287 approximately 800 feet, measured center to center, south of Arapahoe Road. It is recommended that the westbound approach of the access include a single right turn lane and operate with stop control with the installation of an R1-1 "STOP" sign. To further identify this proposed access along US-287 to right turn movements only it is recommended that a R3-2 No Left Turn sign be placed underneath the STOP sign. An additional R3-2 No Left Turn sign could be located so it is visible to south drivers along US-287 (on the southeast corner of the right-in/right-out access intersection) to restrict left turn entrance movements as well. With this configuration in 2020, all movements at the unsignalized access are anticipated to operate acceptably. A continuous acceleration/deceleration lane exists along northbound US-287. The westbound right turn movement will operate as a "free" movement and therefore the level of service for the westbound right will operate better than reported.

By 2040, it is anticipated that US-287 will be at least a three-lane roadway based on the high traffic volume growth projected. With this configuration in 2040, the westbound right turn movement at this unsignalized access may operate with long delays and LOS F based on the heavy northbound through volume. If the conservative traffic growth and long delays are realized, it is anticipated that traffic will reroute on the street network and use the signalized project access along Arapahoe Road or US-287. **Table 8** provides the results of the level of service at this intersection.

Table 8 – US-287 Right-In/Right-Out Access LOS Results

	AM Peak Hour		PM Peak Hour	
Scenario	**Delay (sec)**	**LOS**	**Delay (sec)**	**LOS**
2020 Total Westbound Right	22.6	C	33.6	D
2040 Total Westbound Right	226.0	F	914.6	F

US-287 Full Movement Access

A full movement project access along US-287 is proposed approximately one-quarter mile (1,320 feet), measured center to center, south of Arapahoe Road. Following the standard quarter-mile spacing for full movement intersections with traffic signals provides this intersection in the optimal location. It matches the spacing for the Diamond Circle/US-287 signalized intersection to the south between this intersection and Baseline Road/US-287. The westbound approach at this intersection is anticipated to operate with stop control in 2019 with the completion of the residential portion of the project. With the completion of the project in 2019, it is recommended that a southbound left turn lane be designated. It is also recommended that the westbound approach be constructed to full buildout of dual left turn lanes and a separate right turn lane. In 2019, one of the westbound left turn lanes is recommended to be striped out to operate under the stop control condition. With this configuration in 2019, the westbound left turn movement is anticipated to operate with LOS F during both the morning and afternoon peak hours. However, a traffic signal won't likely be warranted with just the residential development portion of Nine Mile. Therefore, during peak hours, it is anticipated that traffic will reroute on the street network.

By 2020 with the completion of the commercial portion of the project, it is anticipated that the intersection will need and warrant signalization. With signalization, the intersection is anticipated to operate with LOS B during both the morning and afternoon peak hours. By 2040, it is anticipated that the development west of US-287 will be complete and that the intersection will be a four-leg intersection. By this time it is anticipated that US-287 will be a six-lane roadway. It is recommended that the eastbound approach of the intersection consist of dual left turn lane, one through lane, and a right turn lane, while the westbound approach consist of dual left turn lanes and a shared through/right turn lane. With this configuration, the intersection is anticipated to operate with LOS D during the morning peak hour and LOS F during the afternoon peak hour. If the conservative traffic growth and long delays are realized, it is anticipated that traffic will reroute on the street network and use other access to Arapahoe Road and US-287. **Table 9** provides the results of the level of service at this intersection.

Table 9 – US-287 Full Movement Access LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec)	LOS	Delay (sec)	LOS
2019 Total				
Westbound Left	79.3	F	117.0	F
Westbound Right	18.4	C	23.6	C
Southbound Left	15.4	C	22.0	C
2020 Total #	11.1	B	15.8	B
2040 Total ##	38.8	D	133.3	F

= Signal
= Signal and West Leg of Intersection

5.3 Turn Bay Length Analysis

It is recommended that auxiliary turn lanes along US-287 be constructed in accordance with the current CDOT State Highway Access Code (SHAC). The State Highway Access Category Schedule categorizes the segment of US-287 through the study intersection as NR-A: Non Rural Principal Highway. According to the State Highway Access Code for category NR-A roadways, the following thresholds apply:

- A left turn deceleration lane and taper with storage length is required for any access with a projected peak hour ingress turning volume greater than 10 vehicles per hour (vph).
- A right turn deceleration lane and taper is required for any access with a projected peak hour ingress turning volume greater than 25 vehicles per hour (vph).
- A right turn acceleration lane and taper is required for any access with a projected peak hour right turning volume greater than 50 vehicles per hour (vph) when the posted aped on the highway is greater than 40 miles per hour.

Based on traffic projections, the auxiliary turn lane requirements were calculated per the Colorado State Highway Access Code for the proposed right-in/right-out and full movement access intersections along US-287. Through these intersections, US-287 provides two lanes of travel each direction, northbound and southbound, with a 60 mile per hour posted speed limit. US-287 also contains a continuous acceleration/deceleration lane along northbound US-287 adjacent to the project. As such, turn lane requirements are as follows:

US-287 Right-In/Right-Out Access

- A northbound right turn deceleration lane will be warranted at the US-287 right-in/right-out access intersection based on projected 2020 traffic volumes with 130 right turn vehicles and the threshold being 25 vehicles per hour (vph). Since it has a category of NR-A with a 60 mile per hour speed limit, the turn lane requirement is deceleration length only with the taper length being included within the required deceleration length. The required deceleration length is 700 feet. The taper is identified as 25 to 1 based on the 60-mile per hour speed limit. Assuming a 12-foot wide right turn lane, the taper length is 300 feet. Therefore, it is recommended that a northbound right turn lane be provided at this intersection with the completion of the project with 400 feet of storage and 300-foot taper. A continuous acceleration/deceleration lane currently exists along northbound US-287 and will remain between the proposed full movement access and this right-in/right-out access. There is approximately 520 feet between the proposed full moment and right-in/right-out access. The requirement for a combination acceleration/deceleration lane is acceleration length plus deceleration length which is 1,270 feet (without the two tapers) for highways with a speed limit of 60 miles per hour. The maximum length of this combination acceleration/deceleration lane will be approximately 520 feet. Therefore, this right-in/right-out access may require a CDOT waiver.

- A westbound right turn acceleration lane is warranted for the US-287 right-in/right-out access based on the projected 2020 traffic volumes with 66 right turn vehicles and the threshold being 50 vehicles per hour (vph). The turn lane requirement is acceleration length with the taper being included. The required acceleration length is 1170 feet with the same 25 to 1 taper based on the 60 mile per hour speed limit. It is recommended that this acceleration lane along northbound US-287 be a continuous acceleration/deceleration lane between this access and Arapahoe Road. A continuous acceleration/deceleration lane currently exists along northbound US-287 and will remain between the proposed right-in/right-out access and Arapahoe Road. There is approximately 800 feet between the proposed right-in/right-out access and Arapahoe Road. The requirement for a combination acceleration/deceleration lane is acceleration length plus deceleration length which is 1,270 feet (without the two tapers) for highways with a speed limit of 60 miles per hour. The maximum length of this combination

acceleration/deceleration lane will be approximately 800 feet. Therefore, this right-in/right-out access may require a CDOT waiver.

US-287 Full Movement Access

- A southbound left turn lane is warranted at the proposed full movement access along US-287 based on the projected 2019 traffic volumes with 18 left turn vehicles per hour and the threshold being 10 vehicles per hour (vph). Since it has a category of NR-A with a 60 mile per hour speed limit, the turn lane requirement is deceleration length plus storage with the taper length being included within the required deceleration length. The required deceleration length is 700 feet (including 25 to 1 taper) with 25 feet of storage based on the projected 2019 traffic volume. Based on the projected 2020 and 2040 traffic volumes with buildout of the project, 96 left turn vehicles are anticipated. This lane would need to be designated with a left turn lane length of 500 feet plus 300-foot taper. Therefore, the overall required length for the southbound left turn lane is recommended to be 500 feet plus 300-foot taper (the taper is identified as 25 to 1 based on the 60 mile per hour speed limit) to accommodate the full buildout traffic volume.

- A northbound right turn deceleration lane will be warranted at the US-287 full movement access intersection based on the projected 2019 traffic volumes with 37 right turn vehicles and the threshold being 25 vehicles per hour (vph). Since it has a category of NR-A with a 60 mile per hour speed limit, the turn lane requirement is deceleration length only with the taper length being included within the required deceleration length. The required deceleration length is 700 feet. The taper is identified as 25 to 1 based on the 60 mile per hour speed limit. Assuming a 12-foot wide right turn lane, the taper length is 300 feet. Therefore, it is recommended that a northbound right turn lane be provided at this intersection with the completion of the project with 400 feet of storage and 300-foot taper. A continuous acceleration/deceleration lane currently exists along northbound US-287 and will remain south of this proposed access. There is approximately 350 feet between the proposed full moment access and Lucerne Drive. Since an acceleration lane is not warranted from the Lucerne Drive intersection, this lane could be designated as a right turn deceleration lane, although a CDOT waiver may be needed for the design.

- A westbound right turn acceleration lane is warranted at the US-287 full movement access based on the projected 2020 traffic volumes with 76 right turn vehicles and the threshold being 50 vehicles per hour (vph). The turn lane requirement is acceleration length with the taper being included. The required acceleration length is 1170 feet with the same 25 to 1 taper based on the 60 mile per hour speed limit. It is recommended that this acceleration lane along northbound US-287 be a continuous acceleration/deceleration lane between this access and the proposed right-in/right-out access. A continuous acceleration/deceleration lane currently exists along northbound US-287 and will remain between the proposed full movement access and the right-in/right-out access. There is approximately 520 feet between these proposed access intersections. The requirement for a combination acceleration/deceleration lane is acceleration length plus deceleration length which is 1,270 feet (without the two tapers) for highways with a speed limit of 60 miles per hour. The maximum length of this combination acceleration/deceleration lane will be approximately 520 feet. Therefore, this right-in/right-out access may require a CDOT waiver.

5.4 Queueing Analysis

A queuing analysis was conducted for the study area intersections and proposed accesses along Arapahoe Road and US-287. Turn lanes are recommended to be constructed/designated to Town of Erie and CDOT standards providing the recommended storage length based on the queuing analysis. Results were obtained from the 95th percentile queue lengths obtained from the Synchro analysis. Results are shown in the following **Table 10** with calculations provided within the level of service operational sheets of **Appendix D** for the unsignalized intersections and **Appendix E** for signalized intersections.

Table 10 – Queue Length Analysis Results

Intersection Turn Lane	Existing Turn Lane Length (feet)	2019 Total Queue Length (feet)	2019 Recmd Turn Lane Length (feet)	2020 Total Queue Length (feet)	2020 Recmd Turn Lane Length (feet)	2040 Total Queue Length (feet)	2040 Recmd Turn Lane Length (feet)
Arapahoe/US 287							
Eastbound Left	150'	223'	150'	152' DL	**150' DL**	252' DL	**250' DL**
Westbound Left	375'	331'	375'	198' DL	**200' DL**	479' DL	**500' DL**
Northbound Left	425'	663'	425'	718'	**725'**	497' DL	**500' DL**
Southbound Left	425'	362'	425'	207' DL	**425' DL**	371' DL	425' DL
Arapahoe/Safeway							
Eastbound Left	150'	-	-	22'	150'	21'	150'
Westbound Left	DNE	-	-	84'	**150'**	136'	150'
Northbound Left	DNE	-	-	75'	**100'**	71'	100'
Southbound Left	DNE	-	-	91'	**100'**	86'	100'
Arapahoe/Beasley							
Eastbound Left	275'	7'	275'	13'	275'	8'	275'
Westbound Left	DNE	14'	**150'**	25'	150'	15'	150'
Northbound Left	DNE	55'	**100'**	43'	100'	55'	100'
Northbound Through/Right	DNE	34'	**C**	30'	C	38'	C
Southbound Left	DNE	22'	**100'**	18'	100'	31'	100'
Southbound Through/Right	DNE	34'	**C**	30'	C	33'	C
Lucerne/US 287							
Southbound Left	200'	25'	200'	25'	200'	-	-
Westbound Left	DNE	75'	**75'**	75'	75'	-	-
Arapahoe RIRO							
Northbound Right	DNE	-	-	25'	**50'**	45'	50'
US 287 RIRO							
Westbound Right	DNE	-	-	40'	**50'**	225'	**225'**
US 287 Full Movement							
Eastbound Left	DNE	DNE	DNE	DNE	DNE	138'	**150' DL**
Westbound Left	DNE	50'	**200' DL**	203'	200' DL	203'	200' DL
Northbound Left	DNE	DNE	DNE	DNE	DNE	338'	**550'**
Southbound Left	DNE	DNE	**425'**	71'	**500'**	195'	500'

DNE = Does Not Exist; C = Continuous; DL = Dual Left Turn Lanes

As shown in the table representing the queuing results in 2019, all anticipated queues are accommodated or managed within existing turn bay lengths except for the eastbound left turn and northbound left turn moments at the at the Arapahoe Road and US-287 intersection. It is not feasible to improve these until the project is constructed in 2020 and Arapahoe Road includes two eastbound through lanes.

At the Arapahoe Road and Beasley Drive intersection, it is recommended that the westbound left turn provide storage of 150 feet. It is recommended that the northbound approach at the Arapahoe Road and Beasley Drive intersection consist of a separate left turn lane. It is recommended that this northbound left turn lane accommodate a queue of 100 feet.

At the Lucerne Drive and US-287 intersection, it is recommended that the westbound left turn be striped to accommodate a queue of 75 feet. At the US-287 full movement access, it is recommended that the westbound dual left turn lanes provide storage of 200 feet, while the southbound left turn movement provide storage of 425 feet.

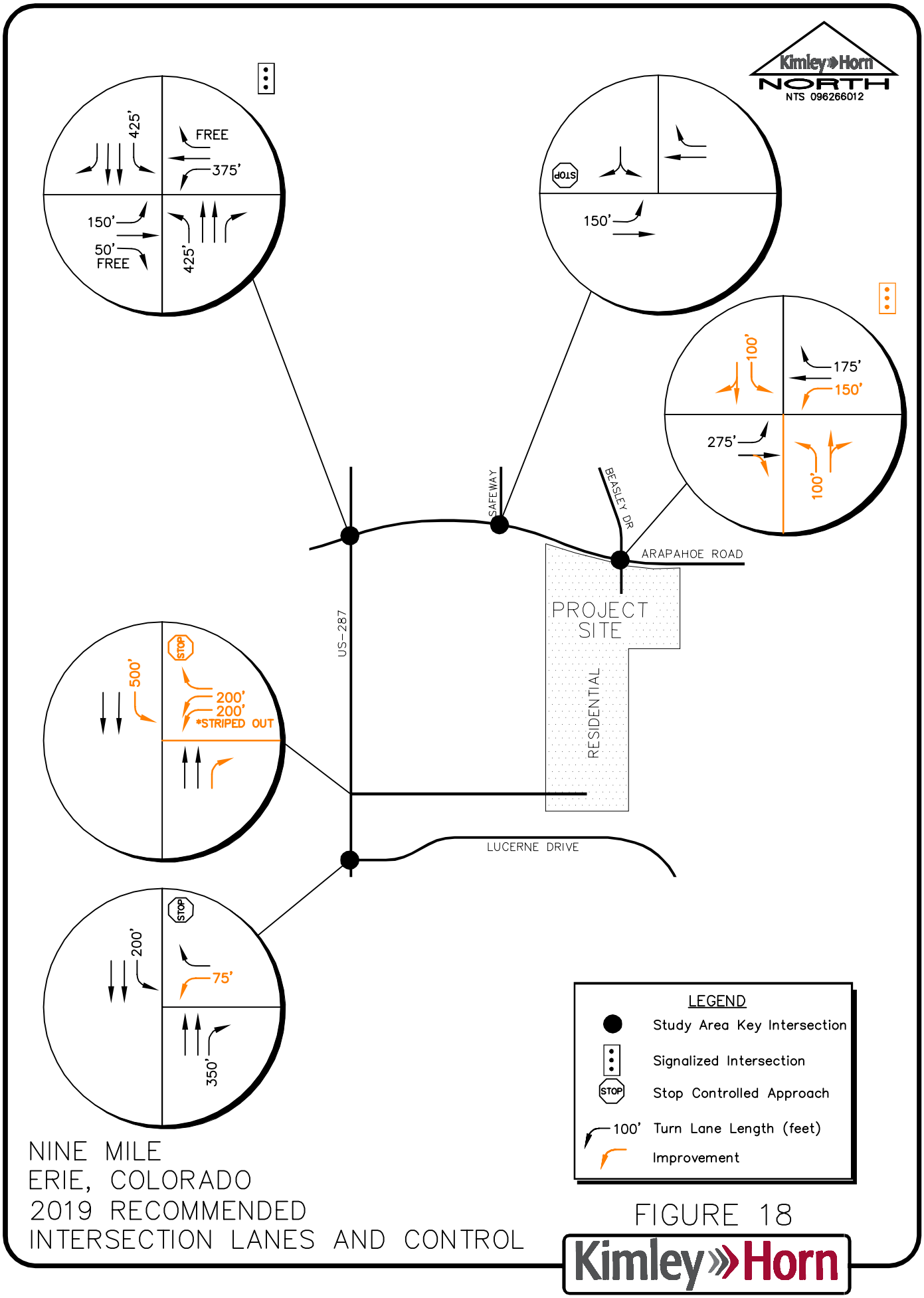
By 2020, it is recommended that the eastbound, westbound, and southbound approaches at the Arapahoe Road and US-287 intersection consist of dual left turn lanes. It is recommended that these turn lanes accommodate queues of 150 feet, 200 feet, and 425 feet, respectively.

At the Arapahoe Road Safeway access, the westbound left, northbound left, and southbound left turn lanes should provide storage of 150 feet, 100 feet, and 100 feet, respectively.

It is recommended that the driveway lengths at the Arapahoe Road and US-287 right-in/right-out intersections provide a minimum throat depths of 50 feet (two vehicles). At the US-287 full movement access, it is recommended that the southbound left turn movement provide a length of 500 feet.

By 2040, it is recommended that the eastbound, westbound, northbound, and southbound approaches at the Arapahoe Road and US-287 intersection consist of dual left turn lanes. It is recommended that these turn lanes accommodate queues of 250 feet, 500 feet, 500 feet, and 425 feet, respectively. At the US-287 full movement access, it is recommended that the eastbound dual left turn lanes and northbound left turn movement accommodate lengths of 150 and 550 feet.

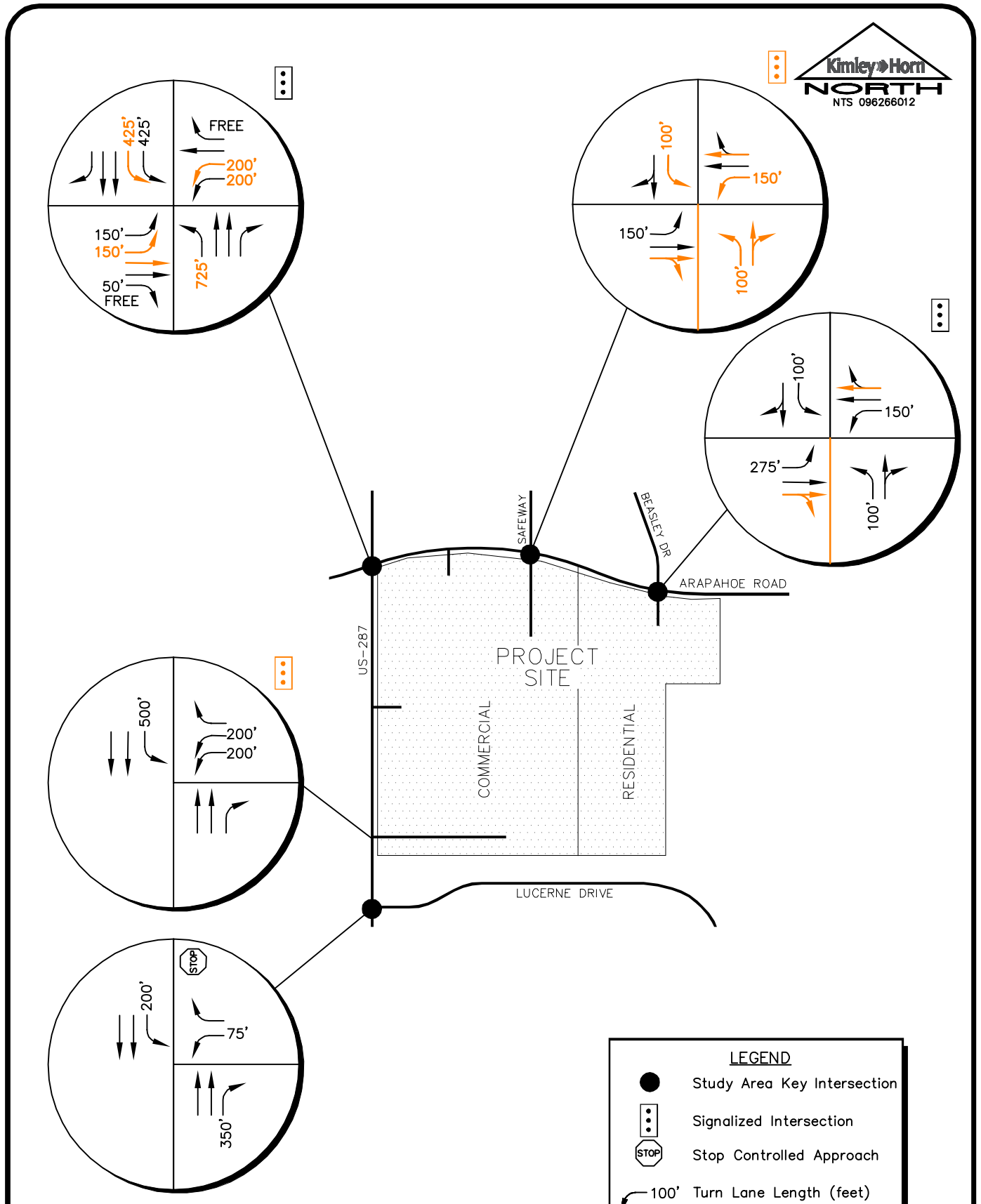
Based on the results of the operational and queuing analysis, the recommended intersection improvements are illustrated in **Figure 18** for the 2019 horizon year, **Figure 19** for the 2020 horizon year, and **Figure 20** for the 2040 horizon year.



NINE MILE
ERIE, COLORADO
2019 RECOMMENDED
INTERSECTION LANES AND CONTROL

FIGURE 18

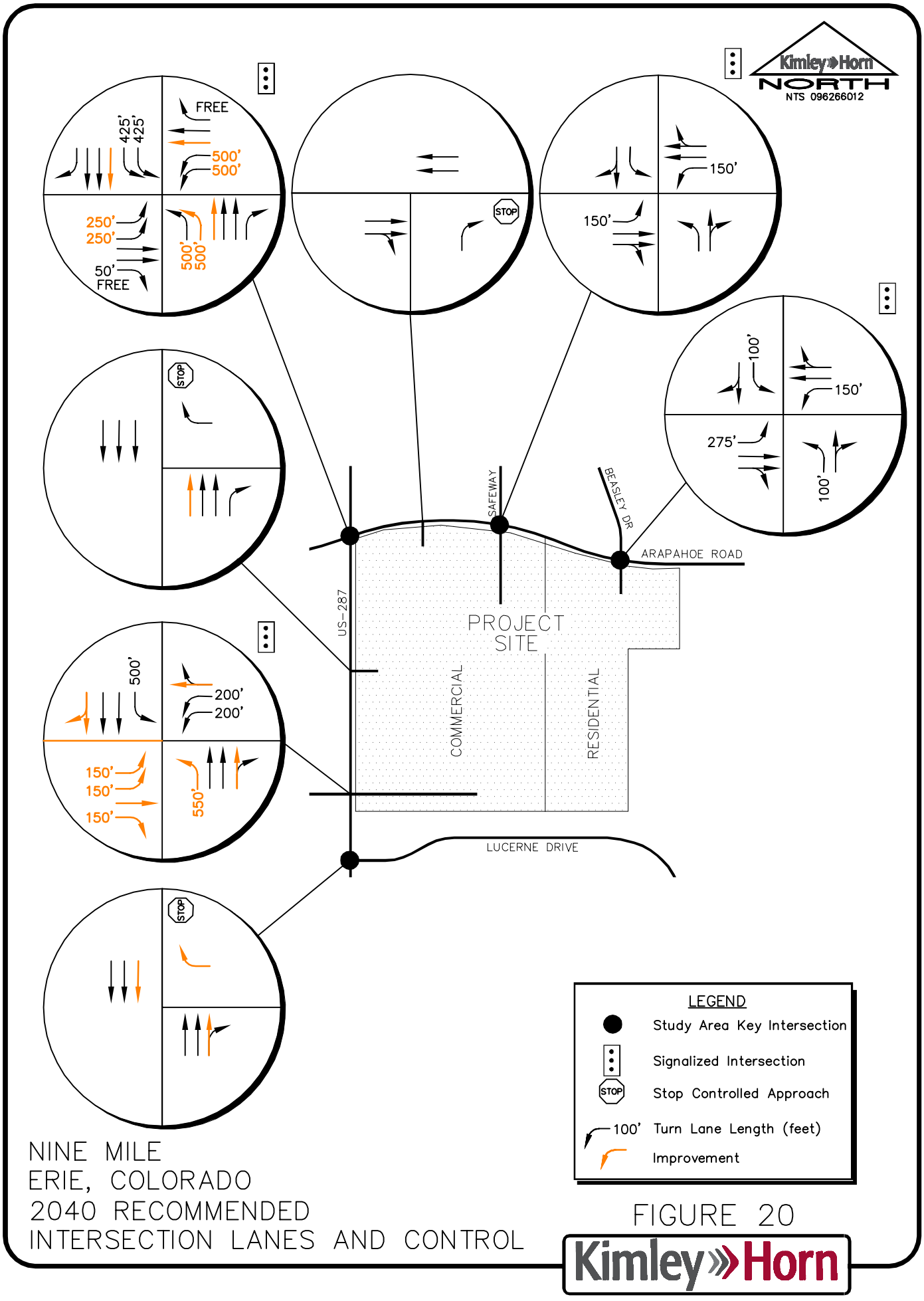
Kimley»Horn



NINE MILE
ERIE, COLORADO
2020 RECOMMENDED
INTERSECTION LANES AND CONTROL

FIGURE 19

Kimley»Horn



NINE MILE
ERIE, COLORADO
2040 RECOMMENDED
INTERSECTION LANES AND CONTROL

FIGURE 20

Kimley»Horn

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the analysis presented in this report, Kimley-Horn believes the traffic anticipated from the proposed Nine Mile project on the southeast corner of the Arapahoe Road and US-287 intersection will be incorporated into the existing and future roadway network. Analysis of the existing street network, the proposed project development, and expected traffic volumes resulted in the following recommendations:

2019 Horizon Recommendations

With development of the multi-family portion of Nine Mile, access improvements are recommended to serve this portion of development. It is proposed that full movement access will be provided by both Arapahoe Road and US-287.

- A new south leg is recommended to be constructed at the Arapahoe Road and Beasley Drive intersection to provide access to the project. With this new access, it is recommended that this intersection be signalized. It is recommended that a westbound left turn lane of 150 feet in length plus 100-foot taper be designated along Arapahoe Road. The new northbound approach is recommended to include separate left turn and through/right turn lanes. A northbound left turn lane of 100 feet with 50-foot taper is recommended. The southbound approach of Beasley Drive to the intersection is recommended to also be striped to include a separate left turn lane and shared through/right turn lane as well to provide for more efficient signal operations. Separate right turn lanes are not anticipated to be needed for any approach to this intersection.
- A new full movement access is recommended along US-287, approximately ¼-mile south of the Arapahoe Road intersection. This access intersection is recommended to operate with stop control with a R1-1 “STOP” sign installed on the westbound approach. It is recommended that this westbound approach include separate left turn (200 feet in length) and right turn lanes, with enough pavement width for future westbound dual left turn lanes.
- A southbound left turn lane, length of 500 feet (to accommodate the full buildout 2020 traffic volume) plus 300-foot taper (725-foot total length), is recommended to be designated along US-287 at the proposed full movement access. The existing painted full lane width double yellow centerline striped median is recommended to be restriped to accommodate this southbound left turn lane.

- A northbound right turn deceleration lane is recommended to be designated for the full movement access along US-287. Adequate pavement width exists for this turn lane today. Therefore, it is recommended that northbound US-287 be restriped to account for this recommended northbound right turn deceleration lane back to the Lucerne Drive intersection located approximately 350 feet to the south.
- To improve operations of the existing westbound left turn at the Lucerne Drive/US-287 intersection, the City of Lafayette and/or CDOT could consider designating separate left turn and right turn lanes on this approach. If a separate left turn lane were designated, it is recommended that it include a length of 75 feet with a 50-foot taper to not impact the Lucerne Drive/Sedge Way intersection to the east.

2020 Horizon Recommendations

With development of the commercial portion of Nine Mile on the southeast corner of the Arapahoe Road and US-287 intersection, several improvements are recommended to improve traffic operations. The improvements recommended are those that are believed to be feasible to construct with the development of the project.

- It is recommended that Arapahoe Road be widened to include two eastbound through lanes adjacent to the project.
- It is recommended that the Arapahoe Road/US-287 signalized intersection include dual westbound left turn lanes, dual eastbound left turn lanes, two eastbound through lanes, and dual southbound left turn lanes. The widening of Arapahoe Road along the south side of the roadway adjacent to the project will allow for the eastbound and westbound dual left turn lanes along with the two eastbound through lanes. The southbound dual left turn lanes can be designated within the existing striped out area along US-287. A traffic signal modification will be needed at the intersection to accommodate these additional turn lanes.
- The proposed right-in/right-out access along Arapahoe Road is recommended to operate with stop control on the new northbound exiting access approach with the installation of a R1-1 “STOP” sign. A separate right turn lane is not anticipated to be needed on the eastbound approach. To provide signage for the proposed right-in/right-out restricted access along Arapahoe Road, it is recommended that a R6-1(R) “ONE WAY” sign be installed within the raised median in alignment of exiting traffic from the proposed access.

- It is recommended that the northbound right turn movement at the Arapahoe Road right-in/right-out intersection provide a minimum throat depth of 50 feet (2 vehicles).
- The full movement access proposed along Arapahoe Road to align with the existing full movement access for Safeway is recommended to be signalized. The new northbound approach to the intersection is recommended to include separate left turn and shared through/right turn lanes. The southbound approach should also be designated with this configuration if possible to provide the most efficient signal operations. Northbound and southbound left turn lanes of 100 feet with 50-foot tapers is recommended. A westbound left turn lane of 150 feet with 100-foot taper is recommended along Arapahoe Road for the new access. Separate right turn lanes are not anticipated to be needed on any approaches.
- The proposed full movement access intersection along US-287 is recommended to be signalized. With signalization, the westbound approach is recommended to include dual left turn lanes and a separate right turn lane.
- A new right-in/right-out access along US-287 is recommended to be constructed to serve the commercial property, to be located approximately 800 feet, measured center to center, south of Arapahoe Road. It is recommended that the existing third northbound auxiliary lane along US-287 be restriped to include continuous auxiliary acceleration to deceleration lanes between the accesses and Arapahoe Road. With the presence of a northbound acceleration lane along US-287 for westbound to northbound right turn exiting vehicles to turn into, stop control isn't necessarily needed, although it may still be recommended to identify control by installing either a R1-1 "STOP" or R1-2 "YIELD" sign. To further identify this proposed access along US-287 to right turn movements only it is recommended that a R3-2 No Left Turn sign be placed underneath the STOP sign. An additional R3-2 No Left Turn sign could be located so it is visible to southbound drivers along US-287 (on the southeast corner of the right-in/right-out access intersection) to restrict left turn entrance movements as well.
- It is recommended that the westbound right turn movement at the US-287 right-in/right-out intersection provide a minimum throat depth of 50 feet (2 vehicles).

2040 Horizon Recommendations

Based on the conservative annual traffic volume growth rate of three percent per year, several capacity improvements may be needed in the future to accommodate traffic within the area. Although the likely possible and planned street network improvements will still not

adequately accommodate traffic if volumes actually double within the next 23 years to the 2040 horizon as a three percent annual growth rate would indicate. The following provides recommendations that will likely be needed to accommodate future traffic volumes:

- If future projected traffic volume growth is realized, US-287 may need to provide three or four through lanes in each direction, northbound and southbound. It is recommended that CDOT continue to monitor traffic volumes in the future to determine if and when the highway may need to include capacity improvements for possible increased through lane capacity in each direction.
- Arapahoe Road is anticipated to require two through lanes in each direction, eastbound and westbound, through the study area and further to the east and west. When Arapahoe Road is improved to include two westbound through lanes, it is recommended that dual northbound left turn lanes be implemented at the existing Arapahoe Road and US-287 signalized intersection.
- A new west leg is anticipated to be constructed for the development area along the west side of US-287 to align with the Nine Mile full movement signalized access. It is recommended that the eastbound approach also include dual left turn lanes and a separate right turn lane. Whenever this area develops and a new west leg is constructed at the intersection, a northbound left turn lane will be required, which will precipitate the need for the existing Lucerne Drive/US-287 intersection to be restricted to right-in/right-out movements only. There is a limited westbound left turn volume, so restriction of the westbound left out from Lucerne Drive to southbound US-287 isn't anticipated to have a significant impact and will improve safety of the intersection. Street network connections exist that will allow traffic to reroute through the neighborhood for traffic wishing to turn left at this intersection.

General Recommendation

- All on-site and off-site roadway improvements should be incorporated into the Civil Drawings, and conform to standards of the Town of Erie and CDOT (as appropriate), American Association of State Highway and Transportation Officials (AASHTO) Geometric Design of Highways and Streets, Institute of Transportation Engineers (ITE), and the Manual on Uniform Traffic Control Devices (MUTCD) – 2009 Edition.

APPENDICES

APPENDIX A

Intersection Count Sheets

RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Arapahoe and US-287 Counts
AM Peak
Arapahoe Rd and Beasley Dr

File Name : Arapahoe and Beasley AM
Site Code : ED IPO 1
Start Date : 2/9/2017
Page No : 1

Groups Printed- Automobiles

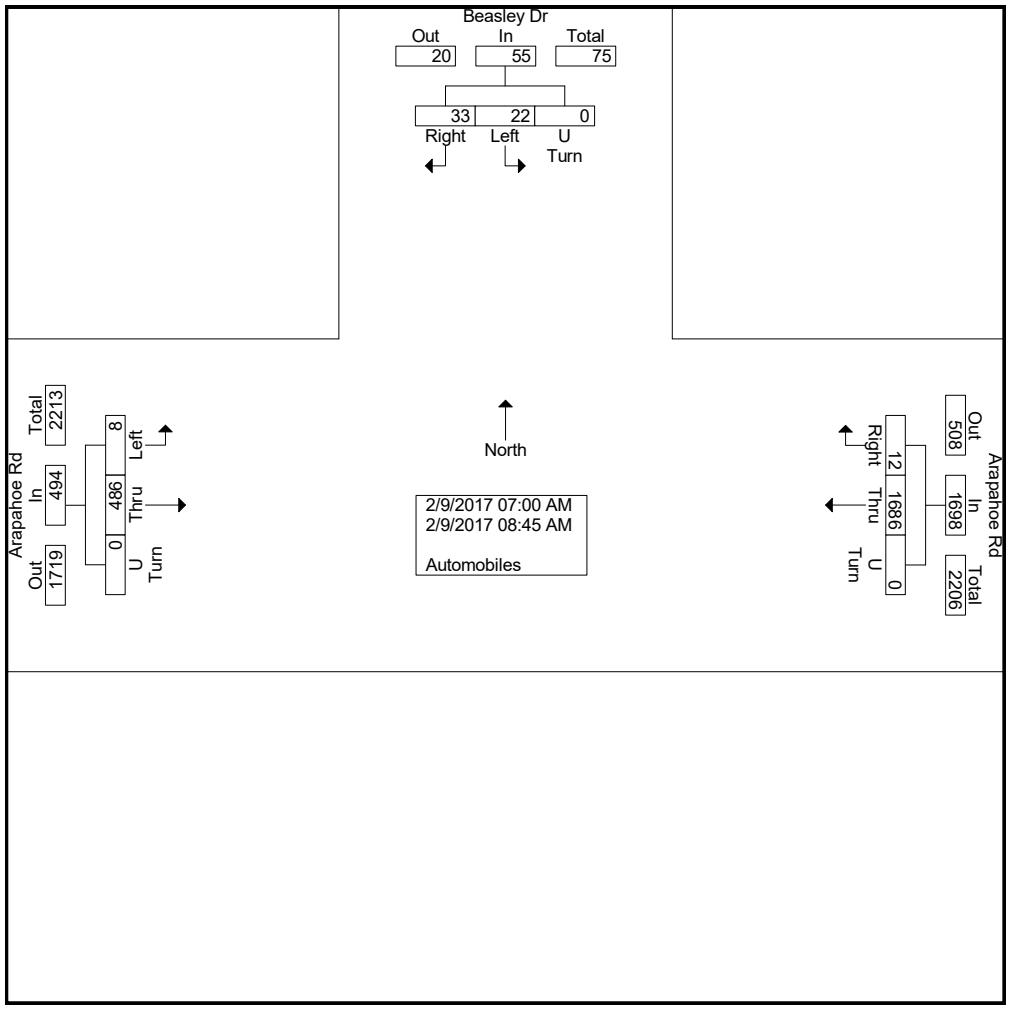
	Arapahoe Rd Eastbound				Arapahoe Rd Westbound				Beasley Dr Southbound				
Start Time	Left	Thru	U Turn	App. Total	Thru	Right	U Turn	App. Total	Left	Right	U Turn	App. Total	Int. Total
07:00 AM	2	48	0	50	221	0	0	221	2	4	0	6	277
07:15 AM	1	54	0	55	235	1	0	236	3	2	0	5	296
07:30 AM	1	73	0	74	222	1	0	223	11	5	0	16	313
07:45 AM	0	66	0	66	215	4	0	219	2	10	0	12	297
Total	4	241	0	245	893	6	0	899	18	21	0	39	1183
08:00 AM	0	64	0	64	226	4	0	230	0	4	0	4	298
08:15 AM	0	70	0	70	226	1	0	227	1	6	0	7	304
08:30 AM	1	61	0	62	165	1	0	166	1	2	0	3	231
08:45 AM	3	50	0	53	176	0	0	176	2	0	0	2	231
Total	4	245	0	249	793	6	0	799	4	12	0	16	1064
Grand Total	8	486	0	494	1686	12	0	1698	22	33	0	55	2247
Apprch %	1.6	98.4	0		99.3	0.7	0		40	60	0		
Total %	0.4	21.6	0	22	75	0.5	0	75.6	1	1.5	0	2.4	

RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Arapahoe and US-287 Counts
AM Peak
Arapahoe Rd and Beasley Dr

File Name : Arapahoe and Beasley AM
Site Code : ED IPO 1
Start Date : 2/9/2017
Page No : 2



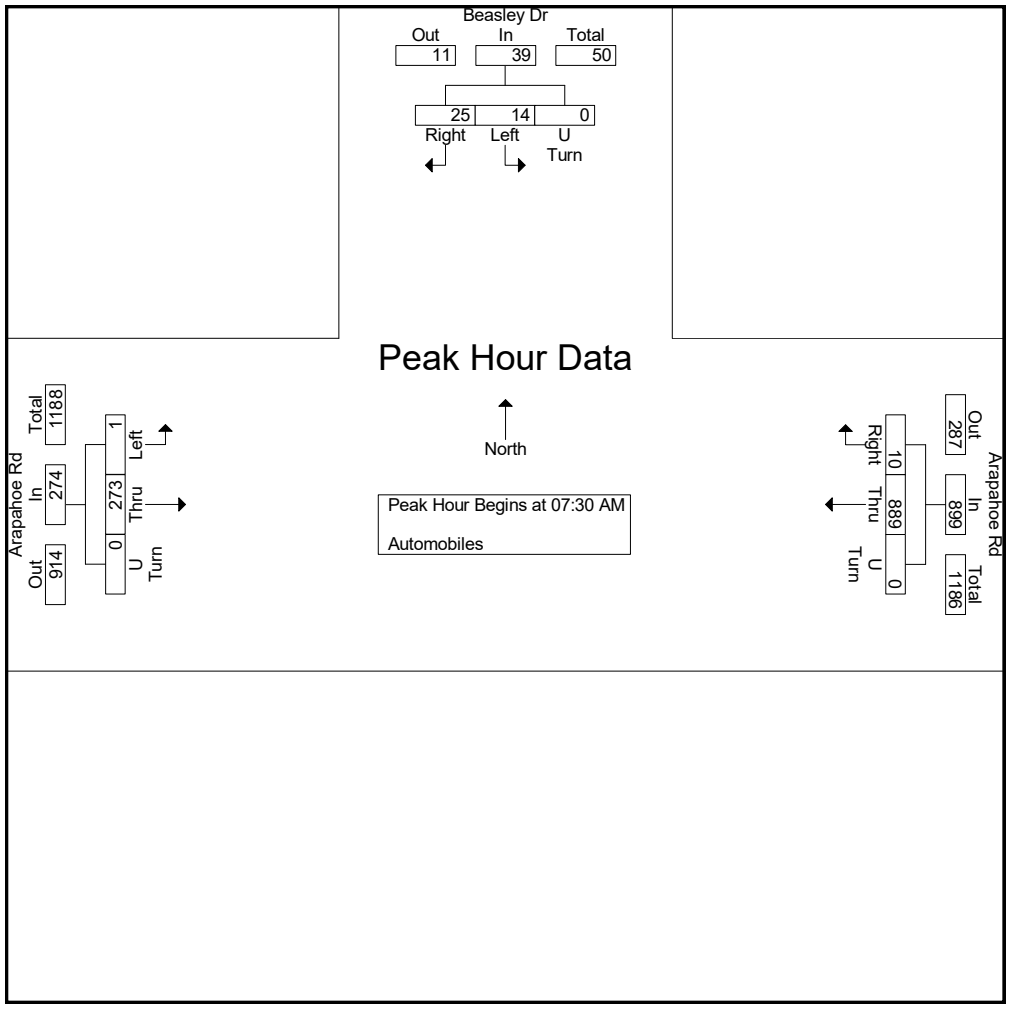
RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Arapahoe and US-287 Counts
AM Peak
Arapahoe Rd and Beasley Dr

File Name : Arapahoe and Beasley AM
Site Code : ED IPO 1
Start Date : 2/9/2017
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	Arapahoe Rd Eastbound				Arapahoe Rd Westbound				Beasley Dr Southbound				
Start Time	Left	Thru	U Turn	App. Total	Thru	Right	U Turn	App. Total	Left	Right	U Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:30 AM													
07:30 AM	**1**	**73**	0	**74**	222	1	0	223	**11**	5	0	**16**	**313**
07:45 AM	0	66	0	66	215	**4**	0	219	2	**10**	0	12	297
08:00 AM	0	64	0	64	**226**	4	0	**230**	0	4	0	4	298
08:15 AM	0	70	0	70	226	1	0	227	1	6	0	7	304
Total Volume	1	273	0	274	889	10	0	899	14	25	0	39	1212
% App. Total	0.4	99.6	0		98.9	1.1	0		35.9	64.1	0		
PHF	.250	.935	.000	.926	.983	.625	.000	.977	.318	.625	.000	.609	.968



RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Arapahoe and US-287 Counts
PM Peak
Arapahoe Rd and Beasley Dr

File Name : Arapahoe and Beasley PM
Site Code : ED IPO 1
Start Date : 2/9/2017
Page No : 1

Groups Printed- Automobiles

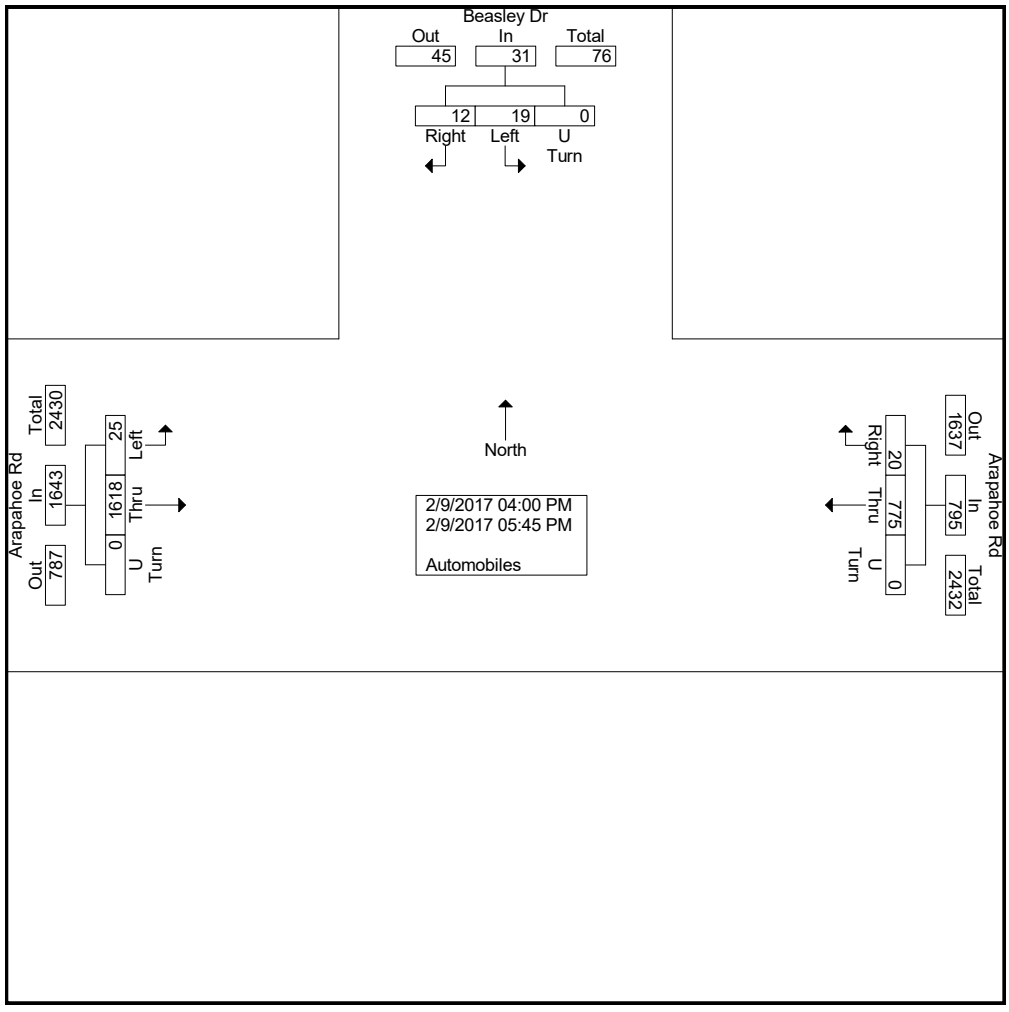
	Arapahoe Rd Eastbound				Arapahoe Rd Westbound				Beasley Dr Southbound				
Start Time	Left	Thru	U Turn	App. Total	Thru	Right	U Turn	App. Total	Left	Right	U Turn	App. Total	Int. Total
04:00 PM	0	178	0	178	86	1	0	87	1	0	0	1	266
04:15 PM	1	213	0	214	107	2	0	109	2	0	0	2	325
04:30 PM	5	212	0	217	103	4	0	107	3	3	0	6	330
04:45 PM	4	208	0	212	90	4	0	94	6	1	0	7	313
Total	10	811	0	821	386	11	0	397	12	4	0	16	1234
05:00 PM	6	202	0	208	101	3	0	104	0	3	0	3	315
05:15 PM	3	215	0	218	87	0	0	87	2	2	0	4	309
05:30 PM	4	199	0	203	115	4	0	119	4	1	0	5	327
05:45 PM	2	191	0	193	86	2	0	88	1	2	0	3	284
Total	15	807	0	822	389	9	0	398	7	8	0	15	1235
Grand Total	25	1618	0	1643	775	20	0	795	19	12	0	31	2469
Apprch %	1.5	98.5	0		97.5	2.5	0		61.3	38.7	0		
Total %	1	65.5	0	66.5	31.4	0.8	0	32.2	0.8	0.5	0	1.3	

RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Arapahoe and US-287 Counts
PM Peak
Arapahoe Rd and Beasley Dr

File Name : Arapahoe and Beasley PM
Site Code : ED IPO 1
Start Date : 2/9/2017
Page No : 2



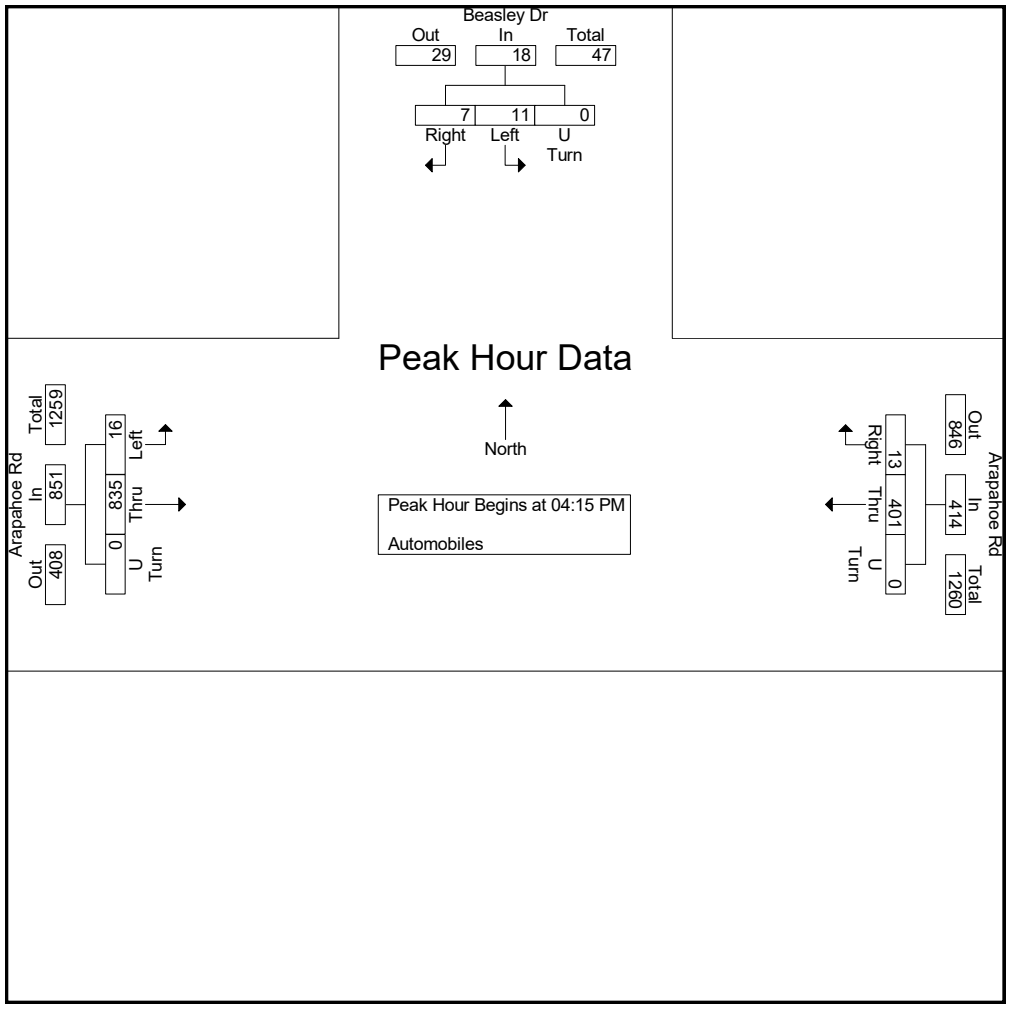
RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Arapahoe and US-287 Counts
PM Peak
Arapahoe Rd and Beasley Dr

File Name : Arapahoe and Beasley PM
Site Code : ED IPO 1
Start Date : 2/9/2017
Page No : 3

	Arapahoe Rd Eastbound				Arapahoe Rd Westbound				Beasley Dr Southbound				
Start Time	Left	Thru	U Turn	App. Total	Thru	Right	U Turn	App. Total	Left	Right	U Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:15 PM													
04:15 PM	1	**213**	0	214	**107**	2	0	**109**	2	0	0	2	325
04:30 PM	5	212	0	**217**	103	**4**	0	107	3	**3**	0	6	**330**
04:45 PM	4	208	0	212	90	4	0	94	**6**	1	0	**7**	313
05:00 PM	**6**	202	0	208	101	3	0	104	0	3	0	3	315
Total Volume	16	835	0	851	401	13	0	414	11	7	0	18	1283
% App. Total	1.9	98.1	0		96.9	3.1	0		61.1	38.9	0		
PHF	.667	.980	.000	.980	.937	.813	.000	.950	.458	.583	.000	.643	.972



RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Arapahoe and US-287 Counts
AM Peak
Arapahoe Rd and US-287

File Name : Arapahoe and US 287 AM
Site Code : ED IPO 1
Start Date : 2/9/2017
Page No : 1

Groups Printed- Automobiles

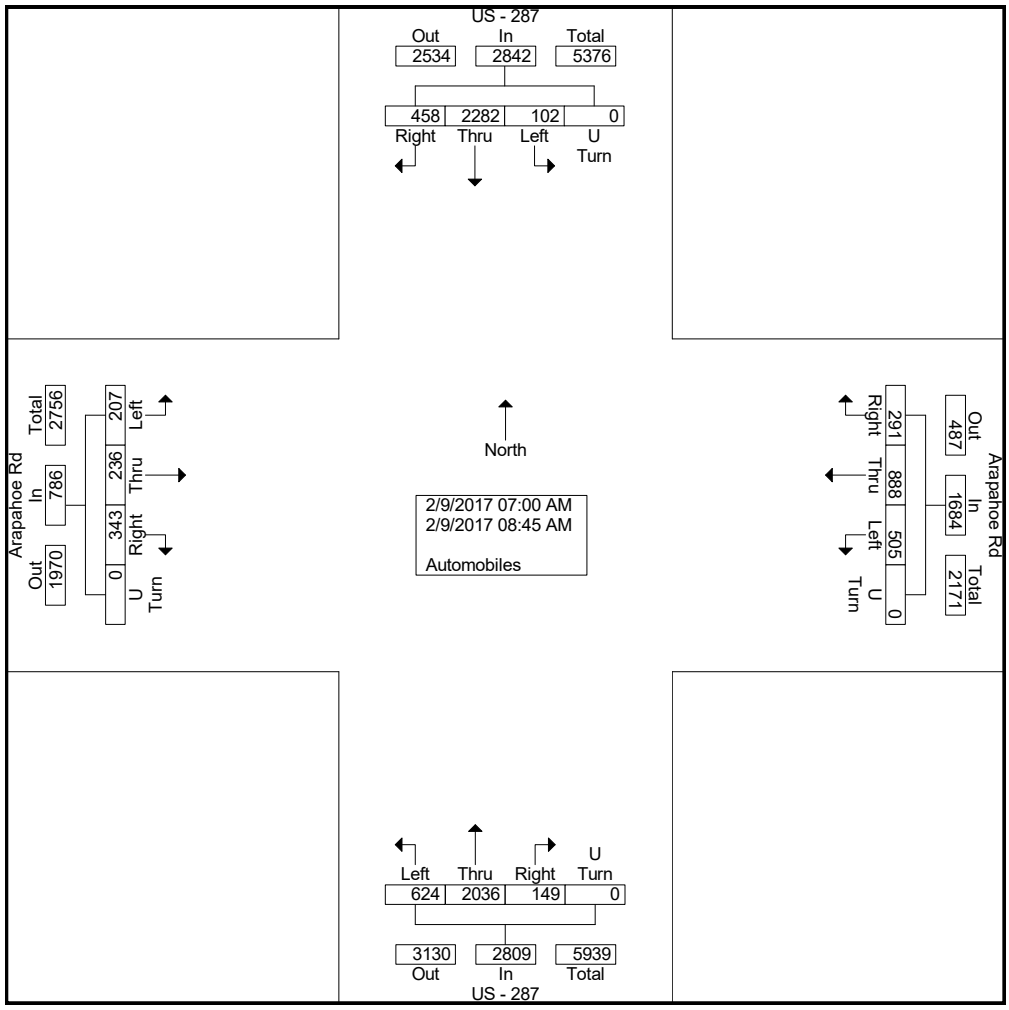
	Arapahoe Rd Eastbound					Arapahoe Rd Westbound					US - 287 Northbound					US - 287 Southbound					
Start Time	Left	Thru	Right	U Turn	App. Total	Left	Thru	Right	U Turn	App. Total	Left	Thru	Right	U Turn	App. Total	Left	Thru	Right	U Turn	App. Total	Int. Total
07:00 AM	21	18	32	0	71	60	108	39	0	207	56	168	18	0	242	12	264	45	0	321	841
07:15 AM	21	28	33	0	82	69	120	31	0	220	86	287	14	0	387	9	322	57	0	388	1077
07:30 AM	26	30	65	0	121	60	125	27	0	212	89	292	22	0	403	18	337	60	0	415	1151
07:45 AM	45	35	60	0	140	77	97	41	0	215	75	257	19	0	351	10	343	63	0	416	1122
Total	113	111	190	0	414	266	450	138	0	854	306	1004	73	0	1383	49	1266	225	0	1540	4191
08:00 AM	24	32	31	0	87	58	114	55	0	227	82	284	20	0	386	14	295	64	0	373	1073
08:15 AM	25	31	37	0	93	53	125	35	0	213	97	271	15	0	383	17	256	61	0	334	1023
08:30 AM	23	27	39	0	89	57	115	30	0	202	71	262	21	0	354	18	238	59	0	315	960
08:45 AM	22	35	46	0	103	71	84	33	0	188	68	215	20	0	303	4	227	49	0	280	874
Total	94	125	153	0	372	239	438	153	0	830	318	1032	76	0	1426	53	1016	233	0	1302	3930
Grand Total	207	236	343	0	786	505	888	291	0	1684	624	2036	149	0	2809	102	2282	458	0	2842	8121
Apprch %	26.3	30	43.6	0		30	52.7	17.3	0		22.2	72.5	5.3	0		3.6	80.3	16.1	0		
Total %	2.5	2.9	4.2	0	9.7	6.2	10.9	3.6	0	20.7	7.7	25.1	1.8	0	34.6	1.3	28.1	5.6	0	35	

RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Arapahoe and US-287 Counts
AM Peak
Arapahoe Rd and US-287

File Name : Arapahoe and US 287 AM
Site Code : ED IPO 1
Start Date : 2/9/2017
Page No : 2



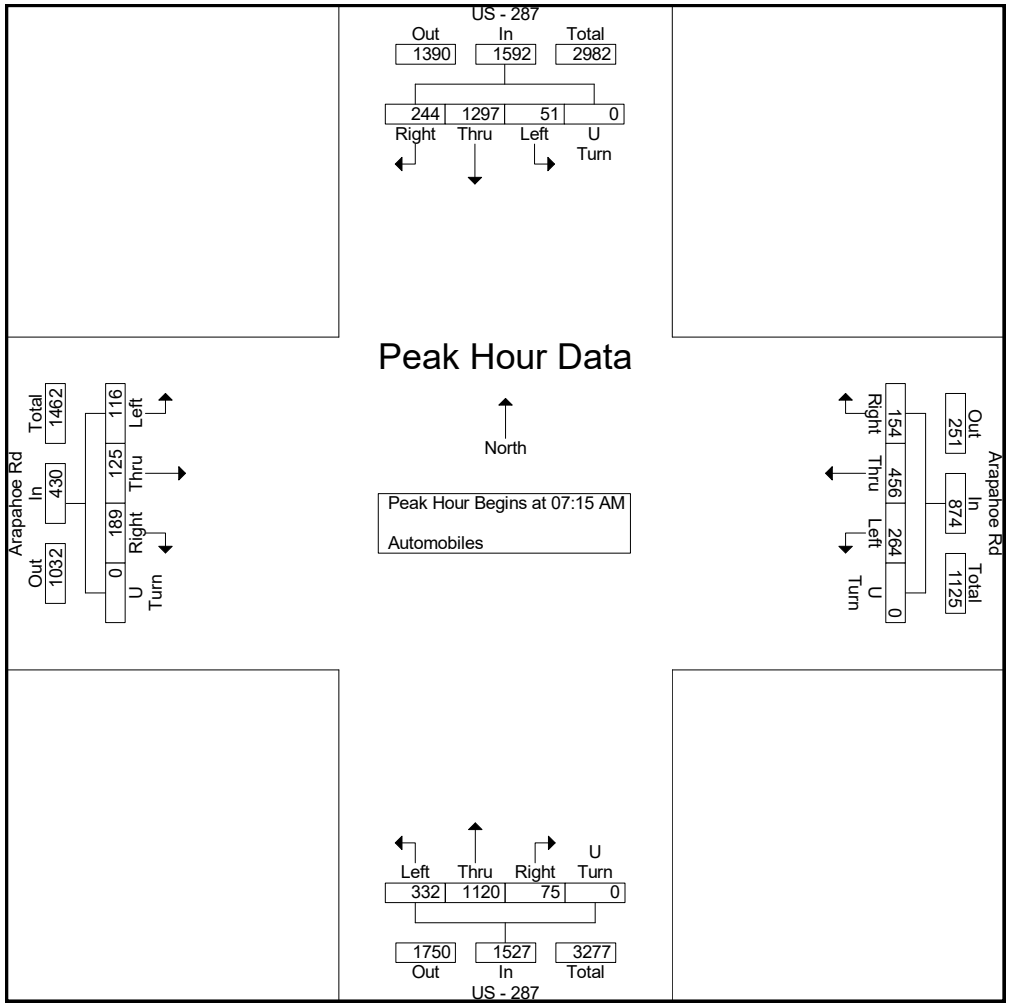
RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Arapahoe and US-287 Counts
AM Peak
Arapahoe Rd and US-287

File Name : Arapahoe and US 287 AM
Site Code : ED IPO 1
Start Date : 2/9/2017
Page No : 3

	Arapahoe Rd Eastbound					Arapahoe Rd Westbound					US - 287 Northbound					US - 287 Southbound					
Start Time	Left	Thru	Right	U Turn	App. Total	Left	Thru	Right	U Turn	App. Total	Left	Thru	Right	U Turn	App. Total	Left	Thru	Right	U Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	21	28	33	0	82	69	120	31	0	220	86	287	14	0	387	9	322	57	0	388	1077
07:30 AM	26	30	**65**	0	121	60	**125**	27	0	212	**89**	**292**	**22**	0	**403**	**18**	337	60	0	415	**1151**
07:45 AM	**45**	**35**	60	0	**140**	**77**	97	41	0	215	75	257	19	0	351	10	**343**	63	0	**416**	1122
08:00 AM	24	32	31	0	87	58	114	**55**	0	**227**	82	284	20	0	386	14	295	**64**	0	373	1073
Total Volume	116	125	189	0	430	264	456	154	0	874	332	1120	75	0	1527	51	1297	244	0	1592	4423
% App. Total	27	29.1	44	0		30.2	52.2	17.6	0		21.7	73.3	4.9	0		3.2	81.5	15.3	0		
PHF	.644	.893	.727	.000	.768	.857	.912	.700	.000	.963	.933	.959	.852	.000	.947	.708	.945	.953	.000	.957	.961



RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Arapahoe and US-287 Counts
PM Peak
Arapahoe Rd and US-287

File Name : Arapahoe and US 287 PM
Site Code : ED IPO 1
Start Date : 2/9/2017
Page No : 1

Groups Printed- Automobiles

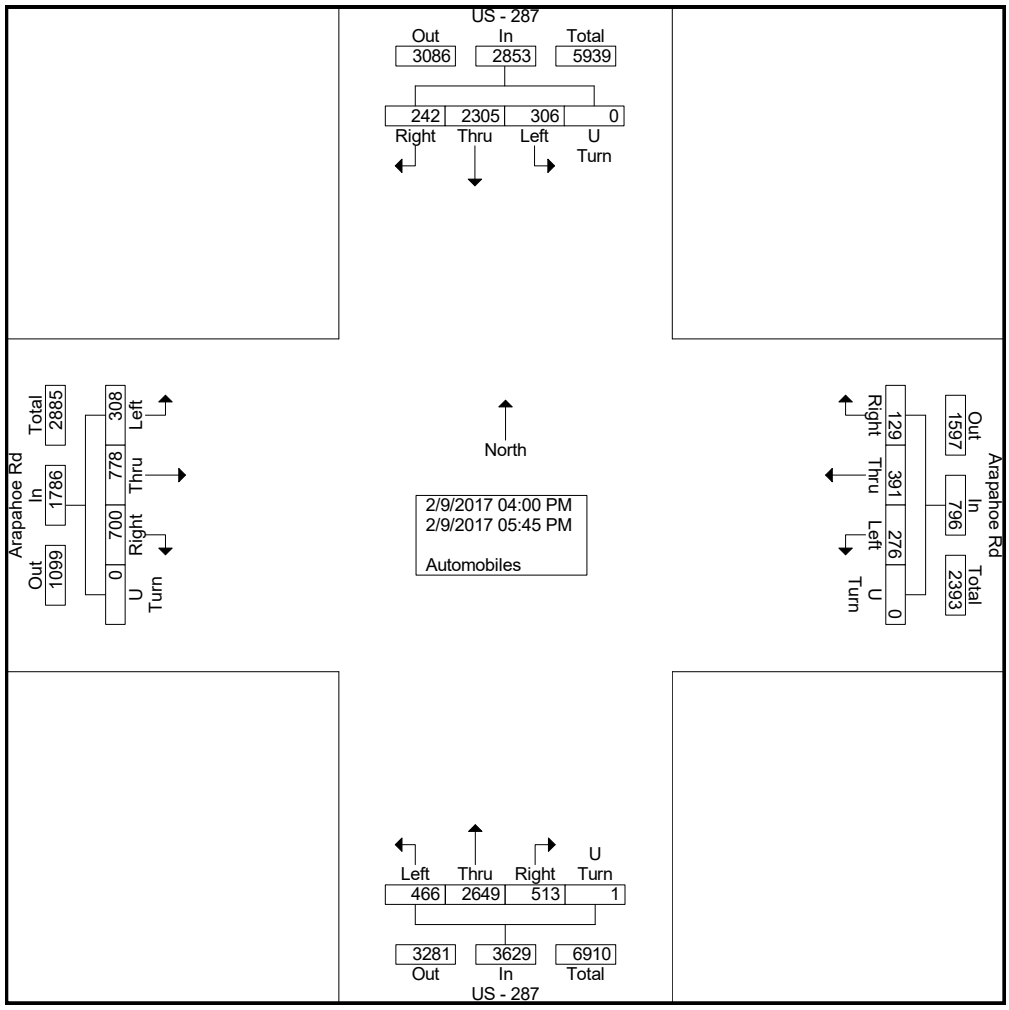
	Arapahoe Rd Eastbound					Arapahoe Rd Westbound					US - 287 Northbound					US - 287 Southbound					
Start Time	Left	Thru	Right	U Turn	App. Total	Left	Thru	Right	U Turn	App. Total	Left	Thru	Right	U Turn	App. Total	Left	Thru	Right	U Turn	App. Total	Int. Total
04:00 PM	35	100	93	0	228	37	51	10	0	98	58	300	61	0	419	21	257	23	0	301	1046
04:15 PM	38	105	79	0	222	37	51	10	0	98	42	307	47	0	396	48	291	34	0	373	1089
04:30 PM	48	93	108	0	249	29	42	24	0	95	55	383	66	0	504	49	264	32	0	345	1193
04:45 PM	38	97	73	0	208	34	54	14	0	102	68	333	83	0	484	29	306	23	0	358	1152
Total	159	395	353	0	907	137	198	58	0	393	223	1323	257	0	1803	147	1118	112	0	1377	4480
05:00 PM	37	104	90	0	231	38	39	21	0	98	55	334	63	0	452	38	294	25	0	357	1138
05:15 PM	44	103	84	0	231	32	52	17	0	101	68	352	68	0	488	47	324	35	0	406	1226
05:30 PM	34	90	88	0	212	30	60	20	0	110	67	343	51	1	462	42	324	28	0	394	1178
05:45 PM	34	86	85	0	205	39	42	13	0	94	53	297	74	0	424	32	245	42	0	319	1042
Total	149	383	347	0	879	139	193	71	0	403	243	1326	256	1	1826	159	1187	130	0	1476	4584
Grand Total	308	778	700	0	1786	276	391	129	0	796	466	2649	513	1	3629	306	2305	242	0	2853	9064
Apprch %	17.2	43.6	39.2	0		34.7	49.1	16.2	0		12.8	73	14.1	0		10.7	80.8	8.5	0		
Total %	3.4	8.6	7.7	0	19.7	3	4.3	1.4	0	8.8	5.1	29.2	5.7	0	40	3.4	25.4	2.7	0	31.5	

RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Arapahoe and US-287 Counts
PM Peak
Arapahoe Rd and US-287

File Name : Arapahoe and US 287 PM
Site Code : ED IPO 1
Start Date : 2/9/2017
Page No : 2



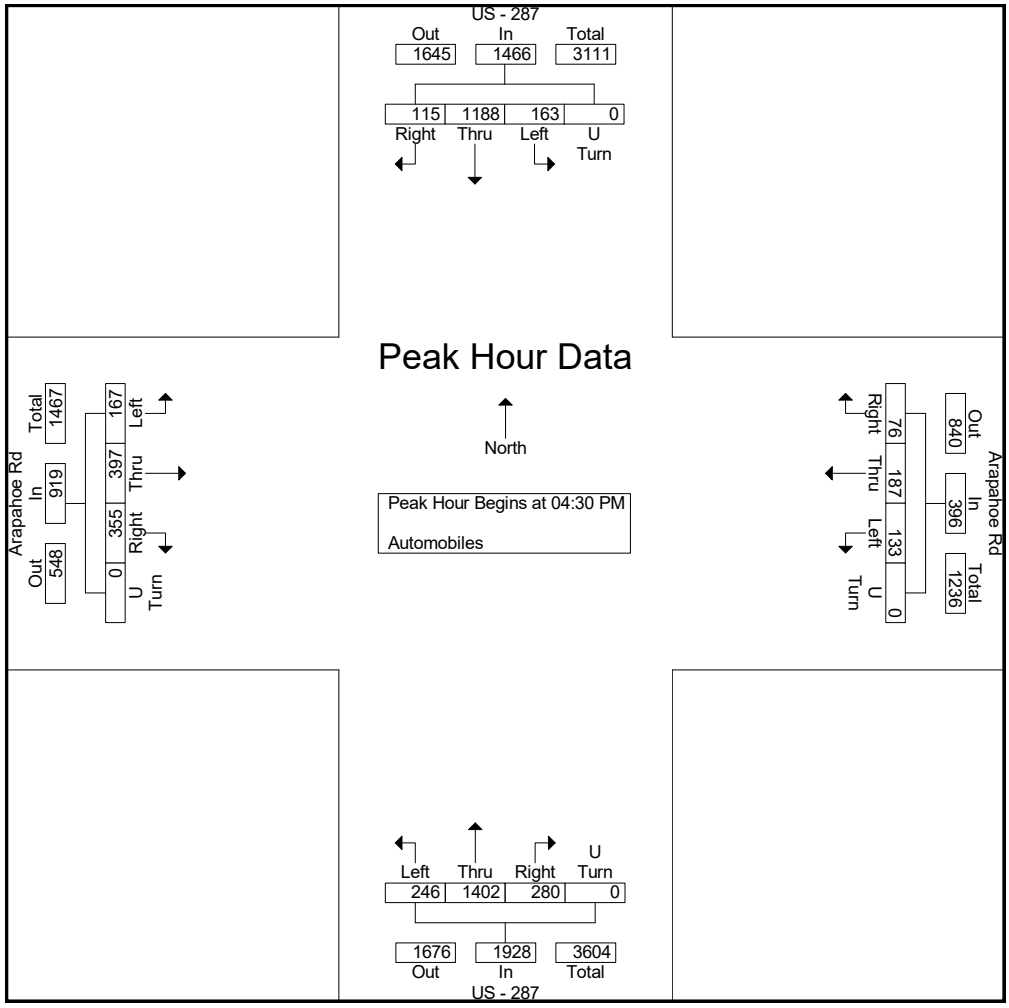
RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Arapahoe and US-287 Counts
PM Peak
Arapahoe Rd and US-287

File Name : Arapahoe and US 287 PM
Site Code : ED IPO 1
Start Date : 2/9/2017
Page No : 3

	Arapahoe Rd Eastbound					Arapahoe Rd Westbound					US - 287 Northbound					US - 287 Southbound					
Start Time	Left	Thru	Right	U Turn	App. Total	Left	Thru	Right	U Turn	App. Total	Left	Thru	Right	U Turn	App. Total	Left	Thru	Right	U Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	**48**	93	**108**	0	**249**	29	42	**24**	0	95	55	**383**	66	0	**504**	**49**	264	32	0	345	1193
04:45 PM	38	97	73	0	208	34	**54**	14	0	**102**	**68**	333	**83**	0	484	29	306	23	0	358	1152
05:00 PM	37	**104**	90	0	231	**38**	39	21	0	98	55	334	63	0	452	38	294	25	0	357	1138
05:15 PM	44	103	84	0	231	32	52	17	0	101	68	352	68	0	488	47	**324**	**35**	0	**406**	**1226**
Total Volume	167	397	355	0	919	133	187	76	0	396	246	1402	280	0	1928	163	1188	115	0	1466	4709
% App. Total	18.2	43.2	38.6	0		33.6	47.2	19.2	0		12.8	72.7	14.5	0		11.1	81	7.8	0		
PHF	.870	.954	.822	.000	.923	.875	.866	.792	.000	.971	.904	.915	.843	.000	.956	.832	.917	.821	.000	.903	.960



RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Arapahoe and US-287 Counts
AM Peak
Arapahoe Rd Safeway Access

File Name : Arapahoe Safeway Access AM
Site Code : ED IPO 1
Start Date : 2/9/2017
Page No : 1

Groups Printed- Automobiles

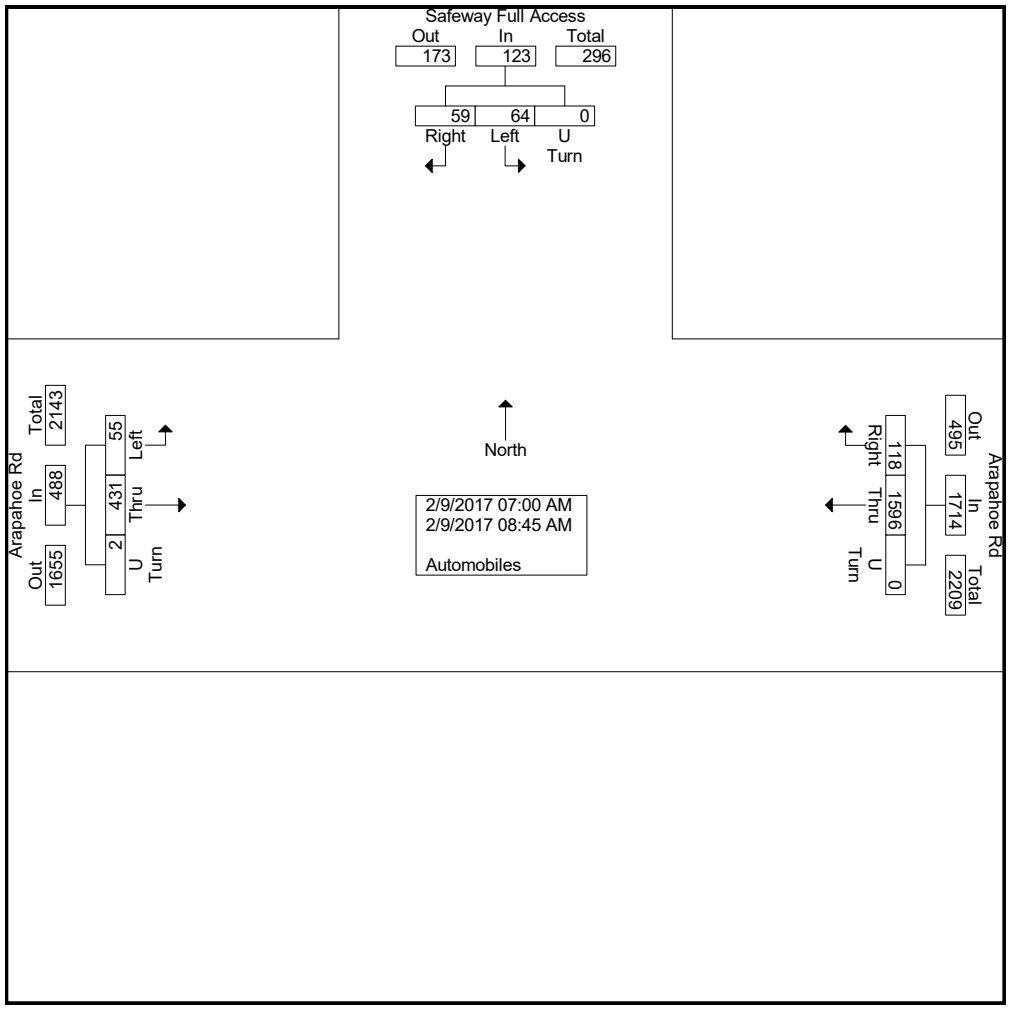
	Arapahoe Rd Eastbound				Arapahoe Rd Westbound				Safeway Full Access Southbound				
Start Time	Left	Thru	U Turn	App. Total	Thru	Right	U Turn	App. Total	Left	Right	U Turn	App. Total	Int. Total
07:00 AM	7	42	1	50	212	9	0	221	7	6	0	13	284
07:15 AM	5	43	0	48	205	19	0	224	13	11	0	24	296
07:30 AM	5	70	0	75	204	26	0	230	3	8	0	11	316
07:45 AM	4	59	0	63	211	14	0	225	6	6	0	12	300
Total	21	214	1	236	832	68	0	900	29	31	0	60	1196
08:00 AM	7	58	1	66	225	14	0	239	7	6	0	13	318
08:15 AM	6	58	0	64	209	17	0	226	11	11	0	22	312
08:30 AM	9	56	0	65	164	9	0	173	9	7	0	16	254
08:45 AM	12	45	0	57	166	10	0	176	8	4	0	12	245
Total	34	217	1	252	764	50	0	814	35	28	0	63	1129
Grand Total	55	431	2	488	1596	118	0	1714	64	59	0	123	2325
Apprch %	11.3	88.3	0.4		93.1	6.9	0		52	48	0		
Total %	2.4	18.5	0.1	21	68.6	5.1	0	73.7	2.8	2.5	0	5.3	

RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Arapahoe and US-287 Counts
AM Peak
Arapahoe Rd Safeway Access

File Name : Arapahoe Safeway Access AM
Site Code : ED IPO 1
Start Date : 2/9/2017
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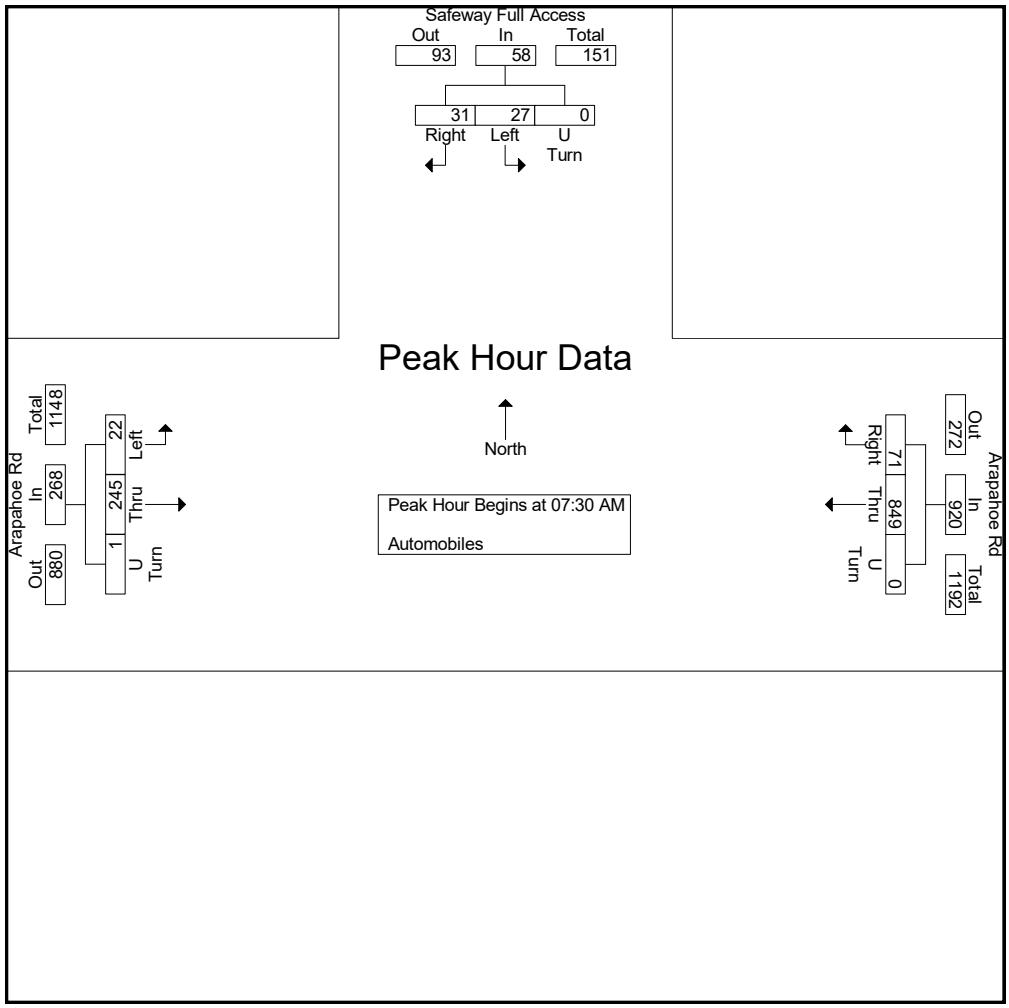
RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Arapahoe and US-287 Counts
AM Peak
Arapahoe Rd Safeway Access

File Name : Arapahoe Safeway Access AM
Site Code : ED IPO 1
Start Date : 2/9/2017
Page No : 3

	Arapahoe Rd Eastbound				Arapahoe Rd Westbound				Safeway Full Access Southbound				
Start Time	Left	Thru	U Turn	App. Total	Thru	Right	U Turn	App. Total	Left	Right	U Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:30 AM													
07:30 AM	5	**70**	0	**75**	204	**26**	0	230	3	8	0	11	316
07:45 AM	4	59	0	63	211	14	0	225	6	6	0	12	300
08:00 AM	**7**	58	**1**	66	**225**	14	0	**239**	7	6	0	13	**318**
08:15 AM	6	58	0	64	209	17	0	226	**11**	**11**	0	**22**	312
Total Volume	22	245	1	268	849	71	0	920	27	31	0	58	1246
% App. Total	8.2	91.4	0.4		92.3	7.7	0		46.6	53.4	0		
PHF	.786	.875	.250	.893	.943	.683	.000	.962	.614	.705	.000	.659	.980



RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Arapahoe and US-287 Counts
PM Peak
Arapahoe Rd Safeway Access

File Name : Arapahoe Safeway Access PM
Site Code : ED IPO 1
Start Date : 2/9/2017
Page No : 1

Groups Printed- Automobiles

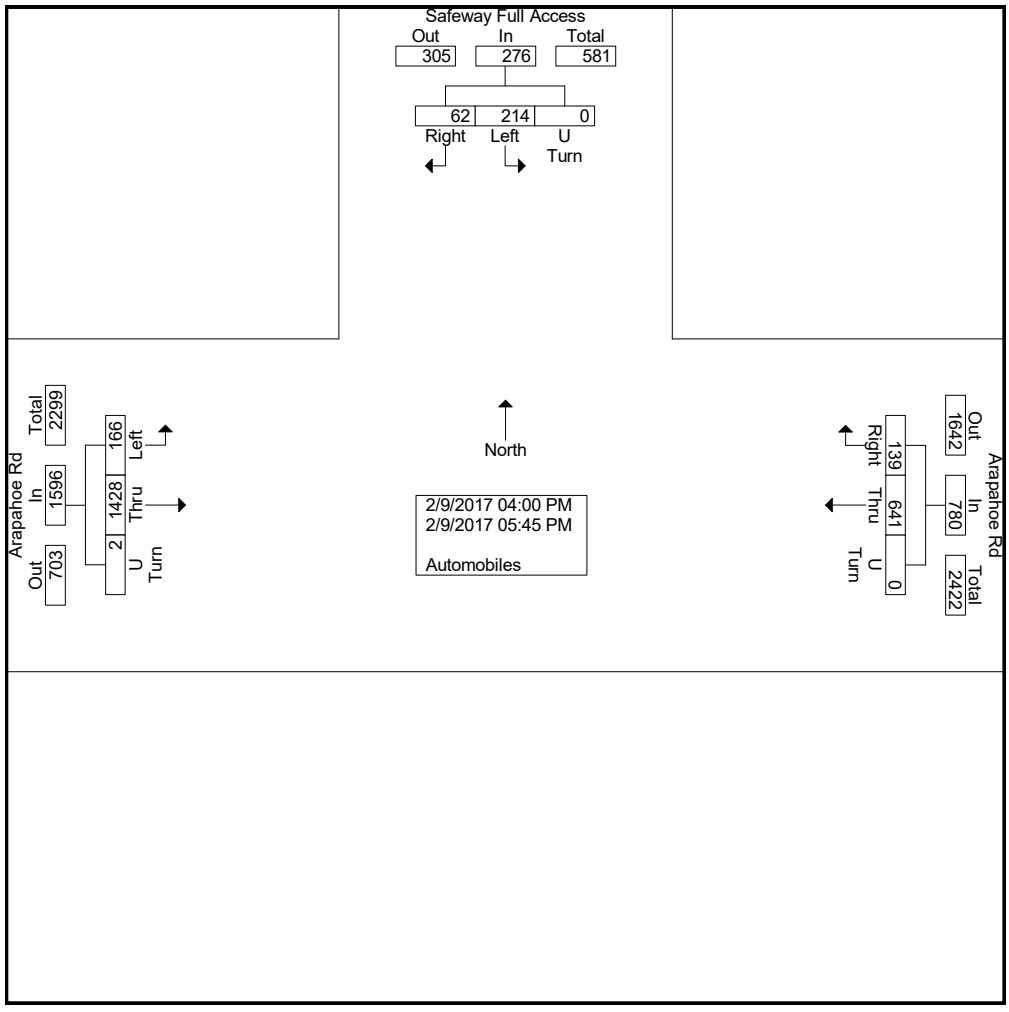
	Arapahoe Rd Eastbound				Arapahoe Rd Westbound				Safeway Full Access Southbound				
Start Time	Left	Thru	U Turn	App. Total	Thru	Right	U Turn	App. Total	Left	Right	U Turn	App. Total	Int. Total
04:00 PM	20	157	0	177	78	11	0	89	20	10	0	30	296
04:15 PM	14	185	0	199	81	21	0	102	31	5	0	36	337
04:30 PM	19	193	0	212	81	26	0	107	22	10	0	32	351
04:45 PM	26	183	0	209	76	13	0	89	30	9	0	39	337
Total	79	718	0	797	316	71	0	387	103	34	0	137	1321
05:00 PM	24	180	0	204	80	20	0	100	24	4	0	28	332
05:15 PM	16	199	1	216	82	12	0	94	26	6	0	32	342
05:30 PM	22	166	1	189	91	20	0	111	34	12	0	46	346
05:45 PM	25	165	0	190	72	16	0	88	27	6	0	33	311
Total	87	710	2	799	325	68	0	393	111	28	0	139	1331
Grand Total	166	1428	2	1596	641	139	0	780	214	62	0	276	2652
Apprch %	10.4	89.5	0.1		82.2	17.8	0		77.5	22.5	0		
Total %	6.3	53.8	0.1	60.2	24.2	5.2	0	29.4	8.1	2.3	0	10.4	

RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Arapahoe and US-287 Counts
PM Peak
Arapahoe Rd Safeway Access

File Name : Arapahoe Safeway Access PM
Site Code : ED IPO 1
Start Date : 2/9/2017
Page No : 2



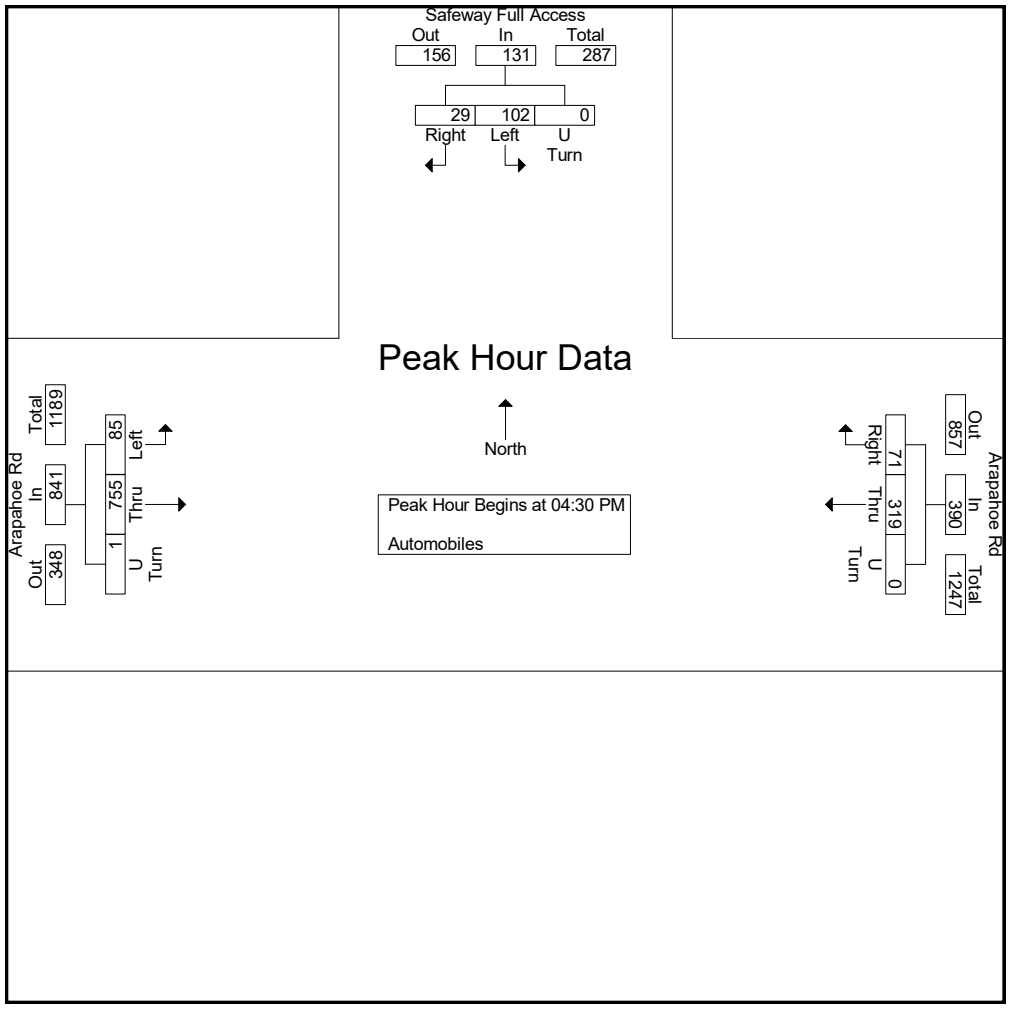
RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Arapahoe and US-287 Counts
PM Peak
Arapahoe Rd Safeway Access

File Name : Arapahoe Safeway Access PM
Site Code : ED IPO 1
Start Date : 2/9/2017
Page No : 3

	Arapahoe Rd Eastbound				Arapahoe Rd Westbound				Safeway Full Access Southbound				
Start Time	Left	Thru	U Turn	App. Total	Thru	Right	U Turn	App. Total	Left	Right	U Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:30 PM													
04:30 PM	19	193	0	212	81	**26**	0	**107**	22	**10**	0	32	**351**
04:45 PM	**26**	183	0	209	76	13	0	89	**30**	9	0	**39**	337
05:00 PM	24	180	0	204	80	20	0	100	24	4	0	28	332
05:15 PM	16	**199**	**1**	**216**	**82**	12	0	94	26	6	0	32	342
Total Volume	85	755	1	841	319	71	0	390	102	29	0	131	1362
% App. Total	10.1	89.8	0.1		81.8	18.2	0		77.9	22.1	0		
PHF	.817	.948	.250	.973	.973	.683	.000	.911	.850	.725	.000	.840	.970



RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Arapahoe and US-287 Counts
AM Peak
Lucerne Drive and US-287

File Name : US 287 and Lucerne AM
Site Code : ED IPO 1
Start Date : 2/9/2017
Page No : 1

Groups Printed- Automobiles

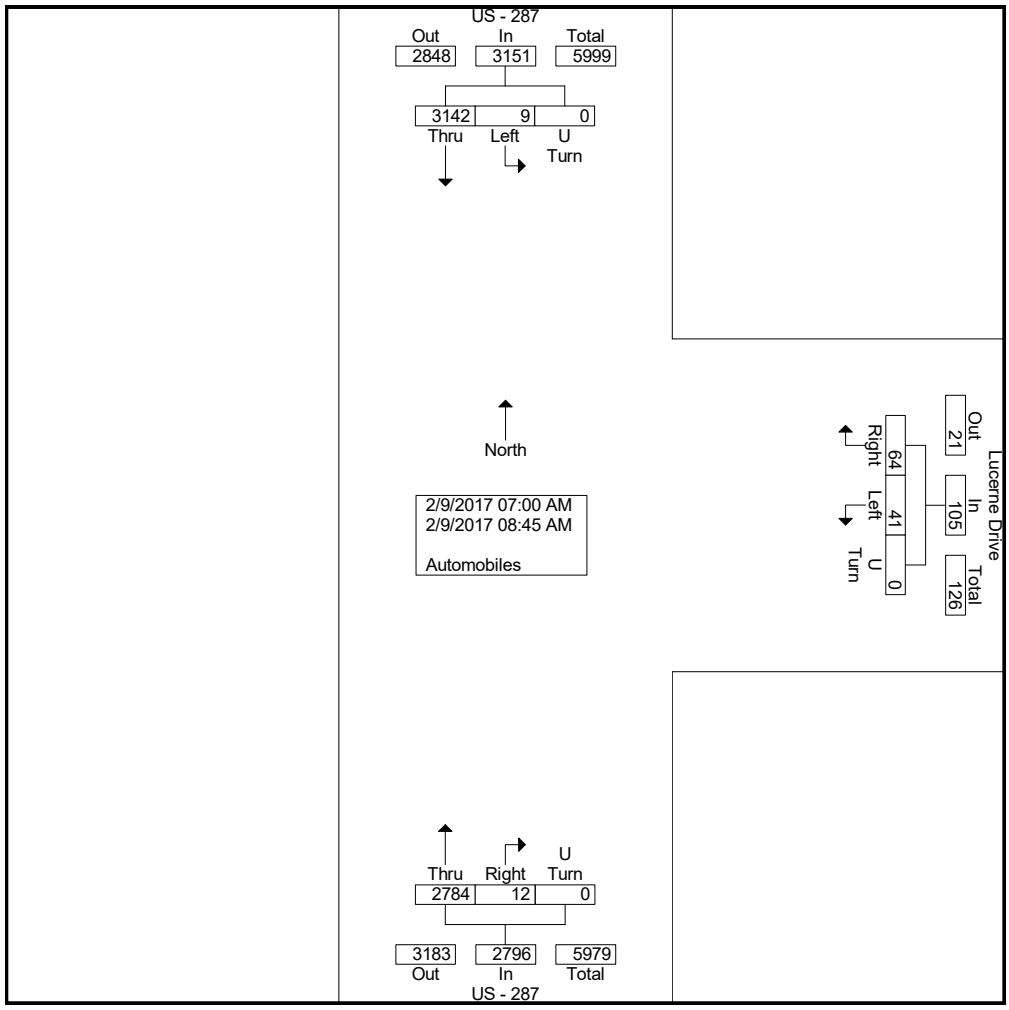
	Lucerne Drive Westbound				US - 287 Northbound				US - 287 Southbound				
Start Time	Left	Right	U Turn	App. Total	Thru	Right	U Turn	App. Total	Left	Thru	U Turn	App. Total	Int. Total
07:00 AM	4	6	0	10	283	1	0	284	0	359	0	359	653
07:15 AM	11	10	0	21	373	1	0	374	1	415	0	416	811
07:30 AM	6	6	0	12	403	3	0	406	1	474	0	475	893
07:45 AM	8	13	0	21	339	0	0	339	1	476	0	477	837
Total	29	35	0	64	1398	5	0	1403	3	1724	0	1727	3194
08:00 AM	3	11	0	14	411	2	0	413	1	385	0	386	813
08:15 AM	3	7	0	10	355	1	0	356	1	357	0	358	724
08:30 AM	2	5	0	7	346	4	0	350	2	333	0	335	692
08:45 AM	4	6	0	10	274	0	0	274	2	343	0	345	629
Total	12	29	0	41	1386	7	0	1393	6	1418	0	1424	2858
Grand Total	41	64	0	105	2784	12	0	2796	9	3142	0	3151	6052
Apprch %	39	61	0		99.6	0.4	0		0.3	99.7	0		
Total %	0.7	1.1	0	1.7	46	0.2	0	46.2	0.1	51.9	0	52.1	

RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Arapahoe and US-287 Counts
AM Peak
Lucerne Drive and US-287

File Name : US 287 and Lucerne AM
Site Code : ED IPO 1
Start Date : 2/9/2017
Page No : 2



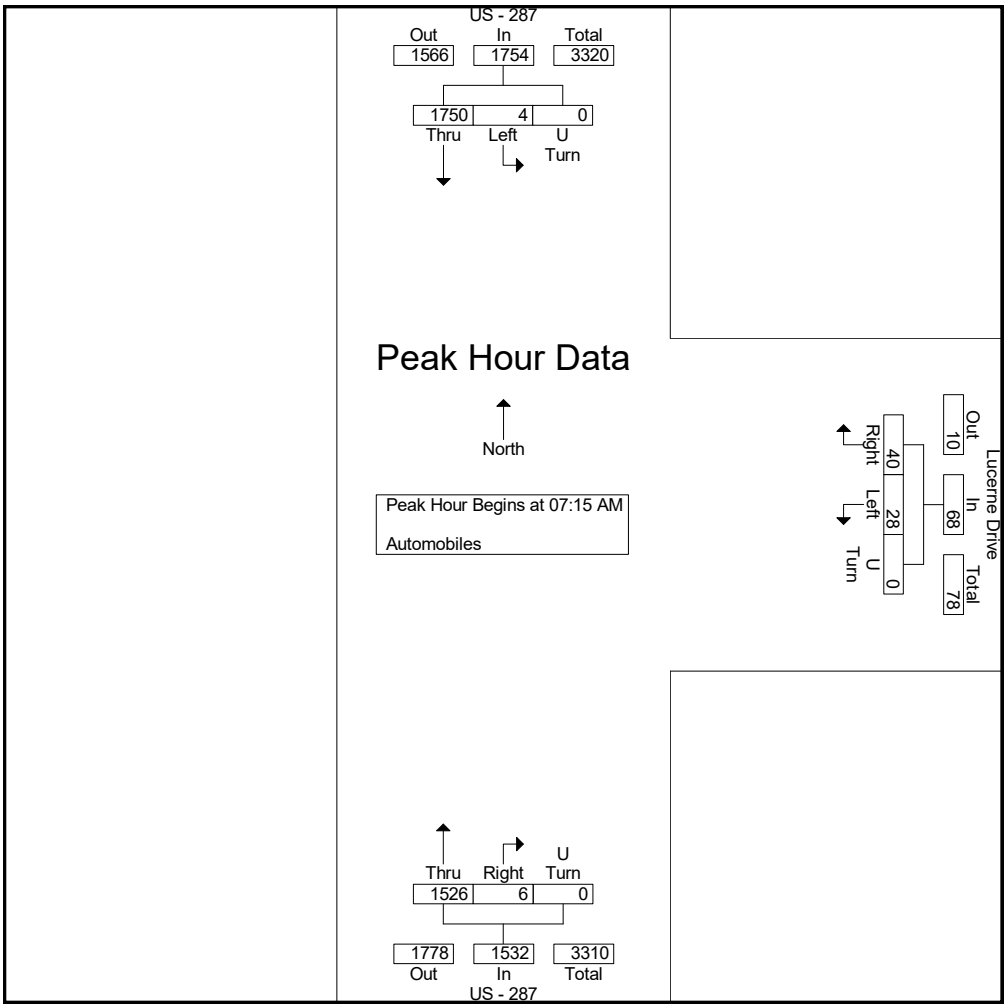
RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Arapahoe and US-287 Counts
AM Peak
Lucerne Drive and US-287

File Name : US 287 and Lucerne AM
Site Code : ED IPO 1
Start Date : 2/9/2017
Page No : 3

	Lucerne Drive Westbound				US - 287 Northbound				US - 287 Southbound				
Start Time	Left	Right	U Turn	App. Total	Thru	Right	U Turn	App. Total	Left	Thru	U Turn	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:15 AM													
07:15 AM	**11**	10	0	**21**	373	1	0	374	**1**	415	0	416	811
07:30 AM	6	6	0	12	403	**3**	0	406	1	474	0	475	**893**
07:45 AM	8	**13**	0	21	339	0	0	339	1	**476**	0	**477**	837
08:00 AM	3	11	0	14	**411**	2	0	**413**	1	385	0	386	813
Total Volume	28	40	0	68	1526	6	0	1532	4	1750	0	1754	3354
% App. Total	41.2	58.8	0		99.6	0.4	0		0.2	99.8	0		
PHF	.636	.769	.000	.810	.928	.500	.000	.927	1.00	.919	.000	.919	.939



RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Arapahoe and US-287 Counts
PM Peak
Lucerne Drive and US-287

File Name : US 287 and Lucerne PM
Site Code : ED IPO 1
Start Date : 2/9/2017
Page No : 1

Groups Printed- Automobiles

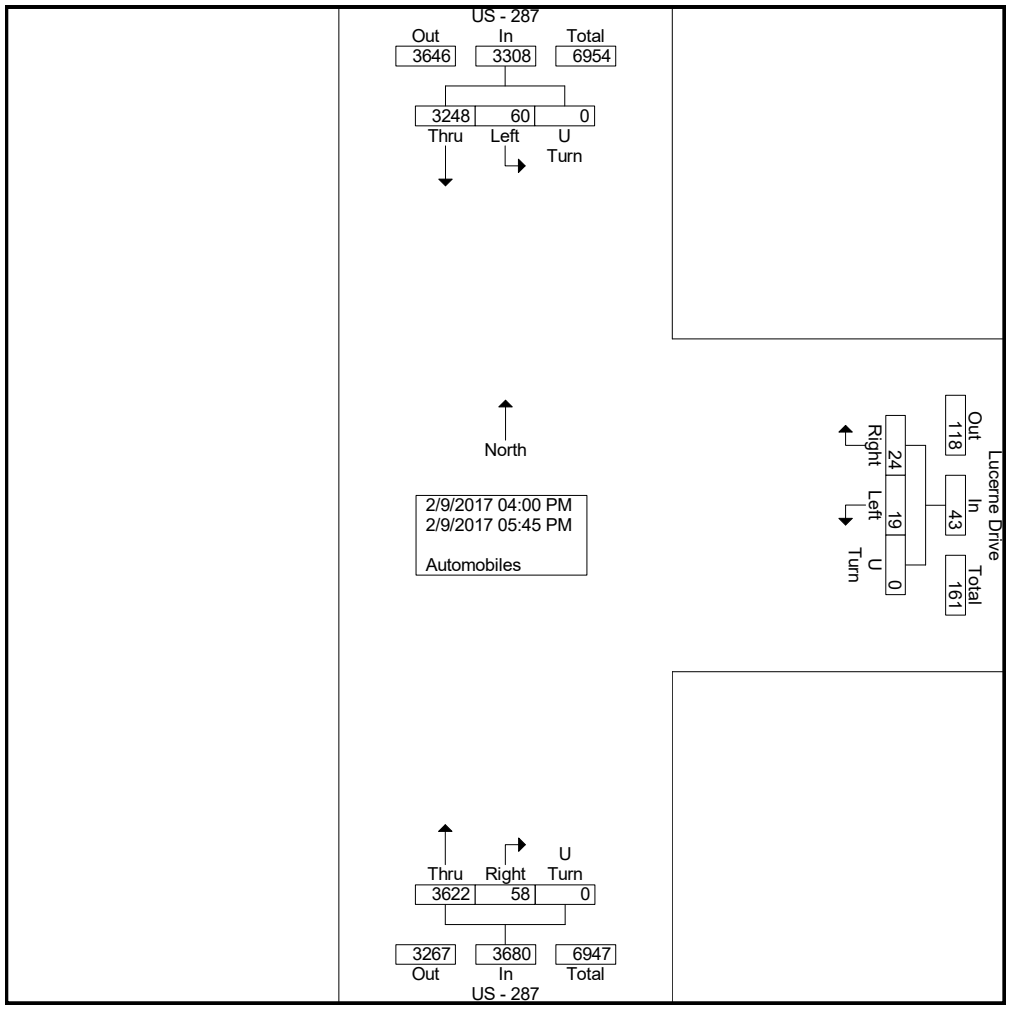
	Lucerne Drive Westbound				US - 287 Northbound				US - 287 Southbound				
Start Time	Left	Right	U Turn	App. Total	Thru	Right	U Turn	App. Total	Left	Thru	U Turn	App. Total	Int. Total
04:00 PM	4	6	0	10	440	10	0	450	5	382	0	387	847
04:15 PM	6	3	0	9	406	6	0	412	5	405	0	410	831
04:30 PM	1	3	0	4	505	4	0	509	8	395	0	403	916
04:45 PM	0	2	0	2	488	10	0	498	7	411	0	418	918
Total	11	14	0	25	1839	30	0	1869	25	1593	0	1618	3512
05:00 PM	1	3	0	4	435	10	0	445	9	412	0	421	870
05:15 PM	5	0	0	5	495	10	0	505	11	432	0	443	953
05:30 PM	1	4	0	5	440	4	0	444	6	448	0	454	903
05:45 PM	1	3	0	4	413	4	0	417	9	363	0	372	793
Total	8	10	0	18	1783	28	0	1811	35	1655	0	1690	3519
Grand Total	19	24	0	43	3622	58	0	3680	60	3248	0	3308	7031
Apprch %	44.2	55.8	0		98.4	1.6	0		1.8	98.2	0		
Total %	0.3	0.3	0	0.6	51.5	0.8	0	52.3	0.9	46.2	0	47	

Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Arapahoe and US-287 Counts
PM Peak
Lucerne Drive and US-287

File Name : US 287 and Lucerne PM
Site Code : ED IPO 1
Start Date : 2/9/2017
Page No : 2



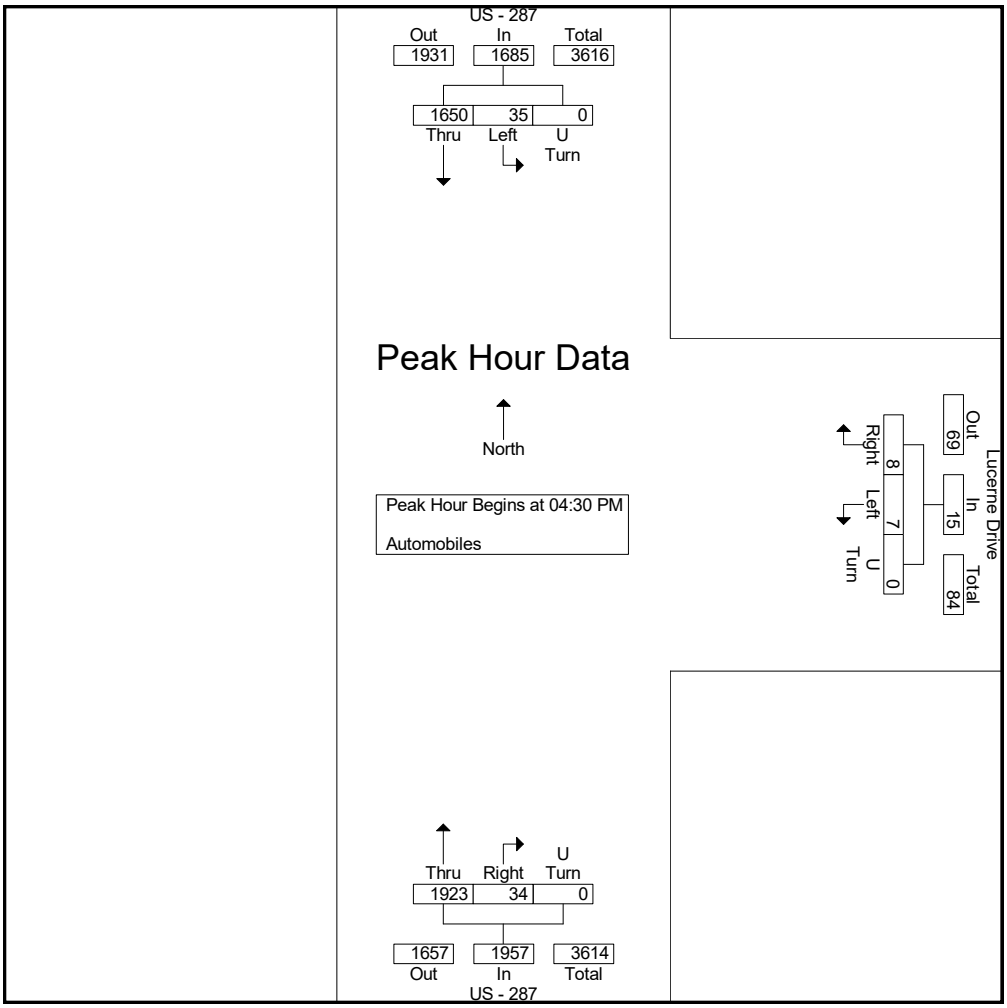
RDC
Ridgeview Data Collection

Morrison, CO 80465

Erie, CO
Arapahoe and US-287 Counts
PM Peak
Lucerne Drive and US-287

File Name : US 287 and Lucerne PM
Site Code : ED IPO 1
Start Date : 2/9/2017
Page No : 3

	Lucerne Drive Westbound				US - 287 Northbound				US - 287 Southbound				
Start Time	Left	Right	U Turn	App. Total	Thru	Right	U Turn	App. Total	Left	Thru	U Turn	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:30 PM													
04:30 PM	1	**3**	0	4	**505**	4	0	**509**	8	395	0	403	916
04:45 PM	0	2	0	2	488	**10**	0	498	7	411	0	418	918
05:00 PM	1	3	0	4	435	10	0	445	9	412	0	421	870
05:15 PM	**5**	0	0	**5**	495	10	0	505	**11**	**432**	0	**443**	**953**
Total Volume	7	8	0	15	1923	34	0	1957	35	1650	0	1685	3657
% App. Total	46.7	53.3	0		98.3	1.7	0		2.1	97.9	0		
PHF	.350	.667	.000	.750	.952	.850	.000	.961	.795	.955	.000	.951	.959



APPENDIX B

CDOT Traffic Data

ROUTE	REFPT	ENDREFPT	LENGTH	UPDATEYR	AADT	YR20FACT	LOCATION
287C	304.273	305.361	1.023	2016	35000	1.79	ON SH 287 107TH ST S/O SH 7 N JCT ARAPAHOE RD LAFAYETTE

APPENDIX C

Trip Generation Worksheets

	Daily	AM			PM		
		In	Out	Total	In	Out	Total
Total Trips							
Apartment (220)	1990	31	124	155	122	65	187
Superstore (813)	6598	135	106	241	289	277	566
Retail (826)	902	12	8	20	24	31	55
Home Improvement (862)	3998	111	83	194	148	155	303
HTSD Restaurant (932)	910	42	35	77	42	28	70
Fast Food w/ Drive Through (934)	4118	192	185	377	141	130	271
Gas Station (944)	3036	112	107	219	125	125	250
Total	21552	635	648	1283	891	811	1702
Total Trips After Internal Capture							
Superstore (813)	5834	124	92	216	257	252	509
Retail (826)	797	11	7	18	21	28	50
Home Improvement (862)	3535	102	72	174	132	141	273
HTSD Restaurant (932)	605	35	30	65	30	16	46
Fast Food w/ Drive Through (934)	2739	159	160	319	100	77	177
Gas Station (944)	2684	103	93	196	111	114	225
Total	16194	534	454	988	651	628	1279
Non Pass-By Trips							
Superstore (813)	4200	89	66	156	185	181	366
Retail (826)	797	11	7	18	21	28	50
Home Improvement (862)	1838	53	37	91	68	73	142
HTSD Restaurant (932)	345	20	17	37	17	9	26
Fast Food w/ Drive Through (934)	1369	81	81	163	50	38	88
Gas Station (944)	1342	43	39	82	64	66	130
Total	**9892**	**298**	**248**	**546**	**406**	**397**	**803**
Pass-By Trips							
Superstore (813)	1633	35	26	61	72	71	143
Home Improvement (862)	1697	49	35	84	63	68	131
HTSD Restaurant (932)	260	15	13	28	13	7	20
Fast Food w/ Drive Through (934)	1369	78	78	156	50	38	88
Gas Station (944)	1342	60	54	114	47	48	94
Total	**6302**	**236**	**206**	**442**	**245**	**231**	**476**
Total Trips	**16,194**	**534**	**454**	**988**	**651**	**628**	**1,279**

2019 Total	1990	31	124	155	122	65	187
2020/2040 Total	18184	565	578	1143	773	693	1466

Kimley»Horn

Project	Nine Mile				
Subject	Trip Generation for Apartment				
Designed by	Matt Farmen	*Date*	March 10, 2017	*Job No.*	096266012
Checked by	Curtis Rowe	*Date*	March 10, 2017	*Sheet No.*	1 *of* 1

TRIP GENERATION MANUAL TECHNIQUES

ITE Trip Generation Manual 9th Edition, Fitted Curve Equations

Land Use Code - Apartment, (220)

Independant Variable - Dwelling Units (X)

X = 308
T = Average Vehicle Trip Ends

Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m. (page 334)

Daily Weekday
T = 0.49 (X) + 3.73
T = 0.49 * 308.0 + 3.79

Directional Distribution: 20% ent. 80% exit.
T = 155 Average Vehicle Trip Ends
31 entering 124 exiting

31 + 124 = 155

Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m. (page 335)

Daily Weekday
T = 0.55 (X) + 17.65
T = 0.55 * 308.0 + 17.65

Directional Distribution: 65% ent. 35% exit.
T = 187 Average Vehicle Trip Ends
122 entering 65 exiting

122 + 65 = 187

Weekday (page 333)

Daily Weekday
T = 6.06 (X) + 123.56
T = 6.06 * 308.0 + 123.56

Directional Distribution: 50% entering, 50% exiting
T = 1990 Average Vehicle Trip Ends
995 entering 995 exiting

995 + 995 = 1990

Kimley»Horn

Project	Nine Mile				
Subject	Trip Generation for Free-Standing Discount Superstore				
Designed by	Matt Farmen	*Date*	March 10, 2017	*Job No.*	096266012
Checked by	Curtis Rowe	*Date*	March 10, 2017	*Sheet No.*	1 of 1

TRIP GENERATION MANUAL TECHNIQUES

ITE Trip Generation Manual 9th Edition, Average Rate Equations
Land Use Code - Free-Standing Discount Superstore (813)
Independant Variable - 1000 Square Feet Gross Leasable Area (X)
Gross Leasable Area = 130,000 Square Feet
X = 130.000
T = Average Vehicle Trip Ends

Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m. (Page 1441)

T = 1.85 (X)
T = 1.85 * 130.000

Directional Distribution: 56% ent. 44% exit.
T = 241 Average Vehicle Trip Ends
135 entering 106 exiting
135 + 106 = 241

Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m. (page 1442)

Average Weekday
T = 4.35 (X)
T = 4.35 * 130.000

Directional Distribution: 49% ent. 51% exit.
T = 566 Average Vehicle Trip Ends
277 entering 289 exiting
277 + 289 = 566

Weekday (page 1440)

Average Weekday
T = 50.75 (X)
T = 50.75 * 130.000

Directional Distribution: 50% entering, 50% exiting
T = 6598 Average Vehicle Trip Ends
3299 entering 3299 exiting
3299 + 3299 = 6,598

Saturday Peak Hour of Generator (page 1446)

Average Saturday
T = 5.64 (X)
T = 5.64 * 130.000

Directional Distribution: 50% ent. 50% exit.
T = 733 Average Vehicle Trip Ends
366 entering 367 exiting
366 + 367 = 733

Non-Pass-by Trip Volumes (Trip Generation Handbook)

June 2004 Handbook for Land Use Code 813
Weekday = 28% Pass By

	In	Out	Total
AM Peak	97	76	174
PM Peak	199	208	408
Daily	2,375	2,375	4,750
Saturday Peak	282	283	564

June 2004 Handbook for Land Use Code 815
Saturday = 23% Pass By

PM Peak Hour Pass-by Rate Applied to AM Peak Hour

PM Peak Hour Pass-by Rate Applied to Daily

Kimley»Horn

Project	Nine Mile				
Subject	Trip Generation for Specialty Retail				
Designed by	Matt Farmen	*Date*	March 10, 2017	*Job No.*	096266012
Checked by	Curtis Rowe	*Date*	March 10, 2017	*Sheet No.*	1 *of* 1

TRIP GENERATION MANUAL TECHNIQUES

ITE Trip Generation Manual 9th Edition, Average Rate Equations

Land Use Code - Specialty Retail Center (826)

Independant Variable - 1000 Sq. Feet Gross Leasable Area (X)

X = 20.350
T = Average Vehicle Trip Ends

Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m.
Proportional Difference Between AM and PM rates for Shopping Center (820) were applied to determine rate

Directional Distribution: 61% ent. 39% exit.
(T) = 1.00 (X) T = 20 Average Vehicle Trip Ends
(T) = 1.00 * (20.4) 12 entering 8 exiting

12 + 8 = 20

Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m. (page 1580)

Directional Distribution: 44% ent. 56% exit.
(T) = 2.71 (X) T = 55 Average Vehicle Trip Ends
(T) = 2.71 * (20.4) 24 entering 31 exiting

24 + 31 = 55

Weekday (page 1579)

Average Weekday Directional Distribution: 50% entering, 50% exiting
(T) = 44.32 (X) T = 902 Average Vehicle Trip Ends
(T) = 44.32 * (20.4) 451 entering 451 exiting

451 + 451 = 902

Saturday Peak Hour of Generator
Proportional Difference Between Saturday and PM rates for Shopping Center (820) were applied to determine rate

Directional Distribution: 52% ent. 48% exit.
(T) = 3.52 (X) T = 72 Average Vehicle Trip Ends
(T) = 3.52 * (20.4) 37 entering 35 exiting

37 + 35 = 72

Kimley»Horn

Project	Nine Mile				
Subject	Trip Generation for Home Improvement Superstore				
Designed by	Matt Farmen	*Date*	March 10, 2017	*Job No.*	096266012
Checked by	Curtis Rowe	*Date*	March 10, 2017	*Sheet No.*	1 of 1

TRIP GENERATION MANUAL TECHNIQUES

ITE Trip Generation Manual 9th Edition, Average Rate Equations

Land Use Code - Home Improvement Superstore (862)

Independant Variable - 1000 Square Feet Gross Floor Area (X)
Gross Floor Area = 130,000 Square Feet
X = 130.000
T = Average Vehicle Trip Ends

Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m. (Page 1741)

Directional Distribution: 57% ent. 43% exit.
T = 1.49 (X) T = 194 Average Vehicle Trip Ends
T = 1.49 * 130.000 111 entering 83 exiting

111 + 83 (*) = 194

Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m. (page 1742)

Directional Distribution: 49% ent. 51% exit.
T = 2.33 (X) T = 303 Average Vehicle Trip Ends
T = 2.33 * 130.000 148 entering 155 exiting

148 + 155 (*) = 303

Weekday (page 1740)

Average Weekday Directional Distribution: 50% entering, 50% exiting
T = 30.74 (X) T = 3998 Average Vehicle Trip Ends
T = 30.74* 130.000 1999 entering 1999 exiting

1999 + 1999 = 3998

Non Pass-By Trip Volumes (Per ITE Trip Generation Handbook, June 2004)

PM Peak Hour =	48% IN	Pass-by Out	Total	
AM Peak	58	43	101	*uses PM peak hour pass-by rate
PM Peak	77	81	158	
Daily	1039	1039	2078	*uses PM peak hour pass-by rate

Kimley»Horn

Project	Nine Mile				
Subject	Trip Generation for High-Turnover (Sit-Down) Restaurant				
Designed by	Matt Farmen	*Date*	March 10, 2017	*Job No.*	096266012
Checked by	Curtis Rowe	*Date*	March 10, 2017	*Sheet No.*	1 of 1

TRIP GENERATION MANUAL TECHNIQUES

ITE Trip Generation Manual 9th Edition, Average Rate Equations
Land Use Code - High Turnover Sit-Down Restaurant (932)
Independant Variable - 1000 Square Feet Gross Floor Area (X)
Gross Floor Area = 7,150 Square Feet
X = 7.150
T = Average Vehicle Trip Ends

Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m. (Page 1886)

Average Weekday — Directional Distribution: 55% ent. 45% exit.
T = 10.81 (X) — T = 77 Average Vehicle Trip Ends
T = 10.81 * 7.150 — 42 entering 35 exiting

Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m. (page 1887)

Average Weekday — Directional Distribution: 60% ent. 40% exit.
T = 9.85 (X) — T = 70 Average Vehicle Trip Ends
T = 9.85 * 7.150 — 42 entering 28 exiting

Weekday (page 1885)

Average Weekday — Directional Distribution: 50% entering, 50% exiting
T = 127.15 (X) — T = 910 Average Vehicle Trip Ends
T = 127.15 * 7.150 — 455 entering 455 exiting

P.M. Peak Hour of Generator (page 1889)

Average Weekday — Directional Distribution: 54% ent. 46% exit.
T = 18.49 (X) — T = 132 Average Vehicle Trip Ends
T = 18.49 * 7.150 — 71 entering 61 exiting

Saturday Peak Hour of Generator (page 1891)

Average Saturday — Directional Distribution: 53% ent. 47% exit.
T = 14.07 (X) — T = 102 Average Vehicle Trip Ends
T = 14.07 * 7.150 — 54 entering 48 exiting

Non-Pass-by Trip Volumes (page 48 Trip Generation Handbook, June 2004)

PM Peak Hour = 57% Non-Pass By

	IN	Out	Total	
AM Peak	24	20	44	
PM Peak	24	16	40	
Daily	259	259	518	PM Peak Hour Rate Applied to All Other Time Periods

Pass-by Trip Volumes (page 48 Trip Generation Handbook, June 2004

PM Peak Hour = 43% Pass By

	IN	Out	Total	
AM Peak	18	15	33	
PM Peak	18	12	30	
Daily	196	196	392	PM Peak Hour Rate Applied to All Other Time Periods

Kimley»Horn

Project	Nine Mile				
Subject	Trip Generation for Fast-Food Restaurant with Drive-Through Window				
Designed by	Matt Farmen	*Date*	March 10, 2017	*Job No.*	096266012
Checked by	Curtis Rowe	*Date*	March 10, 2017	*Sheet No.*	1 of 1

TRIP GENERATION MANUAL TECHNIQUES

ITE Trip Generation Manual 9th Edition, Average Rate Equations

Land Use Code - Fast Food Restaurant With Drive-Through Window (934)

Independant Variable - 1000 Square Feet Gross Floor Area (X)
Gross Floor Area = 8,300 Square Feet
X = 8.300
T = Average Vehicle Trip Ends

Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m. (Page 1913)

Average Weekday
T = 45.42 (X)
T = 45.42 * 8.300

Directional Distribution: 51% ent. 49% exit.
T = 377 Average Vehicle Trip Ends
192 entering 185 exiting

192 + 185 = 377

Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m. (page 1914)

Average Weekday
T = 32.65 (X)
T = 32.65 * 8.300

Directional Distribution: 52% ent. 48% exit.
T = 271 Average Vehicle Trip Ends
141 entering 130 exiting

141 + 130 = 271

Weekday (page 1912)

Average Weekday
T = 496.12 (X)
T = 496.12 * 8.300

Directional Distribution: 50% entering, 50% exiting
T = 4118 Average Vehicle Trip Ends
2059 entering 2059 exiting

2059 + 2059 = 4118

Saturday Peak Hour of Generator (Page 1918)

Directional Distribution: 51% ent. 49% exit.
T = 59.00 (X)
T = 59.00 * 8.300

T = 490 Average Vehicle Trip Ends
250 entering 240 exiting

250 + 240 = 490

Non-Pass-by Trip Volumes (pages 68 and 70, Trip Generation Handbook, June 2004)

AM Peak Hour = 51% Non-Pass By PM Peak Hour = 50% Non-Pass By

	IN	Out	Total
AM Peak	98	94	192
PM Peak	71	65	136
Daily	1030	1030	2060

PM Peak Hour Rate Applied to Daily

Pass-by Trip Volumes (pages 68 and 70, Trip Generation Handbook, June 2004

AM Peak Hour = 49% Pass By PM Peak Hour = 50% Pass By

	IN	Out	Total
AM Peak	94	91	185
PM Peak	71	65	136
Daily	1029	1029	2058

PM Peak Hour Rate Applied to Daily

Kimley»Horn

Project	Nine Mile						
Subject	Trip Generation for Gasoline Service Station						
Designed by	Matt Farmen	*Date*	March 10, 2017	*Job No.*	096266012		
Checked by	Curtis Rowe	*Date*	March 10, 2017	*Sheet No.*	1	*of*	1

TRIP GENERATION MANUAL TECHNIQUES

ITE Trip Generation Manual 9th Edition, Average Rate Equations
Land Use Code - Gasoline Service Station (944)
Independant Variable - Vehicle Fueling Positions (X)
Vehicle Fueling Positions= 18 Positions
X = 18
T = Average Vehicle Trip Ends

Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m. (Page 1985)

Directional Distribution: 51% ent. 49% exit.
T = 12.16 (X)
T = 12.16 * 18.000
T = 219 Average Vehicle Trip Ends
112 entering 107 exiting

Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m. (page 1986)

Directional Distribution: 50% ent. 50% exit.
T = 13.87 (X)
T = 13.87 * 18.000
T = 250 Average Vehicle Trip Ends
125 entering 125 exiting

Weekday (page 1984)

Average Weekday
T = 168.56 (X)
T = 168.56 * 18.000
Directional Distribution: 50% entering, 50% exiting
T = 3036 Average Vehicle Trip Ends
1518 entering 1518 exiting

Non-Pass-by Trip Volumes (pages 73 and 74, Trip Generation Handbook, June 2004)

AM Peak Hour = 58% Pass By
PM Peak Hour = 42% Pass By

	In	Out	Total	
AM Peak	47	45	92	
PM Peak	72	72	144	
Daily	759	759	1518	50% Applied to Daily

Pass-by Trip Volumes (page 73, ITE Trip Generation Handbook, December 2012)

AM Average Pass By Percentage: 58% Pass By
PM Average Pass By Percentage: 42% Pass By
Average Daily Pass By Percentage: 50%

	In	Out	Total
AM Peak	65	62	127
PM Peak	52	52	104
Daily	759	759	1518

Internal Capture Reduction Calculations

Methodology for A.M. Peak Hour and P.M. Peak Hour
based on the *Trip Generation Handbook* , 3rd Edition, published by the Institute of Transportation Engineers

Methodology for Daily
based on the average of the Unconstrained Rates for the A.M. Peak Hour and P.M. Peak Hour

SUMMARY

GROSS TRIP GENERATION

INPUT

Land Use	Daily		A.M. Peak Hour		P.M. Peak Hour	
	Enter	Exit	Enter	Exit	Enter	Exit
Office						
Retail	7,267	7,267	370	304	586	588
Restaurant	2,514	2,514	234	220	183	158
Cinema/Entertainment						
Residential						
Hotel						
	9,781	9,781	604	524	769	746

INTERNAL TRIPS

OUTPUT

Land Use	Daily		A.M. Peak Hour		P.M. Peak Hour	
	Enter	Exit	Enter	Exit	Enter	Exit
Office	0	0	0	0	0	0
Retail	691	993	30	40	65	53
Restaurant	993	691	40	30	53	65
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	0	0	0	0	0
Hotel	0	0	0	0	0	0
	1,684	1,684	70	70	118	118
% Reduction	17.2%		12.4%		15.6%	

EXTERNAL TRIPS

OUTPUT

Land Use	Daily		A.M. Peak Hour		P.M. Peak Hour	
	Enter	Exit	Enter	Exit	Enter	Exit
Office	0	0	0	0	0	0
Retail	6,576	6,274	340	264	521	535
Restaurant	1,521	1,823	194	190	130	93
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	0	0	0	0	0
Hotel	0	0	0	0	0	0
	8,097	8,097	534	454	651	628

DAILY

GROSS TRIP GENERATION

DAILY

Land Use	Daily	
	Enter	Exit
Office	0	0
Retail	7,267	7,267
Restaurant	2,514	2,514
Cinema/Entertainment	0	0
Residential	0	0
Hotel	0	0
	9,781	9,781

Estimated Trip Origins within a Mixed-Use Development (Daily)
(Average of A.M. Peak Hour and P.M. Peak Hour)

DAILY

Origin Land Use	Destination Land Use					
	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel
Office		24%	34%	0%	2%	0%
Retail	16%		21%	2%	20%	3%
Restaurant	17%	28%		4%	11%	5%
Cinema/Entertainment	1%	11%	16%		4%	1%
Residential	3%	22%	21%	0%		2%
Hotel	38%	15%	39%	0%	1%	

Estimated Trip Destinations within a Mixed-Use Development (Daily)
(Average of A.M. Peak Hour and P.M. Peak Hour)

DAILY

Origin Land Use	Destination Land Use					
	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel
Office		20%	13%	1%	2%	0%
Retail	18%		40%	13%	24%	9%
Restaurant	22%	29%		16%	11%	38%
Cinema/Entertainment	3%	2%	2%		2%	1%
Residential	30%	14%	17%	0%		6%
Hotel	2%	3%	6%	0%	0%	

*** BASED ON EXIT ***

DAILY

(Exit) Land Use	(Enter) Land Use					
	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel
Office		0	0	0	0	0
Retail	1,126		1,526	145	1,453	182
Restaurant	427	691		101	277	126
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

*** BASED ON ENTER ***

DAILY

(Exit) Land Use	(Enter) Land Use					
	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel
Office		1,453	314	0	0	0
Retail	0		993	0	0	0
Restaurant	0	2,107		0	0	0
Cinema/Entertainment	0	145	38		0	0
Residential	0	981	427	0		0
Hotel	0	218	138	0	0	

*** MINIMUM ***

DAILY

(Exit) Land Use	(Enter) Land Use					
	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel
Office		0	0	0	0	0
Retail	0		993	0	0	0
Restaurant	0	691		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

INTERNAL TRIPS

DAILY

Land Use	Daily	
	Enter	Exit
Office	0	0
Retail	691	993
Restaurant	993	691
Cinema/Entertainment	0	0
Residential	0	0
Hotel	0	0
	1,684	1,684

A.M. PEAK HOUR

GROSS TRIP GENERATION

A.M. PEAK

Land Use	A.M. Peak Hour	
	Enter	Exit
Office	0	0
Retail	370	304
Restaurant	234	220
Cinema/Entertainment	0	0
Residential	0	0
Hotel	0	0
	604	524

Table 6.1 Unconstrained Internal Person Trip Capture Rates
for Trip Origins within a Mixed-Use Development (A.M. Peak Hour)

A.M. PEAK

Origin Land Use	Destination Land Use					
	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel
Office		28%	63%	0%	1%	0%
Retail	29%		13%	0%	14%	0%
Restaurant	31%	14%		0%	4%	3%
Cinema/Entertainment	0%	0%	0%		0%	0%
Residential	2%	1%	20%	0%		0%
Hotel	75%	14%	9%	0%	0%	

Table 6.2 Unconstrained Internal Person Trip Capture Rates
for Trip Destinations within a Mixed-Use Development (A.M. Peak Hour)

A.M. PEAK

Origin Land Use	Destination Land Use					
	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel
Office		32%	23%	0%	0%	0%
Retail	4%		50%	0%	2%	0%
Restaurant	14%	8%		0%	5%	4%
Cinema/Entertainment	0%	0%	0%		0%	0%
Residential	3%	17%	20%	0%		0%
Hotel	3%	4%	6%	0%	0%	

*** BASED ON EXIT ***

A.M. PEAK

(Exit) Land Use	(Enter) Land Use					
	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel
Office		0	0	0	0	0
Retail	88		40	0	43	0
Restaurant	68	31		0	9	7
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

*** BASED ON ENTER ***

A.M. PEAK

(Exit) Land Use	(Enter) Land Use					
	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel
Office		118	54	0	0	0
Retail	0		117	0	0	0
Restaurant	0	30		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	63	47	0		0
Hotel	0	15	14	0	0	

*** MINIMUM ***

A.M. PEAK

(Exit) Land Use	(Enter) Land Use					
	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel
Office		0	0	0	0	0
Retail	0		40	0	0	0
Restaurant	0	30		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

INTERNAL TRIPS

A.M. PEAK

Land Use	A. M. Peak Hour	
	Enter	Exit
Office	0	0
Retail	30	40
Restaurant	40	30
Cinema/Entertainment	0	0
Residential	0	0
Hotel	0	0
	70	70

P.M. PEAK HOUR

GROSS TRIP GENERATION

P.M. PEAK

Land Use	P.M. Peak Hour	
	Enter	Exit
Office	0	0
Retail	586	588
Restaurant	183	158
Cinema/Entertainment	0	0
Residential	0	0
Hotel	0	0
	769	746

Table 6.1 Unconstrained Internal Person Trip Capture Rates
for Trip Origins within a Mixed-Use Development (P.M. Peak Hour)

P.M. PEAK

Origin Land Use	Destination Land Use					
	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel
Office		20%	4%	0%	2%	0%
Retail	2%		29%	4%	26%	5%
Restaurant	3%	41%		8%	18%	7%
Cinema/Entertainment	2%	21%	31%		8%	2%
Residential	4%	42%	21%	0%		3%
Hotel	0%	16%	68%	0%	2%	

Table 6.2 Unconstrained Internal Person Trip Capture Rates
for Trip Destinations within a Mixed-Use Development (P.M. Peak Hour)

P.M. PEAK

Origin Land Use	Destination Land Use					
	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel
Office		8%	2%	1%	4%	0%
Retail	31%		29%	26%	46%	17%
Restaurant	30%	50%		32%	16%	71%
Cinema/Entertainment	6%	4%	3%		4%	1%
Residential	57%	10%	14%	0%		12%
Hotel	0%	2%	5%	0%	0%	

*** BASED ON EXIT ***

P.M. PEAK

(Exit) Land Use	(Enter) Land Use					
	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel
Office		0	0	0	0	0
Retail	12		171	24	153	29
Restaurant	5	65		13	28	11
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

*** BASED ON ENTER ***

P.M. PEAK

(Exit) Land Use	(Enter) Land Use					
	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel
Office		47	4	0	0	0
Retail	0		53	0	0	0
Restaurant	0	293		0	0	0
Cinema/Entertainment	0	23	5		0	0
Residential	0	59	26	0		0
Hotel	0	12	9	0	0	

*** MINIMUM ***

P.M. PEAK

(Exit) Land Use	(Enter) Land Use					
	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel
Office		0	0	0	0	0
Retail	0		53	0	0	0
Restaurant	0	65		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

INTERNAL TRIPS

P.M. PEAK

Land Use	P.M. Peak Hour	
	Enter	Exit
Office	0	0
Retail	65	53
Restaurant	53	65
Cinema/Entertainment	0	0
Residential	0	0
Hotel	0	0
	118	118

APPENDIX D

Intersection Analysis Worksheets

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	116	125	189	264	456	154	332	1120	75	51	1297	244
Future Volume (veh/h)	116	125	189	264	456	154	332	1120	75	51	1297	244
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	181	140	0	307	501	0	357	1167	88	72	1365	257
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	1
Peak Hour Factor	0.64	0.89	0.73	0.86	0.91	0.70	0.93	0.96	0.85	0.71	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	172	354	301	433	466	396	337	1801	806	91	1310	586
Arrive On Green	0.07	0.19	0.00	0.13	0.25	0.00	0.19	0.51	0.51	0.05	0.37	0.37
Sat Flow, veh/h	1774	1863	1583	1774	1863	1583	1774	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	181	140	0	307	501	0	357	1167	88	72	1365	257
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	1863	1583	1774	1770	1583	1774	1770	1583
Q Serve(g_s), s	10.5	9.9	0.0	19.5	37.5	0.0	28.5	36.2	4.3	6.0	55.5	18.3
Cycle Q Clear(g_c), s	10.5	9.9	0.0	19.5	37.5	0.0	28.5	36.2	4.3	6.0	55.5	18.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	172	354	301	433	466	396	337	1801	806	91	1310	586
V/C Ratio(X)	1.05	0.40	0.00	0.71	1.08	0.00	1.06	0.65	0.11	0.79	1.04	0.44
Avail Cap(c_a), veh/h	172	354	301	433	466	396	337	1801	806	149	1310	586
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	50.7	53.2	0.0	41.7	56.3	0.0	60.8	27.0	19.2	70.4	47.3	35.5
Incr Delay (d2), s/veh	82.8	0.7	0.0	5.3	63.6	0.0	65.5	1.8	0.3	14.4	36.7	2.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.9	5.2	0.0	2.7	27.5	0.0	20.1	18.1	2.0	3.3	33.8	8.4
LnGrp Delay(d),s/veh	133.5	53.9	0.0	47.0	119.8	0.0	126.2	28.8	19.4	84.7	83.9	37.9
LnGrp LOS	F	D		D	F		F	C	B	F	F	D
Approach Vol, veh/h		321			808			1612			1694	
Approach Delay, s/veh		98.8			92.1			49.9			77.0	
Approach LOS		F			F			D			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.2	80.8	24.0	33.0	33.0	60.0	15.0	42.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	12.6	71.4	19.5	28.5	28.5	55.5	10.5	37.5
Max Q Clear Time (g_c+I1), s	8.0	38.2	21.5	11.9	30.5	57.5	12.5	39.5
Green Ext Time (p_c), s	0.0	24.2	0.0	3.4	0.0	0.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	71.5
HCM 2010 LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	167	397	355	133	187	76	246	1402	280	163	1188	115
Future Volume (veh/h)	167	397	355	133	187	76	246	1402	280	163	1188	115
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	192	418	0	151	215	0	273	1524	333	196	1291	140
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	1
Peak Hour Factor	0.87	0.95	0.82	0.88	0.87	0.79	0.90	0.92	0.84	0.83	0.92	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	334	439	373	176	382	325	292	1643	735	216	1491	667
Arrive On Green	0.10	0.24	0.00	0.07	0.21	0.00	0.16	0.46	0.46	0.12	0.42	0.42
Sat Flow, veh/h	1774	1863	1583	1774	1863	1583	1774	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	192	418	0	151	215	0	273	1524	333	196	1291	140
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	1863	1583	1774	1770	1583	1774	1770	1583
Q Serve(g_s), s	13.3	35.4	0.0	10.6	16.6	0.0	24.3	64.8	22.8	17.5	53.2	9.0
Cycle Q Clear(g_c), s	13.3	35.4	0.0	10.6	16.6	0.0	24.3	64.8	22.8	17.5	53.2	9.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	334	439	373	176	382	325	292	1643	735	216	1491	667
V/C Ratio(X)	0.57	0.95	0.00	0.86	0.56	0.00	0.94	0.93	0.45	0.91	0.87	0.21
Avail Cap(c_a), veh/h	366	448	381	176	382	325	294	1643	735	216	1491	667
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.5	60.3	0.0	50.2	57.1	0.0	66.0	40.3	29.1	69.4	42.2	29.4
Incr Delay (d2), s/veh	1.8	30.5	0.0	31.6	1.9	0.0	35.6	10.6	2.0	37.2	7.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.7	21.9	0.0	3.0	8.7	0.0	14.8	34.0	10.4	10.8	27.4	4.0
LnGrp Delay(d),s/veh	45.3	90.7	0.0	81.9	59.0	0.0	101.6	50.9	31.1	106.6	49.2	30.1
LnGrp LOS	D	F		F	E		F	D	C	F	D	C
Approach Vol, veh/h		610			366			2130			1627	
Approach Delay, s/veh		76.4			68.4			54.3			54.5	
Approach LOS		E			E			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	24.0	78.8	15.1	42.2	30.8	71.9	20.0	37.3
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	19.5	73.4	10.6	38.5	26.5	66.4	18.3	30.8
Max Q Clear Time (g_c+I1), s	19.5	66.8	12.6	37.4	26.3	55.2	15.3	18.6
Green Ext Time (p_c), s	0.0	6.2	0.0	0.3	0.0	10.3	0.1	2.9

Intersection Summary	
HCM 2010 Ctrl Delay	58.3
HCM 2010 LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	123	133	201	280	484	163	352	1188	80	54	1376	259
Future Volume (veh/h)	123	133	201	280	484	163	352	1188	80	54	1376	259
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	192	149	0	326	532	0	378	1238	94	76	1448	273
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	1
Peak Hour Factor	0.64	0.89	0.73	0.86	0.91	0.70	0.93	0.96	0.85	0.71	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	160	317	269	435	478	406	325	1792	802	95	1333	596
Arrive On Green	0.06	0.17	0.00	0.15	0.26	0.00	0.18	0.51	0.51	0.05	0.38	0.38
Sat Flow, veh/h	1774	1863	1583	1774	1863	1583	1774	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	192	149	0	326	532	0	378	1238	94	76	1448	273
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	1863	1583	1774	1770	1583	1774	1770	1583
Q Serve(g_s), s	9.5	10.8	0.0	22.5	38.5	0.0	27.5	39.8	4.7	6.4	56.5	19.5
Cycle Q Clear(g_c), s	9.5	10.8	0.0	22.5	38.5	0.0	27.5	39.8	4.7	6.4	56.5	19.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	160	317	269	435	478	406	325	1792	802	95	1333	596
V/C Ratio(X)	1.20	0.47	0.00	0.75	1.11	0.00	1.16	0.69	0.12	0.80	1.09	0.46
Avail Cap(c_a), veh/h	160	317	269	435	478	406	325	1792	802	153	1333	596
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	53.8	56.2	0.0	41.6	55.8	0.0	61.3	28.1	19.4	70.2	46.8	35.2
Incr Delay (d2), s/veh	134.0	1.1	0.0	7.1	75.6	0.0	101.5	2.2	0.3	14.0	51.6	2.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.9	5.7	0.0	11.8	29.8	0.0	22.6	20.0	2.1	3.5	37.1	8.9
LnGrp Delay(d),s/veh	187.8	57.2	0.0	48.7	131.4	0.0	162.8	30.3	19.7	84.2	98.3	37.7
LnGrp LOS	F	E		D	F		F	C	B	F	F	D
Approach Vol, veh/h		341			858			1710			1797	
Approach Delay, s/veh		130.7			100.0			59.0			88.5	
Approach LOS		F			F			E			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.5	80.5	27.0	30.0	32.0	61.0	14.0	43.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	12.9	71.1	22.5	25.5	27.5	56.5	9.5	38.5
Max Q Clear Time (g_c+I1), s	8.4	41.8	24.5	12.8	29.5	58.5	11.5	40.5
Green Ext Time (p_c), s	0.0	23.2	0.0	3.3	0.0	0.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	82.9
HCM 2010 LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	177	421	377	141	198	81	261	1487	297	173	1260	122
Future Volume (veh/h)	177	421	377	141	198	81	261	1487	297	173	1260	122
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	203	443	0	160	228	0	290	1616	354	208	1370	149
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	1
Peak Hour Factor	0.87	0.95	0.82	0.88	0.87	0.79	0.90	0.92	0.84	0.83	0.92	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	329	448	381	163	388	330	302	1630	729	216	1460	653
Arrive On Green	0.10	0.24	0.00	0.06	0.21	0.00	0.17	0.46	0.46	0.12	0.41	0.41
Sat Flow, veh/h	1774	1863	1583	1774	1863	1583	1774	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	203	443	0	160	228	0	290	1616	354	208	1370	149
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	1863	1583	1774	1770	1583	1774	1770	1583
Q Serve(g_s), s	14.1	37.9	0.0	10.3	17.7	0.0	26.0	72.5	24.9	18.7	59.4	9.8
Cycle Q Clear(g_c), s	14.1	37.9	0.0	10.3	17.7	0.0	26.0	72.5	24.9	18.7	59.4	9.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	329	448	381	163	388	330	302	1630	729	216	1460	653
V/C Ratio(X)	0.62	0.99	0.00	0.98	0.59	0.00	0.96	0.99	0.49	0.96	0.94	0.23
Avail Cap(c_a), veh/h	329	448	381	163	388	330	302	1630	729	216	1460	653
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.5	60.5	0.0	52.5	57.2	0.0	65.9	42.8	30.0	69.9	45.1	30.5
Incr Delay (d2), s/veh	3.5	39.3	0.0	65.5	2.3	0.0	41.4	20.3	2.3	50.3	12.8	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.2	24.5	0.0	5.0	9.4	0.0	16.2	39.8	11.3	12.2	31.5	4.4
LnGrp Delay(d),s/veh	47.0	99.9	0.0	118.0	59.5	0.0	107.3	63.1	32.3	120.2	57.9	31.3
LnGrp LOS	D	F		F	E		F	E	C	F	E	C
Approach Vol, veh/h		646			388			2260			1727	
Approach Delay, s/veh		83.3			83.6			64.0			63.1	
Approach LOS		F			F			E			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	24.0	78.2	14.8	43.0	31.7	70.5	20.0	37.8
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	19.5	73.7	10.3	38.5	27.2	66.0	15.5	33.3
Max Q Clear Time (g_c+I1), s	20.7	74.5	12.3	39.9	28.0	61.4	16.1	19.7
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	4.5	0.0	3.3

Intersection Summary	
HCM 2010 Ctrl Delay	67.7
HCM 2010 LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	123	139	204	280	509	169	364	1194	80	56	1378	259
Future Volume (veh/h)	123	139	204	280	509	169	364	1194	80	56	1378	259
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	192	156	0	326	559	0	391	1244	94	79	1451	273
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	1
Peak Hour Factor	0.64	0.89	0.73	0.86	0.91	0.70	0.93	0.96	0.85	0.71	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	160	330	281	438	491	417	337	1762	788	99	1286	575
Arrive On Green	0.06	0.18	0.00	0.15	0.26	0.00	0.19	0.50	0.50	0.06	0.36	0.36
Sat Flow, veh/h	1774	1863	1583	1774	1863	1583	1774	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	192	156	0	326	559	0	391	1244	94	79	1451	273
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	1863	1583	1774	1770	1583	1774	1770	1583
Q Serve(g_s), s	9.5	11.3	0.0	22.3	39.5	0.0	28.5	40.8	4.8	6.6	54.5	19.9
Cycle Q Clear(g_c), s	9.5	11.3	0.0	22.3	39.5	0.0	28.5	40.8	4.8	6.6	54.5	19.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	160	330	281	438	491	417	337	1762	788	99	1286	575
V/C Ratio(X)	1.20	0.47	0.00	0.74	1.14	0.00	1.16	0.71	0.12	0.80	1.13	0.47
Avail Cap(c_a), veh/h	160	330	281	438	491	417	337	1762	788	156	1286	575
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	53.0	55.4	0.0	40.8	55.3	0.0	60.8	29.2	20.1	70.0	47.8	36.7
Incr Delay (d2), s/veh	134.0	1.0	0.0	6.8	85.0	0.0	99.9	2.4	0.3	14.4	68.2	2.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.9	5.9	0.0	11.7	31.9	0.0	23.3	20.5	2.1	3.6	38.8	9.1
LnGrp Delay(d),s/veh	187.0	56.4	0.0	47.6	140.2	0.0	160.7	31.6	20.4	84.4	115.9	39.5
LnGrp LOS	F	E		D	F		F	C	C	F	F	D
Approach Vol, veh/h		348			885			1729			1803	
Approach Delay, s/veh		128.5			106.1			60.2			103.0	
Approach LOS		F			F			E			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.8	79.2	26.9	31.1	33.0	59.0	14.0	44.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	13.2	69.8	22.4	26.6	28.5	54.5	9.5	39.5
Max Q Clear Time (g_c+I1), s	8.6	42.8	24.3	13.3	30.5	56.5	11.5	41.5
Green Ext Time (p_c), s	0.0	21.8	0.0	3.6	0.0	0.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	89.9
HCM 2010 LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	177	445	389	141	211	84	268	1490	297	179	1266	122
Future Volume (veh/h)	177	445	389	141	211	84	268	1490	297	179	1266	122
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	203	468	0	160	243	0	298	1620	354	216	1376	149
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	1
Peak Hour Factor	0.87	0.95	0.82	0.88	0.87	0.79	0.90	0.92	0.84	0.83	0.92	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	325	460	391	159	404	343	300	1608	719	216	1440	644
Arrive On Green	0.09	0.25	0.00	0.06	0.22	0.00	0.17	0.45	0.45	0.12	0.41	0.41
Sat Flow, veh/h	1774	1863	1583	1774	1863	1583	1774	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	203	468	0	160	243	0	298	1620	354	216	1376	149
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	1863	1583	1774	1770	1583	1774	1770	1583
Q Serve(g_s), s	14.0	39.5	0.0	10.3	18.8	0.0	26.8	72.7	25.1	19.5	60.4	9.9
Cycle Q Clear(g_c), s	14.0	39.5	0.0	10.3	18.8	0.0	26.8	72.7	25.1	19.5	60.4	9.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	325	460	391	159	404	343	300	1608	719	216	1440	644
V/C Ratio(X)	0.62	1.02	0.00	1.00	0.60	0.00	0.99	1.01	0.49	1.00	0.96	0.23
Avail Cap(c_a), veh/h	325	460	391	159	404	343	300	1608	719	216	1440	644
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.0	60.3	0.0	51.4	56.4	0.0	66.3	43.7	30.7	70.2	46.0	31.1
Incr Delay (d2), s/veh	3.7	46.5	0.0	72.6	2.5	0.0	49.5	24.2	2.4	60.9	15.2	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.2	26.3	0.0	5.2	9.9	0.0	17.3	40.9	11.4	13.2	32.5	4.5
LnGrp Delay(d),s/veh	46.7	106.8	0.0	124.1	58.9	0.0	115.9	67.9	33.1	131.2	61.3	31.9
LnGrp LOS	D	F		F	E		F	F	C	F	E	C
Approach Vol, veh/h		671			403			2272			1741	
Approach Delay, s/veh		88.6			84.8			68.8			67.4	
Approach LOS		F			F			E			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	24.0	77.2	14.8	44.0	31.6	69.6	19.6	39.2
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	19.5	72.7	10.3	39.5	27.1	65.1	15.1	34.7
Max Q Clear Time (g_c+I1), s	21.5	74.7	12.3	41.5	28.8	62.4	16.0	20.8
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	2.7	0.0	3.5

Intersection Summary	
HCM 2010 Ctrl Delay	72.2
HCM 2010 LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	127	137	207	288	498	168	363	1224	82	56	1417	267
Future Volume (veh/h)	127	137	207	288	498	168	363	1224	82	56	1417	267
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	198	154	0	335	547	0	390	1275	96	79	1492	281
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	1
Peak Hour Factor	0.64	0.89	0.73	0.86	0.91	0.70	0.93	0.96	0.85	0.71	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	160	325	277	417	466	396	325	1809	809	98	1357	607
Arrive On Green	0.06	0.17	0.00	0.14	0.25	0.00	0.18	0.51	0.51	0.06	0.38	0.38
Sat Flow, veh/h	1774	1863	1583	1774	1863	1583	1774	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	198	154	0	335	547	0	390	1275	96	79	1492	281
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	1863	1583	1774	1770	1583	1774	1770	1583
Q Serve(g_s), s	9.5	11.2	0.0	20.8	37.5	0.0	27.5	41.3	4.7	6.6	57.5	20.0
Cycle Q Clear(g_c), s	9.5	11.2	0.0	20.8	37.5	0.0	27.5	41.3	4.7	6.6	57.5	20.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	160	325	277	417	466	396	325	1809	809	98	1357	607
V/C Ratio(X)	1.23	0.47	0.00	0.80	1.17	0.00	1.20	0.70	0.12	0.80	1.10	0.46
Avail Cap(c_a), veh/h	160	325	277	417	466	396	325	1809	809	150	1357	607
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	53.3	55.7	0.0	44.2	56.3	0.0	61.3	28.0	19.1	70.0	46.3	34.7
Incr Delay (d2), s/veh	147.8	1.1	0.0	10.8	99.2	0.0	115.5	2.3	0.3	16.1	56.5	2.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.6	5.8	0.0	4.4	32.1	0.0	23.9	20.8	2.1	3.7	38.7	9.1
LnGrp Delay(d),s/veh	201.1	56.8	0.0	55.0	155.4	0.0	176.7	30.3	19.4	86.1	102.7	37.2
LnGrp LOS	F	E		E	F		F	C	B	F	F	D
Approach Vol, veh/h		352			882			1761			1852	
Approach Delay, s/veh		138.0			117.3			62.2			92.1	
Approach LOS		F			F			E			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.8	81.2	25.3	30.7	32.0	62.0	14.0	42.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	12.7	72.3	20.8	26.2	27.5	57.5	9.5	37.5
Max Q Clear Time (g_c+I1), s	8.6	43.3	22.8	13.2	29.5	59.5	11.5	39.5
Green Ext Time (p_c), s	0.0	23.6	0.0	3.4	0.0	0.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	89.1
HCM 2010 LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	182	434	388	145	204	83	269	1532	306	178	1298	126
Future Volume (veh/h)	182	434	388	145	204	83	269	1532	306	178	1298	126
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	209	457	0	165	234	0	299	1665	364	214	1411	154
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	1
Peak Hour Factor	0.87	0.95	0.82	0.88	0.87	0.79	0.90	0.92	0.84	0.83	0.92	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	331	451	383	164	390	332	297	1617	723	216	1456	651
Arrive On Green	0.10	0.24	0.00	0.07	0.21	0.00	0.17	0.46	0.46	0.12	0.41	0.41
Sat Flow, veh/h	1774	1863	1583	1774	1863	1583	1774	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	209	457	0	165	234	0	299	1665	364	214	1411	154
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	1863	1583	1774	1770	1583	1774	1770	1583
Q Serve(g_s), s	14.5	38.7	0.0	10.7	18.2	0.0	26.8	73.1	25.9	19.3	62.5	10.1
Cycle Q Clear(g_c), s	14.5	38.7	0.0	10.7	18.2	0.0	26.8	73.1	25.9	19.3	62.5	10.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	331	451	383	164	390	332	297	1617	723	216	1456	651
V/C Ratio(X)	0.63	1.01	0.00	1.01	0.60	0.00	1.01	1.03	0.50	0.99	0.97	0.24
Avail Cap(c_a), veh/h	331	451	383	164	390	332	297	1617	723	216	1456	651
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.3	60.6	0.0	51.8	57.2	0.0	66.6	43.4	30.6	70.2	46.1	30.7
Incr Delay (d2), s/veh	3.9	46.0	0.0	72.5	2.5	0.0	53.8	30.4	2.5	58.1	17.3	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.4	25.7	0.0	5.3	9.6	0.0	17.6	42.5	11.8	12.9	33.9	4.6
LnGrp Delay(d),s/veh	47.2	106.7	0.0	124.4	59.7	0.0	120.4	73.8	33.1	128.3	63.5	31.6
LnGrp LOS	D	F		F	E		F	F	C	F	E	C
Approach Vol, veh/h		666			399			2328			1779	
Approach Delay, s/veh		88.0			86.5			73.4			68.5	
Approach LOS		F			F			E			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	24.0	77.6	15.2	43.2	31.3	70.3	20.4	38.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	19.5	73.1	10.7	38.7	26.8	65.8	15.9	33.5
Max Q Clear Time (g_c+I1), s	21.3	75.1	12.7	40.7	28.8	64.5	16.5	20.2
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	1.3	0.0	3.3

Intersection Summary	
HCM 2010 Ctrl Delay	74.6
HCM 2010 LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	127	173	225	276	558	174	387	1254	82	108	1410	255
Future Volume (veh/h)	127	173	225	276	558	174	387	1254	82	108	1410	255
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	198	194	0	321	613	0	416	1306	96	152	1484	268
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	1
Peak Hour Factor	0.64	0.89	0.73	0.86	0.91	0.70	0.93	0.96	0.85	0.71	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	179	453	385	463	558	474	200	1576	705	109	1394	624
Arrive On Green	0.07	0.24	0.00	0.13	0.30	0.00	0.11	0.45	0.45	0.06	0.39	0.39
Sat Flow, veh/h	1774	1863	1583	1774	1863	1583	1774	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	198	194	0	321	613	0	416	1306	96	152	1484	268
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	1863	1583	1774	1770	1583	1774	1770	1583
Q Serve(g_s), s	11.1	13.2	0.0	19.5	44.9	0.0	16.9	48.7	5.4	9.2	59.1	18.5
Cycle Q Clear(g_c), s	11.1	13.2	0.0	19.5	44.9	0.0	16.9	48.7	5.4	9.2	59.1	18.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	179	453	385	463	558	474	200	1576	705	109	1394	624
V/C Ratio(X)	1.10	0.43	0.00	0.69	1.10	0.00	2.08	0.83	0.14	1.40	1.06	0.43
Avail Cap(c_a), veh/h	179	453	385	463	558	474	200	1576	705	109	1394	624
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	44.2	47.9	0.0	36.0	52.6	0.0	66.6	36.6	24.6	70.4	45.5	33.2
Incr Delay (d2), s/veh	97.9	0.6	0.0	4.4	68.2	0.0	503.3	5.2	0.4	224.9	43.2	2.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.9	6.9	0.0	2.8	33.6	0.0	36.2	24.9	2.4	11.3	37.2	8.5
LnGrp Delay(d),s/veh	142.1	48.6	0.0	40.5	120.7	0.0	569.9	41.7	25.0	295.3	88.7	35.3
LnGrp LOS	F	D		D	F		F	D	C	F	F	D
Approach Vol, veh/h		392			934			1818			1904	
Approach Delay, s/veh		95.8			93.1			161.7			97.6	
Approach LOS		F			F			F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.7	71.3	24.0	41.0	21.4	63.6	15.6	49.4
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	9.2	66.8	19.5	36.5	16.9	59.1	11.1	44.9
Max Q Clear Time (g_c+I1), s	11.2	50.7	21.5	15.2	18.9	61.1	13.1	46.9
Green Ext Time (p_c), s	0.0	14.3	0.0	5.0	0.0	0.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	119.7
HCM 2010 LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	127	173	225	276	558	174	387	1254	82	108	1410	255
Future Volume (veh/h)	127	173	225	276	558	174	387	1254	82	108	1410	255
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	198	194	0	321	613	0	416	1306	96	152	1484	268
Adj No. of Lanes	2	2	1	2	1	1	1	2	1	2	2	1
Peak Hour Factor	0.64	0.89	0.73	0.86	0.91	0.70	0.93	0.96	0.85	0.71	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	172	772	345	374	515	438	337	1757	786	196	1286	575
Arrive On Green	0.05	0.22	0.00	0.11	0.28	0.00	0.19	0.50	0.50	0.06	0.36	0.36
Sat Flow, veh/h	3442	3539	1583	3442	1863	1583	1774	3539	1583	3442	3539	1583
Grp Volume(v), veh/h	198	194	0	321	613	0	416	1306	96	152	1484	268
Grp Sat Flow(s),veh/h/ln	1721	1770	1583	1721	1863	1583	1774	1770	1583	1721	1770	1583
Q Serve(g_s), s	7.5	6.8	0.0	13.8	41.5	0.0	28.5	44.2	4.9	6.5	54.5	19.5
Cycle Q Clear(g_c), s	7.5	6.8	0.0	13.8	41.5	0.0	28.5	44.2	4.9	6.5	54.5	19.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	172	772	345	374	515	438	337	1757	786	196	1286	575
V/C Ratio(X)	1.15	0.25	0.00	0.86	1.19	0.00	1.23	0.74	0.12	0.77	1.15	0.47
Avail Cap(c_a), veh/h	172	772	345	484	515	438	337	1757	786	213	1286	575
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	71.3	48.5	0.0	65.7	54.2	0.0	60.8	30.2	20.3	69.8	47.7	36.6
Incr Delay (d2), s/veh	114.9	0.2	0.0	11.7	103.3	0.0	128.5	2.9	0.3	15.1	78.6	2.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.3	3.4	0.0	7.2	36.1	0.0	26.0	22.3	2.2	3.5	40.6	9.0
LnGrp Delay(d),s/veh	186.2	48.7	0.0	77.4	157.6	0.0	189.2	33.1	20.6	84.8	126.3	39.3
LnGrp LOS	F	D		E	F		F	C	C	F	F	D
Approach Vol, veh/h		392			934			1818			1904	
Approach Delay, s/veh		118.1			130.1			68.1			110.8	
Approach LOS		F			F			E			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.1	78.9	20.8	37.2	33.0	59.0	12.0	46.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	9.3	73.7	21.1	27.9	28.5	54.5	7.5	41.5
Max Q Clear Time (g_c+I1), s	8.5	46.2	15.8	8.8	30.5	56.5	9.5	43.5
Green Ext Time (p_c), s	0.0	22.7	0.5	4.9	0.0	0.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	99.5
HCM 2010 LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	127	173	225	276	558	174	387	1254	82	108	1410	255
Future Volume (veh/h)	127	173	225	276	558	174	387	1254	82	108	1410	255
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	198	194	0	321	613	0	416	1306	96	152	1484	268
Adj No. of Lanes	2	2	1	2	2	1	2	3	0	2	3	0
Peak Hour Factor	0.64	0.89	0.73	0.86	0.91	0.70	0.93	0.96	0.85	0.71	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	244	566	253	371	696	312	467	2682	197	198	2066	372
Arrive On Green	0.07	0.16	0.00	0.11	0.20	0.00	0.14	0.55	0.55	0.06	0.48	0.48
Sat Flow, veh/h	3442	3539	1583	3442	3539	1583	3442	4835	355	3442	4334	781
Grp Volume(v), veh/h	198	194	0	321	613	0	416	916	486	152	1160	592
Grp Sat Flow(s),veh/h/ln	1721	1770	1583	1721	1770	1583	1721	1695	1800	1721	1695	1725
Q Serve(g_s), s	8.5	7.3	0.0	13.8	25.2	0.0	17.8	24.7	24.7	6.5	40.8	41.0
Cycle Q Clear(g_c), s	8.5	7.3	0.0	13.8	25.2	0.0	17.8	24.7	24.7	6.5	40.8	41.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.20	1.00		0.45
Lane Grp Cap(c), veh/h	244	566	253	371	696	312	467	1881	999	198	1616	822
V/C Ratio(X)	0.81	0.34	0.00	0.87	0.88	0.00	0.89	0.49	0.49	0.77	0.72	0.72
Avail Cap(c_a), veh/h	287	602	269	447	767	343	539	1881	999	271	1616	822
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	68.7	56.0	0.0	65.8	58.5	0.0	63.7	20.4	20.4	69.7	31.2	31.3
Incr Delay (d2), s/veh	14.1	0.4	0.0	14.1	10.8	0.0	15.3	0.9	1.7	8.6	2.8	5.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.5	3.6	0.0	7.3	13.4	0.0	9.5	11.8	12.8	3.3	19.6	20.6
LnGrp Delay(d),s/veh	82.8	56.4	0.0	79.9	69.4	0.0	79.1	21.3	22.1	78.3	34.0	36.7
LnGrp LOS	F	E		E	E		E	C	C	E	C	D
Approach Vol, veh/h		392			934			1818			1904	
Approach Delay, s/veh		69.7			73.0			34.7			38.4	
Approach LOS		E			E			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	13.1	87.7	20.7	28.5	24.9	76.0	15.1	34.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	11.8	75.2	19.5	25.5	23.5	63.5	12.5	32.5
Max Q Clear Time (g_c+I1), s	8.5	26.7	15.8	9.3	19.8	43.0	10.5	27.2
Green Ext Time (p_c), s	0.1	35.0	0.4	4.6	0.5	17.5	0.1	2.3

Intersection Summary	
HCM 2010 Ctrl Delay	45.9
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	170	524	408	133	257	118	296	1555	306	229	1299	126
Future Volume (veh/h)	170	524	408	133	257	118	296	1555	306	229	1299	126
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	195	552	0	151	295	0	329	1690	364	276	1412	154
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	1
Peak Hour Factor	0.87	0.95	0.82	0.88	0.87	0.79	0.90	0.92	0.84	0.83	0.92	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	277	495	421	117	411	349	309	1559	698	249	1440	644
Arrive On Green	0.09	0.27	0.00	0.04	0.22	0.00	0.17	0.44	0.44	0.14	0.41	0.41
Sat Flow, veh/h	1774	1863	1583	1774	1863	1583	1774	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	195	552	0	151	295	0	329	1690	364	276	1412	154
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1774	1863	1583	1774	1770	1583	1774	1770	1583
Q Serve(g_s), s	13.5	42.5	0.0	6.5	23.5	0.0	27.9	70.5	26.7	22.5	63.0	10.2
Cycle Q Clear(g_c), s	13.5	42.5	0.0	6.5	23.5	0.0	27.9	70.5	26.7	22.5	63.0	10.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	277	495	421	117	411	349	309	1559	698	249	1440	644
V/C Ratio(X)	0.70	1.12	0.00	1.29	0.72	0.00	1.06	1.08	0.52	1.11	0.98	0.24
Avail Cap(c_a), veh/h	277	495	421	117	411	349	309	1559	698	249	1440	644
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	44.2	58.8	0.0	56.3	57.7	0.0	66.0	44.8	32.5	68.8	46.8	31.2
Incr Delay (d2), s/veh	7.9	76.0	0.0	180.0	5.9	0.0	69.0	49.1	2.8	88.5	19.5	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.2	32.3	0.0	7.8	12.7	0.0	19.6	45.1	12.2	17.1	34.7	4.6
LnGrp Delay(d),s/veh	52.0	134.8	0.0	236.3	63.7	0.0	135.0	93.9	35.3	157.2	66.3	32.1
LnGrp LOS	D	F		F	E		F	F	D	F	E	C
Approach Vol, veh/h		747			446			2383			1842	
Approach Delay, s/veh		113.2			122.1			90.6			77.1	
Approach LOS		F			F			F			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	27.0	75.0	11.0	47.0	32.4	69.6	18.2	39.8
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	22.5	70.5	6.5	42.5	27.9	65.1	13.7	35.3
Max Q Clear Time (g_c+I1), s	24.5	72.5	8.5	44.5	29.9	65.0	15.5	25.5
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	0.1	0.0	3.6

Intersection Summary	
HCM 2010 Ctrl Delay	91.7
HCM 2010 LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	170	524	408	133	257	118	296	1555	306	229	1299	126
Future Volume (veh/h)	170	524	408	133	257	118	296	1555	306	229	1299	126
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	195	552	0	151	295	0	329	1690	364	276	1412	154
Adj No. of Lanes	2	2	1	2	1	1	1	2	1	2	2	1
Peak Hour Factor	0.87	0.95	0.82	0.88	0.87	0.79	0.90	0.92	0.84	0.83	0.92	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	237	729	326	168	346	295	338	1927	862	303	1565	700
Arrive On Green	0.07	0.21	0.00	0.02	0.06	0.00	0.19	0.54	0.54	0.09	0.44	0.44
Sat Flow, veh/h	3442	3539	1583	3442	1863	1583	1774	3539	1583	3442	3539	1583
Grp Volume(v), veh/h	195	552	0	151	295	0	329	1690	364	276	1412	154
Grp Sat Flow(s),veh/h/ln	1721	1770	1583	1721	1863	1583	1774	1770	1583	1721	1770	1583
Q Serve(g_s), s	8.9	23.5	0.0	7.0	25.1	0.0	29.5	66.6	21.8	12.7	59.3	9.6
Cycle Q Clear(g_c), s	8.9	23.5	0.0	7.0	25.1	0.0	29.5	66.6	21.8	12.7	59.3	9.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	237	729	326	168	346	295	338	1927	862	303	1565	700
V/C Ratio(X)	0.82	0.76	0.00	0.90	0.85	0.00	0.97	0.88	0.42	0.91	0.90	0.22
Avail Cap(c_a), veh/h	256	830	371	168	389	331	338	1927	862	303	1565	700
HCM Platoon Ratio	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	73.5	59.7	0.0	78.3	72.9	0.0	64.3	31.8	21.5	72.3	41.4	27.6
Incr Delay (d2), s/veh	18.1	3.5	0.0	42.1	15.1	0.0	41.5	6.0	1.5	29.7	8.9	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.8	11.9	0.0	4.3	14.4	0.0	18.3	34.0	9.9	7.3	30.8	4.3
LnGrp Delay(d),s/veh	91.7	63.3	0.0	120.4	88.0	0.0	105.9	37.8	23.1	102.0	50.3	28.3
LnGrp LOS	F	E		F	F		F	D	C	F	D	C
Approach Vol, veh/h		747			446			2383			1842	
Approach Delay, s/veh		70.7			99.0			44.9			56.2	
Approach LOS		E			F			D			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	18.6	91.6	12.3	37.5	35.0	75.2	15.5	34.3
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	14.1	82.6	7.8	37.5	30.5	66.2	11.9	33.4
Max Q Clear Time (g_c+I1), s	14.7	68.6	9.0	25.5	31.5	61.3	10.9	27.1
Green Ext Time (p_c), s	0.0	13.1	0.0	4.1	0.0	4.8	0.1	2.7

Intersection Summary	
HCM 2010 Ctrl Delay	56.8
HCM 2010 LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	229	247	373	521	900	304	655	2210	148	101	2560	482
Future Volume (veh/h)	229	247	373	521	900	304	655	2210	148	101	2560	482
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	249	268	0	566	978	0	712	2402	161	110	2783	524
Adj No. of Lanes	2	2	1	2	2	1	2	3	1	2	3	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	218	465	208	535	790	354	539	2791	869	153	2221	691
Arrive On Green	0.06	0.13	0.00	0.16	0.22	0.00	0.16	0.55	0.55	0.04	0.44	0.44
Sat Flow, veh/h	3442	3539	1583	3442	3539	1583	3442	5085	1583	3442	5085	1583
Grp Volume(v), veh/h	249	268	0	566	978	0	712	2402	161	110	2783	524
Grp Sat Flow(s),veh/h/ln	1721	1770	1583	1721	1770	1583	1721	1695	1583	1721	1695	1583
Q Serve(g_s), s	9.5	10.7	0.0	23.3	33.5	0.0	23.5	60.6	7.7	4.7	65.5	41.8
Cycle Q Clear(g_c), s	9.5	10.7	0.0	23.3	33.5	0.0	23.5	60.6	7.7	4.7	65.5	41.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	218	465	208	535	790	354	539	2791	869	153	2221	691
V/C Ratio(X)	1.14	0.58	0.00	1.06	1.24	0.00	1.32	0.86	0.19	0.72	1.25	0.76
Avail Cap(c_a), veh/h	218	465	208	535	790	354	539	2791	869	165	2221	691
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	70.3	61.2	0.0	63.4	58.3	0.0	63.3	28.9	17.0	70.7	42.3	35.6
Incr Delay (d2), s/veh	104.6	1.8	0.0	55.4	117.6	0.0	156.9	3.8	0.5	12.9	117.9	7.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.7	5.3	0.0	15.2	29.3	0.0	22.9	29.2	3.5	2.5	54.9	19.7
LnGrp Delay(d),s/veh	174.9	63.0	0.0	118.7	175.8	0.0	220.1	32.7	17.5	83.7	160.1	43.2
LnGrp LOS	F	E		F	F		F	C	B	F	F	D
Approach Vol, veh/h		517			1544			3275			3417	
Approach Delay, s/veh		116.9			154.9			72.7			139.7	
Approach LOS		F			F			E			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	11.2	86.8	27.8	24.2	28.0	70.0	14.0	38.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	7.2	81.8	23.3	19.7	23.5	65.5	9.5	33.5
Max Q Clear Time (g_c+I1), s	6.7	62.6	25.3	12.7	25.5	67.5	11.5	35.5
Green Ext Time (p_c), s	0.0	19.1	0.0	4.2	0.0	0.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	116.0
HCM 2010 LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	330	784	701	262	369	150	486	2767	553	322	2345	227
Future Volume (veh/h)	330	784	701	262	369	150	486	2767	553	322	2345	227
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	359	852	0	285	401	0	528	3008	601	350	2549	247
Adj No. of Lanes	2	2	1	2	2	1	2	3	1	2	3	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	413	933	418	218	733	328	402	2422	754	264	2219	691
Arrive On Green	0.12	0.26	0.00	0.06	0.21	0.00	0.12	0.48	0.48	0.08	0.44	0.44
Sat Flow, veh/h	3442	3539	1583	3442	3539	1583	3442	5085	1583	3442	5085	1583
Grp Volume(v), veh/h	359	852	0	285	401	0	528	3008	601	350	2549	247
Grp Sat Flow(s),veh/h/ln	1721	1770	1583	1721	1770	1583	1721	1695	1583	1721	1695	1583
Q Serve(g_s), s	15.4	35.0	0.0	9.5	15.2	0.0	17.5	71.4	48.1	11.5	65.4	15.6
Cycle Q Clear(g_c), s	15.4	35.0	0.0	9.5	15.2	0.0	17.5	71.4	48.1	11.5	65.4	15.6
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	413	933	418	218	733	328	402	2422	754	264	2219	691
V/C Ratio(X)	0.87	0.91	0.00	1.31	0.55	0.00	1.31	1.24	0.80	1.33	1.15	0.36
Avail Cap(c_a), veh/h	525	1003	449	218	733	328	402	2422	754	264	2219	691
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	64.8	53.5	0.0	70.3	53.2	0.0	66.3	39.3	33.2	69.3	42.3	28.2
Incr Delay (d2), s/veh	12.1	11.8	0.0	167.4	0.9	0.0	158.5	112.6	8.6	170.8	72.8	1.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.0	18.7	0.0	9.6	7.6	0.0	17.1	58.7	22.8	11.7	45.6	7.1
LnGrp Delay(d),s/veh	77.0	65.4	0.0	237.7	54.0	0.0	224.7	151.9	41.7	240.0	115.1	29.7
LnGrp LOS	E	E		F	D		F	F	D	F	F	C
Approach Vol, veh/h		1211			686			4137			3146	
Approach Delay, s/veh		68.8			130.3			145.2			122.3	
Approach LOS		E			F			F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	16.0	75.9	14.0	44.1	22.0	69.9	22.5	35.6
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	11.5	68.5	9.5	42.5	17.5	62.5	22.9	29.1
Max Q Clear Time (g_c+I1), s	13.5	73.4	11.5	37.0	19.5	67.4	17.4	17.2
Green Ext Time (p_c), s	0.0	0.0	0.0	2.5	0.0	0.0	0.6	6.1

Intersection Summary	
HCM 2010 Ctrl Delay	126.1
HCM 2010 LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	229	283	391	590	960	310	679	2240	148	153	2553	470
Future Volume (veh/h)	229	283	391	590	960	310	679	2240	148	153	2553	470
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	249	308	0	641	1043	0	738	2435	161	166	2775	511
Adj No. of Lanes	2	2	1	2	2	1	2	3	1	2	3	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	195	531	237	493	838	375	539	2702	841	190	2187	681
Arrive On Green	0.06	0.15	0.00	0.05	0.08	0.00	0.16	0.53	0.53	0.06	0.43	0.43
Sat Flow, veh/h	3442	3539	1583	3442	3539	1583	3442	5085	1583	3442	5085	1583
Grp Volume(v), veh/h	249	308	0	641	1043	0	738	2435	161	166	2775	511
Grp Sat Flow(s),veh/h/ln	1721	1770	1583	1721	1770	1583	1721	1695	1583	1721	1695	1583
Q Serve(g_s), s	8.5	12.2	0.0	21.5	35.5	0.0	23.5	64.6	8.0	7.2	64.5	40.7
Cycle Q Clear(g_c), s	8.5	12.2	0.0	21.5	35.5	0.0	23.5	64.6	8.0	7.2	64.5	40.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	195	531	237	493	838	375	539	2702	841	190	2187	681
V/C Ratio(X)	1.28	0.58	0.00	1.30	1.25	0.00	1.37	0.90	0.19	0.87	1.27	0.75
Avail Cap(c_a), veh/h	195	531	237	493	838	375	539	2702	841	190	2187	681
HCM Platoon Ratio	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	70.8	59.4	0.0	71.5	69.1	0.0	63.3	31.6	18.3	70.3	42.7	36.0
Incr Delay (d2), s/veh	158.1	1.6	0.0	149.0	120.3	0.0	177.5	5.4	0.5	32.7	124.8	7.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.3	6.1	0.0	20.5	31.4	0.0	24.5	31.3	3.6	4.3	55.4	19.2
LnGrp Delay(d),s/veh	228.8	60.9	0.0	220.5	189.5	0.0	240.8	37.0	18.8	103.1	167.6	43.4
LnGrp LOS	F	E		F	F		F	D	B	F	F	D
Approach Vol, veh/h		557			1684			3334			3452	
Approach Delay, s/veh		136.0			201.3			81.2			146.1	
Approach LOS		F			F			F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	12.8	84.2	26.0	27.0	28.0	69.0	13.0	40.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	8.3	79.7	21.5	22.5	23.5	64.5	8.5	35.5
Max Q Clear Time (g_c+I1), s	9.2	66.6	23.5	14.2	25.5	66.5	10.5	37.5
Green Ext Time (p_c), s	0.0	13.1	0.0	5.1	0.0	0.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	131.8
HCM 2010 LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	318	874	721	250	422	185	513	2790	553	373	2346	227
Future Volume (veh/h)	318	874	721	250	422	185	513	2790	553	373	2346	227
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	346	950	0	272	459	0	558	3033	601	405	2550	247
Adj No. of Lanes	2	2	1	2	2	1	2	3	1	2	3	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	399	1003	449	218	816	365	402	2254	702	310	2119	660
Arrive On Green	0.12	0.28	0.00	0.11	0.39	0.00	0.12	0.44	0.44	0.09	0.42	0.42
Sat Flow, veh/h	3442	3539	1583	3442	3539	1583	3442	5085	1583	3442	5085	1583
Grp Volume(v), veh/h	346	950	0	272	459	0	558	3033	601	405	2550	247
Grp Sat Flow(s),veh/h/ln	1721	1770	1583	1721	1770	1583	1721	1695	1583	1721	1695	1583
Q Serve(g_s), s	14.8	39.4	0.0	9.5	15.3	0.0	17.5	66.5	51.1	13.5	62.5	16.2
Cycle Q Clear(g_c), s	14.8	39.4	0.0	9.5	15.3	0.0	17.5	66.5	51.1	13.5	62.5	16.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	399	1003	449	218	816	365	402	2254	702	310	2119	660
V/C Ratio(X)	0.87	0.95	0.00	1.25	0.56	0.00	1.39	1.35	0.86	1.31	1.20	0.37
Avail Cap(c_a), veh/h	507	1026	459	218	816	365	402	2254	702	310	2119	660
HCM Platoon Ratio	1.00	1.00	1.00	1.67	1.67	1.67	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	65.2	52.7	0.0	67.1	40.2	0.0	66.3	41.7	37.5	68.3	43.7	30.2
Incr Delay (d2), s/veh	12.2	16.7	0.0	143.8	0.9	0.0	190.1	158.4	12.8	159.8	96.3	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.7	21.6	0.0	8.8	7.5	0.0	18.9	64.2	24.8	13.3	48.1	7.3
LnGrp Delay(d),s/veh	77.4	69.4	0.0	210.9	41.0	0.0	256.4	200.2	50.2	228.0	140.1	31.9
LnGrp LOS	E	E		F	D		F	F	D	F	F	C
Approach Vol, veh/h		1296			731			4192			3202	
Approach Delay, s/veh		71.5			104.2			186.2			142.9	
Approach LOS		E			F			F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	18.0	71.0	14.0	47.0	22.0	67.0	21.9	39.1
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	13.5	65.5	9.5	43.5	17.5	61.5	22.1	30.9
Max Q Clear Time (g_c+I1), s	15.5	68.5	11.5	41.4	19.5	64.5	16.8	17.3
Green Ext Time (p_c), s	0.0	0.0	0.0	1.1	0.0	0.0	0.6	7.5

Intersection Summary	
HCM 2010 Ctrl Delay	149.3
HCM 2010 LOS	F

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	23	245	849	71	27	31
Future Vol, veh/h	23	245	849	71	27	31
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	150	-	-	0	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	79	88	94	68	61	70
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	29	278	903	104	44	44

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	903	0	-	0	1240	903
Stage 1	-	-	-	-	903	-
Stage 2	-	-	-	-	337	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	753	-	-	-	193	336
Stage 1	-	-	-	-	396	-
Stage 2	-	-	-	-	723	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	753	-	-	-	186	336
Mov Cap-2 Maneuver	-	-	-	-	305	-
Stage 1	-	-	-	-	396	-
Stage 2	-	-	-	-	695	-

Approach	EB	WB	SB
HCM Control Delay, s	0.9	0	20.5
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	753	-	-	-	320
HCM Lane V/C Ratio	0.039	-	-	-	0.277
HCM Control Delay (s)	10	-	-	-	20.5
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	1.1

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	86	755	319	71	102	29
Future Vol, veh/h	86	755	319	71	102	29
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	150	-	-	0	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	82	95	97	68	85	72
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	105	795	329	104	120	40

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	329	0	-	0	1333	329
Stage 1	-	-	-	-	329	-
Stage 2	-	-	-	-	1004	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1231	-	-	-	170	712
Stage 1	-	-	-	-	729	-
Stage 2	-	-	-	-	354	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1231	-	-	-	155	712
Mov Cap-2 Maneuver	-	-	-	-	261	-
Stage 1	-	-	-	-	729	-
Stage 2	-	-	-	-	324	-

Approach	EB	WB	SB
HCM Control Delay, s	1	0	28.4
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1231	-	-	-	310
HCM Lane V/C Ratio	0.085	-	-	-	0.517
HCM Control Delay (s)	8.2	-	-	-	28.4
HCM Lane LOS	A	-	-	-	D
HCM 95th %tile Q(veh)	0.3	-	-	-	2.8

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	23	260	901	71	27	31
Future Vol, veh/h	23	260	901	71	27	31
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	150	-	-	0	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	79	88	94	68	61	70
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	29	295	959	104	44	44

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	959	0	-	0	1313	959
Stage 1	-	-	-	-	959	-
Stage 2	-	-	-	-	354	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	717	-	-	-	175	312
Stage 1	-	-	-	-	372	-
Stage 2	-	-	-	-	710	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	717	-	-	-	168	312
Mov Cap-2 Maneuver	-	-	-	-	287	-
Stage 1	-	-	-	-	372	-
Stage 2	-	-	-	-	681	-

Approach	EB	WB	SB
HCM Control Delay, s	0.9	0	22
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	717	-	-	-	299
HCM Lane V/C Ratio	0.041	-	-	-	0.296
HCM Control Delay (s)	10.2	-	-	-	22
HCM Lane LOS	B	-	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	1.2

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	86	801	338	71	102	29
Future Vol, veh/h	86	801	338	71	102	29
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	150	-	-	0	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	82	95	97	68	85	72
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	105	843	348	104	120	40

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	348	0	-	0	1401	348
Stage 1	-	-	-	-	348	-
Stage 2	-	-	-	-	1053	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1211	-	-	-	154	695
Stage 1	-	-	-	-	715	-
Stage 2	-	-	-	-	336	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1211	-	-	-	141	695
Mov Cap-2 Maneuver	-	-	-	-	246	-
Stage 1	-	-	-	-	715	-
Stage 2	-	-	-	-	307	-

Approach	EB	WB	SB
HCM Control Delay, s	0.9	0	31
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1211	-	-	-	294
HCM Lane V/C Ratio	0.087	-	-	-	0.545
HCM Control Delay (s)	8.3	-	-	-	31
HCM Lane LOS	A	-	-	-	D
HCM 95th %tile Q(veh)	0.3	-	-	-	3

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	23	268	932	71	27	31
Future Vol, veh/h	23	268	932	71	27	31
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	150	-	-	0	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	79	88	94	68	61	70
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	29	305	991	104	44	44

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	991	0	-	0	1354	991
Stage 1	-	-	-	-	991	-
Stage 2	-	-	-	-	363	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	698	-	-	-	165	299
Stage 1	-	-	-	-	359	-
Stage 2	-	-	-	-	704	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	698	-	-	-	158	299
Mov Cap-2 Maneuver	-	-	-	-	276	-
Stage 1	-	-	-	-	359	-
Stage 2	-	-	-	-	675	-

Approach	EB	WB	SB
HCM Control Delay, s	0.9	0	23
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	698	-	-	-	287
HCM Lane V/C Ratio	0.042	-	-	-	0.309
HCM Control Delay (s)	10.4	-	-	-	23
HCM Lane LOS	B	-	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	1.3

Intersection	
Int Delay, s/veh	3.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	86	832	354	71	102	29
Future Vol, veh/h	86	832	354	71	102	29
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	150	-	-	0	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	82	95	97	68	85	72
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	105	876	365	104	120	40

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	365	0	-	0	1451	365
Stage 1	-	-	-	-	365	-
Stage 2	-	-	-	-	1086	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1194	-	-	-	144	680
Stage 1	-	-	-	-	702	-
Stage 2	-	-	-	-	324	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1194	-	-	-	131	680
Mov Cap-2 Maneuver	-	-	-	-	236	-
Stage 1	-	-	-	-	702	-
Stage 2	-	-	-	-	296	-

Approach	EB	WB	SB
HCM Control Delay, s	0.9	0	33.3
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1194	-	-	-	282
HCM Lane V/C Ratio	0.088	-	-	-	0.568
HCM Control Delay (s)	8.3	-	-	-	33.3
HCM Lane LOS	A	-	-	-	D
HCM 95th %tile Q(veh)	0.3	-	-	-	3.3

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	23	268	928	71	27	31
Future Vol, veh/h	23	268	928	71	27	31
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	150	-	-	0	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	79	88	94	68	61	70
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	29	305	987	104	44	44

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	987	0	-	0	1350	987
Stage 1	-	-	-	-	987	-
Stage 2	-	-	-	-	363	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	700	-	-	-	166	300
Stage 1	-	-	-	-	361	-
Stage 2	-	-	-	-	704	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	700	-	-	-	159	300
Mov Cap-2 Maneuver	-	-	-	-	278	-
Stage 1	-	-	-	-	361	-
Stage 2	-	-	-	-	675	-

Approach	EB	WB	SB
HCM Control Delay, s	0.9	0	22.9
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	700	-	-	-	289
HCM Lane V/C Ratio	0.042	-	-	-	0.306
HCM Control Delay (s)	10.4	-	-	-	22.9
HCM Lane LOS	B	-	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	1.3

Intersection	
Int Delay, s/veh	5.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	86	825	349	71	102	29
Future Vol, veh/h	86	825	349	71	102	29
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	150	-	-	0	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	82	95	97	68	85	72
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	105	868	360	104	120	40

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	360	0	-	0	1438	360
Stage 1	-	-	-	-	360	-
Stage 2	-	-	-	-	1078	-
Critical Hdwy	4.12	-	-	-	7.12	6.22
Critical Hdwy Stg 1	-	-	-	-	6.12	-
Critical Hdwy Stg 2	-	-	-	-	6.12	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1199	-	-	-	~ 111	684
Stage 1	-	-	-	-	658	-
Stage 2	-	-	-	-	265	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1199	-	-	-	~ 104	684
Mov Cap-2 Maneuver	-	-	-	-	193	-
Stage 1	-	-	-	-	600	-
Stage 2	-	-	-	-	242	-

Approach	EB	WB	SB
HCM Control Delay, s	0.9	0	47.9
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1199	-	-	-	235
HCM Lane V/C Ratio	0.087	-	-	-	0.682
HCM Control Delay (s)	8.3	-	-	-	47.9
HCM Lane LOS	A	-	-	-	E
HCM 95th %tile Q(veh)	0.3	-	-	-	4.4

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	23	313	39	151	924	71	68	5	50	27	5	31
Future Volume (veh/h)	23	313	39	151	924	71	68	5	50	27	5	31
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	29	356	42	164	983	104	74	5	54	44	5	44
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	1	1	0
Peak Hour Factor	0.79	0.88	0.92	0.92	0.94	0.68	0.92	0.92	0.92	0.61	0.92	0.70
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	211	1070	125	470	1251	132	614	55	591	604	66	581
Arrive On Green	0.01	0.11	0.11	0.08	0.39	0.39	0.40	0.40	0.40	0.40	0.40	0.40
Sat Flow, veh/h	1774	3192	374	1774	3230	342	1351	136	1468	1338	164	1444
Grp Volume(v), veh/h	29	196	202	164	538	549	74	0	59	44	0	49
Grp Sat Flow(s),veh/h/ln	1774	1770	1797	1774	1770	1802	1351	0	1604	1338	0	1608
Q Serve(g_s), s	0.8	7.7	7.8	4.3	20.1	20.1	2.7	0.0	1.7	1.6	0.0	1.4
Cycle Q Clear(g_c), s	0.8	7.7	7.8	4.3	20.1	20.1	4.1	0.0	1.7	3.3	0.0	1.4
Prop In Lane	1.00		0.21	1.00		0.19	1.00		0.92	1.00		0.90
Lane Grp Cap(c), veh/h	211	593	602	470	686	698	614	0	645	604	0	647
V/C Ratio(X)	0.14	0.33	0.33	0.35	0.79	0.79	0.12	0.00	0.09	0.07	0.00	0.08
Avail Cap(c_a), veh/h	288	743	755	525	814	829	614	0	645	604	0	647
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	17.6	25.6	25.6	13.8	20.2	20.2	15.1	0.0	13.9	14.9	0.0	13.8
Incr Delay (d2), s/veh	0.3	0.3	0.3	0.4	4.3	4.3	0.4	0.0	0.3	0.2	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	3.8	3.9	2.2	10.5	10.7	1.1	0.0	0.8	0.6	0.0	0.7
LnGrp Delay(d),s/veh	17.9	25.9	26.0	14.2	24.5	24.5	15.5	0.0	14.2	15.2	0.0	14.0
LnGrp LOS	B	C	C	B	C	C	B		B	B		B
Approach Vol, veh/h		427			1251			133			93	
Approach Delay, s/veh		25.4			23.2			14.9			14.6	
Approach LOS		C			C			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		34.7	10.7	29.6		34.7	6.8	33.6
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		21.5	8.5	31.5		21.5	5.5	34.5
Max Q Clear Time (g_c+I1), s		6.1	6.3	9.8		5.3	2.8	22.1
Green Ext Time (p_c), s		0.8	0.1	9.6		0.8	0.0	6.9

Intersection Summary	
HCM 2010 Ctrl Delay	22.7
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	86	904	45	167	360	71	83	5	91	102	5	29
Future Volume (veh/h)	86	904	45	167	360	71	83	5	91	102	5	29
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	105	952	49	182	371	104	90	5	99	120	5	40
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	1	1	0
Peak Hour Factor	0.82	0.95	0.92	0.92	0.97	0.68	0.92	0.92	0.92	0.85	0.92	0.72
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	447	1181	61	310	1037	287	603	30	601	545	71	567
Arrive On Green	0.08	0.46	0.46	0.09	0.38	0.38	0.40	0.40	0.40	0.40	0.40	0.40
Sat Flow, veh/h	1774	3425	176	1774	2740	759	1356	77	1518	1285	179	1431
Grp Volume(v), veh/h	105	492	509	182	238	237	90	0	104	120	0	45
Grp Sat Flow(s),veh/h/ln	1774	1770	1832	1774	1770	1729	1356	0	1595	1285	0	1610
Q Serve(g_s), s	3.0	19.1	19.1	5.1	7.7	7.9	3.5	0.0	3.4	5.3	0.0	1.4
Cycle Q Clear(g_c), s	3.0	19.1	19.1	5.1	7.7	7.9	4.9	0.0	3.4	8.7	0.0	1.4
Prop In Lane	1.00		0.10	1.00		0.44	1.00		0.95	1.00		0.89
Lane Grp Cap(c), veh/h	447	610	631	310	670	654	603	0	631	545	0	638
V/C Ratio(X)	0.23	0.81	0.81	0.59	0.36	0.36	0.15	0.00	0.16	0.22	0.00	0.07
Avail Cap(c_a), veh/h	490	719	744	449	874	854	603	0	631	545	0	638
HCM Platoon Ratio	1.33	1.33	1.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	15.1	19.4	19.4	17.5	17.9	17.9	16.5	0.0	15.6	18.4	0.0	15.0
Incr Delay (d2), s/veh	0.3	5.8	5.6	1.8	0.3	0.3	0.5	0.0	0.6	0.9	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	10.3	10.6	2.6	3.8	3.8	1.4	0.0	1.6	2.0	0.0	0.7
LnGrp Delay(d),s/veh	15.4	25.2	25.0	19.3	18.2	18.2	17.1	0.0	16.2	19.4	0.0	15.2
LnGrp LOS	B	C	C	B	B	B	B		B	B		B
Approach Vol, veh/h		1106			657			194			165	
Approach Delay, s/veh		24.2			18.5			16.6			18.2	
Approach LOS		C			B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		36.2	11.8	32.1		36.2	9.1	34.8
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		20.5	13.5	32.5		20.5	6.5	39.5
Max Q Clear Time (g_c+I1), s		6.9	7.1	21.1		10.7	5.0	9.9
Green Ext Time (p_c), s		1.3	0.2	6.5		1.1	0.0	10.7

Intersection Summary	
HCM 2010 Ctrl Delay	21.3
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	23	484	1676	71	27	31
Future Vol, veh/h	23	484	1676	71	27	31
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	150	-	-	0	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	25	526	1822	77	29	34

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1822	0	-	0	2135	1822
Stage 1	-	-	-	-	1822	-
Stage 2	-	-	-	-	313	-
Critical Hdwy	4.13	-	-	-	6.63	6.23
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.83	-
Follow-up Hdwy	2.219	-	-	-	3.519	3.319
Pot Cap-1 Maneuver	334	-	-	-	48	96
Stage 1	-	-	-	-	140	-
Stage 2	-	-	-	-	715	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	334	-	-	-	44	96
Mov Cap-2 Maneuver	-	-	-	-	116	-
Stage 1	-	-	-	-	140	-
Stage 2	-	-	-	-	661	-

Approach	EB	WB	SB
HCM Control Delay, s	0.8	0	82.5
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	334	-	-	-	104
HCM Lane V/C Ratio	0.075	-	-	-	0.606
HCM Control Delay (s)	16.6	-	-	-	82.5
HCM Lane LOS	C	-	-	-	F
HCM 95th %tile Q(veh)	0.2	-	-	-	2.9

Intersection	
Int Delay, s/veh	2.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	86	1490	630	71	102	29
Future Vol, veh/h	86	1490	630	71	102	29
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	150	-	-	0	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	93	1620	685	77	111	32

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	685	0	-	0	1682	685
Stage 1	-	-	-	-	685	-
Stage 2	-	-	-	-	997	-
Critical Hdwy	4.13	-	-	-	6.63	6.23
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.83	-
Follow-up Hdwy	2.219	-	-	-	3.519	3.319
Pot Cap-1 Maneuver	906	-	-	-	~ 94	447
Stage 1	-	-	-	-	499	-
Stage 2	-	-	-	-	319	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	906	-	-	-	~ 84	447
Mov Cap-2 Maneuver	-	-	-	-	201	-
Stage 1	-	-	-	-	499	-
Stage 2	-	-	-	-	286	-

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	43.5
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	906	-	-	-	229
HCM Lane V/C Ratio	0.103	-	-	-	0.622
HCM Control Delay (s)	9.4	-	-	-	43.5
HCM Lane LOS	A	-	-	-	E
HCM 95th %tile Q(veh)	0.3	-	-	-	3.7

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	23	529	39	151	1672	71	68	5	50	27	5	31
Future Volume (veh/h)	23	529	39	151	1672	71	68	5	50	27	5	31
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	25	575	42	164	1817	77	74	5	54	29	5	34
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	144	1521	111	518	1730	73	471	40	430	452	61	412
Arrive On Green	0.04	0.60	0.60	0.07	0.50	0.50	0.29	0.29	0.29	0.29	0.29	0.29
Sat Flow, veh/h	1774	3345	244	1774	3461	146	1363	136	1468	1338	207	1407
Grp Volume(v), veh/h	25	304	313	164	923	971	74	0	59	29	0	39
Grp Sat Flow(s),veh/h/ln	1774	1770	1820	1774	1770	1837	1363	0	1604	1338	0	1614
Q Serve(g_s), s	0.6	6.6	6.6	3.5	37.5	37.5	3.1	0.0	2.0	1.2	0.0	1.3
Cycle Q Clear(g_c), s	0.6	6.6	6.6	3.5	37.5	37.5	4.4	0.0	2.0	3.2	0.0	1.3
Prop In Lane	1.00		0.13	1.00		0.08	1.00		0.92	1.00		0.87
Lane Grp Cap(c), veh/h	144	805	828	518	885	919	471	0	470	452	0	473
V/C Ratio(X)	0.17	0.38	0.38	0.32	1.04	1.06	0.16	0.00	0.13	0.06	0.00	0.08
Avail Cap(c_a), veh/h	217	823	847	572	885	919	471	0	470	452	0	473
HCM Platoon Ratio	1.33	1.33	1.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	17.8	9.4	9.4	9.3	18.7	18.8	20.8	0.0	19.5	20.7	0.0	19.2
Incr Delay (d2), s/veh	0.6	0.3	0.3	0.3	42.2	45.8	0.7	0.0	0.5	0.3	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	3.3	3.4	1.7	28.6	30.6	1.3	0.0	1.0	0.5	0.0	0.6
LnGrp Delay(d),s/veh	18.4	9.7	9.7	9.6	61.0	64.6	21.5	0.0	20.0	20.9	0.0	19.6
LnGrp LOS	B	A	A	A	F	F	C		C	C		B
Approach Vol, veh/h		642			2058			133			68	
Approach Delay, s/veh		10.0			58.6			20.9			20.1	
Approach LOS		B			E			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		26.5	9.9	38.6		26.5	6.5	42.0
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		18.9	7.7	34.9		18.9	5.1	37.5
Max Q Clear Time (g_c+I1), s		6.4	5.5	8.6		5.2	2.6	39.5
Green Ext Time (p_c), s		0.6	0.1	20.2		0.7	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	45.2
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	86	1569	45	167	641	71	83	5	91	102	5	29
Future Volume (veh/h)	86	1569	45	167	641	71	83	5	91	102	5	29
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	93	1705	49	182	697	77	90	5	99	111	5	32
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	452	1710	49	229	1623	179	425	20	392	361	56	361
Arrive On Green	0.06	0.49	0.49	0.08	0.50	0.50	0.26	0.26	0.26	0.26	0.26	0.26
Sat Flow, veh/h	1774	3514	101	1774	3215	355	1365	77	1518	1285	218	1398
Grp Volume(v), veh/h	93	856	898	182	383	391	90	0	104	111	0	37
Grp Sat Flow(s),veh/h/ln	1774	1770	1845	1774	1770	1800	1365	0	1595	1285	0	1616
Q Serve(g_s), s	1.9	36.1	36.5	3.8	10.3	10.3	4.0	0.0	3.9	5.6	0.0	1.3
Cycle Q Clear(g_c), s	1.9	36.1	36.5	3.8	10.3	10.3	5.3	0.0	3.9	9.5	0.0	1.3
Prop In Lane	1.00		0.05	1.00		0.20	1.00		0.95	1.00		0.86
Lane Grp Cap(c), veh/h	452	861	898	229	893	909	425	0	412	361	0	417
V/C Ratio(X)	0.21	0.99	1.00	0.79	0.43	0.43	0.21	0.00	0.25	0.31	0.00	0.09
Avail Cap(c_a), veh/h	488	861	898	236	893	909	425	0	412	361	0	417
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	8.9	19.1	19.3	16.9	11.7	11.7	23.1	0.0	22.1	25.8	0.0	21.1
Incr Delay (d2), s/veh	0.2	29.1	30.1	16.5	0.3	0.3	1.1	0.0	1.5	2.2	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	24.3	26.0	2.9	5.1	5.2	1.6	0.0	1.9	2.2	0.0	0.6
LnGrp Delay(d),s/veh	9.1	48.2	49.3	33.4	12.1	12.1	24.3	0.0	23.5	28.0	0.0	21.5
LnGrp LOS	A	D	F	C	B	B	C		C	C		C
Approach Vol, veh/h		1847			956			194			148	
Approach Delay, s/veh		46.8			16.1			23.9			26.4	
Approach LOS		D			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		23.9	10.1	41.0		23.9	8.8	42.4
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		19.1	5.9	36.5		19.1	5.8	36.6
Max Q Clear Time (g_c+I1), s		7.3	5.8	38.5		11.5	3.9	12.3
Green Ext Time (p_c), s		1.1	0.0	0.0		0.9	0.0	18.7

Intersection Summary	
HCM 2010 Ctrl Delay	35.1
HCM 2010 LOS	D

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	1	273	889	10	14	25
Future Vol, veh/h	1	273	889	10	14	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	275	-	-	175	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	25	94	98	62	32	62
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	290	907	16	44	40

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	907	0	-	0	1205	907
Stage 1	-	-	-	-	907	-
Stage 2	-	-	-	-	298	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	750	-	-	-	203	334
Stage 1	-	-	-	-	394	-
Stage 2	-	-	-	-	753	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	750	-	-	-	202	334
Mov Cap-2 Maneuver	-	-	-	-	314	-
Stage 1	-	-	-	-	394	-
Stage 2	-	-	-	-	749	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	20
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	750	-	-	-	323
HCM Lane V/C Ratio	0.005	-	-	-	0.26
HCM Control Delay (s)	9.8	-	-	-	20
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	1

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	16	835	401	13	11	7
Future Vol, veh/h	16	835	401	13	11	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	275	-	-	175	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	67	98	94	81	46	58
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	24	852	427	16	24	12

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	427	0	-	0	1327	427
Stage 1	-	-	-	-	427	-
Stage 2	-	-	-	-	900	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1132	-	-	-	171	628
Stage 1	-	-	-	-	658	-
Stage 2	-	-	-	-	397	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1132	-	-	-	167	628
Mov Cap-2 Maneuver	-	-	-	-	292	-
Stage 1	-	-	-	-	658	-
Stage 2	-	-	-	-	389	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	16.2
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1132	-	-	-	356
HCM Lane V/C Ratio	0.021	-	-	-	0.101
HCM Control Delay (s)	8.2	-	-	-	16.2
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	1	290	943	10	14	25
Future Vol, veh/h	1	290	943	10	14	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	275	-	-	175	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	25	94	98	62	32	62
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	309	962	16	44	40

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	962	0	-	0	1279	962
Stage 1	-	-	-	-	962	-
Stage 2	-	-	-	-	317	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	715	-	-	-	183	310
Stage 1	-	-	-	-	371	-
Stage 2	-	-	-	-	738	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	715	-	-	-	182	310
Mov Cap-2 Maneuver	-	-	-	-	295	-
Stage 1	-	-	-	-	371	-
Stage 2	-	-	-	-	734	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	21.5
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	715	-	-	-	302
HCM Lane V/C Ratio	0.006	-	-	-	0.278
HCM Control Delay (s)	10.1	-	-	-	21.5
HCM Lane LOS	B	-	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	1.1

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	16	886	425	13	11	7
Future Vol, veh/h	16	886	425	13	11	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	275	-	-	175	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	67	98	94	81	46	58
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	24	904	452	16	24	12

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	452	0	-	0	1404	452
Stage 1	-	-	-	-	452	-
Stage 2	-	-	-	-	952	-
Critical Hdwy	4.12	-	-	-	7.12	6.22
Critical Hdwy Stg 1	-	-	-	-	6.12	-
Critical Hdwy Stg 2	-	-	-	-	6.12	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1109	-	-	-	117	608
Stage 1	-	-	-	-	587	-
Stage 2	-	-	-	-	312	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1109	-	-	-	115	608
Mov Cap-2 Maneuver	-	-	-	-	228	-
Stage 1	-	-	-	-	574	-
Stage 2	-	-	-	-	305	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	19.3
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1109	-	-	-	288
HCM Lane V/C Ratio	0.022	-	-	-	0.125
HCM Control Delay (s)	8.3	-	-	-	19.3
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	290	8	9	943	10	31	2	37	14	2	25
Future Volume (veh/h)	1	290	8	9	943	10	31	2	37	14	2	25
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	4	309	9	10	962	16	34	2	40	44	2	40
Adj No. of Lanes	1	1	0	1	1	1	1	1	0	1	1	0
Peak Hour Factor	0.25	0.94	0.92	0.92	0.98	0.62	0.92	0.92	0.92	0.32	0.92	0.62
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	128	1007	29	576	1054	896	465	24	481	465	24	481
Arrive On Green	0.01	0.56	0.56	0.01	0.57	0.57	0.32	0.32	0.32	0.32	0.32	0.32
Sat Flow, veh/h	1774	1801	52	1774	1863	1583	1359	76	1519	1359	76	1519
Grp Volume(v), veh/h	4	0	318	10	962	16	34	0	42	44	0	42
Grp Sat Flow(s),veh/h/ln	1774	0	1853	1774	1863	1583	1359	0	1595	1359	0	1595
Q Serve(g_s), s	0.1	0.0	11.0	0.3	55.7	0.5	2.2	0.0	2.2	2.8	0.0	2.2
Cycle Q Clear(g_c), s	0.1	0.0	11.0	0.3	55.7	0.5	4.4	0.0	2.2	5.0	0.0	2.2
Prop In Lane	1.00		0.03	1.00		1.00	1.00		0.95	1.00		0.95
Lane Grp Cap(c), veh/h	128	0	1036	576	1054	896	465	0	505	465	0	505
V/C Ratio(X)	0.03	0.00	0.31	0.02	0.91	0.02	0.07	0.00	0.08	0.09	0.00	0.08
Avail Cap(c_a), veh/h	192	0	1274	628	1281	1089	465	0	505	465	0	505
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	24.0	0.0	14.1	11.6	23.4	11.4	30.3	0.0	28.8	30.5	0.0	28.8
Incr Delay (d2), s/veh	0.1	0.0	0.2	0.0	8.9	0.0	0.3	0.0	0.3	0.4	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.0	5.6	0.1	30.9	0.2	0.9	0.0	1.0	1.1	0.0	1.0
LnGrp Delay(d),s/veh	24.1	0.0	14.2	11.6	32.3	11.4	30.6	0.0	29.1	31.0	0.0	29.1
LnGrp LOS	C		B	B	C	B	C		C	C		C
Approach Vol, veh/h		322			988			76			86	
Approach Delay, s/veh		14.4			31.8			29.8			30.0	
Approach LOS		B			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		42.5	5.9	71.6		42.5	5.1	72.4
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		19.0	5.0	82.5		19.0	5.0	82.5
Max Q Clear Time (g_c+I1), s		6.4	2.3	13.0		7.0	2.1	57.7
Green Ext Time (p_c), s		0.5	0.0	13.1		0.5	0.0	10.2

Intersection Summary	
HCM 2010 Ctrl Delay	27.8
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	16	886	31	37	425	13	16	2	20	11	2	7
Future Volume (veh/h)	16	886	31	37	425	13	16	2	20	11	2	7
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	24	904	34	40	452	16	17	2	22	24	2	12
Adj No. of Lanes	1	1	0	1	1	1	1	1	0	1	1	0
Peak Hour Factor	0.67	0.98	0.92	0.92	0.94	0.81	0.92	0.92	0.92	0.46	0.92	0.58
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	497	1000	38	179	1059	900	464	40	435	454	68	411
Arrive On Green	0.02	0.56	0.56	0.03	0.57	0.57	0.30	0.30	0.30	0.30	0.30	0.30
Sat Flow, veh/h	1774	1784	67	1774	1863	1583	1394	134	1470	1381	231	1387
Grp Volume(v), veh/h	24	0	938	40	452	16	17	0	24	24	0	14
Grp Sat Flow(s),veh/h/ln	1774	0	1851	1774	1863	1583	1394	0	1603	1381	0	1618
Q Serve(g_s), s	0.7	0.0	54.2	1.1	16.6	0.5	1.1	0.0	1.3	1.5	0.0	0.7
Cycle Q Clear(g_c), s	0.7	0.0	54.2	1.1	16.6	0.5	1.8	0.0	1.3	2.8	0.0	0.7
Prop In Lane	1.00		0.04	1.00		1.00	1.00		0.92	1.00		0.86
Lane Grp Cap(c), veh/h	497	0	1038	179	1059	900	464	0	475	454	0	479
V/C Ratio(X)	0.05	0.00	0.90	0.22	0.43	0.02	0.04	0.00	0.05	0.05	0.00	0.03
Avail Cap(c_a), veh/h	535	0	1257	206	1268	1078	464	0	475	454	0	479
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	11.6	0.0	23.5	23.4	14.8	11.3	30.6	0.0	30.2	31.2	0.0	30.0
Incr Delay (d2), s/veh	0.0	0.0	8.2	0.6	0.3	0.0	0.1	0.0	0.2	0.2	0.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.0	30.0	0.7	8.6	0.2	0.4	0.0	0.6	0.6	0.0	0.3
LnGrp Delay(d),s/veh	11.6	0.0	31.7	24.0	15.0	11.3	30.8	0.0	30.4	31.4	0.0	30.1
LnGrp LOS	B		C	C	B	B	C		C	C		C
Approach Vol, veh/h		962			508			41			38	
Approach Delay, s/veh		31.2			15.6			30.5			30.9	
Approach LOS		C			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		40.0	8.2	71.8		40.0	7.3	72.7
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		19.5	5.5	81.5		19.5	5.3	81.7
Max Q Clear Time (g_c+I1), s		3.8	3.1	56.2		4.8	2.7	18.6
Green Ext Time (p_c), s		0.2	0.0	11.1		0.2	0.0	14.4

Intersection Summary	
HCM 2010 Ctrl Delay	26.1
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	1	298	971	10	14	25
Future Vol, veh/h	1	298	971	10	14	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	275	-	-	175	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	25	94	98	62	32	62
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	317	991	16	44	40

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	991	0	-	0	1316	991
Stage 1	-	-	-	-	991	-
Stage 2	-	-	-	-	325	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	698	-	-	-	174	299
Stage 1	-	-	-	-	359	-
Stage 2	-	-	-	-	732	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	698	-	-	-	173	299
Mov Cap-2 Maneuver	-	-	-	-	285	-
Stage 1	-	-	-	-	359	-
Stage 2	-	-	-	-	728	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	22.2
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	698	-	-	-	292
HCM Lane V/C Ratio	0.006	-	-	-	0.288
HCM Control Delay (s)	10.2	-	-	-	22.2
HCM Lane LOS	B	-	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	1.2

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	16	912	438	13	11	7
Future Vol, veh/h	16	912	438	13	11	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	275	-	-	175	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	67	98	94	81	46	58
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	24	931	466	16	24	12

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	466	0	-	0	1444	466
Stage 1	-	-	-	-	466	-
Stage 2	-	-	-	-	978	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1095	-	-	-	145	597
Stage 1	-	-	-	-	632	-
Stage 2	-	-	-	-	364	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1095	-	-	-	142	597
Mov Cap-2 Maneuver	-	-	-	-	266	-
Stage 1	-	-	-	-	632	-
Stage 2	-	-	-	-	356	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	17.4
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1095	-	-	-	327
HCM Lane V/C Ratio	0.022	-	-	-	0.11
HCM Control Delay (s)	8.4	-	-	-	17.4
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	385	8	9	1075	10	31	5	37	14	5	25
Future Volume (veh/h)	1	385	8	9	1075	10	31	5	37	14	5	25
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	4	410	9	10	1097	16	34	5	40	44	5	40
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	1	1	0
Peak Hour Factor	0.25	0.94	0.92	0.92	0.98	0.62	0.92	0.92	0.92	0.32	0.92	0.62
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	129	1356	30	372	1391	20	708	88	705	708	88	705
Arrive On Green	0.01	0.38	0.38	0.01	0.39	0.39	0.49	0.49	0.49	0.49	0.49	0.49
Sat Flow, veh/h	1774	3541	78	1774	3571	52	1356	179	1431	1356	179	1431
Grp Volume(v), veh/h	4	205	214	10	544	569	34	0	45	44	0	45
Grp Sat Flow(s),veh/h/ln	1774	1770	1849	1774	1770	1854	1356	0	1610	1356	0	1610
Q Serve(g_s), s	0.2	9.7	9.7	0.4	32.5	32.5	1.6	0.0	1.8	2.1	0.0	1.8
Cycle Q Clear(g_c), s	0.2	9.7	9.7	0.4	32.5	32.5	3.4	0.0	1.8	3.9	0.0	1.8
Prop In Lane	1.00		0.04	1.00		0.03	1.00		0.89	1.00		0.89
Lane Grp Cap(c), veh/h	129	678	708	372	690	722	708	0	793	708	0	793
V/C Ratio(X)	0.03	0.30	0.30	0.03	0.79	0.79	0.05	0.00	0.06	0.06	0.00	0.06
Avail Cap(c_a), veh/h	231	1084	1133	462	1084	1135	708	0	793	708	0	793
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.94	0.94	0.94	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	26.7	25.8	25.8	22.5	32.3	32.3	16.8	0.0	15.9	16.9	0.0	15.9
Incr Delay (d2), s/veh	0.1	0.2	0.2	0.0	2.1	2.0	0.1	0.0	0.1	0.2	0.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	4.8	5.0	0.2	16.3	17.0	0.6	0.0	0.8	0.8	0.0	0.8
LnGrp Delay(d),s/veh	26.8	26.1	26.1	22.5	34.3	34.3	16.9	0.0	16.0	17.1	0.0	16.0
LnGrp LOS	C	C	C	C	C	C	B		B	B		B
Approach Vol, veh/h		423			1123			79			89	
Approach Delay, s/veh		26.1			34.2			16.4			16.5	
Approach LOS		C			C			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		63.6	5.9	50.5		63.6	5.1	51.3
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		25.5	7.5	73.5		25.5	7.5	73.5
Max Q Clear Time (g_c+I1), s		5.4	2.4	11.7		5.9	2.2	34.5
Green Ext Time (p_c), s		0.7	0.0	13.3		0.7	0.0	12.3

Intersection Summary	
HCM 2010 Ctrl Delay	30.4
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	16	1051	31	37	580	13	16	5	20	11	5	7
Future Volume (veh/h)	16	1051	31	37	580	13	16	5	20	11	5	7
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	24	1072	34	40	617	16	17	5	22	24	5	12
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	1	1	0
Peak Hour Factor	0.67	0.98	0.92	0.92	0.94	0.81	0.92	0.92	0.92	0.46	0.92	0.58
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	326	1408	45	185	1445	37	684	137	603	674	222	532
Arrive On Green	0.02	0.40	0.40	0.03	0.41	0.41	0.45	0.45	0.45	0.45	0.45	0.45
Sat Flow, veh/h	1774	3502	111	1774	3525	91	1390	302	1327	1378	487	1169
Grp Volume(v), veh/h	24	542	564	40	310	323	17	0	27	24	0	17
Grp Sat Flow(s),veh/h/ln	1774	1770	1843	1774	1770	1847	1390	0	1629	1378	0	1656
Q Serve(g_s), s	0.9	31.7	31.7	1.6	15.0	15.0	0.8	0.0	1.1	1.2	0.0	0.7
Cycle Q Clear(g_c), s	0.9	31.7	31.7	1.6	15.0	15.0	1.5	0.0	1.1	2.3	0.0	0.7
Prop In Lane	1.00		0.06	1.00		0.05	1.00		0.81	1.00		0.71
Lane Grp Cap(c), veh/h	326	711	741	185	725	757	684	0	741	674	0	753
V/C Ratio(X)	0.07	0.76	0.76	0.22	0.43	0.43	0.02	0.00	0.04	0.04	0.00	0.02
Avail Cap(c_a), veh/h	396	1069	1114	271	1099	1146	684	0	741	674	0	753
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.62	0.62	0.62	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	21.0	30.9	30.9	24.3	25.3	25.3	18.4	0.0	18.1	18.8	0.0	18.0
Incr Delay (d2), s/veh	0.1	1.1	1.1	0.6	0.4	0.4	0.1	0.0	0.1	0.1	0.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	15.7	16.4	0.8	7.4	7.7	0.3	0.0	0.5	0.5	0.0	0.3
LnGrp Delay(d),s/veh	21.0	32.0	32.0	24.9	25.7	25.7	18.5	0.0	18.2	18.9	0.0	18.1
LnGrp LOS	C	C	C	C	C	C	B		B	B		B
Approach Vol, veh/h		1130			673			44			41	
Approach Delay, s/veh		31.8			25.7			18.3			18.5	
Approach LOS		C			C			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		59.1	8.2	52.7		59.1	7.3	53.7
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		24.5	9.5	72.5		24.5	7.5	74.5
Max Q Clear Time (g_c+I1), s		3.5	3.6	33.7		4.3	2.9	17.0
Green Ext Time (p_c), s		0.3	0.0	14.6		0.3	0.0	16.1

Intersection Summary	
HCM 2010 Ctrl Delay	29.0
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	1	539	1755	10	14	25
Future Vol, veh/h	1	539	1755	10	14	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	275	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	586	1908	11	15	27

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1918	0	-	0	2208	959
Stage 1	-	-	-	-	1913	-
Stage 2	-	-	-	-	295	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	305	-	-	-	38	257
Stage 1	-	-	-	-	102	-
Stage 2	-	-	-	-	730	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	305	-	-	-	38	257
Mov Cap-2 Maneuver	-	-	-	-	88	-
Stage 1	-	-	-	-	102	-
Stage 2	-	-	-	-	728	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	37.6
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	305	-	-	-	152
HCM Lane V/C Ratio	0.004	-	-	-	0.279
HCM Control Delay (s)	16.8	-	-	-	37.6
HCM Lane LOS	C	-	-	-	E
HCM 95th %tile Q(veh)	0	-	-	-	1.1

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	16	1648	791	13	11	7
Future Vol, veh/h	16	1648	791	13	11	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	275	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	17	1791	860	14	12	8

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	874	0	-	0	1797	437
Stage 1	-	-	-	-	867	-
Stage 2	-	-	-	-	930	-
Critical Hdwy	4.14	-	-	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	2.22	-	-	-	3.52	3.32
Pot Cap-1 Maneuver	768	-	-	-	71	567
Stage 1	-	-	-	-	372	-
Stage 2	-	-	-	-	344	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	768	-	-	-	69	567
Mov Cap-2 Maneuver	-	-	-	-	193	-
Stage 1	-	-	-	-	372	-
Stage 2	-	-	-	-	336	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	20
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	768	-	-	-	260
HCM Lane V/C Ratio	0.023	-	-	-	0.075
HCM Control Delay (s)	9.8	-	-	-	20
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	626	8	9	1859	10	31	5	37	14	5	25
Future Volume (veh/h)	1	626	8	9	1859	10	31	5	37	14	5	25
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	1	680	9	10	2021	11	34	5	40	15	5	27
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	104	2283	30	496	2342	13	364	42	340	352	60	325
Arrive On Green	0.00	0.64	0.64	0.01	0.65	0.65	0.24	0.24	0.24	0.24	0.24	0.24
Sat Flow, veh/h	1774	3577	47	1774	3609	20	1372	179	1431	1356	253	1368
Grp Volume(v), veh/h	1	336	353	10	990	1042	34	0	45	15	0	32
Grp Sat Flow(s),veh/h/ln	1774	1770	1854	1774	1770	1859	1372	0	1610	1356	0	1621
Q Serve(g_s), s	0.0	10.2	10.2	0.2	53.5	53.7	2.4	0.0	2.6	1.1	0.0	1.8
Cycle Q Clear(g_c), s	0.0	10.2	10.2	0.2	53.5	53.7	4.2	0.0	2.6	3.7	0.0	1.8
Prop In Lane	1.00		0.03	1.00		0.01	1.00		0.89	1.00		0.84
Lane Grp Cap(c), veh/h	104	1130	1184	496	1148	1206	364	0	382	352	0	385
V/C Ratio(X)	0.01	0.30	0.30	0.02	0.86	0.86	0.09	0.00	0.12	0.04	0.00	0.08
Avail Cap(c_a), veh/h	180	1220	1278	554	1220	1281	364	0	382	352	0	385
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.94	0.94	0.94	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	19.3	9.7	9.7	7.8	16.8	16.8	37.2	0.0	35.9	37.4	0.0	35.6
Incr Delay (d2), s/veh	0.0	0.1	0.1	0.0	6.3	6.1	0.5	0.0	0.6	0.2	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	5.0	5.2	0.1	27.9	29.2	0.9	0.0	1.2	0.4	0.0	0.9
LnGrp Delay(d),s/veh	19.4	9.8	9.8	7.8	23.1	22.9	37.8	0.0	36.5	37.6	0.0	36.0
LnGrp LOS	B	A	A	A	C	C	D		D	D		D
Approach Vol, veh/h		690			2042			79			47	
Approach Delay, s/veh		9.8			22.9			37.1			36.5	
Approach LOS		A			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		33.0	5.9	81.1		33.0	4.7	82.4
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		18.5	5.3	82.7		18.5	5.3	82.7
Max Q Clear Time (g_c+I1), s		6.2	2.2	12.2		5.7	2.0	55.7
Green Ext Time (p_c), s		0.4	0.0	44.8		0.4	0.0	22.1

Intersection Summary	
HCM 2010 Ctrl Delay	20.4
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	16	1787	31	37	933	13	16	5	20	11	5	7
Future Volume (veh/h)	16	1787	31	37	933	13	16	5	20	11	5	7
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	17	1942	34	40	1014	14	17	5	22	12	5	8
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	375	2287	40	161	2342	32	350	65	284	337	138	221
Arrive On Green	0.02	0.64	0.64	0.03	0.66	0.66	0.21	0.21	0.21	0.21	0.21	0.21
Sat Flow, veh/h	1774	3559	62	1774	3574	49	1395	302	1327	1378	646	1034
Grp Volume(v), veh/h	17	963	1013	40	502	526	17	0	27	12	0	13
Grp Sat Flow(s),veh/h/ln	1774	1770	1852	1774	1770	1854	1395	0	1629	1378	0	1680
Q Serve(g_s), s	0.4	51.2	51.8	0.9	16.4	16.4	1.2	0.0	1.6	0.8	0.0	0.7
Cycle Q Clear(g_c), s	0.4	51.2	51.8	0.9	16.4	16.4	1.9	0.0	1.6	2.4	0.0	0.7
Prop In Lane	1.00		0.03	1.00		0.03	1.00		0.81	1.00		0.62
Lane Grp Cap(c), veh/h	375	1137	1190	161	1160	1215	350	0	349	337	0	360
V/C Ratio(X)	0.05	0.85	0.85	0.25	0.43	0.43	0.05	0.00	0.08	0.04	0.00	0.04
Avail Cap(c_a), veh/h	422	1193	1248	199	1208	1265	350	0	349	337	0	360
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.14	0.14	0.14	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	7.9	16.8	16.9	20.2	9.9	10.0	38.1	0.0	37.7	38.7	0.0	37.3
Incr Delay (d2), s/veh	0.0	0.8	0.8	0.8	0.3	0.2	0.3	0.0	0.4	0.2	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	24.9	26.5	0.7	8.0	8.4	0.5	0.0	0.8	0.3	0.0	0.4
LnGrp Delay(d),s/veh	7.9	17.6	17.7	21.0	10.2	10.2	38.4	0.0	38.1	38.8	0.0	37.5
LnGrp LOS	A	B	B	C	B	B	D		D	D		D
Approach Vol, veh/h		1993			1068			44			25	
Approach Delay, s/veh		17.6			10.6			38.2			38.2	
Approach LOS		B			B			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		30.2	8.2	81.6		30.2	6.7	83.1
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		19.3	6.3	80.9		19.3	5.3	81.9
Max Q Clear Time (g_c+I1), s		3.9	2.9	53.8		4.4	2.4	18.4
Green Ext Time (p_c), s		0.2	0.0	23.3		0.2	0.0	46.2

Intersection Summary	
HCM 2010 Ctrl Delay	15.7
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	1.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	28	40	1526	6	4	1750
Future Vol, veh/h	28	40	1526	6	4	1750
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	350	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	64	77	93	50	100	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	44	52	1641	12	4	1902

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	2600	820	0	0	1641	0
Stage 1	1641	-	-	-	-	-
Stage 2	959	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	~ 20	318	-	-	391	-
Stage 1	143	-	-	-	-	-
Stage 2	333	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 20	318	-	-	391	-
Mov Cap-2 Maneuver	99	-	-	-	-	-
Stage 1	143	-	-	-	-	-
Stage 2	330	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	57.7	0	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	158	391	-
HCM Lane V/C Ratio	-	-	0.606	0.01	-
HCM Control Delay (s)	-	-	57.7	14.3	-
HCM Lane LOS	-	-	F	B	-
HCM 95th %tile Q(veh)	-	-	3.3	0	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	0.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	7	8	1923	34	35	1650
Future Vol, veh/h	7	8	1923	34	35	1650
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	350	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	35	67	95	85	80	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	20	12	2024	40	44	1737

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	2980	1012	0	0	2024	0
Stage 1	2024	-	-	-	-	-
Stage 2	956	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	~ 11	237	-	-	277	-
Stage 1	88	-	-	-	-	-
Stage 2	334	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 9	237	-	-	277	-
Mov Cap-2 Maneuver	64	-	-	-	-	-
Stage 1	88	-	-	-	-	-
Stage 2	281	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	67.6	0	0.5
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	88	277	-
HCM Lane V/C Ratio	-	-	0.363	0.158	-
HCM Control Delay (s)	-	-	67.6	20.4	-
HCM Lane LOS	-	-	F	C	-
HCM 95th %tile Q(veh)	-	-	1.4	0.6	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	1.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	28	40	1619	6	4	1857
Future Vol, veh/h	28	40	1619	6	4	1857
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	350	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	64	77	93	50	100	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	44	52	1741	12	4	2018

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	2758	870	0	0	1741	0
Stage 1	1741	-	-	-	-	-
Stage 2	1017	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	~ 16	295	-	-	357	-
Stage 1	126	-	-	-	-	-
Stage 2	310	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 16	295	-	-	357	-
Mov Cap-2 Maneuver	87	-	-	-	-	-
Stage 1	126	-	-	-	-	-
Stage 2	307	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	72.4	0	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	141	357	-
HCM Lane V/C Ratio	-	-	0.679	0.011	-
HCM Control Delay (s)	-	-	72.4	15.2	-
HCM Lane LOS	-	-	F	C	-
HCM 95th %tile Q(veh)	-	-	3.8	0	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	1.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	7	8	2040	34	35	1750
Future Vol, veh/h	7	8	2040	34	35	1750
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	350	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	35	67	95	85	80	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	20	12	2147	40	44	1842

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	3156	1074	0	0	2147	0
Stage 1	2147	-	-	-	-	-
Stage 2	1009	-	-	-	-	-
Critical Hdwy	7.54	6.94	-	-	4.14	-
Critical Hdwy Stg 1	6.54	-	-	-	-	-
Critical Hdwy Stg 2	6.54	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	~ 4	216	-	-	248	-
Stage 1	50	-	-	-	-	-
Stage 2	257	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 3	216	-	-	248	-
Mov Cap-2 Maneuver	38	-	-	-	-	-
Stage 1	50	-	-	-	-	-
Stage 2	211	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	137.4	0	0.5
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	55	248	-
HCM Lane V/C Ratio	-	-	0.581	0.176	-
HCM Control Delay (s)	-	-	137.4	22.6	-
HCM Lane LOS	-	-	F	C	-
HCM 95th %tile Q(veh)	-	-	2.3	0.6	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	1.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	28	40	1628	6	4	1894
Future Vol, veh/h	28	40	1628	6	4	1894
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	350	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	64	77	93	50	100	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	44	52	1751	12	4	2059

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	2788	875	0	0	1751	0
Stage 1	1751	-	-	-	-	-
Stage 2	1037	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	~ 15	292	-	-	354	-
Stage 1	125	-	-	-	-	-
Stage 2	303	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 15	292	-	-	354	-
Mov Cap-2 Maneuver	86	-	-	-	-	-
Stage 1	125	-	-	-	-	-
Stage 2	300	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	74.5	0	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	139	354	-
HCM Lane V/C Ratio	-	-	0.688	0.011	-
HCM Control Delay (s)	-	-	74.5	15.3	-
HCM Lane LOS	-	-	F	C	-
HCM 95th %tile Q(veh)	-	-	3.9	0	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	0.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	7	8	2077	34	35	1770
Future Vol, veh/h	7	8	2077	34	35	1770
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	350	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	35	67	95	85	80	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	20	12	2186	40	44	1863

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	3205	1093	0	0	2186	0
Stage 1	2186	-	-	-	-	-
Stage 2	1019	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	~ 8	209	-	-	239	-
Stage 1	71	-	-	-	-	-
Stage 2	309	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 7	209	-	-	239	-
Mov Cap-2 Maneuver	53	-	-	-	-	-
Stage 1	71	-	-	-	-	-
Stage 2	252	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	86.4	0	0.5
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	74	239	-
HCM Lane V/C Ratio	-	-	0.432	0.183	-
HCM Control Delay (s)	-	-	86.4	23.4	-
HCM Lane LOS	-	-	F	C	-
HCM 95th %tile Q(veh)	-	-	1.7	0.7	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	1.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	28	40	1628	6	4	1894
Future Vol, veh/h	28	40	1628	6	4	1894
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	350	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	64	77	93	50	100	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	44	52	1751	12	4	2059

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	2788	875	0	0	1751	0
Stage 1	1751	-	-	-	-	-
Stage 2	1037	-	-	-	-	-
Critical Hdwy	7.54	6.94	-	-	4.14	-
Critical Hdwy Stg 1	6.54	-	-	-	-	-
Critical Hdwy Stg 2	6.54	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	~ 9	292	-	-	354	-
Stage 1	89	-	-	-	-	-
Stage 2	247	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 9	292	-	-	354	-
Mov Cap-2 Maneuver	63	-	-	-	-	-
Stage 1	89	-	-	-	-	-
Stage 2	244	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	76.6	0	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	63	292	354	-
HCM Lane V/C Ratio	-	-	0.694	0.178	0.011	-
HCM Control Delay (s)	-	-	143.7	20	15.3	-
HCM Lane LOS	-	-	F	C	C	-
HCM 95th %tile Q(veh)	-	-	3	0.6	0	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	0.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	7	8	2077	34	35	1770
Future Vol, veh/h	7	8	2077	34	35	1770
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	350	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	35	67	95	85	80	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	20	12	2186	40	44	1863

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	3205	1093	0	0	2186	0
Stage 1	2186	-	-	-	-	-
Stage 2	1019	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	~ 8	209	-	-	239	-
Stage 1	71	-	-	-	-	-
Stage 2	309	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 7	209	-	-	239	-
Mov Cap-2 Maneuver	53	-	-	-	-	-
Stage 1	71	-	-	-	-	-
Stage 2	252	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	77.2	0	0.5
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	53	209	239	-
HCM Lane V/C Ratio	-	-	0.377	0.057	0.183	-
HCM Control Delay (s)	-	-	109.4	23.3	23.4	-
HCM Lane LOS	-	-	F	C	C	-
HCM 95th %tile Q(veh)	-	-	1.4	0.2	0.7	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	28	40	1668	6	4	1912
Future Vol, veh/h	28	40	1668	6	4	1912
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	350	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	64	77	93	50	100	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	44	52	1794	12	4	2078

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	2841	897	0	0	1794	0
Stage 1	1794	-	-	-	-	-
Stage 2	1047	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	~ 14	283	-	-	341	-
Stage 1	118	-	-	-	-	-
Stage 2	299	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 14	283	-	-	341	-
Mov Cap-2 Maneuver	82	-	-	-	-	-
Stage 1	118	-	-	-	-	-
Stage 2	295	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	81.9	0	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	133	341	-
HCM Lane V/C Ratio	-	-	0.72	0.012	-
HCM Control Delay (s)	-	-	81.9	15.7	-
HCM Lane LOS	-	-	F	C	-
HCM 95th %tile Q(veh)	-	-	4.1	0	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	0.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	7	8	2101	34	35	1803
Future Vol, veh/h	7	8	2101	34	35	1803
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	350	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	35	67	95	85	80	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	20	12	2212	40	44	1898

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	3248	1106	0	0	2212	0
Stage 1	2212	-	-	-	-	-
Stage 2	1036	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	~ 7	205	-	-	233	-
Stage 1	69	-	-	-	-	-
Stage 2	303	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 6	205	-	-	233	-
Mov Cap-2 Maneuver	51	-	-	-	-	-
Stage 1	69	-	-	-	-	-
Stage 2	246	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	91.9	0	0.5
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	71	233	-
HCM Lane V/C Ratio	-	-	0.45	0.188	-
HCM Control Delay (s)	-	-	91.9	24	-
HCM Lane LOS	-	-	F	C	-
HCM 95th %tile Q(veh)	-	-	1.8	0.7	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	1.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	28	40	1796	6	4	2048
Future Vol, veh/h	28	40	1796	6	4	2048
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	350	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	64	77	93	50	100	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	44	52	1931	12	4	2226

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	3052	966	0	0	1931	0
Stage 1	1931	-	-	-	-	-
Stage 2	1121	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	~ 10	254	-	-	301	-
Stage 1	99	-	-	-	-	-
Stage 2	273	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 10	254	-	-	301	-
Mov Cap-2 Maneuver	70	-	-	-	-	-
Stage 1	99	-	-	-	-	-
Stage 2	269	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	66.8	0	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	70	254	301	-
HCM Lane V/C Ratio	-	-	0.625	0.205	0.013	-
HCM Control Delay (s)	-	-	119	22.8	17.1	-
HCM Lane LOS	-	-	F	C	C	-
HCM 95th %tile Q(veh)	-	-	2.7	0.7	0	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	1.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	7	8	2300	34	35	1982
Future Vol, veh/h	7	8	2300	34	35	1982
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	350	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	35	67	95	85	80	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	20	12	2421	40	44	2086

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	3552	1211	0	0	2421	0
Stage 1	2421	-	-	-	-	-
Stage 2	1131	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	~ 4	174	-	-	193	-
Stage 1	53	-	-	-	-	-
Stage 2	270	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 3	174	-	-	193	-
Mov Cap-2 Maneuver	39	-	-	-	-	-
Stage 1	53	-	-	-	-	-
Stage 2	208	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	116.7	0	0.6
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	39	174	193	-
HCM Lane V/C Ratio	-	-	0.513	0.069	0.227	-
HCM Control Delay (s)	-	-	170.2	27.2	29	-
HCM Lane LOS	-	-	F	D	D	-
HCM 95th %tile Q(veh)	-	-	1.8	0.2	0.8	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	23.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	28	40	3012	6	4	3454
Future Vol, veh/h	28	40	3012	6	4	3454
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	30	43	3274	7	4	3754

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	4787	1640	0	0	3280	0
Stage 1	3277	-	-	-	-	-
Stage 2	1510	-	-	-	-	-
Critical Hdwy	5.74	7.14	-	-	5.34	-
Critical Hdwy Stg 1	6.64	-	-	-	-	-
Critical Hdwy Stg 2	6.04	-	-	-	-	-
Follow-up Hdwy	3.82	3.92	-	-	3.12	-
Pot Cap-1 Maneuver	~ 2	76	-	-	27	-
Stage 1	~ 8	-	-	-	-	-
Stage 2	150	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 2	76	-	-	27	-
Mov Cap-2 Maneuver	~ 7	-	-	-	-	-
Stage 1	~ 8	-	-	-	-	-
Stage 2	128	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	$ 2274.6	0	0.2
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	15	27	-
HCM Lane V/C Ratio	-	-	4.928	0.161	-
HCM Control Delay (s)	-	-	$ 2274.6	162.4	-
HCM Lane LOS	-	-	F	F	-
HCM 95th %tile Q(veh)	-	-	10.1	0.5	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	11.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	7	8	3795	34	35	3256
Future Vol, veh/h	7	8	3795	34	35	3256
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	8	9	4125	37	38	3539

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	5635	2081	0	0	4162	0
Stage 1	4143	-	-	-	-	-
Stage 2	1492	-	-	-	-	-
Critical Hdwy	5.74	7.14	-	-	5.34	-
Critical Hdwy Stg 1	6.64	-	-	-	-	-
Critical Hdwy Stg 2	6.04	-	-	-	-	-
Follow-up Hdwy	3.82	3.92	-	-	3.12	-
Pot Cap-1 Maneuver	~ 1	37	-	-	~ 9	-
Stage 1	~ 2	-	-	-	-	-
Stage 2	154	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	0	37	-	-	~ 9	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	~ 2	-	-	-	-	-
Stage 2	0	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	163.9	0	24.1
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	37	~ 9	-
HCM Lane V/C Ratio	-	-	0.441	4.227	-
HCM Control Delay (s)	-	-	163.9	$ 2266	-
HCM Lane LOS	-	-	F	F	-
HCM 95th %tile Q(veh)	-	-	1.5	6	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	16

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	28	40	3140	6	4	3590
Future Vol, veh/h	28	40	3140	6	4	3590
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	30	43	3413	7	4	3902

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	4986	1710	0	0	3420	0
Stage 1	3416	-	-	-	-	-
Stage 2	1570	-	-	-	-	-
Critical Hdwy	5.74	7.14	-	-	5.34	-
Critical Hdwy Stg 1	6.64	-	-	-	-	-
Critical Hdwy Stg 2	6.04	-	-	-	-	-
Follow-up Hdwy	3.82	3.92	-	-	3.12	-
Pot Cap-1 Maneuver	~ 2	68	-	-	23	-
Stage 1	~ 6	-	-	-	-	-
Stage 2	139	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 2	68	-	-	23	-
Mov Cap-2 Maneuver	~ 5	-	-	-	-	-
Stage 1	~ 6	-	-	-	-	-
Stage 2	115	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	$ 1589.1	0	0.2
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	5	68	23	-
HCM Lane V/C Ratio	-	-	6.087	0.639	0.189	-
HCM Control Delay (s)	-	-	$ 3681.3	124.5	194.9	-
HCM Lane LOS	-	-	F	F	F	-
HCM 95th %tile Q(veh)	-	-	5.3	2.8	0.6	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	14

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	7	8	3994	34	35	3435
Future Vol, veh/h	7	8	3994	34	35	3435
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	8	9	4341	37	38	3734

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	5930	2189	0	0	4378	0
Stage 1	4360	-	-	-	-	-
Stage 2	1570	-	-	-	-	-
Critical Hdwy	5.74	7.14	-	-	5.34	-
Critical Hdwy Stg 1	6.64	-	-	-	-	-
Critical Hdwy Stg 2	6.04	-	-	-	-	-
Follow-up Hdwy	3.82	3.92	-	-	3.12	-
Pot Cap-1 Maneuver	0	31	-	-	~ 7	-
Stage 1	~ 1	-	-	-	-	-
Stage 2	139	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	0	31	-	-	~ 7	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	~ 1	-	-	-	-	-
Stage 2	0	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s		0	30.4
HCM LOS	-		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	-	31	~ 7	-
HCM Lane V/C Ratio	-	-	-	0.281	5.435	-
HCM Control Delay (s)	-	-	-	161.4	$ 3018.3	-
HCM Lane LOS	-	-	-	F	F	-
HCM 95th %tile Q(veh)	-	-	-	0.9	6.2	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	0.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	40	3140	6	0	3590
Future Vol, veh/h	0	40	3140	6	0	3590
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	43	3413	7	0	3902

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	1710	0	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	7.14	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.92	-	-	-	-
Pot Cap-1 Maneuver	0	68	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	68	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	124.5	0	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	68	-
HCM Lane V/C Ratio	-	-	0.639	-
HCM Control Delay (s)	-	-	124.5	-
HCM Lane LOS	-	-	F	-
HCM 95th %tile Q(veh)	-	-	2.8	-

Intersection	
Int Delay, s/veh	0.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	8	3994	34	0	3435
Future Vol, veh/h	0	8	3994	34	0	3435
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	9	4341	37	0	3734

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	2189	0	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	7.14	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.92	-	-	-	-
Pot Cap-1 Maneuver	0	31	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	31	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	161.4	0	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	31	-
HCM Lane V/C Ratio	-	-	0.281	-
HCM Control Delay (s)	-	-	161.4	-
HCM Lane LOS	-	-	F	-
HCM 95th %tile Q(veh)	-	-	0.9	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	309	54	0	1023	0	47
Future Vol, veh/h	309	54	0	1023	0	47
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	336	59	0	1112	0	51

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	197
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	-	-	0	-	0	811
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	811
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	9.7
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	811	-	-	-
HCM Lane V/C Ratio	0.063	-	-	-
HCM Control Delay (s)	9.7	-	-	-
HCM Lane LOS	A	-	-	-
HCM 95th %tile Q(veh)	0.2	-	-	-

Intersection	
Int Delay, s/veh	0.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	957	102	0	472	0	83
Future Vol, veh/h	957	102	0	472	0	83
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1040	111	0	513	0	90

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	576
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	-	-	0	-	0	460
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	460
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	14.7
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	460	-	-	-
HCM Lane V/C Ratio	0.196	-	-	-
HCM Control Delay (s)	14.7	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.7	-	-	-

Intersection	
Int Delay, s/veh	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	584	54	0	1771	0	47
Future Vol, veh/h	584	54	0	1771	0	47
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	635	59	0	1925	0	51

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	347
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	-	-	0	-	0	649
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	649
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	11
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	649	-	-	-
HCM Lane V/C Ratio	0.079	-	-	-
HCM Control Delay (s)	11	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.3	-	-	-

Intersection	
Int Delay, s/veh	0.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1800	102	0	753	0	83
Future Vol, veh/h	1800	102	0	753	0	83
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1957	111	0	818	0	90

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	1034
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.94
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.32
Pot Cap-1 Maneuver	-	-	0	-	0	229
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	229
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	30.6
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	229	-	-	-
HCM Lane V/C Ratio	0.394	-	-	-
HCM Control Delay (s)	30.6	-	-	-
HCM Lane LOS	D	-	-	-
HCM 95th %tile Q(veh)	1.8	-	-	-

Intersection	
Int Delay, s/veh	0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	64	1687	107	0	1911
Future Vol, veh/h	0	64	1687	107	0	1911
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	0	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	70	1834	116	0	2077

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	917	0	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	274	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	274	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	22.6	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	274	-
HCM Lane V/C Ratio	-	-	0.254	-
HCM Control Delay (s)	-	-	22.6	-
HCM Lane LOS	-	-	C	-
HCM 95th %tile Q(veh)	-	-	1	-

Intersection	
Int Delay, s/veh	0.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	66	2087	130	0	1840
Future Vol, veh/h	0	66	2087	130	0	1840
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	0	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	72	2268	141	0	2000

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	1134	0	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	196	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	196	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	33.6	0	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	196	-
HCM Lane V/C Ratio	-	-	0.366	-
HCM Control Delay (s)	-	-	33.6	-
HCM Lane LOS	-	-	D	-
HCM 95th %tile Q(veh)	-	-	1.6	-

Intersection	
Int Delay, s/veh	2.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	64	3054	107	0	3504
Future Vol, veh/h	0	64	3054	107	0	3504
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	70	3320	116	0	3809

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	1718	0	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	7.14	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.92	-	-	-	-
Pot Cap-1 Maneuver	0	~ 67	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	~ 67	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	226	0	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	67	-
HCM Lane V/C Ratio	-	-	1.038	-
HCM Control Delay (s)	-	-	226	-
HCM Lane LOS	-	-	F	-
HCM 95th %tile Q(veh)	-	-	5.3	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	7.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	66	3948	130	0	3483
Future Vol, veh/h	0	66	3948	130	0	3483
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	72	4291	141	0	3786

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	2216	0	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	7.14	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.92	-	-	-	-
Pot Cap-1 Maneuver	0	~ 30	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	~ 30	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	$ 914.6	0	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	30	-
HCM Lane V/C Ratio	-	-	2.391	-
HCM Control Delay (s)	-	-	$ 914.6	-
HCM Lane LOS	-	-	F	-
HCM 95th %tile Q(veh)	-	-	8.4	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	0.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	37	19	1620	9	5	1857
Future Vol, veh/h	37	19	1620	9	5	1857
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	0	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	40	21	1761	10	5	2018

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	2781	880	0	0	1761	0
Stage 1	1761	-	-	-	-	-
Stage 2	1020	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	~ 15	290	-	-	351	-
Stage 1	123	-	-	-	-	-
Stage 2	309	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 15	290	-	-	351	-
Mov Cap-2 Maneuver	86	-	-	-	-	-
Stage 1	123	-	-	-	-	-
Stage 2	305	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	58.6	0	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	86	290	351	-
HCM Lane V/C Ratio	-	-	0.468	0.071	0.015	-
HCM Control Delay (s)	-	-	79.3	18.4	15.4	-
HCM Lane LOS	-	-	F	C	C	-
HCM 95th %tile Q(veh)	-	-	2	0.2	0	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	0.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	20	10	2045	37	18	1778
Future Vol, veh/h	20	10	2045	37	18	1778
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	0	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	22	11	2223	40	20	1933

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	3228	1111	0	0	2223	0
Stage 1	2223	-	-	-	-	-
Stage 2	1005	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.14	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.22	-
Pot Cap-1 Maneuver	~ 7	204	-	-	231	-
Stage 1	68	-	-	-	-	-
Stage 2	315	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 6	204	-	-	231	-
Mov Cap-2 Maneuver	52	-	-	-	-	-
Stage 1	68	-	-	-	-	-
Stage 2	288	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	85.9	0	0.2
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	52	204	231	-
HCM Lane V/C Ratio	-	-	0.418	0.053	0.085	-
HCM Control Delay (s)	-	-	117	23.6	22	-
HCM Lane LOS	-	-	F	C	C	-
HCM 95th %tile Q(veh)	-	-	1.5	0.2	0.3	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	218	62	1732	104	94	1817
Future Volume (veh/h)	218	62	1732	104	94	1817
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	237	67	1883	113	102	1975
Adj No. of Lanes	2	1	2	1	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	293	135	2803	1254	226	3026
Arrive On Green	0.09	0.09	0.79	0.79	0.03	0.85
Sat Flow, veh/h	3442	1583	3632	1583	1774	3632
Grp Volume(v), veh/h	237	67	1883	113	102	1975
Grp Sat Flow(s),veh/h/ln	1721	1583	1770	1583	1774	1770
Q Serve(g_s), s	10.1	6.1	35.5	2.4	1.5	27.5
Cycle Q Clear(g_c), s	10.1	6.1	35.5	2.4	1.5	27.5
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	293	135	2803	1254	226	3026
V/C Ratio(X)	0.81	0.50	0.67	0.09	0.45	0.65
Avail Cap(c_a), veh/h	447	206	2803	1254	315	3026
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	67.4	65.5	6.9	3.5	11.0	3.6
Incr Delay (d2), s/veh	6.4	2.8	1.3	0.1	1.4	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.1	2.8	17.5	1.1	2.1	13.6
LnGrp Delay(d),s/veh	73.8	68.4	8.2	3.6	12.4	4.7
LnGrp LOS	E	E	A	A	B	A
Approach Vol, veh/h	304		1996			2077
Approach Delay, s/veh	72.6		8.0			5.1
Approach LOS	E		A			A

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	9.4	123.3				132.7		17.3
Change Period (Y+Rc), s	4.5	4.5				4.5		4.5
Max Green Setting (Gmax), s	12.5	104.5				121.5		19.5
Max Q Clear Time (g_c+I1), s	3.5	37.5				29.5		12.1
Green Ext Time (p_c), s	0.1	59.7				78.7		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	11.1
HCM 2010 LOS	B



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	260	76	2141	167	96	1744
Future Volume (veh/h)	260	76	2141	167	96	1744
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	283	83	2327	182	104	1896
Adj No. of Lanes	2	1	2	1	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	332	153	2790	1248	149	2999
Arrive On Green	0.10	0.10	0.79	0.79	0.03	0.85
Sat Flow, veh/h	3442	1583	3632	1583	1774	3632
Grp Volume(v), veh/h	283	83	2327	182	104	1896
Grp Sat Flow(s),veh/h/ln	1721	1583	1770	1583	1774	1770
Q Serve(g_s), s	13.0	8.0	65.0	4.4	1.7	28.2
Cycle Q Clear(g_c), s	13.0	8.0	65.0	4.4	1.7	28.2
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	332	153	2790	1248	149	2999
V/C Ratio(X)	0.85	0.54	0.83	0.15	0.70	0.63
Avail Cap(c_a), veh/h	398	183	2790	1248	200	2999
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	71.2	68.9	10.5	4.0	39.2	4.0
Incr Delay (d2), s/veh	14.2	3.0	3.1	0.2	6.5	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.8	3.6	32.6	2.0	4.0	13.9
LnGrp Delay(d),s/veh	85.4	71.9	13.6	4.3	45.7	5.0
LnGrp LOS	F	E	B	A	D	A
Approach Vol, veh/h	366		2509			2000
Approach Delay, s/veh	82.4		12.9			7.2
Approach LOS	F		B			A

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	9.5	130.6				140.1		19.9
Change Period (Y+Rc), s	4.5	4.5				4.5		4.5
Max Green Setting (Gmax), s	9.5	118.5				132.5		18.5
Max Q Clear Time (g_c+I1), s	3.7	67.0				30.2		15.0
Green Ext Time (p_c), s	0.1	49.1				93.5		0.5

Intersection Summary	
HCM 2010 Ctrl Delay	15.8
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	60	25	60	218	25	62	50	3039	104	94	3360	50
Future Volume (veh/h)	60	25	60	218	25	62	50	3039	104	94	3360	50
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	65	27	65	237	27	67	54	3303	113	102	3652	54
Adj No. of Lanes	2	1	1	2	1	0	1	3	0	1	3	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	107	107	91	288	52	130	101	3564	121	114	3661	54
Arrive On Green	0.03	0.06	0.06	0.08	0.11	0.11	0.03	0.71	0.71	0.03	0.71	0.71
Sat Flow, veh/h	3442	1863	1583	3442	475	1179	1774	5052	171	1774	5164	76
Grp Volume(v), veh/h	65	27	65	237	0	94	54	2205	1211	102	2392	1314
Grp Sat Flow(s),veh/h/ln	1721	1863	1583	1721	0	1655	1774	1695	1833	1774	1695	1849
Q Serve(g_s), s	2.8	2.1	6.1	10.2	0.0	8.0	1.2	82.1	86.1	3.9	104.5	106.4
Cycle Q Clear(g_c), s	2.8	2.1	6.1	10.2	0.0	8.0	1.2	82.1	86.1	3.9	104.5	106.4
Prop In Lane	1.00		1.00	1.00		0.71	1.00		0.09	1.00		0.04
Lane Grp Cap(c), veh/h	107	107	91	288	0	182	101	2392	1293	114	2404	1311
V/C Ratio(X)	0.61	0.25	0.72	0.82	0.00	0.52	0.54	0.92	0.94	0.90	0.99	1.00
Avail Cap(c_a), veh/h	156	224	190	413	0	322	107	2392	1293	114	2404	1311
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	71.8	67.6	69.5	67.6	0.0	63.0	42.8	18.6	19.2	49.2	21.6	21.8
Incr Delay (d2), s/veh	5.4	1.2	10.0	8.7	0.0	2.3	4.5	7.3	13.9	53.1	17.2	25.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	1.1	2.9	5.2	0.0	3.8	1.7	40.4	48.1	5.9	53.9	62.8
LnGrp Delay(d),s/veh	77.2	68.8	79.4	76.3	0.0	65.2	47.2	25.9	33.1	102.3	38.8	47.2
LnGrp LOS	E	E	E	E		E	D	C	C	F	D	F
Approach Vol, veh/h		157			331			3470			3808	
Approach Delay, s/veh		76.7			73.2			28.7			43.4	
Approach LOS		E			E			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.5	110.3	17.1	13.1	9.0	110.9	9.2	21.0
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	5.0	91.0	18.0	18.0	5.0	91.0	6.8	29.2
Max Q Clear Time (g_c+I1), s	5.9	88.1	12.2	8.1	3.2	108.4	4.8	10.0
Green Ext Time (p_c), s	0.0	2.9	0.4	0.6	0.0	0.0	0.0	0.8

Intersection Summary	
HCM 2010 Ctrl Delay	38.8
HCM 2010 LOS	D

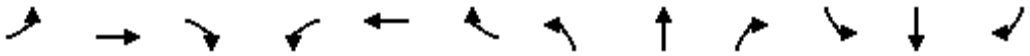
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	165	25	165	260	25	76	165	3837	167	96	3222	165
Future Volume (veh/h)	165	25	165	260	25	76	165	3837	167	96	3222	165
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	179	27	179	283	27	83	179	4171	182	104	3502	179
Adj No. of Lanes	2	1	1	2	1	0	1	3	0	1	3	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	224	210	178	328	58	177	150	3226	139	106	3076	155
Arrive On Green	0.06	0.11	0.11	0.10	0.14	0.14	0.06	0.65	0.65	0.03	0.62	0.62
Sat Flow, veh/h	3442	1863	1583	3442	403	1240	1774	5000	215	1774	4960	249
Grp Volume(v), veh/h	179	27	179	283	0	110	179	2809	1544	104	2376	1305
Grp Sat Flow(s),veh/h/ln	1721	1863	1583	1721	0	1644	1774	1695	1825	1774	1695	1819
Q Serve(g_s), s	8.2	2.1	18.0	13.0	0.0	9.8	9.5	103.2	103.2	5.3	99.2	99.2
Cycle Q Clear(g_c), s	8.2	2.1	18.0	13.0	0.0	9.8	9.5	103.2	103.2	5.3	99.2	99.2
Prop In Lane	1.00		1.00	1.00		0.75	1.00		0.12	1.00		0.14
Lane Grp Cap(c), veh/h	224	210	178	328	0	235	150	2187	1177	106	2103	1128
V/C Ratio(X)	0.80	0.13	1.00	0.86	0.00	0.47	1.19	1.28	1.31	0.98	1.13	1.16
Avail Cap(c_a), veh/h	303	210	178	387	0	235	150	2187	1177	106	2103	1128
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	73.8	63.9	71.0	71.3	0.0	63.0	58.9	28.4	28.4	52.1	30.4	30.4
Incr Delay (d2), s/veh	10.4	0.3	68.7	15.8	0.0	1.4	133.8	131.6	146.1	81.2	65.1	81.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.2	1.1	11.3	6.9	0.0	4.6	12.2	88.0	99.5	7.0	65.2	74.9
LnGrp Delay(d),s/veh	84.1	64.2	139.7	87.1	0.0	64.4	192.7	159.9	174.5	133.3	95.5	111.4
LnGrp LOS	F	E	F	F		E	F	F	F	F	F	F
Approach Vol, veh/h		385			393			4532			3785	
Approach Delay, s/veh		108.6			80.8			166.2			102.0	
Approach LOS		F			F			F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	10.0	107.7	19.8	22.5	14.0	103.7	14.9	27.4
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	5.5	100.5	18.0	18.0	9.5	96.5	14.1	21.9
Max Q Clear Time (g_c+I1), s	7.3	105.2	15.0	20.0	11.5	101.2	10.2	11.8
Green Ext Time (p_c), s	0.0	0.0	0.3	0.0	0.0	0.0	0.2	1.0

Intersection Summary	
HCM 2010 Ctrl Delay	133.3
HCM 2010 LOS	F

APPENDIX E

Queuing Analysis Worksheets

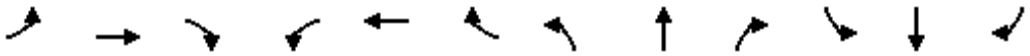


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	192	156	279	326	559	241	391	1244	94	79	1451	273
v/c Ratio	1.19	0.46	0.67	0.77	1.14	0.45	1.16	0.73	0.12	0.60	1.13	0.41
Control Delay	166.5	60.2	33.5	52.3	134.1	19.2	153.1	35.0	2.9	85.7	111.9	17.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	166.5	60.2	33.5	52.3	134.1	19.2	153.1	35.0	2.9	85.7	111.9	17.6
Queue Length 50th (ft)	~175	139	113	251	~636	66	~452	512	0	76	~862	87
Queue Length 95th (ft)	#181	213	138	331	#872	80	#663	610	20	104	#1002	167
Internal Link Dist (ft)		935			323			601			465	
Turn Bay Length (ft)	150		50	375			425			425		
Base Capacity (vph)	161	338	415	425	490	531	336	1694	814	155	1285	669
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.19	0.46	0.67	0.77	1.14	0.45	1.16	0.73	0.12	0.51	1.13	0.41

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

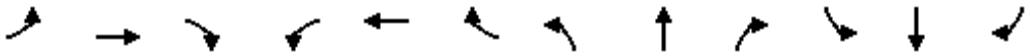


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	203	468	474	160	243	106	298	1620	354	216	1376	149
v/c Ratio	0.67	1.02	1.01	1.00	0.59	0.24	1.00	1.01	0.43	1.00	0.96	0.21
Control Delay	51.7	105.1	91.1	113.8	63.1	4.6	116.1	67.2	14.8	130.5	61.3	6.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.7	105.1	91.1	113.8	63.1	4.6	116.1	67.2	14.8	130.5	61.3	6.7
Queue Length 50th (ft)	159	~516	~435	~122	231	0	316	~900	111	~230	731	10
Queue Length 95th (ft)	223	#744	#554	#272	318	12	#520	#1068	169	#362	#888	43
Internal Link Dist (ft)		935			323			385			465	
Turn Bay Length (ft)	150		50	375			425			425		
Base Capacity (vph)	308	459	467	160	409	451	299	1608	821	215	1439	722
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.66	1.02	1.01	1.00	0.59	0.24	1.00	1.01	0.43	1.00	0.96	0.21

Intersection Summary

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Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

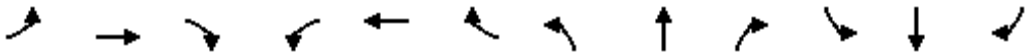


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	198	194	308	321	613	249	416	1306	96	152	1484	268
v/c Ratio	1.16	0.27	0.58	0.76	1.19	0.46	1.24	0.75	0.12	0.72	1.15	0.40
Control Delay	177.0	52.3	14.3	75.0	149.8	21.7	178.8	34.1	2.8	88.6	121.6	18.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	177.0	52.3	14.3	75.0	149.8	21.7	178.8	34.1	2.8	88.6	121.6	18.0
Queue Length 50th (ft)	~117	85	33	158	~721	84	~503	532	0	76	~897	87
Queue Length 95th (ft)	#118	125	51	198	#962	96	#718	621	20	90	#1037	168
Internal Link Dist (ft)		935			323			601			465	
Turn Bay Length (ft)	150		50	375			425			425		
Base Capacity (vph)	171	716	533	482	515	540	336	1740	834	212	1285	665
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.16	0.27	0.58	0.67	1.19	0.46	1.24	0.75	0.12	0.72	1.15	0.40

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



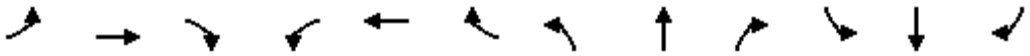
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	195	552	498	151	295	149	329	1690	364	276	1412	154
v/c Ratio	0.78	0.67	1.02	0.90	0.75	0.33	0.98	0.93	0.40	0.91	0.96	0.22
Control Delay	93.6	60.1	88.0	118.4	80.5	18.8	98.8	39.4	12.5	105.1	62.0	11.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	93.6	60.1	88.0	118.4	80.5	18.8	98.8	39.4	12.5	105.1	62.0	11.5
Queue Length 50th (ft)	105	278	~424	83	317	3	359	628	99	150	753	33
Queue Length 95th (ft)	#152	346	#540	#150	410	56	m#550	886	162	#207	#915	68
Internal Link Dist (ft)		935			323			385			465	
Turn Bay Length (ft)	150		50	375			425			425		
Base Capacity (vph)	255	829	486	167	391	450	337	1827	907	302	1464	714
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.76	0.67	1.02	0.90	0.75	0.33	0.98	0.93	0.40	0.91	0.96	0.22

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.



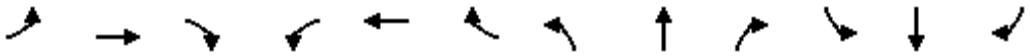
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	249	308	425	641	1043	337	738	2435	161	166	2775	511
v/c Ratio	1.28	0.58	1.03	1.30	1.25	0.74	1.37	0.90	0.18	0.88	1.27	0.67
Control Delay	213.7	64.3	82.9	188.5	169.5	53.0	223.5	30.6	11.1	109.2	161.6	28.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	213.7	64.3	82.9	188.5	169.5	53.0	223.5	30.6	11.1	109.2	161.6	28.5
Queue Length 50th (ft)	~158	150	~260	~420	~660	239	~503	484	36	84	~1249	287
Queue Length 95th (ft)	#251	202	#480	m#479	m#774	m298	m#497	m449	m42	#154	#1327	424
Internal Link Dist (ft)		935			323			386			465	
Turn Bay Length (ft)	150		50	375			425		150	425		150
Base Capacity (vph)	194	530	413	492	837	457	537	2701	892	189	2186	765
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.28	0.58	1.03	1.30	1.25	0.74	1.37	0.90	0.18	0.88	1.27	0.67

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

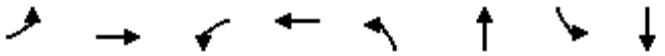


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	346	950	784	272	459	201	558	3033	601	405	2550	247
v/c Ratio	0.77	0.93	1.37	1.25	0.58	0.42	1.40	1.37	0.77	1.31	1.22	0.35
Control Delay	75.0	66.8	211.0	195.1	68.4	26.5	238.6	202.2	33.4	213.2	143.6	17.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	75.0	66.8	211.0	195.1	68.4	26.5	238.6	202.2	33.4	213.2	143.6	17.9
Queue Length 50th (ft)	170	476	~898	~172	238	56	~374	~1428	376	~261	~1120	88
Queue Length 95th (ft)	223	#603	#1155	#273	303	141	#494	#1500	545	#371	#1202	160
Internal Link Dist (ft)		935			323			386			465	
Turn Bay Length (ft)	150		50	375			425		150	425		150
Base Capacity (vph)	505	1026	571	217	787	482	400	2220	781	308	2084	713
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.69	0.93	1.37	1.25	0.58	0.42	1.40	1.37	0.77	1.31	1.22	0.35

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

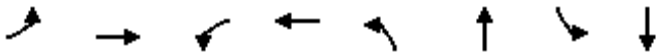
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	29	398	164	1087	74	59	44	49
v/c Ratio	0.13	0.39	0.37	0.76	0.13	0.08	0.08	0.07
Control Delay	11.4	20.6	12.9	22.5	18.1	7.3	17.9	7.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.4	20.6	12.9	22.5	18.1	7.3	17.9	7.8
Queue Length 50th (ft)	10	93	47	213	19	1	11	1
Queue Length 95th (ft)	m12	m64	57	262	58	27	26	25
Internal Link Dist (ft)		310		530		160		251
Turn Bay Length (ft)	150		150					
Base Capacity (vph)	218	1475	449	1616	570	710	565	705
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.27	0.37	0.67	0.13	0.08	0.08	0.07

Intersection Summary

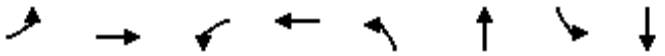
m Volume for 95th percentile queue is metered by upstream signal.



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	105	1001	182	475	90	104	120	45
v/c Ratio	0.22	0.77	0.59	0.31	0.19	0.17	0.27	0.08
Control Delay	8.5	25.3	19.2	12.9	22.7	6.6	23.7	9.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.5	25.3	19.2	12.9	22.7	6.6	23.7	9.2
Queue Length 50th (ft)	28	311	42	70	32	2	44	2
Queue Length 95th (ft)	m22	m286	84	88	75	38	91	26
Internal Link Dist (ft)		310		530		236		251
Turn Bay Length (ft)	150		150					
Base Capacity (vph)	471	1437	380	1721	462	609	437	576
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.70	0.48	0.28	0.19	0.17	0.27	0.08

Intersection Summary

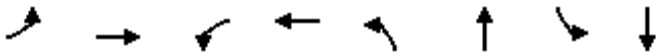
m Volume for 95th percentile queue is metered by upstream signal.



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	25	617	164	1894	74	59	29	39
v/c Ratio	0.12	0.37	0.33	0.93	0.22	0.13	0.09	0.09
Control Delay	4.6	6.0	7.6	26.9	24.3	8.6	22.4	9.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.6	6.0	7.6	26.9	24.3	8.6	22.4	9.9
Queue Length 50th (ft)	1	27	28	327	27	2	10	2
Queue Length 95th (ft)	m4	m40	51	#663	61	29	30	24
Internal Link Dist (ft)		310		530		160		251
Turn Bay Length (ft)	150		150					
Base Capacity (vph)	213	1653	506	2032	343	445	337	433
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.37	0.32	0.93	0.22	0.13	0.09	0.09

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	93	1754	182	774	90	104	111	37
v/c Ratio	0.22	1.02	0.78	0.43	0.26	0.22	0.34	0.08
Control Delay	5.8	45.9	36.9	12.4	24.8	7.1	26.4	10.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.8	45.9	36.9	12.4	24.8	7.1	26.4	10.0
Queue Length 50th (ft)	20	~726	34	113	33	2	42	2
Queue Length 95th (ft)	m21	m#751	#136	157	71	37	86	23
Internal Link Dist (ft)		310		530		160		251
Turn Bay Length (ft)	150		150					
Base Capacity (vph)	419	1718	234	1807	347	480	327	436
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.22	1.02	0.78	0.43	0.26	0.22	0.34	0.08

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.



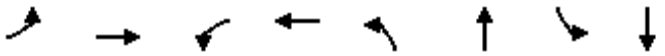
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	4	318	10	962	16	34	42	44	42
v/c Ratio	0.02	0.26	0.01	0.78	0.01	0.10	0.10	0.13	0.10
Control Delay	4.0	8.1	4.0	18.5	0.0	41.8	14.6	42.2	14.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.0	8.1	4.0	18.5	0.0	41.8	14.6	42.2	14.6
Queue Length 50th (ft)	1	78	2	407	0	21	1	28	1
Queue Length 95th (ft)	1	122	5	611	0	55	34	22	34
Internal Link Dist (ft)		530		533			119		244
Turn Bay Length (ft)	275		150		175				
Base Capacity (vph)	251	1302	709	1306	1126	329	417	329	417
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.24	0.01	0.74	0.01	0.10	0.10	0.13	0.10

Intersection Summary



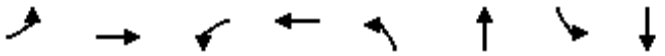
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	24	938	40	452	16	17	24	24	14
v/c Ratio	0.04	0.79	0.16	0.37	0.02	0.06	0.07	0.08	0.04
Control Delay	3.8	20.9	5.1	10.0	0.0	43.2	18.1	43.5	22.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.8	20.9	5.1	10.0	0.0	43.2	18.1	43.5	22.6
Queue Length 50th (ft)	4	427	6	134	0	11	1	16	1
Queue Length 95th (ft)	7	600	14	189	0	33	26	21	21
Internal Link Dist (ft)		530		533			221		244
Turn Bay Length (ft)	275		150		175				
Base Capacity (vph)	607	1259	255	1279	1104	304	368	301	363
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.75	0.16	0.35	0.01	0.06	0.07	0.08	0.04

Intersection Summary



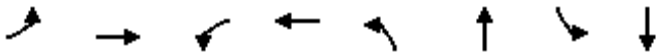
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	4	419	10	1113	34	45	44	45
v/c Ratio	0.02	0.28	0.02	0.74	0.05	0.06	0.07	0.06
Control Delay	14.0	22.1	14.1	31.7	21.9	8.9	21.9	8.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.0	22.1	14.1	31.7	21.9	8.9	21.9	8.9
Queue Length 50th (ft)	2	108	4	373	13	2	17	2
Queue Length 95th (ft)	2	123	10	381	43	30	18	30
Internal Link Dist (ft)		530		533		119		244
Turn Bay Length (ft)	275		150					
Base Capacity (vph)	187	2162	428	2164	654	800	654	800
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.02	0.19	0.02	0.51	0.05	0.06	0.07	0.06

Intersection Summary



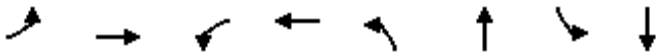
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	24	1106	40	633	17	27	24	17
v/c Ratio	0.07	0.74	0.21	0.40	0.03	0.04	0.04	0.02
Control Delay	11.8	32.0	14.2	22.5	26.4	12.7	26.3	15.8
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.8	32.1	14.2	22.5	26.4	12.7	26.3	15.8
Queue Length 50th (ft)	9	372	15	174	8	2	11	2
Queue Length 95th (ft)	13	380	25	184	27	25	17	20
Internal Link Dist (ft)		530		533		221		244
Turn Bay Length (ft)	275		150					
Base Capacity (vph)	372	2129	226	2189	588	705	583	712
Starvation Cap Reductn	0	213	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.58	0.18	0.29	0.03	0.04	0.04	0.02

Intersection Summary



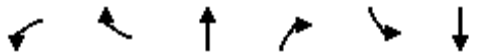
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	1	689	10	2032	34	45	15	32
v/c Ratio	0.01	0.29	0.02	0.84	0.11	0.11	0.05	0.08
Control Delay	5.0	7.9	5.1	18.5	39.9	14.9	39.1	17.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.0	7.9	5.1	18.5	39.9	14.9	39.1	17.3
Queue Length 50th (ft)	0	94	2	526	21	3	9	3
Queue Length 95th (ft)	1	124	5	662	55	38	31	33
Internal Link Dist (ft)		530		533		119		244
Turn Bay Length (ft)	275		150					
Base Capacity (vph)	136	2455	518	2458	308	394	305	386
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.28	0.02	0.83	0.11	0.11	0.05	0.08

Intersection Summary



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	17	1976	40	1028	17	27	12	13
v/c Ratio	0.04	0.84	0.27	0.41	0.07	0.08	0.05	0.04
Control Delay	3.8	18.9	8.4	7.9	43.8	20.3	43.5	28.1
Queue Delay	0.0	18.3	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	3.8	37.2	8.4	7.9	43.8	20.3	43.5	28.1
Queue Length 50th (ft)	3	541	6	117	11	3	8	3
Queue Length 95th (ft)	8	656	15	208	33	30	26	22
Internal Link Dist (ft)		530		533		119		244
Turn Bay Length (ft)	275		150					
Base Capacity (vph)	389	2382	152	2526	256	318	253	317
Starvation Cap Reductn	0	460	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	1.03	0.26	0.41	0.07	0.08	0.05	0.04

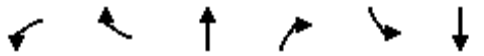
Intersection Summary



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	237	67	1883	113	102	1975
v/c Ratio	0.67	0.30	0.71	0.09	0.51	0.67
Control Delay	73.8	16.1	12.5	1.7	25.6	3.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	73.8	16.1	12.5	1.7	25.6	3.9
Queue Length 50th (ft)	117	0	443	3	22	89
Queue Length 95th (ft)	159	47	672	23	m33	m173
Internal Link Dist (ft)	1056		320			325
Turn Bay Length (ft)	200				150	
Base Capacity (vph)	446	264	2659	1214	246	2959
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.53	0.25	0.71	0.09	0.41	0.67

Intersection Summary

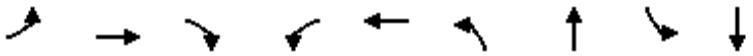
m Volume for 95th percentile queue is metered by upstream signal.



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	283	83	2327	182	104	1896
v/c Ratio	0.77	0.34	0.87	0.15	0.73	0.64
Control Delay	84.1	15.9	19.5	1.8	55.4	2.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.5
Total Delay	84.1	15.9	19.5	1.8	55.4	3.0
Queue Length 50th (ft)	150	0	882	10	71	122
Queue Length 95th (ft)	203	55	1010	31	m71	m122
Internal Link Dist (ft)	891		450			350
Turn Bay Length (ft)	200				150	
Base Capacity (vph)	396	256	2670	1229	152	2960
Starvation Cap Reductn	0	0	0	0	0	576
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.32	0.87	0.15	0.68	0.80

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.



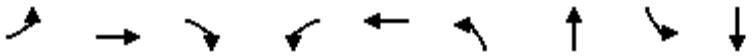
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	65	27	65	237	94	54	3416	102	3706
v/c Ratio	0.43	0.28	0.35	0.68	0.39	0.41	1.02	0.55	1.03
Control Delay	78.7	75.3	6.7	74.9	27.6	24.1	45.6	44.4	34.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	78.7	75.3	6.7	74.9	27.6	24.1	45.6	44.4	34.0
Queue Length 50th (ft)	32	26	0	117	27	12	~1323	65	~1463
Queue Length 95th (ft)	59	60	7	161	83	50	#1461	m46	m228
Internal Link Dist (ft)		298			1056		320		325
Turn Bay Length (ft)	150		150	200		150		150	
Base Capacity (vph)	155	223	285	411	375	132	3359	186	3589
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.12	0.23	0.58	0.25	0.41	1.02	0.55	1.03

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	179	27	179	283	110	179	4353	104	3681
v/c Ratio	0.66	0.15	0.84	0.78	0.44	0.91	1.35	0.78	1.21
Control Delay	83.0	66.9	72.1	85.4	35.4	87.2	186.5	67.8	126.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	83.0	66.9	72.1	85.4	35.4	87.2	186.5	67.8	126.8
Queue Length 50th (ft)	94	26	111	150	47	~160	~2204	59	~1716
Queue Length 95th (ft)	138	60	#220	203	112	#338	#2227	#195	#1763
Internal Link Dist (ft)		298			1056		320		325
Turn Bay Length (ft)	150		150	200		150		150	
Base Capacity (vph)	302	209	241	386	278	197	3227	134	3049
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.13	0.74	0.73	0.40	0.91	1.35	0.78	1.21

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

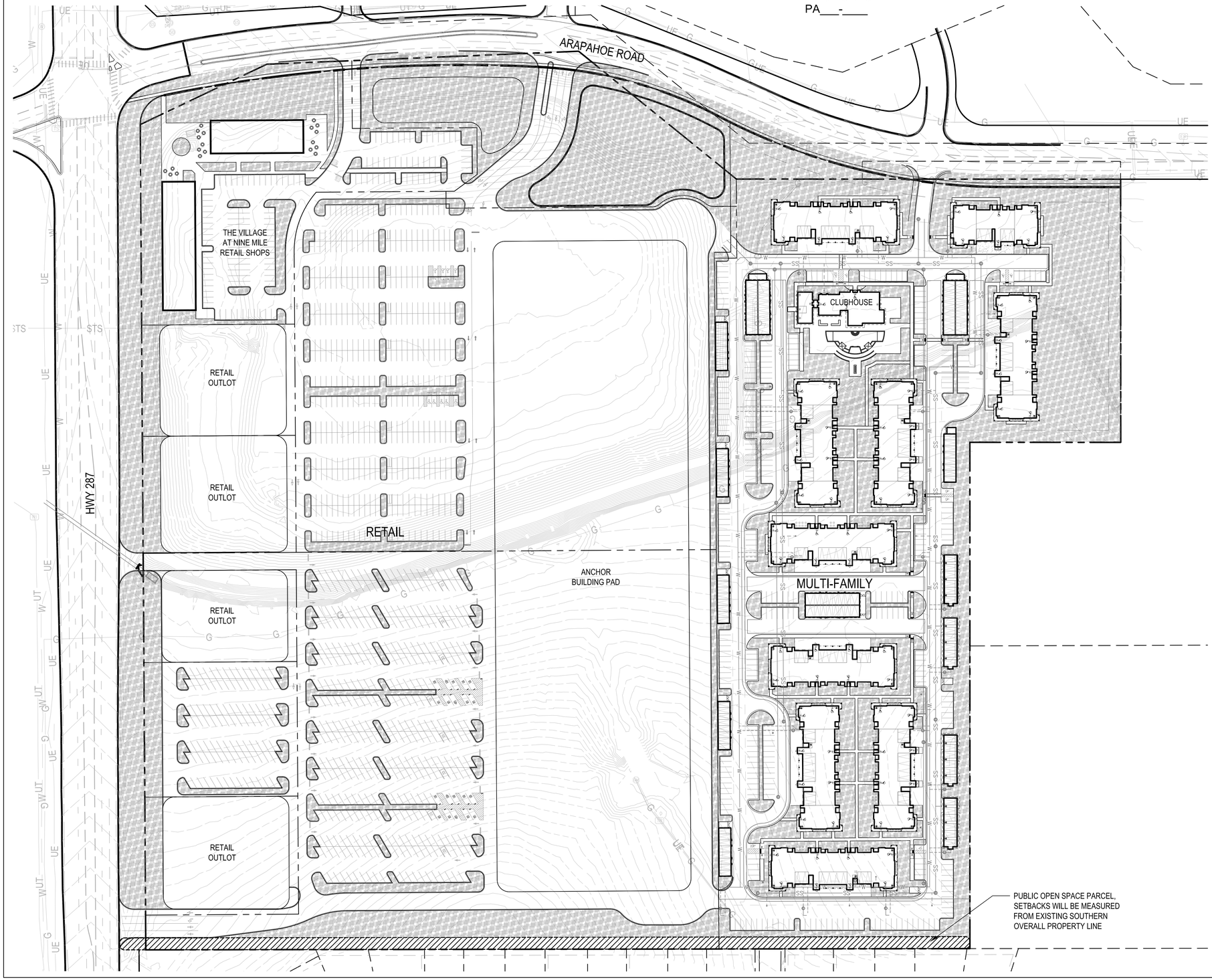
APPENDIX F

Conceptual Site Plan

Nine Mile Corner Site Plan

CONFIDENTIAL WORK PRODUCT

A PORTION OF THE NORTHEAST QUARTER OF SECTION 34, TOWNSHIP 1 NORTH, RANGE 69 WEST
AND THE SOUTHEAST QUARTER OF SECTION 27, TOWNSHIP 1 NORTH, RANGE 69 WEST OF THE 6TH PRINCIPAL MERIDIAN,
TOWN OF ERIE, COUNTY OF BOULDER, STATE OF COLORADO.
47.15 ACRES
PA___-___



LEGEND

- LANDSCAPE AREA
- RETAIL PAD

CHECKED BY: RM
DRAWN BY: ML

Know what's **below.** **Call** before you dig.

NORTH

0 40 80 160

SCALE: 1"= 80'

NORRIS DESIGN
www.norris-design.com

1101 Bannock Street
Denver, Colorado 80204
P 303.892.1166
F 303.892.1186

NINE MILE CORNER
SITE PLAN
TOWN OF ERIE, COUNTY OF BOULDER, STATE OF COLORADO

OWNER:
TOWN OF ERIE

645 HOLBROOK STREET
P.O. BOX 750
ERIE, CO 80516

CONFIDENTIAL WORK PRODUCT

DATE:
11/16/16 CONCEPTUAL SITE PLAN

SHEET TITLE:
LANDSCAPE PLAN

L-1

Phase II Drainage Report

Nine Mile Corner

Erie, Colorado

Prepared for
Evergreen Devco, Inc.
1873 South Bellaire Street
Denver, Colorado 80222

Prepared by:
Galloway & Company, Inc.
5300 DTC Parkway, Suite 100
Greenwood Village, Colorado 80111
Phone: 303.770.8884
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Attention: Brandon S. McCrary, P.E.

Date:
Original Preparation: December 9th, 2016
Revised: May 10th, 2017

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Introduction

This Phase II drainage report is being prepared for the development of a ±47.2 acre site located at Nine Mile Corner in Erie, Colorado. Evergreen Development (Evergreen) has proposed to develop ±32.5 acres, within the larger development, as a commercial site. The remaining site area, ±14.7 acres, will be developed separately as multi-family (i.e., high-density residential). The objective of this report is to identify the master drainage basins which the development is a part of and address the general conformance of the proposed drainage design with previous drainage studies.

Separate tracts along the north and east portions of the site are set aside for water quality and detention pond(s) for the commercial and multi-family sites. The development will be served by four major access points: two-(2) along North 107th Street (U.S Highway 287) and two-(2) along Arapahoe Road.

I. Project Location and Description

A. Location

Nine Mile Corner (site) is located at the southeast corner of North 107th Street (U.S. Highway 287) and Arapahoe Road in Erie, Colorado. The site is located in the northeast quarter of Section 34, Township 1 north, Range 69 west and the southeast quarter of Section 27, Township 1 north, Range 69 west of the 6th principal meridian, Town Erie, County of Boulder, State of Colorado. The site is bounded to the north by Arapahoe Road; to the south by an existing single-family residential development; to the east by a mix of vacant land and a single-family residence (compound) and to the west by North 107th Street (U.S. 287). Refer to Appendix A for the Vicinity Map.

The prominent existing on-site drainage features are:

- Prince Lake Number I (Lake), which is located in the northwest corner of the project site. It contained water as recently as October 2013 (according to Google Earth). The Lake was subsequently drained and partially back filled.
- South Boulder Canyon Ditch (Ditch), which enters the west side of the site through an existing box culvert (underneath N. 107th Street), and then crosses the site along a northeasterly alignment. The ditch generally flows from west-to-northeast.

B. Description of Property

The total project area is ±47.2 acres. The commercial area comprises ±32.5 acres and the proposed multi-family area comprises ±14.7 acres. Vegetative cover within Prince Lake Number I consists of native vegetation; the coverage is generally poor. The existing grades along the side slopes are as steep as 4:1 and direct water toward an existing concrete drainage structure in the northeast region of the Lake.

The existing vegetation along the Ditch is robust and consists of native grasses, shrubs and mature trees. The vegetative cover to south of the South Boulder Canyon Ditch is

generally fair and consists of native grasses. The existing grades are steep and generally between 10:1 and 20:1. The excess runoff in this region drains south-to-north and toward the Ditch.

The existing property consists of mix of land uses including: vacant land, Prince Lake Number I (Lake) and its associated infrastructure (i.e., gravel loop road, access drive and concrete drainage structures), South Boulder Canyon Ditch (Ditch) and two single-family residences with associated out-buildings. The irrigation ditch alignment flows from west-to-northeast and divides the project site.

Prince Lake Number I (Parcel C1) and Parcel B, which contains a single-family residence, are mostly located north of the Ditch. The southeast portion of Parcel B is located south of the Ditch. Parcel A is located south of the Ditch and is mostly undeveloped except for a single-family residence, associated out-buildings and gravel access drive. Refer to Appendix A for an ALTA survey of the project site.

The existing site will require approximately twenty feet of fill to achieve the proposed design grades. Roughly thirty feet of cut is necessary along the south property line to achieve the design grade.

The proposed storm drain system will convey stormwater (refer to sheet DR01 for the proposed alignment) from the following to a grass-lined channel along the west side of 111th Street.

- An existing 24" RCP along the west edge of the site. This pipe currently drains water from the settling pond (owned by the Town of Erie), which is in the southwest corner of North 107th Street and Arapahoe Road, to the Lake.
- Outflow from the commercial and multi-family site water quality and detention ponds.

The existing South Boulder Canyon Ditch will be piped across the project site in a 48" RCP from the existing concrete box culvert underneath North 107th Avenue (U.S. Highway 287) to an off-site section of the ditch located near the southeast corner of the project (refer to sheet DR01 for an approximate alignment).

Separate tracts, which are along the north and east portions of the site, have been set aside for water quality and detention pond(s). The commercial and multi-family sites drain into independent facilities that release into the aforementioned storm drain system. Harris Kocher Smith (HKS) is designing the water quality and detention facilities for the multi-family site.

The project site tenant mix has not been determined. Other site improvements common to this type of development include the installation of site specific wet and dry utilities, improved parking areas (i.e., asphalt and/or concrete) and landscaping. The development will be served by four major access points: two (2) along North 107th Street (U.S Highway 287) and two (2) along Arapahoe Road.

According to the USDA NRCS Web Soil Survey, a mix of 'Ascalon sandy loam, 3 to 5 percent slopes' and 'Ascalon sandy loam 5 to 9 percent slopes' covers the existing

project site. This soil is associated with Hydrologic Soil Group (HSG) 'B'. HSG 'B' soils have a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission. Refer to Appendix A for additional soils information and excerpts from the *Preliminary Geotechnical Investigation Nine Mile Corner - Commercial Area Southeast of Highway 287 and Arapahoe Road Erie, Colorado* (prepared by: CTL Thompson Incorporated. | dated: February 24th, 2017).

II. Drainage Basins

A. Major Basin Description

The project site is not impacted by a FEMA designated floodplain (refer to Appendix B for a FEMA Firmette).

Previous Studies
The project site is included in several previous studies.

RESPEC Consulting & Services prepared a report (OSP) entitled *Town of Erie Outfall Systems Plan* (West of Coal Creek) in January 2014. The main objectives of the study were to:

- Identify the existing drainage problems in the watershed.
- Develop practical solutions that can be implemented through engineering analysis and coordination with the project sponsors and public.

Love & Associates, Inc. prepared a report (Love) entitled *Erie Outfall Systems Planning Preliminary Design Erie and Adjacent Boulder and Weld County Areas* in May 2001. This study provided preliminary design of conveyance facilities to transport the 100-year storm event when proposed future development occurs within the study area.

Improvements to the existing grass-lined channel along the west side of 111th Street (Reach 6 of the Prince Tributary in OSP and Reach BP20) were proposed in by Olsson Associates (Olsson). In February 2006, they prepared a memorandum summarizing their evaluation of the existing conditions and presenting the preliminary design of Reach BP20 improvements. The preliminary design for the conveyance of 350 cfs along the west side of 111th Street upstream is based on results presented in Love & Associates, Inc. work (May 2001).

Overview
In general, the project site overlaps SWMM subbasins 201 and 203 (OSP). These basins combine with SWMM subbasins 200, 202 and 204 at SWMM design point 303. This design point is located at the intersection of 111th Street and Arapahoe Road and serves as the design flow at the upstream (south) end of the channel along the west side of 111th Street. Refer to Appendix C and Figure B-13 for the SWMM schematic covering this area.

Off-Site Flows
The project site is impacted by off-site flow from SWMM subbasin 200 (200) and the southwest region of SWMM subbasin 201 (201). 200 is located along the west side of N. 107th Street. According to the OSP report, this largely undeveloped basin is ±98 acres and generally drains to the northeast. Per the SWMM schematic, runoff from the Nine Mile Corner project combines with runoff from 200 at design point 300. The existing excess runoff in 200 likely flows into the South Boulder Canyon Ditch; however, per section *812.02 Design Principals*, “Irrigation ditches cannot be used as an outfall point for the initial storm drainage system because of physical limitations.” The Nine Mile Corner project is required to convey the outflow from the future on-site detention pond in

SWMM subbasin 200 to the channel along the west side of 111th Street (i.e., SWMM conveyance element 303).

We estimate future detention pond will release ±83.3 cfs (98 acres * 0.85 cfs/acre). However, conveying the outflow through the Nine Mile Corner project site presents technical and financial challenges. Instead of conveying ±83.3 cfs through the project site, we propose using the existing settling basin at the southwest corner of North 107th Street and Arapahoe Road to attenuate outflow from the future detention pond and release it at the capacity available in the existing 24" RCP, which is underneath North 107th Street. Refer to the SWMM model in Appendix C. The Town of Erie owns the land containing the settling pond, which is located in the northeast corner of SWMM subbasin 200. It appears the water routed into the settling pond flows through an outlet structure and into Prince Lake No. 1.

Appendix C includes a conceptual level SWMM model of the area west of N. 107th Street. It is comprised of a future detention pond, outlet and conveyance to the settling pond and the existing 24" RCP underneath North 107th Street. We generated the inflow hydrograph from the future development in SWMM basin 200 with CUHP and the input values shown in Table B-1 CUHP Input (OSP). Since we do not have a site plan for the future development, we increased the percent imperviousness from 37.3% to 55%. This is a weighted value. We assumed 75 acres will be commercial development with 70% impervious cover and the remaining 12 acres stay undeveloped with 10% impervious cover.

This future conditions hydrograph was set as inflow to the future pond. An orifice plate was used to control the release rate into the existing settling pond. The outflow from the settling pond was limited by the inlet hydraulics (i.e., inlet control) of the existing 24" RCP. In summary, the settling pond attenuates the outflow from the future detention pond if the maximum water surface elevation is increased from 5259 to 5261.13 (5256 to 5258.13 – Town of Erie datum).

Other off-site flows we considered in this design come from the southwest portion of SWMM subbasin 201. Specifically, the portion of 201 situated south of the site's south property line. This area is partially developed with single-family residential. It drains from southeast-to-northwest into the U.S. 287 roadside swale. The existing roadside swale flows north and appears to drain into the South Boulder Canyon Ditch. The propose development will remove the current open ditch and replace it with a pipe; therefore, this work assumes the runoff from the aforementioned off-site area will flow further north and drain into the proposed storm drain system. The storm drain system design included herein, shows 100-year flows, which were estimated with the Rational Method and based on the existing condition, entering the proposed system.

B. Subbasin Description

Per section 814.01, on-site detention is required for all new development. For detention basins receiving runoff from tributary areas less than 160 acres, the Full Spectrum Detention method must be used. The allowable release rate is per Table 800-4.

Developed on-site runoff will flow from south to north and into a pair of on-site water quality and detention ponds. The ponds will be interconnected and outflow to the same storm drain system connecting the existing 24" RCP on the east side of N. 107th Street and the existing grass-lined swale along the west side of 111th Street.

Reach BP 20 | 111th Street Future Channel

The existing grass-lined channel along 111th Street may not provide capacity for conveying flows from Nine Mile Corner, ±70 cfs, and existing runoff from other basins in the area. The existing channel conveys approximately 44 cfs and 94 cfs at 1.5 feet and 2.0 feet of depth, respectively. Additional study will be required to determine if the Nine Mile Corner project triggers construction of the improvements proposed by Olsson (refer to Appendix D). Olsson design a channel capable of conveying 350 cfs, which is the 10-year release at SWMM design point 305 (Love). This approximates a unit release rate of ±0.85 cfs/ac for the 408 acre tributary area.

Drainage Design Criteria

C. Development Constraints and Criteria

This Phase I drainage report was prepared using the criteria from the Town of Erie's "Standards and Specifications for Design and Construction of Public Improvements," *Section 800 Storm Drainage Facilities* (Standards), as well as Urban Drainage and Flood Control District's Urban Storm Drainage Criteria Manual (Criteria).

The proposed Nine Mile Corner on-site detention facilities will conform to sections 814.01 General and 814.08 Release Rates.

The aggregate release from the off-site area (i.e., SWMM subbasin 200) and the on-site commercial and multi-family areas will be commensurate with the peak discharges described by Olsson for the design of Reach BP20.

D. Hydrologic Criteria

Our future work will include delineating on-site basins, calculating a runoff coefficient, estimating the Time of Concentration (T_c) and estimating minor and major storm event runoff with the Rational Method. The runoff estimates will be used to size inlets, curb cuts, swales and conveyance infrastructure.

The Rational Method is based on the Rational Formula:

$$Q = CiA$$

in which:

Q = the maximum rate of runoff, cfs
C = a runoff coefficient that is the ratio between the runoff volume from an area and the average rate of rainfall depth over a given duration for that area
i = average intensity of rainfall in inches per hour for a duration equal to the time of concentration
A = area, acres

The runoff coefficient will be determined for each basin given the catchment's soil type and proposed developed imperviousness.

The design rainfall Intensity-Duration-Frequency (IDF) data is provided in section 813.06 Rainfall Intensities (Standards).

Stormwater quality will be provided by designing the detention facility using the Full Spectrum Detention method developed by the Urban Drainage and Flood Control District. The Full Spectrum Detention method is designed to best replicate pre-development peak flows for a broad range of storm intensities and durations.

E. Hydraulic Criteria

This Phase I drainage report does not include detailed analysis of the on-site and off-site storm drainage infrastructure (e.g., storm drain pipes, inlets, detention pond outlet structures, water quality features). The preliminary and final drainage reports will progressively include a detailed analysis of both the on-site and off-site storm drain infrastructure using EPA SWMM Release 5.1.010, Bentley StormCAD and FlowMaster and various Urban Drainage and Flood Control District (UDFCD) spreadsheets (e.g., UD-Detention v3.05 | Full Spectrum detention).

F. Variance from Criteria

We are not seeking variances from the Standards or Criteria at this time.

III. Drainage Facility Design

A. General Concept

On-Site Flows and Concept

The proposed commercial and multi-family development will be graded to drain to area and curb inlets that are connected to an on-site storm drain system. The commercial and multi-family areas will drain to separate water quality and detention ponds. These facilities will drain into the aforementioned storm drain outfall that discharges into the swale along the west side of 111th Street. Preliminary Full Spectrum Detention sizing calculations for each site (i.e., commercial and multi-family) are presented in Appendix C. Sheet DR01 illustrates proposed locations for the facilities.

B. Specific Details

Major Basin Description

To be determined with subsequent submittal.

Pond Design

The on-site ponds associated with the commercial development were sized using UD-Detention, Version 3.02 (March 2016, UDFCD).

The tributary area draining to the on-site ponds the future commercial development (±32.5 acres) as well as North 107th Street (U.S. 287) and Arapahoe Road right-of-way frontage (i.e., half-street). The overall percent imperviousness for the future commercial development was set at 75%.

Refer to Appendix C for the Full Spectrum Detention method calculations.

IV. Conclusions

This Phase I drainage report is in compliance with applicable regional standards including the Town of Erie's "Standards and Specifications for Design and Construction of Public Improvements, Section 800" and the Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual. This conceptual design provides for on-site release of a maximum of 0.85 cfs per acre. It also provides stormwater quality management and 100-year protection to the downstream drainage system.

V. References

1. Urban Storm Drainage Criteria Manual (Volumes 1, 2 and 3), Urban Drainage and Flood Control District, January 2016.

2. Standards and Specifications, Section 800 Storm Drainage Facilities, Town of Erie, January 2016.

3. *Preliminary Engineering Investigation Nine Mile Corner - Commercial Area Southeast of Highway 287 and Arapahoe Road Erie, Colorado*, CTL Thompson Incorporated., February 24th, 2017.

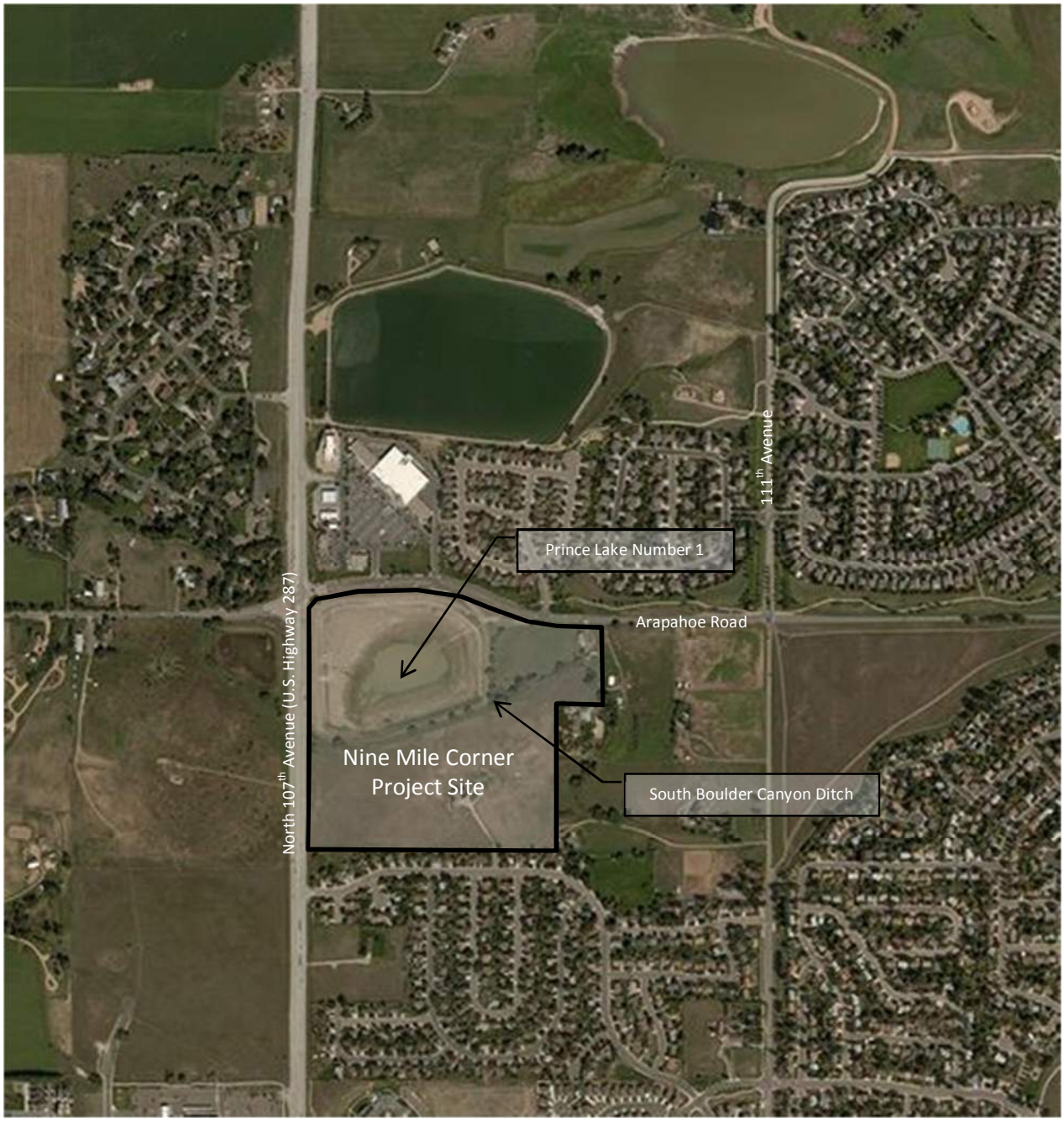
4. Town of Erie Outfall Systems Plan (West of Coal Creek), RESPEC Consulting & Services, January 2014.

5. Erie Outfall Systems Planning Preliminary Design Erie and Adjacent Boulder and Weld County Areas, Love & Associates, Inc., May 2001.

6. Erie Reach BP20 Preliminary Design, Olsson Associates, February 2006.

Appendix A
Background Data

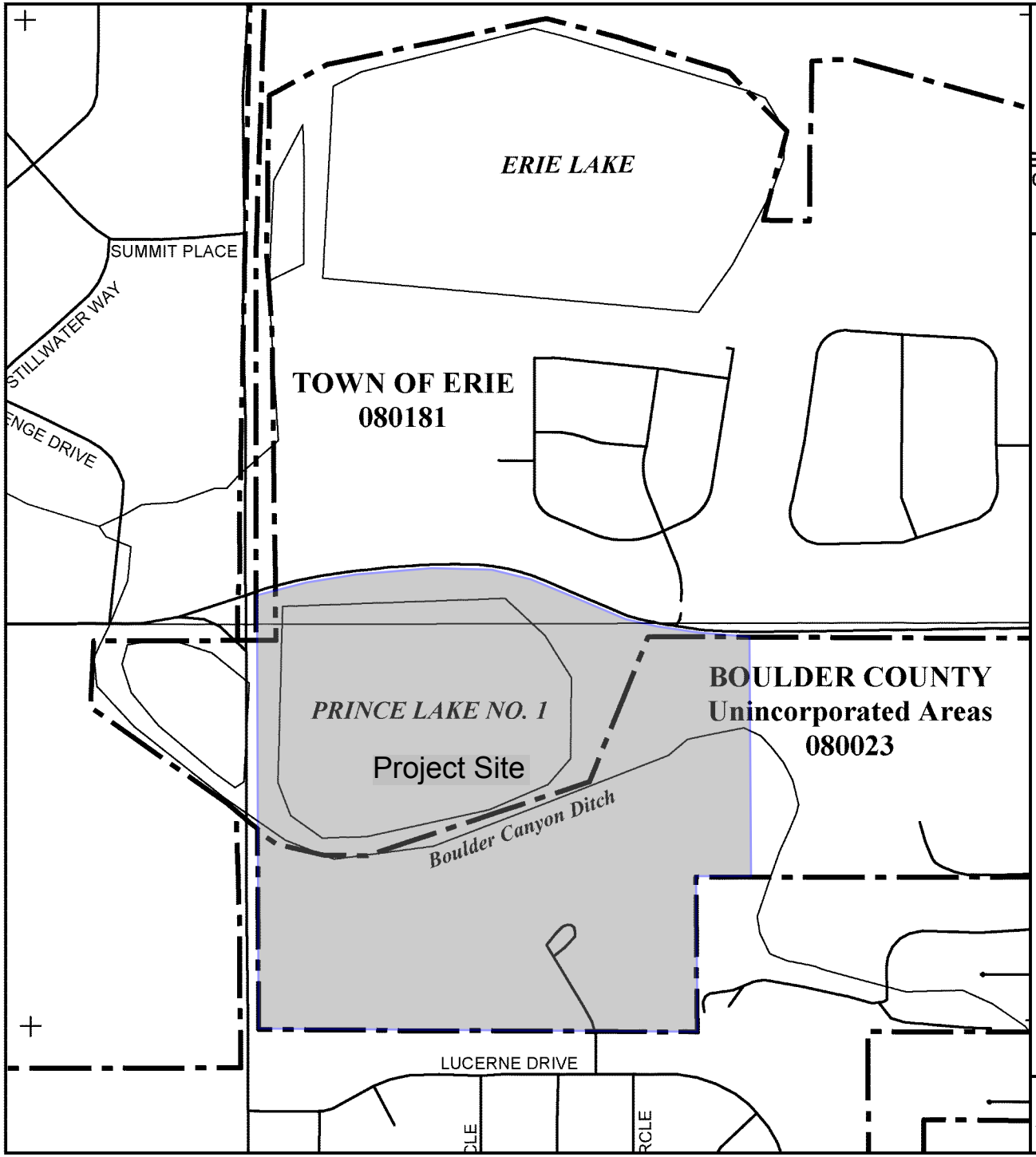
Vicinity Map



Vicinity Map | Erie - Nine Mile Corner

Not to Scale

FEMA Firmette



MAP SCALE 1" = 500'

250 0 500 1000 FEET

0 0 150 300 METERS

NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0438J

FIRM

FLOOD INSURANCE RATE MAP

BOULDER COUNTY, COLORADO

AND INCORPORATED AREAS

PANEL 438 OF 615

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BOULDER COUNTY	080023	0438	J
ERIE, TOWN OF	080181	0438	J
LAFAYETTE, CITY OF	080026	0438	J

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
08013C0438J

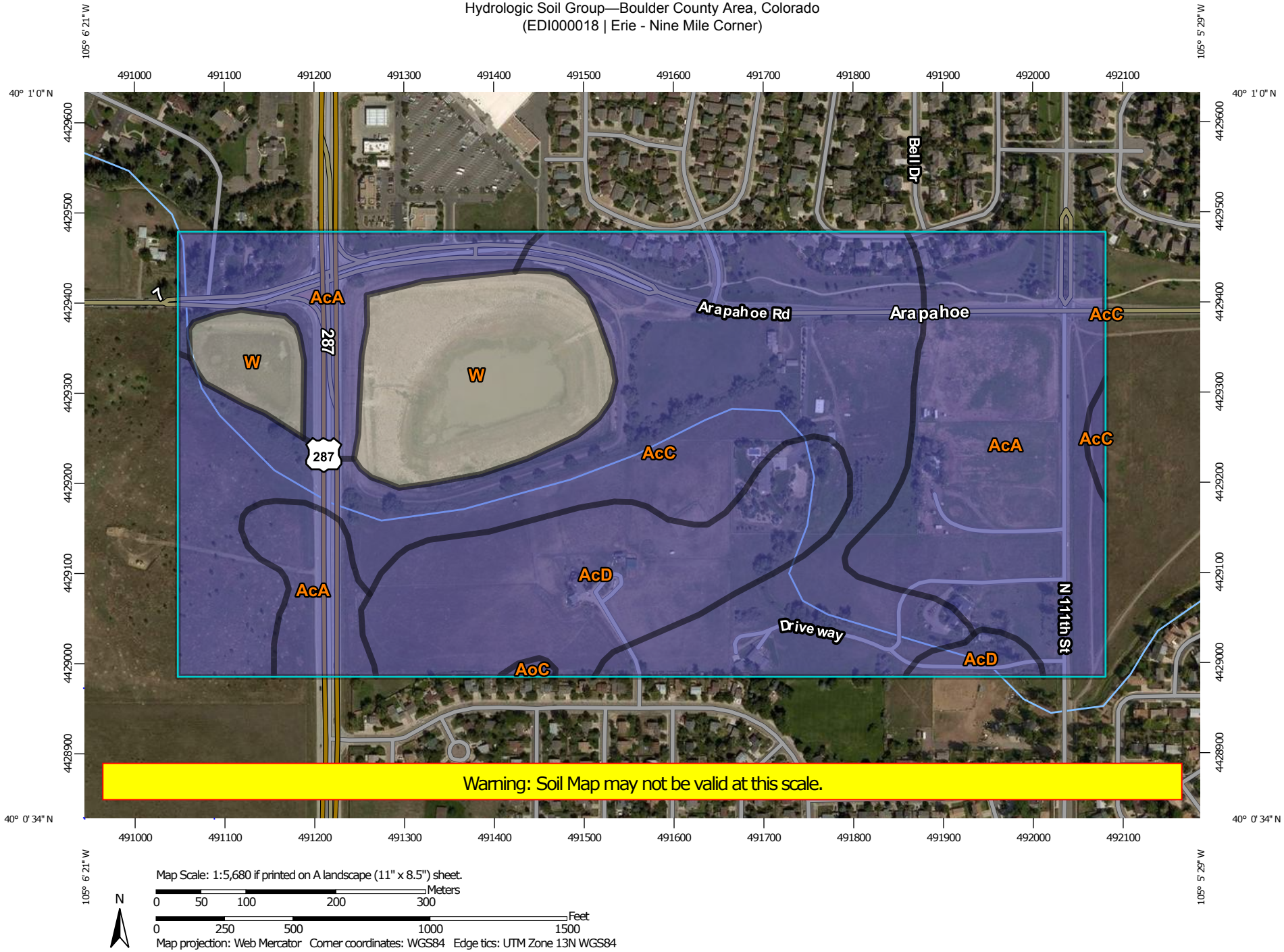
MAP REVISED
DECEMBER 18, 2012

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

Soil Data
(NRCS Web Soil Survey)

Hydrologic Soil Group—Boulder County Area, Colorado
(EDI000018 | Erie - Nine Mile Corner)



Map Scale: 1:5,680 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 250 500 1000 1500

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Boulder County Area, Colorado
Survey Area Data: Version 12, Sep 22, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 30, 2014—Sep 18, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Boulder County Area, Colorado (CO643)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
AcA	Ascalon sandy loam, 0 to 3 percent slopes	B	39.4	31.2%
AcC	Ascalon sandy loam, 3 to 5 percent slopes	B	50.3	39.7%
AcD	Ascalon sandy loam, 5 to 9 percent slopes	B	19.8	15.6%
AoC	Ascalon-Otero complex, 3 to 5 percent slopes	B	0.2	0.2%
W	Water		16.8	13.3%
Totals for Area of Interest			**126.5**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Preliminary Geotechnical Investigation

CTL | THOMPSON INCORPORATED

DRAFT

PRELIMINARY GEOTECHNICAL INVESTIGATION
NINE MILE CORNER – COMMERCIAL AREA
SOUTHEAST OF HIGHWAY 287 AND
ARAPAHOE ROAD
ERIE, COLORADO

Prepared For:

EVERGREEN DEVELOPMENT
1873 South Bellaire Street, #1106
Denver, Colorado 80222

Attention: Angie Grendahl
Ron Wolford

Project No. DN48,647-125

February 24, 2017

1971 West 12th Avenue | Denver, Colorado 80204 | Phone: 303-825-0777 | Fax: 303-825-4252

SCOPE

This report presents the results of our Preliminary Geotechnical Investigation for the commercial area at Nine Mile Corner, southeast of Highway 287 and Arapahoe Road in Erie, Colorado (Fig. 1). We are concurrently performing a Geotechnical Investigation for apartments planned on the east side of the parcel. The purpose of our investigation was to evaluate the subsurface conditions to assist in planning of site development and commercial construction. The report includes descriptions of soil and bedrock strata and groundwater levels encountered in our exploratory borings, and discussions of site development and construction as influenced by geotechnical considerations. The scope was described in our Proposal (DN 16-0532R) dated December 6, 2016. Evaluation of the property for the possible presence of potentially hazardous materials (Environmental Site Assessment) was not included in our scope.

This report is based on subsurface conditions disclosed by exploratory drilling and sampling, results of field and laboratory tests, engineering analysis of field and laboratory data, and our experience. It contains descriptions of the soil and bedrock conditions and groundwater levels found in our exploratory borings, recommendations for site development, and preliminary discussion of potential foundations, floor systems, pavements, and surface drainage. The discussions of foundation and floor system alternatives are intended for planning purposes only. Additional, building-specific investigations will be necessary to design structures and improvements. A brief summary of our conclusions and recommendations follows, with more detailed discussion in the report.

SUMMARY OF FINDINGS AND CONCLUSIONS

1. The primary geotechnical concerns are expansive soil and bedrock, potentially shallow groundwater and deep fill. We believe these concerns can be mitigated with proper investigation, planning, engineering, design and construction. We believe there are no geotechnical constraints at this site that preclude development.

2. Strata found in our borings consisted of nil to 11.5 feet of fill over natural clay, sand, and/or interlayered clay/sand underlain in most borings by weathered to comparatively unweathered claystone and interbedded claystone/sandstone bedrock. Bedrock was not encountered in four borings. Testing indicates the fill is predominately low swelling and the natural clay is low to high swelling. The claystone is low to very high swelling, and we judge the sand is non-expansive.

3. Groundwater was encountered during drilling in fourteen borings at depths of about 3.5 to 28 feet below existing grades. When the holes were checked after drilling, water levels were measured in twenty-one borings at depths of 1.5 to 37.5 feet. Groundwater will likely impact sub-excavation, the retaining walls at the south site limits, and possibly utility installation. Temporary construction dewatering may be necessary. Groundwater may fluctuate seasonally and rise in response to precipitation and landscape irrigation.

4. Expansive soils and bedrock are present. We estimated potential heave of about 1.7 to 8.1 inches at the ground surface based on a depth of wetting of 20 feet below proposed grades. The majority of site borings had heave estimates of 2 inches or less. We anticipate shallow foundations can be used for the north anchor building and building pads along the west and northwest corners of the site. The southern portion of the north anchor pad should be sub-excavated to match existing grades on the northern portion. This will create a relatively uniform fill depth across the building pad and reduce the risk of differential movement. Existing fill should be removed below the northwest building pads.

   Highly expansive claystone and natural clay are present below the south anchor building and southwest building pad. Sub-excavation of the south anchor building and southwest building pad appears merited to potentially allow use of footing-type foundations and enhance performance of slab-on-grade floors.

5. We judge there is relatively low risk of excessive floor movements caused by expansive soils for the north anchor and building pads along the west and northwest corners of the site. Sub-excavation of the south anchor and southwest building pad should reduce potential floor movements.

6. Pavement subgrade soils are likely to be derived of clay and claystone, which are considered poor subgrade material. Imported materials will also support pavements. We anticipate a full depth asphalt section of 5 to 6 inches for parking lots and parking access drives, and 6 to 7 inches for fire/truck lanes and loading dock areas. In areas of highly expansive claystone and/or natural clay (south anchor and southwest building pad parking areas), sub-excavation to depths of 3 to 5 feet can be selected to enhance pavement performance. A design-level subgrade investigation should be done prior to paving.

7. Control of surface and subsurface drainage will be critical to the performance of foundations, slabs-on-grade and pavements. Overall surface drainage should be designed to provide rapid run-off of surface water away from structures and off pavements and flatwork. Water should not be allowed to pond near the crests of slopes, near structures or on pavements and flatwork.

SITE CONDITIONS

The commercial area is planned on the western side of the proposed Nine Mile Corner Development (Fig. 1 and Photo 1). The site is bordered by Arapahoe Road on the north, Highway 287 to the west, and existing single-family residences to the south and east. The ground surface is covered with grass, weeds, bushes and trees. The site generally slopes from south to north, with overall relief of about 50 feet. The northwest portion of the site was previously occupied by Prince Lake No. 1, which was used as a water storage reservoir. Based on Google Earth aerial photos, the reservoir appears to have been constructed in 2003 and remained in use until about 2015 when it was drained and partially filled. An existing ditch traverses the middle portion of the property from west-to-east.

PROPOSED CONSTRUCTION

Plans provided show construction will include two anchor buildings, oriented north-south across the center of the site, and six smaller building pads along the western edge of the parcel. Surface parking and access drives will occupy the area between the anchors and western building pads. Based on site topography and provided grading plans, up to about 21 feet of fill and 33 feet of cut will be necessary to reach final construction grades (Fig. 5). The majority of fill will be located north of the existing ditch, with the deepest fills occurring in the previous reservoir area. A stepped, mechanically stabilized earth retaining wall will be constructed along the south property line, with cuts of 10 to 33 feet occurring north of the wall. Two detention ponds are planned along the north side of the site and the existing ditch will be piped across the site.

ALTA/NSPS Land Title Survey

ALTA/NSPS LAND TITLE SURVEY

PORTION OF THE NORTHEAST QUARTER OF SECTION 34, TOWNSHIP 1 NORTH, RANGE 69 WEST AND THE SOUTHEAST QUARTER OF SECTION 27, TOWNSHIP 1 NORTH, RANGE 69 WEST OF THE 6TH PRINCIPAL MERIDIAN,
TOWN OF ERIE, COUNTY OF BOULDER, STATE OF COLORADO.

TITLE COMMITMENT/REPORT INFORMATION

THIS MAP DOES NOT REPRESENT A TITLE SEARCH BY GALLOWAY & COMPANY, INC. TO DETERMINE OWNERSHIP OR THIS TRACT, VERIFY THE SECRIPTION SHOWN, VERIFY THE COMPATIBILITY OF THIS DESCRIPTION WITH THAT OF ADJACENT TRACTS OR VERIFY EASEMENTS OF RECORD. FOR ALL INFORMATION REGARDING EASEMENTS, RIGHT OF WAY OR TITLE THEREOF, GALLOWAY & COMPANY INC. RELIED UPON THE INFORMATION OR TITLE COMMITMENT/REPORT PROVIDED AT THE TIME OF SURVEY BY THE CLIENT.
TITLE INFORMATION IS BASED ON TITLE COMMITMENT/REPORT BY LAND TITLE GUARANTEE COMPANY, FILE NO.: ABZ70471321, WITH AN EFFECTIVE DATE OF OCTOBER 12, 2015 AT 5:00 P.M.

ONLY THOSE ITEMS LISTED IN THE SCHEDULE B-2 EXCEPTIONS ARE ADDRESS

1. ANY FACTS, RIGHTS, INTERESTS, OR CLAIMS THEREOF, NOT SHOWN BY THE PUBLIC RECORDS BUT THAT COULD BE ASCERTAINED BY AN INSPECTION OF THE LAND OR THAT MAY BE ASSERTED BY PERSONS IN POSSESSION OF THE LAND.
2. EASEMENTS, LIENS OR ENCUMBRANCE, OR CLAIMS THEREOF, NOT SHOWN BY THE PUBLIC RECORDS.
3. ANY ENCROACHMENT, ENCUMBRANCE, VIOLATION, VARIATION, OR ADVERSE CIRCUMSTANCE AFFECTING THE TITLE THAT WOULD BE DISCLOSED BY AN ACCURATE AND COMPLETE LAND SURVEY OF THE LAND AND NOT SHOWN BY THE PUBLIC RECORDS.
4. ANY LIEN, OR RIGHT TO A LIEN, FOR SERVICES, LABOR OR MATERIAL HERETOFORE OR HEREAFTER FURNISHED, IMPOSED BY LAW AND NOT SHOWN BY THE PUBLIC RECORDS.
5. DEFECTS, LIENS, ENCUMBRANCES, ADVERSE CLAIMS OR OTHER MATTERS, IF ANY, CREATED, FIRST APPEARING IN THE PUBLIC RECORDS OR ATTACHING SUBSEQUENT TO THE EFFECTIVE DATE HEREOF BUT PRIOR TO THE DATE OF THE PROPOSED INSURED ACQUIRES OF RECORD FOR VALUE THE ESTATE OR INTEREST OR MORTGAGE THEREON COVERED BY THIS COMMITMENT.
6. (A) TAXES OR ASSESSMENTS THAT ARE NOT SHOWN AS EXISTING LIENS BY THE RECORDS OF ANY TAXING AUTHORITY THAT LEVIES TAXES OR ASSESSMENTS ON REAL PROPERTY OR BY THE PUBLICS RECORDS; (B) PROCEEDINGS BY A PUBLIC AGENCY THAT MAY RESULT IN TAXES OR ASSESSMENTS, OR NOTICES OF SUCH PROCEEDINGS, WHETHER OR NOT SHOWN BY THE RECORDS OF SUCH AGENCY OR BY THE PUBLIC RECORDS.
7. (A) UNPATENTED MINING CLAIMS; (B) RESERVATIONS OR EXCEPTIONS IN PATENTS OR IN ACTS AUTHORIZING THE ISSUANCE THEREOF; (C) WATER RIGHTS, CLAIMS OR TITLE TO WATER.

   EXISTING LEASES AND TENANCIES, IF ANY.

8. ALL COAL THAT MAY BE UNDERNEATH THE SURFACE OF THE LAND HEREIN DESCRIBED, ALSO SUCH RIGHT OF WAY AND OTHER GROUNDS AS MAY BE NECESSARY FOR THE PROPER WORKING OF ANY COAL MINES THAT MAY BE DEVELOPED UPON SAID PREMISES AND FOR THE TRANSPORTATION OF THE COAL FROM THE SAME. AS RESERVED UNTO THE UNION PACIFIC RAILWAY COMPANY IN THE DEED RECORDED JUNE 11, 1891 IN BOOK 138 AT PAGE 469, AND ANY AND ALL ASSIGNMENTS THEREOF OR INTERESTS THEREIN.

   (AFFECTS PARCEL C (III)) (AFFECTS AND IS BLANKET IN NATURE)

9. A RIGHT OF WAY FOR DITCHES IN, ON AND OVER SAID PREMISES AND THE RIGHTS TO ENTER UPON SAID PREMISES FOR THE PURPOSE OF REPAIRING AND MAINTAINING SUCH DITCHES, AS RESERVED IN DEED RECORDED MARCH 23, 1893 IN BOOK 158 AT PAGE 300.

   (AFFECTS PARCELS C (III) (PARCEL CIII IS NOT A PART OF THIS SURVEY)

10. ALL COAL THAT MAY BE UNDERNEATH THE SURFACE OF THE LAND, AND THE EXCLUSIVE RIGHT TO PROSPECT, SINK SHAFT OR SHAFTS AND MINE FOR THE SAME; ALSO RESERVING SUCH RIGHT OF WAY AND OTHER GROUNDS AS MAY BE NECESSARY FOR THE PROPER WORKING OF ANY COAL MINE THAT MAY BE DEVELOPED UPON SAID PREMISES AND FOR THE TRANSPORTATION OF COAL FROM THE SAME, AS RESERVED UNTO THE COLORADO MORTGAGE AND INVESTMENT CO., LTD., A CORPORATION ORGANIZED AND EXISTING UNDER THE LAWS OF GREAT BRITAIN AND IRELAND; ANDREW WHITTON; JAMES GUTHRIE; AND ALEXANDER GOURLAY IN THE DEED RECORDED OCTOBER 18, 1901 IN BOOK 249 AT PAGE 209, AND ANY AND ALL ASSIGNMENTS THEREOF OR INTERESTS THEREIN. \

    NOTE: MINERAL DEED RECORDED FEBRUARY 27, 1907 IN BOOK 296 AT PAGE 299.

    NOTE: MINERAL DEED RECORDED SEPTEMBER 11,1929 IN BOOK 566 AT PAGE 360.

    (AFFECTS PARCELS A AND B) (AFFECTS AND IS BLANKET IN NATURE)

11. ALL COAL OR OTHER MINERALS THAT MAY BE UNDERNEATH THE SURFACE OF THE LAND; AND THE EXCLUSIVE RIGHT TO PROSPECT, SING SHAFT OR SHAFTS, AND MINE FOR THE SAME, AS RESERVED UNTO THE COLORADO MORTGAGE & INVESTMENT COMPANY, LIMITED, A CORPORATION ORGANIZED AND EXISTING UNDER THE LAWS OF GREAT BRITAIN AND IRELAND; ANDREW WHITTON; JAMES GUTHRIE; AND ALEXANDER GOURLAY IN THE DEED RECORDED JANUARY 15, 1904 IN BOOK 251 AT PAGE 460, AND ANY AND ALL ASSIGNMENTS THEREOF OR INTERESTS THEREIN.

    (AFFECTS PARCELS B AND C (III)) (AFFECTS AND IS BLANKET IN NATURE)

12. AN UNDIVIDED ONE-HALF INTEREST IN THE COAL AND OTHER MINERALS LYING UNDERNEATH THE SURFACE OF THE LAND AS CONVEYED TO GEORGE MURRAY, EDWARD E. HOLMES AND ALFRED N. GOSSETT BY THE DEED RECORDED FEBRUARY 27, 1907 IN BOOK 296 AT PAGE 299.

    (AFFECTS PARCELS A, B AND C (II)) (AFFECTS AND IS BLANKET IN NATURE)

13. ALL COAL AND OTHER MINERALS UNDERNEATH THE SURFACE OF THE LAND, AND THE EXCLUSIVE RIGHT TO PROSPECT, SINK OR SHAFTS, AND MINE FOR THE SAME; ALSO RESERVING SUCH RIGHT OF WAY AND OTHER GROUNDS AS MAY BE NECESSARY FOR THE PROPER WORKING OF ANY COAL OR OTHER MINE OR MINES THAT MAY BE DEVELOPED UPON SAID PREMISES AND FOR THE TRANSPORTATION OF THE PRODUCTS THEREFROM, AND FOR SUCH SURFACE AREA SO REQUIRED, AS RESERVED UNTO THE COLORADO MORTGAGE AND INVESTMENT COMPANY, LIMITED, AND CORPORATION ORGANIZED AND EXISTING UNDER THE LAWS OF GREAT BRITAIN AND IRELAND; ANDREW WHITTON; JAMES GUTHRIE; AND ALEXANDER GOURLAY IN THE DEED RECORDED JANUARY 15, 1910 IN BOOK 340 AT PAGE 259, AND ANY AND ALL ASSIGNMENTS THEREOF OR INTERESTS THEREIN.

    (AFFECTS A, B AND C (II)) (AFFECTS AND IS BLANKET IN NATURE)

14. AN UNDIVIDED 2 1/2% INTEREST IN A ND TO ALL THE OIL AND GAS IN AND UNDER AND THAT MAY BE PRODUCED FROM THE LAND, AS CONVEYED TO ROY R. CARPENTER BY THE DEED RECORDED JULY 22, 1924 IN BOOK 511 AT PAGE 168, AND ANY AND ALL ASSIGNMENTS THEREOF OR INTERESTS THEREIN.

    (AFFECTS ALL PARCELS) (AFFECTS AND IS BLANKET IN NATURE)

15. THE RIGHT TO MAINTAIN, REPLACE AND USE WATER PIPE LINE; AND THE RIGHT TO DRAW WATER FROM SAID RESERVOIR BY MEANS OF SAID PIPE LINE FOR DOMESTIC USE, TOGETHER WITH THE RIGHT OF INGRESS AND EGRESS TO REPAIR AND MAINTAIN THE SAME, AS RESERVED UNTO GEORGE L. SCHOFIELD, A. MAUDE SCHOFIELD, FLOYD EUGENE HARRIS, NEVADIA HARRIS, BENNETT W. MUIR AND FRIEDA E. MUIR IN THE DEED RECORDED NOVEMBER 2, 1956 IN BOOK 1028 AT PAGE 471.

    (AFFECTS PARCELS A, AND C (II)) (AFFECTS. NOT PLOTTABLE. EASEMENT IS BASED ON ACTUAL WATER LINE LOCATION WHICH IS UNKNOWN TO THE SURVEYOR AT THIS TIME)

16. ANY RIGHTS OR INTERESTS OF THIRD PARTIES WHICH EXIST OR ARE CLAIMED TO EXIST IN AND OVER THE PRESENT AND PAST BED, BANKS OR WATERS OF SOUTH BOULDER CANYON DITCH, SAID DITCH BEING REFERRED TO IN THE LEGAL DESCRIPTION CONTAINED IN DEED RECORDED APRIL 29, 1968 UNDER RECEPTION NO. 877395 AND DEED RECORDED MAY 21, 1969 UNDER RECEPTION NO. 913694.

    (AFFECTS PARCELS A, AND C (II)) (AFFECTS AND IS BLANKET IN NATURE)

17. ANY CHANGES IN AREA DUE TO THE RELOCATION OR MOVEMENT OF SOUTH BOULDER CANYON DITCH, SAID DITCH BEING DESCRIBED IN THE LEGAL DESCRIPTION CONTAINED IN DEED RECORDED APRIL 29, 1968 UNDER RECEPTION NO. 877395 AND DEED RECORDED MAY 21, 1969 UNDER RECEPTION NO. 913694.

    (AFFECTS PARCEL A AND C (II)) (MAY AFFECT AND IS SHOWN ON SURVEY)

18. AN EASEMENT FOR ROADWAY AND FOR THE MAINTENANCE AND REPAIR OF RESERVOIR, AS RESERVED UNTO THE TOWN OF ERIE IN THE DEED RECORDED APRIL 29, 1968 UNDER RECEPTION NO. 877396.

    (AFFECTS PARCEL B) (AFFECTS AND IS PLOTTED HEREON)

19. EASEMENT GRANTED TO PUBLIC SERVICE COMPANY OF COLORADO, FOR NATURAL GAS FACILITIES, AND INCIDENTAL PURPOSES, BY INSTRUMENT RECORDED AUGUST 04, 1981, UNDER RECEPTION NO. 457820.

    (AFFECTS PARCEL A) (AFFECTS AND IS PLOTTED HEREON)

20. OIL AND GAS LEASE BETWEEN TOWN OF ERIE, LESSOR, AND MARTIN EXPLORATION MANAGEMENT CORP., LESSEE, RECORDED MARCH 31, 1983 UNDER RECEPTION NO. 541012, AND ANY AND ALL ASSIGNMENTS THEREOF, OR INTEREST THEREIN.

    NOTE: AFFIDAVIT OF PRODUCTION RECORDED JULY 30, 1985 UNDER RECEPTION NO. 702639.
    REVISED AFFIDAVIT OF PRODUCTION RECORDED APRIL 21, 1986 UNDER RECEPTION NO. 754068
    AND RECORDED JUNE 12, 1986 UNDER RECEPTION NO. 766082.

    NOTE: NOTICE OF OIL AND GAS INTERESTS AND SURFACE USE IN CONNECTION WITH THE ABOVE LEASE RECORDED JANUARY 23, 2001 UNDER RECEPTION NO. 2112332.

    (AFFECTS PARCELS B, C(I) AND C(II)) (AFFECTS. NO VISIBLE WELL ON SITE)

21. OIL AND GAS LEASE BETWEEN RODGER D. BEERY AND CAMILLA R. BEERY, LESSORS, AND MARTIN EXPLORATION MANAGEMENT CORP., LESSEE, RECORDED APRIL 11, 1983 UNDER RECEPTION NO. 542944, AND ANY AND ALL ASSIGNMENTS THEREOF, OR INTEREST THEREIN.

    NOTE: AFFIDAVIT OF PRODUCTION RECORDED JULY 30, 1985, UNDER RECEPTION NO. 702639.
    REVISED AFFIDAVIT OF PRODUCTION RECORDED APRIL 21, 1986 UNDER RECEPTION NO. 754068 AND
    RECORDED JUNE 12, 1986 UNDER RECEPTION NO. 766082.

    (AFFECTS PARCEL A) (AFFECTS. NO VISIBLE WELL ON SITE)

22. RIGHT OF WAY EASEMENT FOR PIPELINE, AND INCIDENTAL PURPOSES, AS GRANTED TO CDM PIPELINE COMPANY, INC., A COLORADO CORPORATION IN INSTRUMENT RECORDED JULY 16, 1984 UNDER RECEPTION NO. 634026, AND CORRECTION AND AMENDMENT OF PIPELINE RIGHT-OF-WAY GRANT RECORDED OCTOBER 15, 1984 UNDER RECEPTION NO. 652036.

    PIPELINE SURVEY MAP RECORDED SEPTEMBER 28, 1984 UNDER RECEPTION NO. 649253.

    (AFFECTS PARCEL A) (AFFECTS AND IS PLOTTED HEREON)

23. (ITEM INTENTIONALLY DELETED)

24. ANY TAX, LIEN, FEE, OR ASSESSMENT BY REASON OF INCLUSION OF SUBJECT PROPERTY IN THE LONGMONT FIRE PROTECTION DISTRICT, AS EVIDENCED BY INSTRUMENT RECORDED APRIL 29, 1985, UNDER RECEPTION NO. 685397 AND MODIFIED ORDER OF INCLUSION RECOREDED SEPTEMBER 3, 1985 UNDER RECEPTION NO. 710155.

    (AFFECTS ALL PARCELS) (AFFECTS AND IS BLANKET IN NATURE)

25. OIL AND GAS LEASE BETWEEN GEORGE W. KUHL, VIVIAN M. KUHL, RODGER D. KUHL AND JANE M. KUHL, LESSORS, AND O.D. PRESLEY, LESSEE, RECORDED MAY 06, 1985 UNDER RECEPTION NO. 686620, AND ANY AND ALL ASSIGNMENTS THEREOF, OR INTEREST THEREIN.

    NOTE: AFFIDAVIT OF PRODUCTION RECORDED JULY 30, 1985 UNDER RECEPTION NO. 702639.
    REVISED AFFIDAVIT OF PRODUCTION RECORDED APRIL 21, 1986 UNDER RECEPTION NO. 754068
    AND RECORDED JUNE 12, 1986 UNDER RECEPTION NO. 766082.

    (AFFECTS PARCEL B) (AFFECTS AND IS BLANKET IN NATURE)

26. OIL AND GAS LEASE BETWEEN ROY N. AUSTIN, LESSOR, AND O.D. PRESLEY, LESSEE, RECORDED MAY 06, 1985 UNDER RECEPTION NO. 686626, AND ANY AND ALL ASSIGNMENTS THEREOF, OR INTEREST THEREIN

    NOTE: AFFIDAVIT OF PRODUCTION RECORDED JULY 30, 1985 UNDER RECEPTION NO. 702639.
    REVISED AFFIDAVIT OF PRODUCTION RECORDED APRIL 21, 1986 UNDER RECEPTION NO. 754068 AND
    RECORDED JUNE 12, 1986 UNDER RECEPTION NO. 766082.

    (AFFECTS ALL PARCELS) (AFFECTS AND IS BLANKET IN NATURE)

27. OIL AND GAS LEASE BETWEEN JANE KUEHNER, MARY F. DEHAAN, MICHAEL R. SHELTON, MARK L. SHELTON, BRUCE D. CARPENTER, JEAN K. CARPENTER, GLENN C. CARPENTER AND SARAH A. CARPENTER, LESSORS, AND O.D. PRESLEY, LESSEE, RECORDED AUGUST 06, 1985 UNDER RECEPTION NO. 703693, AND ANY AND ALL ASSIGNMENTS THEREOF, OR INTEREST THEREIN.

    NOTE: REVISED AFFIDAVIT OF PRIDUCTION RECORDED APRIL 21, 1986 UNDER RECEPTION NO. 754068 AND
    RECORDED JUNE 12, 1986 UNDER RECEPTION NO. 766082.

    NOTE: RATIFICATION OF OIL AND GAS LEASE RECORDED JUNE 12, 1986 UNDER RECEPTION NOS. 766084, 766085, AND 766086.

    (AFFECTS ALL PARCELS) (AFFECTS AND IS BLANKET IN NATURE)

28. OIL AND GAS LEASE BETWEEN CLAUDE JONES AND ALINE JONES, LESSORS, AND O.D. PRESLEY, LESSEE, RECORDED AUGUST 06, 1985 UNDER RECEPTION NO. 703694, AND ANY AND ALL ASSIGNMENTS THEREOF, OR INTEREST THEREIN.

    NOTE: REVISED AFFIDAVIT OF PRODUCTION RECORDED APRIL 21, 1986 UNDER RECEPTION NO. 754068 AND
    RECORDED JUNE 12, 1986 UNDER RECEPTION NO. 766082.

    (AFFECTS ALL PARCELS) (AFFECTS AND IS BLANKET IN NATURE)

29. OIL AND GAS LEASE BETWEEN EVAN DUVAL, JR. AND O.D. PRESLEY, LESSORS, AND RICHARDSON OIL COMPANY, LESSEE, RECORDED AUGUST 06, 1985 UNDER RECEPTION NO. 703697, AND ANY AND ALL ASSIGNMENTS THEREOF, OR INTEREST THEREIN.

    NOTE: REVISED AFFIDAVIT OF PRODUCTION RECORDED APRIL 21, 1986 UNDER RECEPTION NO. 754068 AND
    RECORDED JUNE 12, 1986 UNDER RECEPTION NO. 766082.

    (PARCELS A, B AND C(I AND II)) (DOCUMENT NOT IN TITLE)

30. OIL AND GAS LEASE BETWEEN WINNIFRED H. EWALT, LESSOR, AND O.D. PRESLEY, LESSEE, TECORDED OCTOBER 08, 1985 UNDER RECEPTION NO. 717948, AND ANY AND ALL ASSIGNMENTS THEREOF, OR INTEREST THEREIN.

    NOTE: REVISED AFFIDAVIT OF PRODUCTION RECORDED APRIL 21, 1986 UNDER RECEPTION NO. 754068 AND
    RECORDED JUNE 12, 1986 UNDER RECEPTION NO. 766082.

    NOTE: RATIFICATION OF OIL AND GAS LEASE RECORDED JUNE 12, 1986 UNDER RECEPTION NO. 766083.

    (AFFECTS ALL PARCELS) (AFFECTS AND IS BLANKET IN NATURE)

31. OIL AND GAS LEASE BETWEEN JAY P. WALKER, LESSOR, AND O.D. PRESLEY, LESSEE, RECORDED JULY 09, 1986 UNDER RECEPTION NO. 772253, AND ANY AND ALL ASSIGNMENTS THEREOF, OR INTEREST THEREIN.

    (AFFECTS ALL PARCELS) (AFFECTS AND IS BLANKET IN NATURE)

32. MINERAL DEED RECORDED MARCH 5, 1992 UNDER RECEPTION NO. 1165768.

    (AFFECTS SE 1/4 OF SECTION 27 AND THE N 1/2 OF THE NE 1/4 OF SECTION 34) (AFFECTS AND IS BLANKET IN NATURE)

33. OIL AND GAS LEASE BETWEEN PAUL K. LASNIK, LESSOR, AND MARTIN EXPLORATION MANAGEMENT COMPANY, LESSEE, RECORDED MARCH 17, 1992 UNDER RECEPTION NO. 1168168, AND ANY AND ALL ASSIGNMENTS THEREOF, OR INTEREST THEREIN.

    (AFFECTS ALL PARCELS) (AFFECTS AND IS BLANKET IN NATURE)

34. OIL AND GAS LEASE BETWEEN HELEN M. MASTRIONA AND FRANK M. MASTRIONA, LESSORS, AND MARTIN EXPLORATION MANAGEMENT COMPANY, LESSEE, RECORDED MARCH 24, 1922 UNDER RECEPTION NO. 1169721, AND ANY AND ALL ASSIGNMENTS THEREOF, OR INTEREST THEREIN.

    (AFFECTS ALL PARCELS) (AFFECTS AND IS BLANKET IN NATURE)

35. OIL AND GAS LEASE BETWEEN DOROTHY J. BLACKBURN AND JOSEPH BLACKBURN, LESSORS, AND MARTIN EXPLORATION MANAGEMENT COMPANY, LESSEE, RECORDED MARCH 24, 1992 UNDER RECEPTION NO. 1169722, AND ANY AND ALL ASSIGNMENTS THEREOF, OR INTEREST THEREIN.

    (AFFECTS ALL PARCELS) (AFFECTS AND IS BLANKET IN NATURE)

36. OIL AND GAS LEASE BETWEEN DOLORES T. FORBIS AND DERL D. FORBIS, LESSORS, AND MARTIN EXPLORATION MANAGEMENT COMPANY, LESSEE, RECORDED MARCH 30, 1992 UNDER RECEPTION NO. 1171195, AND ANY AND ALL ASSIGNMENTS THEREOF, OR INTEREST THEREIN.

    (AFFECTS ALL PARCELS) (AFFECTS AND IS BLANKET IN NATURE)

37. OIL AND GAS LEASE BETWEEN MARTIN EXPLORATION MANAGEMENT COMPANY, LESSOR, AND BASIN EXPLORATION INCORPORATED, LESSEE, RECORDED NOVEMBER 08,1993 UNDER RECEPTION NO. 1358710, AND ANY AND ALL ASSIGNMENTS THEREOF, OR INTEREST THEREIN.

    NOTE: NOTICE OF OIL AND GAS INTERESTS AND SURFACE USE IN CONNECTION WITH THE ABOVE LEASE RECORDED JANUARY 23, 2001 UNDER RECEPTION NO. 2112332.

    (AFFECTS ALL PARCELS) (AFFECTS AND IS PLOTTED HEREON)

38. RESOLUTION #94-25, PERTAINING TO ANNEXATION, RECORDED NOVEMBER 9, 1994 UNDER RECEPTION NO. 1477392 AND MAP IN CONNECTION THEREWITH RECORDED NOVEMBER 9, 1994 UNDER RECEPTION NO. 1477393.

    (AFFECTS PARCEL C (I, II, III) AND A PORTION OF PARCEL B) (AFFECTS AND IS BLANKET IN NATURE)

39. TERMS, CONDITIONS, PROVISIONS, BURDENS AND OBLIGATIONS AS SET FORTH IN NELSON AGREEMENT REGARDING USE OF PUBLIC STREET RECORDED JULY 24, 1998 UNDER RECEPTION NO. 1827415.

    (AFFECTS PARCEL A) (AFFECTS. NOT A PLOTTABLE DESCRIPTION)

40. REQUEST FOR NOTIFICATION OF SURFACE DEVELOPMENT AS EVIDENCED BY INSTRUMENT RECORDED MAY 17, 2002 UNDER RECEPTION NO. 2288464.

    (AFFECTS PARCEL C(III)) (PARCEL CIII NOT A PART OF THIS SURVEY)

41. REQUEST FOR NOTIFICATION OF SURFACE DEVELOPMENT AS EVIDENCED BY INSTRUMENT RECORDED OCTOBER 23, 2007 UNDER RECEPTION NO. 2890878.

    (AFFECTS PARCEL C(III)) (PARCEL CIII NOT A PART OF THIS SURVEY)

42. REQUEST FOR NOTIFICATION OF SURFACE DEVELOPMENT AS EVIDENCED BY INSTRUMENT RECORDED DECEMBER 21, 2007 UNDER RECEPTION NO. 2900941.

    (AFFECTS PARCEL C(III)) (PARCEL CIII NOT A PART OF THIS SURVEY)

43. TERMS, CONDITIONS, PROVISIONS, BURDENS AND OBLIGATIONS AS SET FORTH IN LONG-TER LEASE PURCHASE OPTION AGREEMENT DATED JANUARY 10, 2012 BY AND BETWEEN THE TOWN OF ERIE URBAN RENEWAL AUTHORITY AND BRIAN NELSON AND SHAWNA NELSON, AS MEMERIALIZED BY RECORD NOTICE RECORDED WITH WARRANTY DEED JANUARY 17, 2012 UNDER RECEPTION NO. 3196450.

    NOTE: BY WARRANTY DEED RECORDED JANUARY 16, 2013 UNDER RECEPTION NO. 3282584, BRIAN NELSON AND SHAWNA NELSON CONVEYED OPTION TO PURCHASE, AS SET FORTH IN SAID AGREEMENT, TO TOWN OF ERIE URBAN RENEWAL AUTHORITY.

    (AFFECTS PARCEL A) (AFFECTS AND IS BLANKET IN NATURE)

44. OIL AND GAS LEASE BETWEEN NOBLE ENERGY, INC., A DELAWARE CORPORATION AND EXTRACTION OIL & GAS, LLC, A DELAWARE LIMITED LIABILITY COMPANY, RECORDED MARCH 11, 2015 UNDER RECEPTION NO. 3432573 AND ANY AND ALL ASSIGNMENTS THEREOF, OR INTEREST THEREIN.

    (AFFECTS PARCEL C (III)) (PARCEL CIII NOT A PART OF THIS SURVEY)

45. RESOLUTION #05-2015, PERTAINING TO ANNEXATION, RECORDED APRIL 21, 2015 UNDER RECEPTION NO. 3440934 AND MAP IN CONNECTION THEREWITH RECORDED APRIL 21, 2015 UNDER RECEPTION NO. 3440932. (AFFECTS AND IS BLANKET IN NATURE)

46. RESOLUTION #06-2015, PERTAINING TO ZONING, RECORDING APRIL 21, 2015 UNDER RECEPTION NO. 3440935 AND MAP IN CONNECTION THEREWITH RECORDED APRIL 21, 2015 UNDER RECEPTION NO. 3440933.

    (ITEMS 45-46 AFFECT PARCEL A AND A PORTION OF PARCEL B)
    (AFFECTS AND IS BLANKET IN NATURE)



VICINITY MAP

LEGAL DESCRIPTION (PER TITLE COMMITMENT)

PARCEL A:
PART OF THE NORTH HALF NORTHEAST QUARTER OF SECTION 34, TOWNSHIP 1 NORTH, RANGE 69 WEST OF THE 6TH PRINCIPAL MERIDIAN, DESCRIBED AS FOLLOWS:

BEGINNING AT THE SOUTHWEST CORNER OF THE NORTH HALF NORTHEAST QUARTER FROM WHENCE THE NORTHWEST CORNER OF SAID NORTH HALF NORTHEAST QUARTER BEARS NORTH 00ô04'00" EAST; THENCE SOUTH 89ô48'30" EAST ALONG THE SOUTH LINE OF SAID NORTH HALF NORTHEAST QUARTER, A DISTANCE OF 1434.83 FEET; THENCE NORTH 00ô14'20" EAST, 845.98 FEET TO THE SOUTH LINE OF THAT PROPERTY CONVEYED BY FLOYD E. HARRIS AND NEVADIA HARRIS TO LEONARD L. LANHAM AND NINA E. LANHAM, RECORDED MAY 15, 1968 ON FILM 635 AT RECEPTION NO. 879012; THENCE NORTH 89ô41'50" WEST ALONG SAID SOUTH LINE, A DISTANCE OF 366.57 FEET TO A POINT ON THE EAST LINE OF THAT PROPERTY CONVEYED BY DEED FROM FLOYD EUGENE HARRIS AND NEVADIA HARRIS TO THE TOWN OF ERIE, A MUNICIPAL CORPORATION, RECORDED APRIL 29, 1968 IN FILM 633 AT RECEPTION NO. 877395; THENCE SOUTH 00ô58'00" WEST ALONG SAID EAST LINE, 31.12 FEET TO THE CENTERLINE OF THE SOUTH BOULDER CANYON IRRIGATION DITCH; THENCE TRAVERSING ALONG THE CENTERLINE OF SAID DITCH AND THE SOUTH LINE OF PROPERTY DESCRIBED ON FILM 633 AT RECEPTION NO. 877395, THE FOLLOWING COURSES AND DISTANCES: SOUTH 71ô36'00" WEST 508.65 FEET;
THENCE SOUTH 73ô40'00" WEST, 241.52 FEET;
THENCE NORTH 89ô40'00" WEST, 140.82 FEET;
THENCE NORTH 77ô42'00" WEST, 114.23 FEET;
THENCE NORTH 62ô24'00" WEST, 118.52 FEET TO A POINT ON THE WEST LINE OF THE NORTH HALF NORTHEAST QUARTER OF SAID SECTION 34;
SAID POINT BEING ALSO THE SOUTHWEST CORNER OF THAT PROPERTY DESCRIBED ON FILM 633 AT RECEPTION NO. 877395; THENCE SOUTH 00ô04'00" WEST ALONG SAID WEST LINE OF THE NORTH HALF NORTHEAST QUARTER, A DISTANCE OF 675.12 FEET TO THE TRUE POINT OF BEGINNING,

EXCEPTING THEREFROM THAT PORTION DESCRIBED IN DEED RECORDED APRIL 15, 1983 AT RECEPTION NO. 543786, AND IN DEED RECORDED FEBRUARY 20, 1997 ON FILM NO. 2187 AT RECEPTION NO. 1678309,
COUNTY OF BOULDER, STATE OF COLORADO.

PARCEL B:

A PORTION OF THE NORTH 1/2 OF THE NORTHEAST 1/4 OF SECTION 34, TOWNSHIP 1 NORTH, RANGE 69 WEST OF THE 6TH PRINCIPAL MERIDIAN, DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT ON THE NORTH LINE OF SAID NORTHEAST ¼ 20 FEET WEST OF THE NORTHEAST CORNER OF THE NORTHWEST 1/4 OF THE NORTHEAST 1/4; THENCE NORTH 89ô41'50" WEST ALONG SAID NORTH LINE, 230.64 FEET;
THENCE SOUTH 00ô58' WEST, 469.96 FEET; THENCE SOUTH 89ô41'50" EAST, 618.52; THENCE NORTH 00ô14'20" EAST, 469.93 FEET TO THE NORTH LINE OF SAID NORTHEAST 1/4; THENCE NORTH 89ô41'50" WEST, ALONG SAID NORTH LINE TO THE TRUE POINT OF BEGINNING;
EXCEPTING THEREFROM THAT PORTION CONVEYED TO THE COUNTY OF BOULDER BY THE DEED RECORDED NOVEMBER 29, 1913 IN BOOK 381 AT PAGE 127,

COUNTY OF BOULDER, STATE OF COLORADO.

PARCEL C:

PARCEL I:

A PART OF THE NORTHWEST 1/4 OF THE NORTHEAST 1/4 OF SECTION 34, TOWNSHIP 1 NORTH, RANGE 69 WEST OF THE 6TH PRINCIPAL MERIDIAN, COUNTY OF BOULDER, STATE OF COLORADO, MORE PARTICULARLY DESCRIBED AS FOLLOWS: BEGINNING AT THE NORTH 1/4 CORNER OF SAID SECTION; THENCE SOUTH 0ô09' WEST 642.7 FEET; THENCE SOUTH 69ô 45' EAST 211.4 FEET; THENCE NORTH 85ô EAST 195 FEET; THENCE NORTH 71ô53' EAST 718 FEET; THENCE NORTH 24ô20' EAST 539 FEET TO A POINT O N THE NORTH LINE OF SAID SECTION, 20 FEET WEST OF THE NORTHEAST CORNER OF SAID NORTHWEST 1/4 OF THE NORTHEAST 1/4; THENCE WEST ALONG SAID NORTH LINE OF SAID SECTION TO THE PLACE OF BEGINNING;

EXCEPTING THEREFROM THAT PORTION CONVEYED TO THE COUNTY OF BOULDER BY THE DEED RECORDED NOVEMBER 29, 1913 IN BOOK 381 AT PAGE 127;
AND EXCEPT THAT PORTION DESCRIBED IN DEED RECORDED APRIL 29, 1968 UNDER RECEPTION NO. 877396;
AND EXCEPT THAT PORTION CONVEYED TO THE STATE DEPARTMENT OF HIGHWAYS, DIVISION OF HIGHWAYS, STATE OF COLORADO, BY THE DEED RECORDED FEBRUARY 8, 1983 UNDER RECEPTION NO. 532304.
AND EXCEPT THAT PORTION CONVEYED TO THE DEPARTMENT OF TRANSPORTATION, STATE OF COLORADO BY THE DEED RECORDED JANUARY 2, 1998 UNDER RECEPTION NO. 1759789.

PARCEL II:

A PORTION OF THE NORTHWEST 1/4 OF THE NORTHEAST 1/4 OF SECTION 34, TOWNSHIP 1 NORTH, RANGE 69 WEST OF THE 6TH PRINCIPAL MERIDIAN, COUNTY OF BOULDER, STATE OF COLORADO, DESCRIBED AS FOLLOWS:

COMMENCING AT THE NORTH QUARTER CORNER OF SECTION 34, TOWNSHIP 1 NORTH, RANGE 69 WEST OF THE 6TH PRINCIPAL MERIDIAN, THENCE SOUTH 0ô09' WEST, 642.7 FEET; THENCE SOUTH 69ô45' EAST, 2.59 FEET TO A POINT ON THE WEST LINE OF THE NORTHEAST QUARTER OF SAID SECTION 34, THE TRUE POINT OF BEGINNING; THENCE SOUTH 69ô45' EAST, 208.81 FEET; THENCE NORTH 85ô0' EAST, 195.00 FEET; THENCE NORTH 71ô53' EAST, 718.00 FEET; THENCE SOUTH 0ô58' WEST, 31.12 FEET TO A POINT ON THE CENTERLINE OF THE SOUTH BOULDER CANYON DITCH; THENCE WESTERLY, ALONG THE SAID DITCH CENTERLINE AS FOLLOWS: SOUTH 71ô36' WEST, 508.65 FEET; SOUTH 73ô40' WEST, 241.52 FEET; NORTH 89ô40' WEST, 140.82 FEET; NORTH 77ô42' WEST, 114.23 FEET; NORTH 62ô24' WEST, 118.52 FEET TO A POINT ON THE WEST LINE OF THE NORTHEAST QUARTER OF SAID SECTION 34; THENCE NORTH 0ô04' WEST, ALONG THE SAID WEST LINE OF THE NORTHEAST QUARTER, 11.00 FEET TO THE TRUE POINT OF BEGINNING;

EXCEPTING THEREFROM THAT PORTION CONVEYED TO THE STATE DEPARTMENT OF HIGHWAYS DIVISION OF HIGHWAYS, STATE OF COLORADO BY DEED RECORDED FEBRUARY 8, 1983 UNDER RECEPTION NO. 532304.

GENERAL NOTES

1) ACCESS TO THE PROPERTY IS OBTAINED DIRECTLY VIA ARAPAHOE ROAD AND HWY 287.

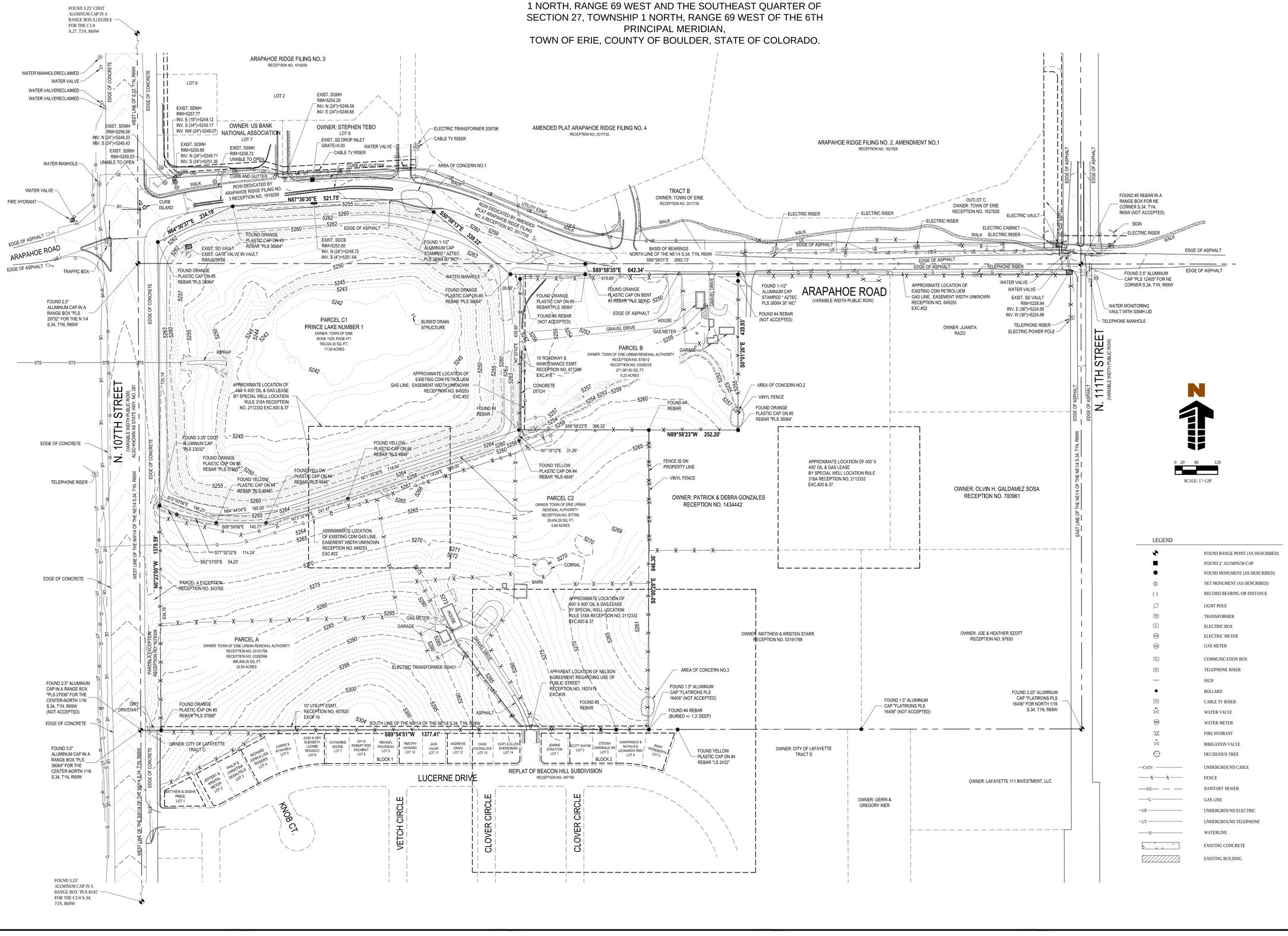
2) FIELD WORK WAS COMPLETED ON: MAY 1, 2016.

3) BASIS OF BEARING: BEARINGS ARE BASED ON THE NORTH LINE OF THE NORTHEAST QUARTER OF SECTION 34 AND MONUMENTED ON THE WEST BY A 2.5" ALUMINUM CAP STAMPED "PLS29752" IN A RANGE BOX FOR THE N 1/4 CORNER AND MONUMENTED ON THE EAST BY A 2.5" ALUMINUM CAP STAMPED "PLS12405" FOR THE NE CORNER AND IS ASSUMED TO BEAR S 89ô30'01" E.

4) UTILITY NOTE: THE LOCATION OF UTILITIES SHOWN HEREON WAS ESTABLISHED FROM SURFACE EVIDENCE, EXISTING UTILITY MARKERS AND UTILITY LOCATES FROM A UTILITY CONTRACTOR. THE EXACT LOCATION OF BURIED UTILITIES IS UNCERTAIN. PRIOR TO ANY EXCAVATION THE CONTRACTOR SHOULD CONTACT THE UTILITY NOTIFICATION CENTER

ALTA/NSPS LAND TITLE SURVEY

PORTION OF THE NORTHEAST QUARTER OF SECTION 34, TOWNSHIP 1 NORTH, RANGE 69 WEST AND THE SOUTHEAST QUARTER OF SECTION 27, TOWNSHIP 1 NORTH, RANGE 69 WEST OF THE 6TH PRINCIPAL MERIDIAN,
TOWN OF ERIE, COUNTY OF BOULDER, STATE OF COLORADO.



LEGEND

- FOUND RANGE POINT (AS DESCRIBED)
- FOUND 2" ALUMINUM CAP
- FOUND MONUMENT (AS DESCRIBED)
- SET MONUMENT (AS DESCRIBED)
- ( ) RECORD BEARING OR DISTANCE
- LIGHT POLE
- TRANSFORMER
- ELECTRIC BOX
- ELECTRIC METER
- GAS METER
- COMMUNICATION BOX
- TELEPHONE RISER
- SIGN
- BOLLARD
- CABLE TV RISER
- WATER VALVE
- WATER METER
- FIRE HYDRANT
- IRRIGATION VALVE
- DECIDUOUS TREE
- CATV — UNDERGROUND CABLE
- X — X — FENCE
- SS — SANITARY SEWER
- G — GAS LINE
- UE — UNDERGROUND ELECTRIC
- UT — UNDERGROUND TELEPHONE
- W — WATERLINE
- EXISTING CONCRETE
- EXISTING BUILDING

Galloway
Planning. Architecture. Engineering.
6162 S. Willow Drive, Suite 320
Greenwood Village, CO 80111
303.770.8884 O
www.gallowayUS.com

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#	Date	Issue / Description	Init.

ALTA/NSPS LAND TITLE SURVEY
EVERGREEN DEVCO INC

TOWN OF ERIE PARCELS
TOWN OF ERIE, COUNTY OF BOULDER, COLORADO

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Project No:	EDI000018
Drawn By:	TJK
Checked By:	BJD
Date:	MAY 12, 2016

ALTA/NSPS LAND TITLE SURVEY

SHEET
2 OF 2

Appendix B
Hydrologic Calculations

CUHP

CUHP SUBCATCHMENTS

Columns with this color heading are for required user-input
Columns with this color heading are for optional override values
Columns with this color heading are for program-calculated values

								Maximum Depression Storage (Watershed inches)		Horton's Infiltration Parameters			DCIA
Subcatchment Name	EPA SWMM Target Node	Raingage	Area (mi^2)	Length to Centroid (mi)	Length (mi)	Slope (ft/ft)	Percent Imperviousness	Pervious	Impervious	Initial Rate (in/hr)	Decay Coefficient (1/seconds)	Final Rate (in/hr)	Level 0, 1, or 2
200	200	100-Year, 1-Hour	0.151	0.239	0.481	0.026	55	0.38	0.1	4.5	0.0018	0.6	0

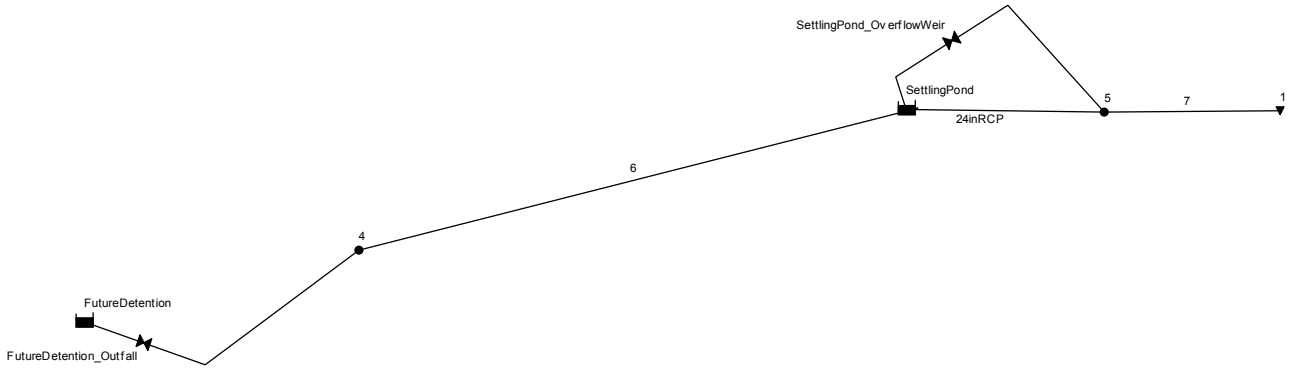
Printouts for Storm Hydrographs

flow in cfs

time in minutes	200
5	0.00
10	0.93
15	16.88
20	44.13
25	103.42
30	266.46
35	331.32
40	307.07
45	269.08
50	230.42
55	190.90
60	164.73
65	145.62
70	114.34
75	85.13
80	59.97
85	43.77
90	33.85
95	27.73
100	23.50
105	20.71
110	18.78
115	17.71
120	17.37
125	13.02
130	8.89
135	6.12
140	4.11
145	2.67
150	1.76
155	1.03
160	0.50
165	0.15
170	0.00

Appendix C
Hydraulic Calculations

EPA SWMM


SettlingPond_OverflowWeir
SettlingPond
24inRCP
5
7
1
6
4
FutureDetention
FutureDetention_Outfall

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.010)

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... CFS
Process Models:
  Rainfall/Runoff ..... NO
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... NO
  Water Quality ..... NO
Flow Routing Method ..... DYNWAVE
Starting Date SEP-21-2016 00:00:00
Ending Date SEP-21-2016 12:00:00
Antecedent Dry Days 0.0
Report Time Step 00:05:00
Routing Time Step ..... 10.00 sec
Variable Time Step ..... YES
Maximum Trials 8
Number of Threads 1
Head Tolerance ..... 0.005000 ft

**********	Volume	Volume
Flow Routing Continuity	acre-feet	10^6 gal
**********	---	---
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.000	0.000

Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	17.690	5.764
External Outflow	16.088	5.242
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	1.603	0.522
Continuity Error (%)	-0.004	

****
Time-Step Critical Elements
****
Link 6 (50.28%)

****
Highest Flow Instability Indexes
****
Link FutureDetention_Outfall (17)

****
Routing Time Step Summary
****

Minimum Time Step	:	0.48 sec
Average Time Step	:	8.16 sec
Maximum Time Step	:	10.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	2.00
Percent Not Converging	:	0.00

****
Node Depth Summary
****

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min	Reported Max Depth Feet
4	JUNCTION	1.01	2.79	5263.29	0 01:15	2.79
5	JUNCTION	0.88	1.20	5247.10	0 03:39	1.20
1	OUTFALL	0.87	1.20	5243.10	0 03:39	1.20
SettlingPond	STORAGE	2.69	4.53	5258.13	0 03:39	4.53
FutureDetention	STORAGE	1.57	4.47	5264.97	0 01:15	4.47

****
Node Inflow Summary
****

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
4	JUNCTION	0.00	84.86	0 01:15	0	5.76	0.001
5	JUNCTION	0.00	28.23	0 03:39	0	5.24	0.025
1	OUTFALL	0.00	28.23	0 03:39	0	5.24	0.000
SettlingPond	STORAGE	0.00	84.86	0 01:15	0	5.76	0.056
FutureDetention	STORAGE	331.30	331.30	0 00:35	5.77	5.76	0.000

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Feet	Min. Depth Below Rim Feet
FutureDetention	STORAGE	0.92	0.469	0.531

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 ft3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 ft3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS
SettlingPond	245.020	37	0	0	442.200	67	0 03:39	28.23
FutureDetention	122.129	21	0	0	476.990	83	0 01:15	84.86

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
1	98.79	17.10	28.23	5.242
System	98.79	17.10	28.23	5.242

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth
6	CONDUIT	84.86	0 01:15	9.06	0.84	0.70
7	CONDUIT	28.23	0 03:39	8.88	0.20	0.30
24inRCP	CONDUIT	28.23	0 03:39	9.74	0.89	0.87
FutureDetention_Outfall	ORIFICE	84.86	0 01:15			1.00
SettlingPond_OverflowWeir	WEIR	0.00	0 00:00			0.00

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
6	1.00	0.04	0.00	0.00	0.00	0.00	0.00	0.96	0.00	0.00
7	1.00	0.01	0.00	0.00	0.01	0.99	0.00	0.00	0.38	0.00
24inRCP	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.99	0.00	0.98

****
Conduit Surcharge Summary
****

Conduit	Hours Full: Both Ends	Upstream	Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
24inRCP	0.01	7.10	0.01	0.01	0.01

Analysis begun on: Thu Oct 06 15:56:39 2016
Analysis ended on: Thu Oct 06 15:56:39 2016
Total elapsed time: < 1 sec

Bentley StormCAD V8i

Nine Mile Corner
Bentley StormCAD v8.1 Output

100-Year Storm Event

Date: 4/27/2017

Start Node (In)	Stop Node (Out)	Length (ft)	Diameter (ft)	Flow (cfs)	Velocity (ft/s)	Invert (Start) (ft)	Elevation Ground (Start) (ft)	Invert (Stop) (ft)	Elevation Ground (Stop) (ft)	Slope (Calculated) (ft/ft)	System CA (acres)	System Intensity (in/h)	System Rational Flow (cfs)
Storm Drain A													
O-1	Structure - 210	Proposed Open Channel											
Structure - 209	Structure - 210	494.60	48	99.1	15.3	5234.04	5246.71	5225.38	5233.09	0.017	6.89	3.91	*N/A*
Structure - 208	Structure - 209	161.54	48	99.3	7.9	5235.37	5252.11	5234.24	5246.71	0.007	6.89	3.94	*N/A*
Structure - 207	Structure - 208	276.94	42	86.7	9.0	5237.81	5255.51	5235.87	5252.11	0.007	6.89	3.98	*N/A*
Structure - 206	Structure - 207	312.28	42	87.1	9.1	5240.20	5260.00	5238.01	5255.51	0.007	6.89	4.03	*N/A*
Structure - 205	Structure - 206	68.66	36	56.2	8.0	5241.17	5260.67	5240.70	5260.00	0.007	6.89	4.04	*N/A*
Structure - 204	Structure - 205	372.87	36	56.7	8.0	5243.99	5259.12	5241.37	5260.67	0.007	6.89	4.10	*N/A*
Structure - 203	Structure - 204	371.92	36	57.1	8.1	5246.79	5258.24	5244.19	5259.12	0.007	6.89	4.16	*N/A*
Structure - 202	Structure - 203	157.49	36	57.3	8.1	5248.09	5260.33	5246.99	5258.24	0.007	6.89	4.19	*N/A*
Structure - 201	Structure - 202	193.10	30	28.2	5.7	5250.50	5262.22	5249.15	5260.33	0.007	0.00	9.40	*N/A*

		HGL and EGL Results[1,2]							
Column Number→		1	2	3	4	5	6	7	8
Start Node (In)	Stop Node (Out)	Pipe Hydraulic Grade Line (In) (ft)	Pipe Hydraulic Grade Line (Out) (ft)	Pipe Energy Grade Line (In) (ft)	Pipe Energy Grade Line (Out) (ft)	Downstream Structure Hydraulic Grade Line (In) (ft)	Downstream Structure Hydraulic Grade Line (Out) (ft)	Downstream Structure Energy Grade Line (In) (ft)	Downstream Structure Energy Grade Line (Out) (ft)
Storm Drain A									
O-1	Structure - 210	Proposed Open Channel							
Structure - 209	Structure - 210	5237.05	5230.80	5238.53	5231.76	5230.41	5227.79	5230.61	5227.98
Structure - 208	Structure - 209	5240.46	5239.69	5241.43	5240.66	5238.80	5237.05	5240.27	5238.53
Structure - 207	Structure - 208	5243.32	5241.26	5244.58	5242.52	5241.05	5240.46	5242.02	5241.43
Structure - 206	Structure - 207	5246.41	5244.07	5247.68	5245.35	5243.57	5243.32	5244.84	5244.58
Structure - 205	Structure - 206	5248.33	5247.84	5249.32	5248.83	5247.16	5246.41	5248.43	5247.68
Structure - 204	Structure - 205	5252.07	5249.38	5253.07	5250.38	5248.99	5248.33	5249.98	5249.32
Structure - 203	Structure - 204	5255.38	5252.66	5256.40	5253.67	5252.27	5252.07	5253.27	5253.07
Structure - 202	Structure - 203	5257.63	5256.46	5258.65	5257.48	5256.06	5255.38	5257.08	5256.40
Structure - 201	Structure - 202	5259.60	5258.69	5260.11	5259.20	5257.98	5257.63	5259.00	5258.65

Notes:
1. Headloss Method: HEC-22 Energy (Third Edition)
2. Results show entrance and structure losses (e.g., **entrance loss** at SDMH A2 = column 2 - column 5, **structure loss** = column 5 - column 6, **total loss** = entrance loss + structure loss)

Full Spectrum Detention

Detention Pond
Stage-Storage Calculations

Project: Nine Mile Corner
Project Location: Erie, Colorado
Calculations By: H. Feissner
Pond Description: Commercial Area

Date: 4/27/2017

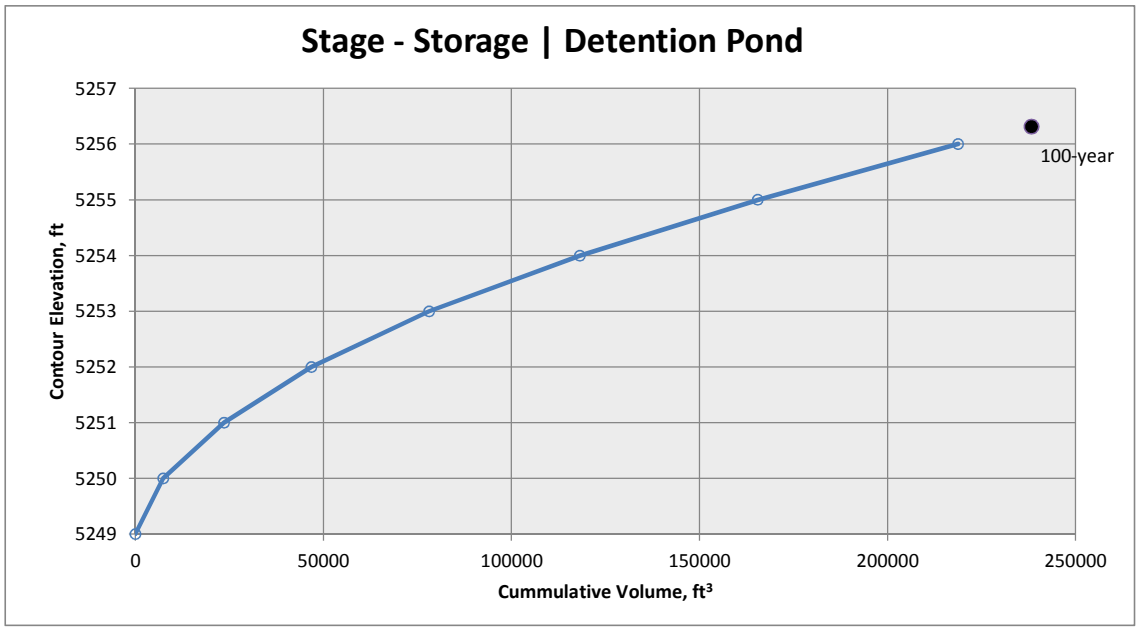
User Input Cell: Blue Text

Design Storm Required Volume, ft^3	Required Volume, ac-ft	Water Surface Elevation, ft
Design Point: Outfall		
Design Storm: **WQCV**		
Required Volume: 35414 ft^3	0.813	5251.51
Design Storm: **EURV**		
Required Volume: 122229 ft^3	2.806	5254.08
Design Storm: **100-year**		
Required Volume: 238229.6 ft^3	5.469	5256.32

Average End Area Method: $V = \frac{1}{2} H (A_1 + A_2)$

Conic Volume Method: $V = \frac{1}{3} H \left(A_1 + A_2 + \sqrt{A_1 \times A_2} \right)$

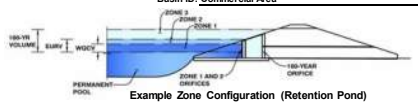
Contour Elevation	Contour Area	Depth	Incremental Volume	Cummulative Volume	Incremental Volume	Cummulative Volume	Cummulative Volume
ft	ft^2	ft	ft^3	ft^3	ft^3	ft^3	ac-ft
5249.00	3141	0.0	0	0	0	0	
5250.00	12778	1.0	7959	7959	7418	7418	0.2
5251.00	19785	1.0	16282	24241	16154	23572	0.5
5252.00	26831	1.0	23308	47549	23219	46791	1.1
5253.00	35984	1.0	31407	78957	31296	78087	1.8
5254.00	44463	1.0	40223	119180	40149	118235	2.7
5255.00	50205	1.0	47334	166514	47305	165540	3.8
5256.00	56348	1.0	53277	219790	53247	218787	5.0
5257.00	65974	1.0	61161	280951	61098	279885	6.4



DETENTION BASIN STAGE-STORAGE TABLE BUILDER

Project: EDI000018 | Nine Mile Corner

Basin ID: Commercial Area



Example Zone Configuration (Retention Pond)

Required Volume Calculation

Selected BMP Type =	EDB		
Watershed Area =	36.3	acres	
Watershed Length =	1,435	ft	
Watershed Slope =	0.010	ft/ft	
Watershed Imperviousness =	75%	percent	
Percentage Hydrologic Soil Group A =	0.0%	percent	
Percentage Hydrologic Soil Group B =	100%	percent	
Percentage Hydrologic Soil Groups C/D =	0.0%	percent	
Desired WQCV Drain Time =	40.0	hours	
Location for 1-hr Rainfall Depths =	UDFCD Default		
Water Quality Capture Volume (WQCV) =	0.905	acre-feet	
Excess Urban Runoff Volume (EURV) =	3.002	acre-feet	
2-yr Runoff Volume (P1 = 0.95 in.) =	2.064	acre-feet	
5-yr Runoff Volume (P1 = 1.34 in.) =	3.145	acre-feet	
10-yr Runoff Volume (P1 = 1.64 in.) =	4.028	acre-feet	
25-yr Runoff Volume (P1 = 2.02 in.) =	5.291	acre-feet	
50-yr Runoff Volume (P1 = 2.32 in.) =	6.286	acre-feet	
100-yr Runoff Volume (P1 = 2.61 in.) =	7.309	acre-feet	
500-yr Runoff Volume (P1 = 3.29 in.) =	9.541	acre-feet	
Approximate 2-yr Detention Volume =	1.960	acre-feet	
Approximate 5-yr Detention Volume =	2.987	acre-feet	
Approximate 10-yr Detention Volume =	3.440	acre-feet	
Approximate 25-yr Detention Volume =	3.824	acre-feet	
Approximate 50-yr Detention Volume =	4.161	acre-feet	
Approximate 100-yr Detention Volume =	4.749	acre-feet	

Optional User Input 1-hr Precipitation

	inches
	inches
	inches
	inches
	inches
	inches

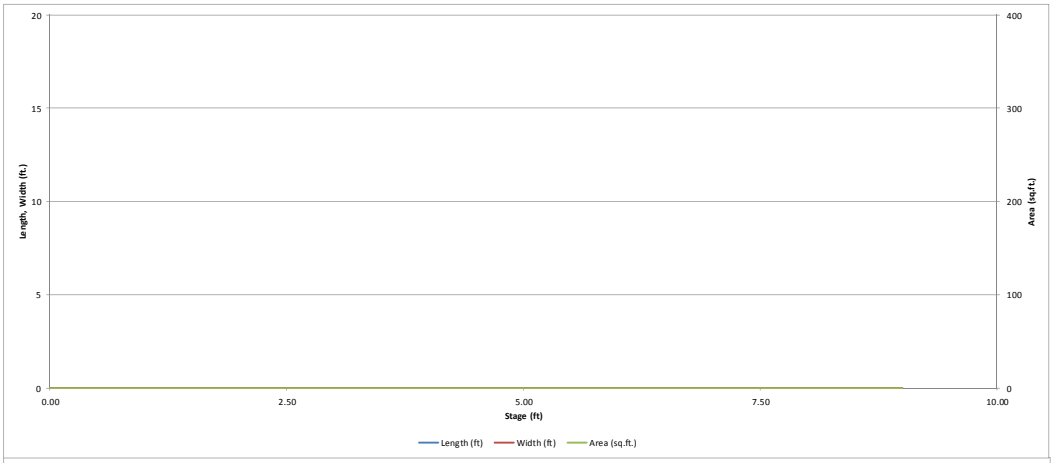
Stage-Storage Calculation

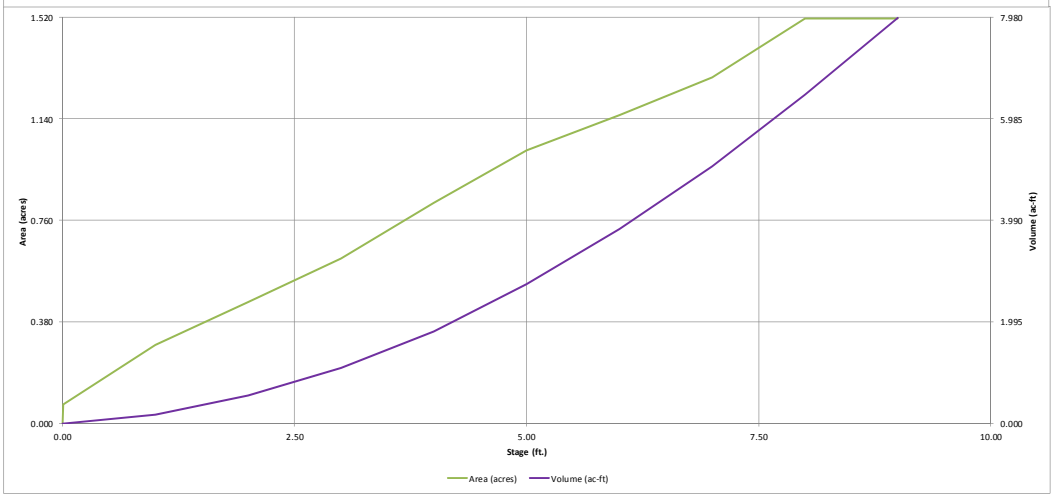
Zone 1 Volume (WQCV) =	0.905	acre-feet
Zone 2 Volume (EURV - Zone 1) =	2.097	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	1.747	acre-feet
Total Detention Basin Volume =	4.749	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	ft^2
Volume of Basin Floor (V_{FLOOR}) =	user	ft^3
Depth of Main Basin (H_{MAIN}) =	user	ft
Length of Main Basin (L_{MAIN}) =	user	ft
Width of Main Basin (W_{MAIN}) =	user	ft
Area of Main Basin (A_{MAIN}) =	user	ft^2
Volume of Main Basin (V_{MAIN}) =	user	ft^3
Calculated Total Basin Volume (V_{total}) =	**user**	acre-feet

Depth Increment = ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Micropool	--	0.00	--	--	--	0	0.000		
	--	0.01	--	--	--	3,141	0.072	10	0.0
	--	1.00	--	--	--	12,778	0.293	7,763	0.2
	--	2.00	--	--	--	19,785	0.454	23,974	0.6
	--	3.00	--	--	--	26,831	0.616	47,480	1.1
	--	4.00	--	--	--	35,984	0.826	78,887	1.8
	--	5.00	--	--	--	44,463	1.021	119,111	2.7
	--	6.00	--	--	--	50,205	1.153	166,445	3.8
	--	7.00	--	--	--	56,348	1.294	219,721	5.0
	--	8.00	--	--	--	65,974	1.515	280,882	6.4
	--	9.00	--	--	--	65,974	1.515	346,856	7.96

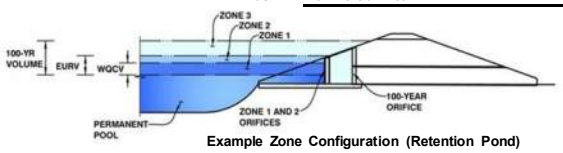
DETENTION BASIN STAGE-STORAGE TABLE BUILDER





Detention Basin Outlet Structure Design

Project: EDI0018 | Erie - Nine Mile Corner
Basin ID: Commercial Area



Example Zone Configuration (Retention Pond)

	Stage (ft)	Zone Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.69	0.905	Orifice Plate
Zone 2 (EURV)	5.26	2.097	Orifice Plate
Zone 3 (100-year)	6.77	1.747	Weir&Pipe (Circular)
		4.749	Total

User Input: Orifice at Underdrain Outlet (typically used to drain WQCV in a Filtration BMP)

Underdrain Orifice Invert Depth =	N/A	ft (distance below the filtration media surface)	
Underdrain Orifice Diameter =	N/A	inches	

Calculated Parameters for Underdrain

Underdrain Orifice Area =	N/A	ft^2
Underdrain Orifice Centroid =	N/A	feet

User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WQCV and/or EURV in a sedimentation BMP)

Invert of Lowest Orifice =	0.00	ft (relative to bottom of basin at Stage = 0 ft)
Depth at top of Zone using Orifice Plate =	5.47	ft (relative to bottom of basin at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	21.90	inches
Orifice Plate: Orifice Area per Row =	8.54	sq. inches (use rectangular openings)

Calculated Parameters for Plate

WQ Orifice Area per Row =	5.931E-02	ft^2
Elliptical Half-Width =	N/A	feet
Elliptical Slot Centroid =	N/A	feet
Elliptical Slot Area =	N/A	ft^2

User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	1.82	3.65					
Orifice Area (sq. inches)	8.54	8.54	8.54					

	Row 9 (optional)	Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)
Stage of Orifice Centroid (ft)								
Orifice Area (sq. inches)								

User Input: Vertical Orifice (Circular or Rectangular)

	Not Selected	Not Selected	
Invert of Vertical Orifice =	N/A	N/A	ft (relative to bottom of basin at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =	N/A	N/A	ft (relative to bottom of basin at Stage = 0 ft)
Vertical Orifice Diameter =	N/A	N/A	inches

Calculated Parameters for Vertical Orifice

	Not Selected	Not Selected	
Vertical Orifice Area =	N/A	N/A	ft^2
Vertical Orifice Centroid =	N/A	N/A	feet

User Input: Overflow Weir (Dropbox) and Grate (Flat or Sloped)

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	5.47	N/A	ft (relative to bottom of basin at Stage = 0 ft)
Overflow Weir Front Edge Length =	4.00	N/A	feet
Overflow Weir Slope =	4.00	N/A	H:V (enter zero for flat grate)
Horiz. Length of Weir Sides =	6.00	N/A	feet
Overflow Grate Open Area % =	70%	N/A	%, grate open area / total area
Debris Clogging % =	50%	N/A	%

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected	
Height of Grate Upper Edge, H_t =	6.97	N/A	feet
Over Flow Weir Slope Length =	6.18	N/A	feet
Grate Open Area / 100-yr Orifice Area =	6.84	N/A	should be ≥ 4
Overflow Grate Open Area w/o Debris =	17.32	N/A	ft^2
Overflow Grate Open Area with Debris =	8.66	N/A	ft^2

User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)

	Zone 3 Circular	Not Selected	
Depth to Invert of Outlet Pipe =	0.00	N/A	ft (distance below bottom of basin at Stage = 0 ft)
Circular Orifice Diameter =	21.55	N/A	inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Circular	Not Selected	
Outlet Orifice Area =	2.53	N/A	ft^2
Outlet Orifice Centroid =	0.90	N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	N/A	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	7.35	ft (relative to bottom of basin at Stage = 0 ft)
Spillway Crest Length =	56	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	0.50	feet

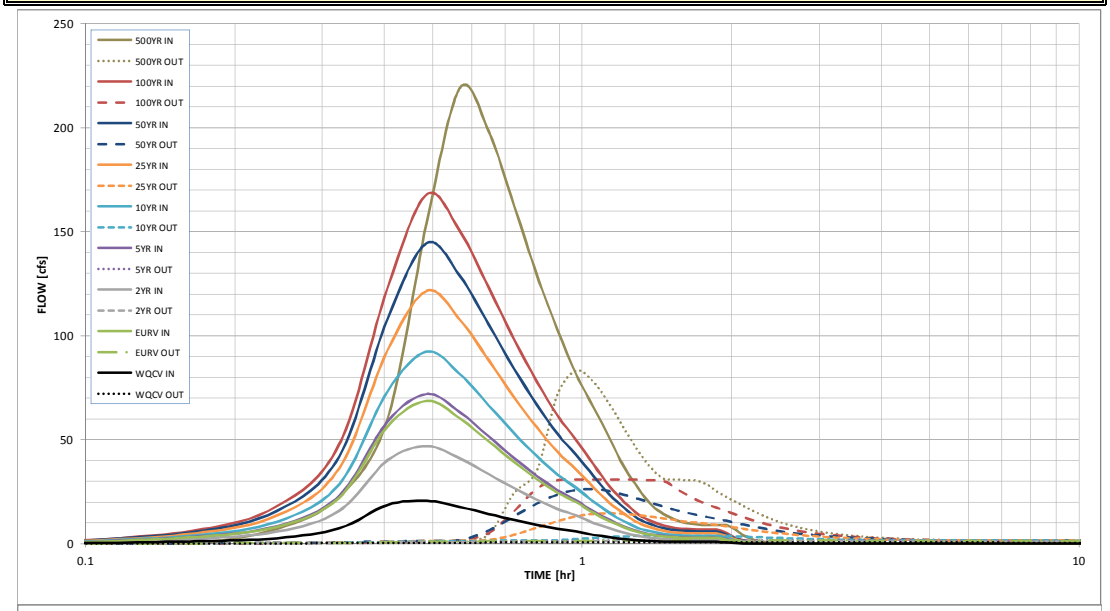
Calculated Parameters for Spillway

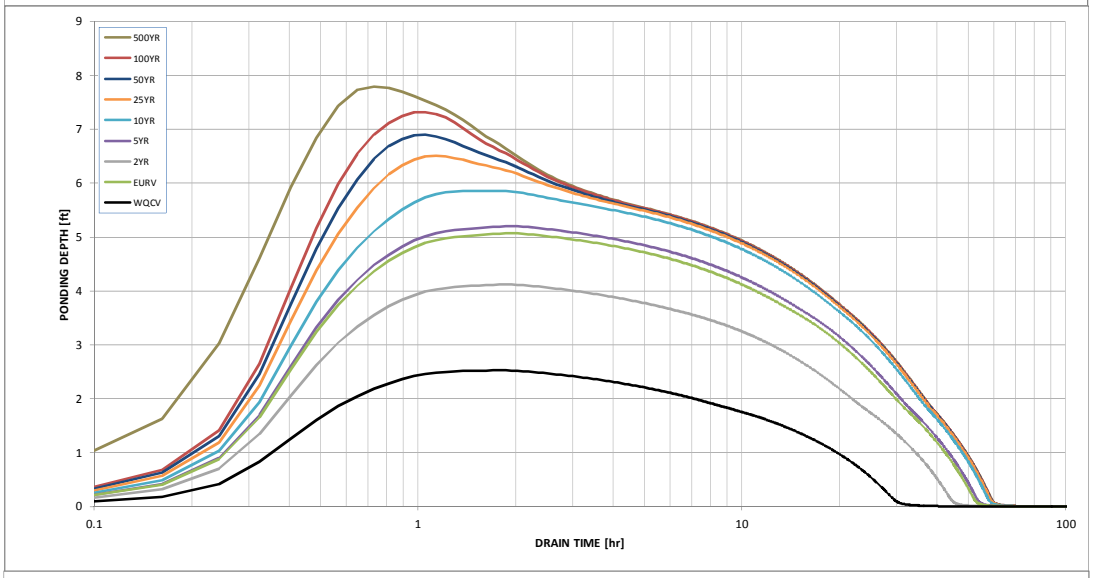
Spillway Design Flow Depth=	0.96	feet
Stage at Top of Freeboard =	8.81	feet
Basin Area at Top of Freeboard =	1.51	acres

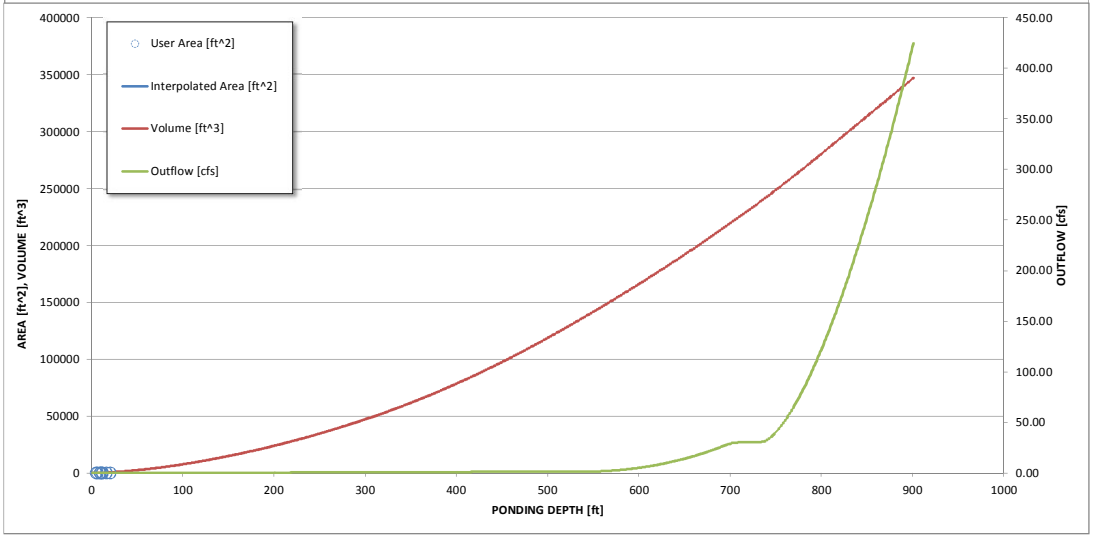
Routed Hydrograph Results

Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	0.53	1.07	0.95	1.34	1.64	2.02	2.32	2.61	3.29
Calculated Runoff Volume (acre-ft) =	0.905	3.002	2.064	3.145	4.028	5.291	6.286	7.309	9.541
OPTIONAL Override Runoff Volume (acre-ft) =									
Inflow Hydrograph Volume (acre-ft) =	0.904	3.002	2.064	3.145	4.027	5.290	6.285	7.301	9.539
Predevelopment Unit Peak Flow, q (cfs/acre) =	0.00	0.00	0.01	0.17	0.35	0.80	1.03	1.32	1.87
Predevelopment Peak Q (cfs) =	0.0	0.0	0.4	6.3	12.6	28.9	37.4	47.9	67.8
Peak Inflow Q (cfs) =	20.6	68.6	46.9	71.9	92.3	121.5	144.5	167.9	219.1
Peak Outflow Q (cfs) =	0.7	1.5	1.2	1.5	3.8	14.7	26.2	30.9	83.2
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.2	0.3	0.5	0.7	0.6	1.2
Structure Controlling Flow =	Plate	Plate	Plate	Plate	Overflow Grate 1	Overflow Grate 1	Overflow Grate 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	0.1	0.7	1.4	1.7	1.7
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	34	53	46	54	58	58	58	58	58
Time to Drain 99% of Inflow Volume (hours) =	**40**	56	50	57	60	61	60	60	60
Maximum Ponding Depth (ft) =	2.53	5.07	4.12	5.20	5.86	6.51	6.90	7.32	7.80
Area at Maximum Ponding Depth (acres) =	0.54	1.03	0.85	1.05	1.13	1.22	1.28	1.36	1.47
Maximum Volume Stored (acre-ft) =	0.813	2.806	1.903	2.941	3.661	4.415	4.903	5.469	6.135

Detention Basin Outlet Structure Design







Detention Basin Outlet Structure Design

Outflow Hydrograph Workbook Filename:

Storm Inflow Hydrographs

The user can override the calculated inflow hydrographs from this workbook with inflow hydrographs developed in a separate program.

Time Interval	SOURCE	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK
	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
4.87 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:04:52	0.04	0.10	0.07	0.10	0.12	0.15	0.17	0.19	0.23
Hydrograph	0:09:44	1.08	3.03	2.23	3.14	3.81	4.68	5.31	5.92	7.13
Constant	0:14:36	2.68	8.15	5.78	8.51	10.63	13.55	15.78	17.99	22.67
1.028	0:19:28	7.38	22.11	15.81	23.04	28.61	36.22	41.98	47.68	59.72
	0:24:20	18.61	56.25	40.05	58.64	73.04	92.80	107.82	122.72	154.24
	0:29:12	20.64	68.61	46.94	71.92	92.34	121.51	144.48	167.87	219.14
	0:34:04	17.66	60.20	40.96	63.14	81.45	107.80	128.71	150.19	198.27
	0:38:56	14.29	49.14	33.41	51.56	66.56	88.21	105.41	123.10	162.52
	0:43:48	11.45	39.27	26.73	41.19	53.14	70.37	84.07	98.13	129.30
	0:48:39	9.01	31.08	21.12	32.61	42.12	55.87	66.82	78.06	103.01
	0:53:31	7.14	24.57	16.72	25.77	33.27	44.14	52.79	61.67	81.40
	0:58:23	5.87	19.87	13.59	20.83	26.84	35.62	42.60	49.77	65.68
	1:03:15	4.23	14.79	9.98	15.53	20.19	27.02	32.49	38.13	50.74
	1:08:07	3.17	10.93	7.43	11.47	14.81	19.69	23.58	27.59	36.56
	1:12:59	2.21	7.77	5.24	8.16	10.61	14.20	17.07	20.04	26.65
	1:17:51	1.60	5.53	3.76	5.81	7.51	9.99	11.98	14.02	18.58
	1:22:43	1.24	4.28	2.91	4.49	5.80	7.70	9.23	10.79	14.26
	1:27:35	1.02	3.46	2.37	3.63	4.68	6.20	7.42	8.66	11.42
	1:32:27	0.90	3.03	2.08	3.17	4.08	5.39	6.43	7.50	9.87
	1:37:19	0.86	2.89	1.98	3.02	3.88	5.10	6.07	7.06	9.25
	1:42:11	0.85	2.81	1.94	2.95	3.78	4.97	5.91	6.87	8.98
	1:47:03	0.85	2.82	1.94	2.95	3.78	4.96	5.89	6.85	8.94
	1:51:55	0.85	2.82	1.94	2.95	3.78	4.96	5.89	6.85	8.94
	1:56:47	0.55	1.99	1.32	2.09	2.74	3.69	4.46	5.25	7.03
	2:01:39	0.32	1.16	0.78	1.22	1.59	2.13	2.57	3.03	4.06
	2:06:31	0.18	0.67	0.45	0.70	0.92	1.24	1.50	1.77	2.37
	2:11:23	0.10	0.36	0.24	0.38	0.50	0.67	0.81	0.95	1.28
	2:16:15	0.05	0.18	0.12	0.19	0.25	0.34	0.42	0.50	0.67
	2:21:07	0.01	0.06	0.04	0.06	0.08	0.12	0.15	0.18	0.26
	2:25:58	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.03
	2:30:50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2:35:42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2:40:34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2:45:26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2:50:18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2:55:10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:00:02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:04:54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:09:46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:14:38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:19:30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:24:22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:29:14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:34:06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:38:58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:43:50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:48:42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:53:34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:58:26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:03:17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:08:09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:13:01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:17:53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:22:45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:27:37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:32:29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:37:21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:42:13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:47:05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:51:57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:56:49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:01:41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:06:33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:11:25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:16:17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:21:09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:26:01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:30:53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:35:44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:40:36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:45:28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:50:20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Bentley FlowMaster

Existing Channel | West of 111th Street

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.02000	ft/ft
Normal Depth	1.50	ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)

Results

Discharge	43.71	ft^3/s
Flow Area	9.00	ft^2
Wetted Perimeter	12.37	ft
Hydraulic Radius	0.73	ft
Top Width	12.00	ft
Critical Depth	1.49	ft
Critical Slope	0.02049	ft/ft
Velocity	4.86	ft/s
Velocity Head	0.37	ft
Specific Energy	1.87	ft
Froude Number	0.99	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.50	ft
Critical Depth	1.49	ft
Channel Slope	0.02000	ft/ft
Critical Slope	0.02049	ft/ft

Existing Channel | West of 111th Street

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.02000	ft/ft
Normal Depth	2.00	ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)

Results

Discharge	94.14	ft^3/s
Flow Area	16.00	ft^2
Wetted Perimeter	16.49	ft
Hydraulic Radius	0.97	ft
Top Width	16.00	ft
Critical Depth	2.03	ft
Critical Slope	0.01850	ft/ft
Velocity	5.88	ft/s
Velocity Head	0.54	ft
Specific Energy	2.54	ft
Froude Number	1.04	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.00	ft
Critical Depth	2.03	ft
Channel Slope	0.02000	ft/ft
Critical Slope	0.01850	ft/ft

Appendix D
Supporting Documentation

Love & Associates, Inc
Erie Outfall Systems Planning
Preliminary Design Erie and Adjacent Boulder and Weld County Areas
May 2001

BULLHEAD GULCH/PRINCE TRIBUTARY

BULLHEAD GULCH OFFSITE
SEE FIGURE: 3

NORTH 107TH STREET
NORTH 111TH STREET
NORTH 119TH STREET
NORTHEAST LINE ROAD
WELD COUNTY
BOULDER CO.
COAL CREEK
ARAPAHOE RD.
BASELINE ROAD

SCALE: 1"=1500'

MATCHLINE SEE FIGURE 2b

STUDY AREA BOUNDARY

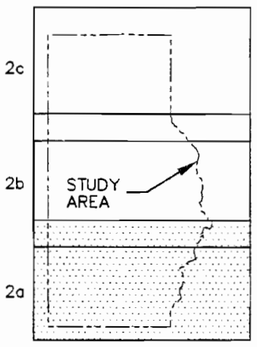
COAL CREEK TRIBUTARIES

COAL CREEK OFFSITE
SEE FIGURE: 3

LEGEND

- CATCHMENT I.D. — 800 / 80.5 CATCHMENT ACRE
- WATERSHED DIVIDE
- CATCHMENT BOUNDARY
- MINOR CATCHMENT BOUNDARY
- OUTFALL FLOW PATH
- STUDY AREA BOUNDARY
- DETENTION AREA — 2000
- UDSWM CHANNEL/PIPE ELEMENT — 2000
- OFFSITE CATCHMENT — 800 / SWMM CATCHMENT SOURCE
- DESIGN POINT/NODE — 902

SHEET INDEX



DATE: MAY 22, 2000
C:\PROJECTS\9922A\BASIN3.DWG

Love & Associates, Inc.
water resource consultants
841 Front Street
Louisville, Colorado 80027-1849
Phone: 303-673-9795
Fax: 303-673-9796

DESIGNED:	RJP
DRAWN:	DM
CHECKED:	DJL
DATE:	5-00

TOWN OF ERIE
URBAN DRAINAGE AND FLOOD CONTROL DISTRICT

ERIE AND ADJACENT AREAS
OUTFALL SYSTEMS PLANNING

CATCHMENT DELINEATION AND SWMM ELEMENTS IN THE STUDY AREA

Figure 2a
Page II - 3

Table 9. Design Point Flood Peaks, Future Percent Imperviousness (cont'd)

Coal Creek Tributaries Future Percent Imperviousness (con.)

525	27	91	130	172	324	398	132	43
526	5	21	34	69	197	355	183	45
528	4	12	19	24	45	57	36	15
529	27	97	147	194	364	442	314	46
530	20	78	155	240	580	717	464	47
531	27	97	181	276	674	843	561	46
532	34	116	198	300	731	924	625	46
534	31	106	156	202	355	423	95	78
536	39	134	199	258	456	543	126	78
538	75	254	378	499	1033	1295	778	53
917	72	225	345	480	1041	1310	857	53
918	13	42	63	84	165	206	120	30
539	20	64	97	128	239	290	120	49
919	32	103	154	204	376	454	177	56
920	6	20	32	41	73	85	34	29
540	15	47	70	93	180	223	88	42
541	26	90	142	197	408	494	270	43
921	32	108	170	237	490	598	338	41
922	1	2	3	4	10	15	30	2
923	1	3	4	5	10	15	48	2
924	1	3	5	7	13	18	59	2

Bullhead Gulch/Prince Tributary Future Percent Imperviousness

UDSWM Design Point	Peak Discharge (cfs) Flood Event 0.4-in	2-yr	5-yr	10-yr	50-yr	100-yr	Cumulative Area (ac)	Cumulative Percent Impervious
300	17	63	96	131	277	356	152	27
302	6	23	32	43	91	115	43	30
303	37	139	207	283	585	745	334	27
305	47	167	254	347	728	921	408	30
306	19	68	180	303	754	976	533	24
308	38	101	216	344	1038	1389	815	28
310	16	59	88	115	219	265	77	47
311	54	156	267	424	1203	1613	957	31
312	84	281	438	604	1465	1971	1290	33
313	90	300	464	636	1547	2080	1401	33
315	112	381	591	810	1774	2379	1615	34
320	1	2	11	30	118	165	122	2
321	1	5	15	40	166	237	222	2
322	110	486	1146	1747	3211	3967	281	3
323	108	474	1117	1706	3170	3925	368	6
317	201	690	1526	2341	4740	5998	1983	29
318	208	704	1556	2387	4837	6123	2136	29
319	206	699	1539	2365	4813	6097	2200	28
940	189	670	1470	2259	4631	5878	2300	27

Table 9. Design Point Flood Peaks, Future Percent Imperviousness (cont'd)

Boulder Creek Tributaries Future Percent Imperviousness

UDSWM Design Pnt.	Peak Discharge (cfs) 0.4-in	2-yr	5-yr	10-yr	50-yr	100-yr	Cumulative Area (ac)	Cumulative % Impervious
950	1	2	9	24	88	123	94	2
700	0	1	3	7	30	45	51	2
951	0	2	10	23	80	113	103	2
952	2	8	15	31	104	143	104	6
701	0	1	3	7	29	40	26	2
953	2	10	19	41	151	210	142	6
954	0	1	5	12	39	54	46	2
702	0	2	4	9	34	48	25	5
703	2	6	18	39	134	189	155	5
955	1	4	18	41	131	182	231	4
956	4	15	28	51	156	208	95	13
704	5	19	33	52	133	172	66	20
957	6	22	39	64	171	224	95	17
705	15	46	66	87	165	203	67	47
706	49	149	218	290	558	691	249	43
707	34	117	174	234	462	574	198	41
708	75	238	360	492	1019	1276	572	39
709	55	168	272	396	913	1178	719	35
710	52	162	267	394	913	1191	795	32
958	51	161	270	401	931	1216	840	30
959	1	4	11	21	57	76	52	9
750	0	13	318	581	1178	1455	1638	2
712	1	13	305	569	1196	1494	1774	2
713	3	16	332	629	1364	1717	2044	2
714	6	23	337	630	1375	1736	2121	3
960	5	20	332	622	1364	1726	2168	3
715	10	35	50	64	120	147	50	37
716	21	66	97	128	248	307	139	36
717	19	62	99	142	313	394	219	29
961	15	49	86	130	295	379	248	26
718	5	20	36	59	167	222	104	14
719	5	20	37	64	188	250	145	11
962	4	14	40	79	246	327	250	7
963	0	1	5	11	39	56	80	2
720	1	3	17	36	116	157	80	4
721	4	15	31	65	212	289	168	7
964	2	9	35	73	222	302	220	6
965	0	2	12	27	93	133	122	2
966	1	3	5	7	14	21	58	2
967	0	1	1	2	7	11	16	2
722	0	2	18	39	124	171	130	2
968	0	3	24	51	159	220	176	2
969	0	1	6	13	35	48	42	2
999	0	1	8	18	54	77	73	2

RESPEC Consulting & Services
Town of Erie Outfall Systems Plan (West of Coal Creek)
January 2014

Prince Tributary

Prince Tributary is a right bank tributary of Boulder Creek, Outfall 940. Bullhead Gulch is an offsite watershed that enters the west side of the study area. The interaction between Prince Tributary and Bullhead Gulch varies with the amount of flow carried by each drainageway. It is possible for flows in Prince Tributary to enter Bullhead Gulch and continue on down to outfall at Boulder Creek. It is also possible for flows in Prince Tributary to bypass the junction with Bullhead Gulch and be conveyed to an irrigation pond on the right bank of Boulder Creek just upstream of the confluence of Bullhead Gulch and Boulder Creek. For the purposes of this plan, Prince Tributary is considered to flow to the irrigation pond. There is currently no formal outfall from the irrigation pond to Boulder Creek.

Prince Tributary originates just to the east of Prince Lake #2, at the outlet of the detention pond located in the Arapahoe Ridge Filing 1 development. A portion of the City of Lafayette contributes to the Prince Tributary drainage.

From the Arapahoe Ridge development, Prince Tributary flows north through the planned Flatiron Meadows development, located south of Erie Parkway and east of N. 111th Street within the Town of Erie. Prince Tributary leaves the Town of Erie and enters unincorporated Boulder County and the Brownsville subdivision. Several properties within the Prince Tributary watershed are located within unincorporated Boulder County and are zoned as open space. A FEMA 100-year floodplain is designated for Prince Tributary. Prince Tributary was divided into six unique reaches for analysis.

Reach 1 – Boulder Creek to Jasper Road

Reach 1 is located in unincorporated Boulder County and is zoned entirely as open space. The Boulder and Weld County Ditch traverses west to east through the reach. A defined channel for Prince Tributary does not exist north of the Boulder and Weld County Ditch. This reach of Prince Tributary has a FEMA designated 100-year floodplain.

Reach 2 – Jasper Road to the Union Pacific Railroad

Reach 2 is also located in unincorporated Boulder County. A linear low flow channel exists from the Union Pacific Railroad downstream to Jasper Road. Downstream of Jasper Road, low flows from Prince Tributary are inadvertently intercepted by the Boulder and Weld County Ditch. This reach of Prince Tributary has a FEMA designated 100-year floodplain.



Jasper Road Crossing



Channel Downstream of Jasper Road

Reach 3 – Union Pacific Railroad to 320' upstream of Flatiron Drive

Reach 3 is located in unincorporated Boulder County and is comprised entirely of the Brownsville subdivision. The upstream limit of Reach 3 is the boundary between Boulder County and the Town of Erie. A defined low flow channel exists for Prince Tributary through this entire reach.



Channel Upstream of Flatiron Drive



Channel Upstream of Dobbins Run

Box culverts convey the drainage through two road crossings, Flatiron Drive and Dobbins Run



Dobbins Run Crossing



Flatiron Drive Crossing

The Lower Boulder Ditch traverses west to east through the reach. A 36" steel culvert conveys Prince Tributary beneath the Lower Boulder Ditch. This reach of Prince Tributary has a FEMA designated 100-year floodplain. Several residential structures are located within the 100-year floodplain.

Reach 4 – 320' upstream of Flatiron Drive to Erie Parkway



Low Flow Channel

Reach 4 is located in the Town of Erie. A defined low flow channel exists for Prince Tributary through the entire reach. Parcels located along the drainageway are zoned Rural Residential. A few large lot residential properties are currently located along the reach. An area of zoned open space is located just to the west of Prince Tributary. This reach of Prince Tributary has a FEMA designated 100-year floodplain.

Reach 5 –Erie Parkway to Walker Street (Arapahoe Ridge Subdivision)

Reach 5 is located in the Town of Erie. The reach is entirely undeveloped and is the future location of the Flatiron Meadows development. At the time of this report, initial overlot grading had begun in the northeast portion of the Flatiron Meadows development. Based on aerial photography, it appears a defined low flow channel exists for Prince Tributary through the reach. This reach of Prince Tributary has a FEMA designated 100-year floodplain.



Undeveloped Drainageway



New Development

Reach 6 –Walker Street (Arapahoe Ridge Subdivision) to Arapahoe Road (City of Lafayette boundary)

Reach 6 is located in the Town of Erie and extends to the boundary with the City of Lafayette at Arapahoe Road. The outfall alignment is located between Filings 1 and 2 of the Arapahoe Ridge subdivision.

A preliminary channel design was developed for this reach to convey stormwater flows north from Arapahoe Road along N. 111th Street to a point at the southwest corner of Prince Lake No. 2, which is located in unincorporated Boulder County. Prince Lake No. 2 is owned by Boulder County and is used for irrigation water supply.



Prince Lake No.2

3.0 HYDROLOGIC ANALYSIS

3.1 OVERVIEW

A detailed hydrologic analysis was performed for the study area to determine peak discharges for the 2-, 5-, 10-, 25-, 50- and 100-year storm frequencies for existing and future development conditions. The latest version of the CUHP computer program, CUHP 2005, Version 1.3.3, was used to estimate storm runoff hydrographs for the individual subbasins. EPA SWMM, Version 5.0.022, was used to route the hydrographs through the watershed. The UDFCD computer program CUHP/SWMM Converter, Version 1.3.2.36493, was used to convert previous versions of UDSWM to the current versions. This baseline hydrologic analysis updates the hydrologic analysis from the 2001 OSP.

3.2 UDSWM CONVERSION

RESPEC, in conjunction with the project sponsors, recommended that the effort used to develop the 2001 OSP hydrology be utilized, after review and QA/QC check. In order to utilize the 2001 OSP analysis, it was first necessary to convert the model files to the current versions of CUHP and SWMM. This was done with CUHP/SWMM Converter, Version 1.3.2.36493. RESPEC performed a thorough check of the converted input files to verify validity of the data.

The 2001 OSP hydrologic analysis utilized UDSWM to develop subbasin hydrographs and route them through the watershed to their outfall locations. CUHP was not used to develop the subbasin hydrographs in the 2001 OSP. CUHP was used to calibrate the UDSWM model based on five subbasins within the study area. Therefore, a new CUHP model was developed to generate the subbasin hydrographs based on the UDSWM model input. New CUHP input variables, not required by UDSWM, were also developed, including subbasin length and distance to subbasin centroid. All other UDSWM input was left unchanged for the conversion process.

EPA SWMM requires invert elevations for each node. UDSWM only requires a starting elevation and channel slopes from one node the next. In order to convert UDSWM to EPA SWMM, a starting outfall elevation must be assigned during the conversion process. The remaining upstream node elevations are assigned automatically by the converter program based on this outfall elevation and the conduit slopes of the UDSWM model (EPA SWMM terminology includes pipes and open channels as conduits). However, this method can result in erroneous node elevations, especially in the upper portions of the watershed. It was found that the 2001 OSP node elevations, once converted to EPA SWMM, were generally higher than actual elevations. Therefore, node elevations were revised for each node in the EPA SWMM model based on the 2-foot topographic mapping.

Once the 2001 OSP models were converted, differences were observed in the results. A detailed review was conducted to determine the source of differences between the 2001 OSP results produced using the older software versions and the results from the converted models. The 2001 OSP did not include a separate CUHP model; therefore it was not possible to compare the results for each individual subbasin. Peak flows were compared at all design points along the outfalls.

The updated CUHP/SWMM results were mixed, with some design points having lower peak flows than the 2001 OSP, and some higher. A complete summary of the conversion results is included in Table 3-2 at the end of this section.

It was found that several irregularly shaped, single basin outfalls, produced results significantly different than the 2001 OSP. These subbasins were compared to other subbasins with similar imperviousness by plotting the subbasin peak runoff versus subbasin area. However, no pattern emerged from this comparison. The discrepancies were attributed to the effects of model calculation changes between the software versions, UDSWM and CUHP.

3.3 CALIBRATION

Some of the improvements recommended in the 2001 OSP have been implemented throughout the study area, including regional detention ponds and channel improvements. These improvements were designed based upon the 2001 hydrologic analysis. Therefore, to avoid discrepancies in the study area hydrology due solely to revisions in software, an effort was made to calibrate the updated hydrologic models. Following the calibration process, the hydrologic model would be updated with physical changes in the watershed, including additional regional detention ponds built since the 2001 OSP, revised land use assumptions, and corresponding subbasin impervious values to create the baseline hydrologic analysis.

The calibration process was aimed at adjusting the revised 100-year peak discharges to within 10% of the effective peak discharges from the 2001 OSP. This was done by adjusting the Cp coefficient in CUHP. Through discussions with the project sponsors, it was determined that only three subbasins required calibration, Subbasins 212, 440, and 487. Calibration of these subbasins was required to reduce 100-year peak flows at design points 310, 511, and 539, respectively.

Peak flows at design points that were significantly less than the 2001 results were analyzed for errors, but were not calibrated up to meet the 2001 peak flows. Several smaller outfalls with peak flow differences greater than $\pm$10% were left uncalibrated based on several factors including: the subbasins are located entirely in planned open space, single subbasin outfalls with no proposed improvements, and peak flow discrepancies due to an irregular basin shape.

The calibrated hydrologic model was then updated with additional regional detention ponds built since the 2001 OSP, revised land use assumptions, and corresponding subbasin impervious values to create the baseline hydrologic analysis. This is summarized in the flowing sections.

Table 4-1
Existing Drainage Facilities

Street Name	Location	Street Classification	Structure	Outfall	Existing Capacity Culvert Only (cfs)	Existing Capacity Culvert Only (return period)	Existing Capacity with Allowable Overtopping (cfs)	Existing Capacity with Allowable Overtopping (return period)
Coal Creek Outfalls								
Flagg Drive	Just south of Baseline Road	Collector	43" x 68" HERCP	Drainageway 2 South	151	-	308	-
Baseline Road	Just east of County Line Road	Arterial	24" CMP	Drainageway 2 South	23	-	23	-
Briggs Street	700' north of Erie Parkway	Collector	6' x 10' RCBC	Briggs Street	615	100 yr	772	100 yr
County Line Road	Just north of Baseline Road	Arterial	30" CMP	Drainageway 2 South	34	< 2 yr	34	< 2 yr
County Line Road	740' north of Baseline Road	Arterial	18" RCP	Drainageway 2 North	16	-	16	-
County Line Road	620' north of Arapahoe Road	Arterial	18" RCP	Erie Farms 1	16	< 2 yr	16	< 2 yr
County Line Road	440' south of Austin Avenue	Arterial	35" x 107" RCBC[1]	Erie Commons 1	200	-	200	-
County Line Road	3,500' north of Erie Parkway	Arterial	3' x 10' RCBC x2	Briggs Street	516	100 yr	516	100 yr
N. 119th Street	Just north of Baseline Road	Arterial	18" CMP	Drainageway 2 South	11	-	11	-
N. 119th Street	250' north of Baseline Road	Arterial	24" RCP	Drainageway 2 South	29	< 2 yr	29	< 2 yr
N. 119th Street	1,650' north of Baseline Road	Arterial	24" RCP	Drainageway 2 North	29	10 yr	29	10 yr
N. 119th Street	2,240' south of Arapahoe Road	Arterial	24" RCP	Drainageway 1	29	2 yr	29	2 yr
N. 119th Street	Just north of Arapahoe Road	Arterial	19" x 30" HERCP	Erie Farms 1	26	10 yr	26	10 yr
N. 119th Street	1,700' north of Arapahoe Road	Arterial	18" RCP	Erie Farms 1	16	2 yr	16	2 yr
N. 119th Street	3,950' north of Arapahoe Road	Arterial	24" RCP	Erie Commons 2	33	-	33	-
N. 111th Street	1,030' north of Baseline Road	Collector	29" x 42" CMP Arch x4	Drainageway 2 South	194	< 2 yr	352	2 yr
Meller Street	480' south of Telleen Avenue	Collector	48" RCP	Briggs Street	166	-	324	-
U.S. Highway 287	900' north of Baseline Road	Freeway	36" RCP[1]	Drainageway 2 South	116	< 2 yr	116	< 2 yr
Prince Tributary Outfall								
Erie Parkway	470' east of N. 111th Street	Arterial	42" x 66" CMP Arch	Prince Tributary	132	< 2 yr	132	< 2 yr
Flatiron Drive	1,340' east of N. 109th Street	Local	41" x 82" RCBC	Prince Tributary	242	2 yr	677	5 yr
Lower Boulder Ditch	1,300' east of N. 109th Street	Ditch Crossing	36" Steel Culvert	Prince Tributary	51	-	N/A	-
Dobbins Run	930' east of N. 109th Street	Local	25" x 72" RCBC	Prince Tributary	92	-	527	-
Union Pacific Railroad	680' east of N. 109th Street	Railroad Crossing	24" x 150" RCBC	Prince Tributary	277	< 2 yr	277	< 2 yr
Jasper Road	1,000' east of N. 109th Street	Arterial	20" x 80" Opening	Prince Tributary	72	< 2 yr	72	< 2 yr
U.S. Highway 287	640' south of Arapahoe Road	Freeway	4' x 6' RCBC	Prince Tributary	281	-	281	-
Isabelle Road	Just east of U.S. Highway 287	Arterial	24" RCP[1]	Prince Tributary	33	2 yr	33	2 yr
Boulder Creek Outfalls								
Kenosha Road	1,020' east of N. 119th Street	Arterial	4' x 6' RCBC[1]	Baily Kenosha Ponds	194	10 yr	194	10 yr
Jasper Road	Just east of U.S. Highway 287	Arterial	24" CMP[1]	N. 109th Street	23	10 yr	23	10 yr
U.S. Highway 287	1,450' north of Lookout Road	Freeway	5' x 11' RCBC x2[1]	Crystal Views	1174	50 yr	1174	50 yr

[1] Approximate Size

Table 5-1
Alternative Pre-Screening Matrix

Coal Creek Outfalls		Drainageway 2 South		Drainageway 2 North	Drainageway 1		Arapahoe Road		Erie Farms 1		Erie Farms 2	Gold Run
Alternative Category	**Description**	*Reach 1*	*Reach 2*	*Reach 1*	*Reach 1*	*Reach 2*	*Reach 1*	*Reach 2*	*Reach 1*	*Reach 2*	*Reach 1*	*Reach 1*
1. 100-Year Storm Conveyance Without Regional Detention	Channel, storm sewer, and/or road crossing improvements to convey 100-year storm event	✓	✓	✓	✓		✓		✓			✓
2. Regional Detention with 100-Year Storm Conveyance	Regional detention facilities in combination with stormwater improvements to convey 100-year storm event	✓	✓		✓		✓		✓			✓
3. Optimization of Stormwater Facilities, Convey Minor Storm	Improvements to existing stormwater facilities to convey the largest storm event possible	✓	✓	✓								
4. Channel Stability	Improvements to address channel instability issues including channel bank erosion and sediment deposition											
5. Water Quality - Excess Urban Runoff Volume (EURV)	Provide the Excess Urban Runoff Volume (EURV) only		✓		✓		✓		✓			✓
6. Non-Structural Measures	Acquisition of flood-prone properties, flood proofing existing structures											
7. No Improvements Recommended	Maintenance Only					✓		✓		✓	✓	

Coal Creek Outfalls		Erie Commons 1	Erie Commons 2	Briggs Street					Old Town	Erie Village	Kenosha Farms
Alternative Category	**Description**	*Reach 1*	*Reach 1*	*Reach 1*	*Reach 2*	*Reach 3*	*Reach 4*	*Reach 5*	*Reach 1*	*Reach 1*	*Reach 1*
1. 100-Year Storm Conveyance Without Regional Detention	Channel, storm sewer, and/or road crossing improvements to convey 100-year storm event					✓			✓		
2. Regional Detention with 100-Year Storm Conveyance	Regional detention facilities in combination with stormwater improvements to convey 100-year storm event	✓	✓	✓							
3. Optimization of Stormwater Facilities, Convey Minor Storm	Improvements to existing stormwater facilities to convey the largest storm event possible								✓		
4. Channel Stability	Improvements to address channel instability issues including channel bank erosion and sediment deposition										
5. Water Quality - Excess Urban Runoff Volume (EURV)	Provide the Excess Urban Runoff Volume (EURV) only										
6. Non-Structural Measures	Acquisition of flood-prone properties, flood proofing existing structures								✓		
7. No Improvements Recommended	Maintenance Only				✓		✓	✓		✓	✓

Prince Tributary		Prince Tributary					
Alternative Category	**Description**	*Reach 1*	*Reach 2*	*Reach 3*	*Reach 4*	*Reach 5*	*Reach 6*
1. 100-Year Storm Conveyance Without Regional Detention	Channel, storm sewer, and/or road crossing improvements to convey 100-year storm event			✓	✓	✓	✓
2. Regional Detention with 100-Year Storm Conveyance	Regional detention facilities in combination with stormwater improvements to convey 100-year storm event			✓	✓	✓	
3. Optimization of Stormwater Facilities, Convey Minor Storm	Improvements to existing stormwater facilities to convey the largest storm event possible	✓	✓	✓			✓
4. Channel Stability	Improvements to address channel instability issues including channel bank erosion and sediment deposition						
5. Water Quality - Excess Urban Runoff Volume (EURV)	Provide the Excess Urban Runoff Volume (EURV) only						
6. Non-Structural Measures	Acquisition of flood-prone properties, flood proofing existing structures			✓			
7. No Improvements Recommended	Maintenance Only	✓	✓				

Reach 6 –Walker Street (Arapahoe Ridge Subdivision) to Arapahoe Road (City of Lafayette boundary)

A preliminary channel design was completed in 2006 for this reach of Prince Tributary. The preliminary design consists of three primary elements: conveyance of 350 cfs along the west side of N. 111th Street upstream of detention pond 1025 (located in Arapahoe Ridge Filing 2), conveyance of 525 cfs through the Schofield Farm property and into Prince Lake #2, and conveyance of a 0.4-inch storm along the east side of N. 111th Street downstream of detention pond 1025. The design flow rates are approximately equal to the 10-year event. Peak discharges from the updated hydrologic analysis are relatively the same for this reach of Prince Tributary as in the 2001 OSP. The channel improvements are scheduled to be constructed in 2014.

1. 100-Year Storm Conveyance without Regional Detention

   Conveyance of the 100-year event along N. 111th Street is not feasible due to limited space.

3. Optimization of Stormwater Facilities and Conveyance of the Minor Storm Event

   The preliminary channel design completed in 2006 for this reach of Prince Tributary was designed for approximately the 10-year event.

Prince Tributary - Reach 6 - Alternative 3

DESCRIPTION			QUANTITY	UNIT	UNIT COST	TOTAL COST
Concrete Box Culverts						
Box Culvert Pipe						
Individual Box Span (ft)	Box Height (ft)	No. of Barrels	Length (ft)			
8	4	1	120	L.F.	$736.17	$88,340.40
8	4	1	35	L.F.	$736.17	$25,765.95
8	4	1	20	L.F.	$736.17	$14,723.40
Headwall and Toewalls						
Individual Box Span (ft)	No. of Barrels	Total Span (ft)				
8	1	10.00	2	EA	$796.75	$1,593.50
8	1	10.00	2	EA	$796.75	$1,593.50
8	1	10.00	2	EA	$796.75	$1,593.50
Wingwalls (includes wingwalls on either side of channel and concrete apron)						
Individual Box Span (ft)	Box Rise (ft)	No. of Barrels				
8	4	1	2	EA	$7,420.37	$14,840.74
8	4	1	2	EA	$7,420.37	$14,840.74
8	4	1	2	EA	$7,420.37	$14,840.74
Hydraulic Structures						
Sloping Drop Structures						
Height (ft)	Bottom Width (ft)	Yn (ft)				
3	9	3	4	EA	$46,445.30	$185,781.20
3	4	5	2	EA	$61,763.36	$123,526.72
4	4	5	1	EA	$66,142.56	$66,142.56
Channel Improvements						
Excavation, Low Range			7180	C.Y.	$12.00	$86,160.00
Soil Riprap, Type VL			4350	C.Y.	$56.00	$243,600.00

Master Plan Capital Improvement Cost Summary			
Capital Improvement Costs			
Pipe Culverts and Storm Drains			$0.00
Concrete Box Culverts			$178,132.00
Hydraulic Structures			$375,450.00
Channel Improvements			$329,760.00
Detention/Water Quality Facilities			$0.00
Removals			$0.00
Landscaping and Maintenance Improvements			$0.00
Special Items (User Defined)			$0.00
Subtotal Capital Improvement Costs			**$883,342.00**
Additional Capital Improvement Costs			
Dewatering		L.S.	$0.00
Mobilization	5%		$44,167.00
Traffic Control	$10,000.00	L.S.	$10,000.00
Utility Coordination/Relocation	$20,000.00	L.S.	$20,000.00
Stormwater Management/Erosion Control	5%		$44,167.00
Subtotal Additional Capital Improvement Costs			**$118,334.00**
Land Acquisition Costs			
ROW/Easements			$0.00
Subtotal Land Acquisition Costs			**$0.00**
Other Costs (percentage of Capital Improvement Costs)			
Engineering	15%		$150,251.00
Legal/Administrative	5%		$50,084.00
Contract Admin/Construction Management	10%		$100,168.00
Contingency	25%		$250,419.00
Subtotal Other Costs			**$550,922.00**
Total Capital Improvement Costs			**$1,552,598.00**

Reach 6 –Walker Street (Arapahoe Ridge Subdivision) to Arapahoe Road (City of Lafayette boundary)

A preliminary channel design was completed in 2006 for this reach of Prince Tributary. The preliminary design consists of three primary elements: conveyance of 350 cfs along the west side of N. 111th Street upstream of detention pond 1025 (located in Arapahoe Ridge Filing 2), conveyance of 525 cfs through the Schofield Farm property and into Prince Lake #2, and conveyance of a 0.4-inch storm along the east side of N. 111th Street downstream of detention pond 1025. The design flow rates are approximately equal to the 10-year event. Peak discharges from the updated hydrologic analysis are relatively the same for this reach of Prince Tributary as in the 2001 OSP. The channel improvements are scheduled to be constructed in 2014.

The preliminary design completed in 2006 for this reach was reviewed as part of this study and found to meet the intent of the outfall systems plan and updated hydrologic analysis. The recommended plan for this reach is the preliminary design completed in 2006.

3. Optimization of Stormwater Facilities and Conveyance of the Minor Storm Event

The recommended plan is the preliminary design completed in 2006 and was designed for approximately the 10-year event.

Prince Tributary – Reach 6 – Recommended Plan

DESCRIPTION			QUANTITY	UNIT	UNIT COST	TOTAL COST
Concrete Box Culverts						
Box Culvert Pipe						
Individual Box Span (ft)	Box Height (ft)	No. of Barrels	Length (ft)			
8	4	1	120	L.F.	$736.17	$88,340.40
8	4	1	35	L.F.	$736.17	$25,765.95
8	4	1	20	L.F.	$736.17	$14,723.40
Headwall and Toewalls						
Individual Box Span (ft)	No. of Barrels	Total Span (ft)				
8	1	10.00	2	EA	$796.75	$1,593.50
8	1	10.00	2	EA	$796.75	$1,593.50
8	1	10.00	2	EA	$796.75	$1,593.50
Wingwalls (includes wingwalls on either side of channel and concrete apron)						
Individual Box Span (ft)	Box Rise (ft)	No. of Barrels				
8	4	1	2	EA	$7,420.37	$14,840.74
8	4	1	2	EA	$7,420.37	$14,840.74
8	4	1	2	EA	$7,420.37	$14,840.74
Hydraulic Structures						
Sloping Drop Structures						
Height (ft)	Bottom Width (ft)	Yn (ft)				
3	9	3	4	EA	$46,445.30	$185,781.20
3	4	5	2	EA	$61,763.36	$123,526.72
4	4	5	1	EA	$66,142.56	$66,142.56
Channel Improvements						
Excavation, Low Range			7180	C.Y.	$12.00	$86,160.00
Soil Riprap, Type VL			4350	C.Y.	$56.00	$243,600.00

Master Plan Capital Improvement Cost Summary			
Capital Improvement Costs			
Pipe Culverts and Storm Drains			$0.00
Concrete Box Culverts			$178,132.00
Hydraulic Structures			$375,450.00
Channel Improvements			$329,760.00
Detention/Water Quality Facilities			$0.00
Removals			$0.00
Landscaping and Maintenance Improvements			$0.00
Special Items (User Defined)			$0.00
Subtotal Capital Improvement Costs			**$883,342.00**
Additional Capital Improvement Costs			
Dewatering		L.S.	$0.00
Mobilization	5%		$44,167.00
Traffic Control	$10,000.00	L.S.	$10,000.00
Utility Coordination/Relocation	$20,000.00	L.S.	$20,000.00
Stormwater Management/Erosion Control	5%		$44,167.00
Subtotal Additional Capital Improvement Costs			**$118,334.00**
Land Acquisition Costs			
ROW/Easements			$0.00
Subtotal Land Acquisition Costs			**$0.00**
Other Costs (percentage of Capital Improvement Costs)			
Engineering	15%		$150,251.00
Legal/Administrative	5%		$50,084.00
Contract Admin/Construction Management	10%		$100,168.00
Contingency	25%		$250,419.00
Subtotal Other Costs			**$550,922.00**
Total Capital Improvement Costs			**$1,552,598.00**

Master Plan Operation and Maintenance Cost Summary					
Description		Quantity	Unit	Unit Cost	Total Annual Cost
Culvert Maintenance (e.g. sediment & debris removal, erosion at entrance/exit, structural repairs		175	L.F.	$1.50	$788.00
Manhole and Inlet Maintenance (e.g. sediment & debris removal, structural repairs, etc.)			EA		$0.00
Hydraulic Structure Maintenance (e.g. debris removal, erosion, structural repairs, etc.)			EA		$0.00
Channel Maintenance (e.g. sediment & debris removal, erosion, tree & weed removal, etc.)		2730	L.F.	$1.50	$12,285.00
Detention/WQ Maintenance (e.g. sediment & debris removal, mucking out, tree & weed removal,		0	ACRE	$1,500.00	$0.00
Mowing (e.g. channels, ponds, etc.)			ACRE		$0.00
Trail Maintenance (e.g. structural repairs, crusher fines, etc.)			L.F.		$0.00
	<-----User Defined Items				$0.00
	<-----User Defined Items				$0.00
	<-----User Defined Items				$0.00
Total Annual Operation and Maintenance Cost					**$13,073.00**
Effective Interest Rate					3.50%
Total Operation and Maintenance Costs Over 50 Years					**$306,635.00**

Prince Tributary – Reach 5 – Conceptual Design Plan

DESCRIPTION			QUANTITY	UNIT	UNIT COST	TOTAL COST
Concrete Box Culverts						
Box Culvert Pipe						
Individual Box Span (ft)	Box Height (ft)	No. of Barrels	Length (ft)			
5	8	2	185	L.F.	$1,420.32	$262,759.00
Headwall and Toewalls						
Individual Box Span (ft)	No. of Barrels	Total Span (ft)				
5	2	13.00	1	EA	$900.09	$900.00
Wingwalls (includes wingwalls on either side of channel and concrete apron)						
Individual Box Span (ft)	Box Rise (ft)	No. of Barrels				
5	8	2	1	EA	$16,355.30	$16,355.30
Detention/Water Quality Facilities						
Detention (Complete-in-Place)						
Detention Facility 1 (Complete-in-Place)			38	AC-FT	$46,400.00	$1,763,200.00
Special Items (User Defined)						
Prince Lake #2 - Excavation, High Range	<----User Defined Items		2545	C.Y	$32.00	$81,440.00
Prince Lake #2 - Soil Riprap, Type M	<----User Defined Items		44	C.Y	$71.00	$3,124.00

Master Plan Capital Improvement Cost Summary			
Capital Improvement Costs			
Pipe Culverts and Storm Drains			$0.00
Concrete Box Culverts			$280,014.00
Hydraulic Structures			$0.00
Channel Improvements			$0.00
Detention/Water Quality Facilities			$1,763,200.00
Removals			$0.00
Landscaping and Maintenance Improvements			$0.00
Special Items (User Defined)			$84,564.00
Subtotal Capital Improvement Costs			**$2,127,778.00**
Additional Capital Improvement Costs			
Dewatering		L.S.	$0.00
Mobilization	5%		$106,389.00
Traffic Control	$10,000.00	L.S.	$10,000.00
Utility Coordination/Relocation	$10,000.00	L.S.	$10,000.00
Stormwater Management/Erosion Control	5%		$106,389.00
Subtotal Additional Capital Improvement Costs			**$232,778.00**
Land Acquisition Costs			
ROW/Easements			$0.00
Subtotal Land Acquisition Costs			**$0.00**
Other Costs (percentage of Capital Improvement Costs)			
Engineering	15%		$354,083.00
Legal/Administrative	5%		$118,028.00
Contract Admin/Construction Management	10%		$236,056.00
Contingency	25%		$590,139.00
Subtotal Other Costs			**$1,298,306.00**
Total Capital Improvement Costs			**$3,658,862.00**

Master Plan Operation and Maintenance Cost Summary				
Description	Quantity	Unit	Unit Cost	Total Annual Cost
Culvert Maintenance (e.g. sediment & debris removal, erosion at entrance/exit, structural repairs	185	L.F.	$1.00	$555.00
Detention/WQ Maintenance (e.g. sediment & debris removal, mucking out, tree & weed removal,	15.64	ACRE	$1,530.00	$71,788.00
Total Annual Operation and Maintenance Cost				**$72,343.00**
Effective Interest Rate				3.50%
Total Operation and Maintenance Costs Over 50 Years				**$1,696,850.00**

PRINCE TRIBUTARY – REACH 6

Walker Street (Arapahoe Ridge Subdivision) to Arapahoe Road (City of Lafayette boundary)

Reach Description

Reach 6 is located in the Town of Erie and extends to the boundary with the City of Lafayette at Arapahoe Road. The outfall alignment is located between Filings 1 and 2 of the Arapahoe Ridge subdivision. A preliminary channel design was developed for this reach to convey stormwater flows north from Arapahoe Road along N. 111th Street to a point at the southwest corner of Prince Lake No. 2, which is located in unincorporated Boulder County. Prince Lake No. 2 is owned by Boulder County and is used for irrigation water supply.

Problem Identification

- Insufficient channel capacity

Conceptual Design Plan Improvements

Optimization of Stormwater Facilities and Conveyance of the Minor Storm Event

The Conceptual Design Plan for this reach is a preliminary design completed in 2006. The preliminary design consists of three primary elements: conveyance of 350 cfs along the west side of N. 111th Street upstream of detention pond 1025 (located in Arapahoe Ridge Filing 2), conveyance of 525 cfs through the Schofield Farm property and into Prince Lake #2, and conveyance of a 0.4-inch storm along the east side of N. 111th Street downstream of detention pond 1025. The design flow rates are approximately equal to the 10-year event. Peak discharges from the updated hydrologic analysis are relatively the same for this reach of Prince Tributary as in the 2001 OSP. The preliminary design was reviewed as part of this study and found to meet the intent of the outfall systems plan and updated hydrologic analysis. The channel improvements are scheduled to be constructed in 2014. A cost estimate was prepared and included with the 2006 preliminary channel design. The design consultant's opinion of probable cost for the proposed channel improvements is $1,737,941. This cost estimate has been included in the Conceptual Design Plan Cost Estimate Summary Table ES-3 and Table 7-1. An operation and maintenance cost estimate is provided below.

Master Plan Operation and Maintenance Cost Summary				
Description	Quantity	Unit	Unit Cost	Total Annual Cost
Culvert Maintenance (e.g. sediment & debris removal, erosion at entrance/exit, structural repairs	169	L.F.	$1.00	$507.00
Channel Maintenance (e.g. sediment & debris removal, erosion, tree & weed removal, etc.)	2885	L.F.	$2.00	$17,310.00
Total Annual Operation and Maintenance Cost				**$17,817.00**
Effective Interest Rate				3.50%
Total Operation and Maintenance Costs Over 50 Years				**$417,909.00**

CLICK HERE TO VIEW REACH 6 MAP NO PROFILE AVAILABLE

Table B-2
Peak Flow Summary

Prince Tributary			Peak Discharge (cfs) - Existing Development						Peak Discharge (cfs) - Future Development					
SWMM Node	Location Description	Drainage Area (acres)	2-Year	5-Year	10-Year	25-Year	50-year	100-Year	2-Year	5-Year	10-Year	25-Year	50-year	100-Year
300		152	7	38	59	126	170	218	39	98	129	220	283	346
302		43	27	54	67	99	124	145	27	54	68	100	125	145
303	Arapahoe Road	334	79	192	246	399	509	618	92	228	298	504	623	744
305		408	73	180	233	388	499	613	89	223	292	490	601	740
1025		408	73	194	260	446	559	676	89	247	328	548	662	804
306		533	74	223	307	541	679	838	91	274	373	620	782	961
308		780	118	301	392	690	861	1,096	145	361	466	779	980	1,245
310		77	14	52	70	123	158	194	14	52	70	123	159	194
311		920	119	342	445	798	1,005	1,279	154	402	527	893	1,130	1,437
312	Erie Parkway	1,256	119	389	524	926	1,201	1,557	186	511	634	1,075	1,396	1,792
313		1,303	124	420	558	982	1,280	1,662	197	531	672	1,137	1,481	1,903
315	Flatiron Drive	1,539	146	469	620	1,078	1,419	1,849	219	574	725	1,239	1,631	2,106
320		122	1	28	43	94	126	158	1	28	43	94	126	158
321	Erie Parkway	222	2	50	74	168	227	290	2	50	74	168	227	290
322		281	83	346	630	1,138	1,455	1,925	490	1,184	1,779	2,676	3,274	4,036
323		368	83	348	637	1,157	1,486	1,961	482	1,177	1,780	2,696	3,302	4,079
317	Lower Boulder Ditch	1,907	180	675	1,160	2,102	2,801	3,672	687	1,746	2,494	3,918	4,909	6,145
318	UPRR	2,081	183	692	1,182	2,146	2,868	3,763	690	1,764	2,524	3,979	5,001	6,271
319	Boulder & Weld Co Ditch	2,145	182	686	1,179	2,149	2,877	3,780	684	1,758	2,525	3,985	5,015	6,295
940		2,245	182	668	1,171	2,149	2,885	3,792	661	1,744	2,511	3,976	5,010	6,296

Table B-3
Runoff Volume Summary

Prince Tributary			Runoff Volume (acre-ft) - Existing Development						Runoff Volume (acre-ft) - Future Development					
SWMM Node	Location Description	Drainage Area (acres)	2-Year	5-Year	10-Year	25-Year	50-year	100-Year	2-Year	5-Year	10-Year	25-Year	50-year	100-Year
300		152	1.0	4.4	6.6	12.4	16.7	21.3	3.7	8.1	10.6	16.2	20.6	25.0
302		43	1.5	2.9	3.6	5.1	6.3	7.5	1.5	2.9	3.6	5.1	6.3	7.5
303	Arapahoe Road	334	5.6	14.2	19.5	31.6	41.0	50.7	8.3	17.9	23.5	35.4	45.0	54.6
305		408	5.7	14.4	19.7	31.8	41.2	51.0	8.5	18.2	23.7	35.7	45.2	54.8
1025		408	6.3	17.2	23.7	38.4	49.8	61.7	9.1	20.9	27.7	42.2	53.9	65.5
306		533	6.6	19.8	28.0	47.6	62.6	78.4	9.4	23.5	32.0	51.6	66.8	82.3
308		780	10.1	29.3	41.8	70.8	93.0	116.0	13.9	35.0	47.7	76.6	98.9	121.7
310		77	0.7	2.5	3.7	6.4	8.5	10.7	0.8	2.6	3.7	6.5	8.5	10.8
311		920	11.1	33.6	48.2	82.3	108.2	135.3	16.4	41.2	56.2	89.9	116.1	142.8
312	Erie Parkway	1,256	11.7	40.5	60.3	108.2	143.5	181.0	22.7	56.7	78.0	124.6	160.6	197.4
313		1,303	13.3	45.1	67.3	120.0	158.7	199.8	24.3	61.8	84.9	136.3	175.8	216.1
315	Flatiron Drive	1,539	16.3	53.2	78.5	137.5	181.9	228.2	27.4	70.0	96.1	153.9	199.0	244.5
320		122	0.1	2.2	3.9	8.4	11.6	15.3	0.1	2.2	3.9	8.4	11.6	15.3
321	Erie Parkway	222	0.2	4.1	7.1	15.5	21.3	28.0	0.2	4.1	7.1	15.5	21.3	28.0
322		281	19.2	68.6	112.4	202.9	234.3	302.7	70.8	157.5	227.7	341.9	412.4	502.1
323		368	19.7	71.4	116.8	210.5	244.6	315.8	72.2	161.4	233.1	350.9	423.8	516.3
317	Lower Boulder Ditch	1,907	36.9	125.9	196.8	350.0	428.7	546.5	100.7	233.3	331.4	507.8	626.1	764.4
318	UPRR	2,081	38.2	131.3	204.9	364.6	448.0	571.0	102.4	239.0	339.7	522.5	645.6	789.0
319	Boulder & Weld Co Ditch	2,145	38.3	133.4	207.9	370.1	455.4	580.3	103.6	242.0	343.8	529.2	654.2	799.7
940	Boulder Creek	2,245	38.6	137.8	214.2	380.3	468.7	596.8	104.9	247.0	350.7	539.7	667.8	816.6

LEGEND

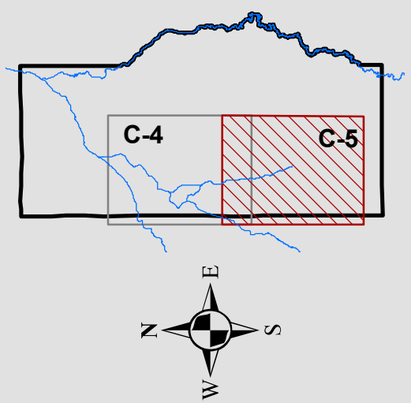
- Study Area Boundary
- Erie Planning Area Boundary
- Town of Erie
- City of Lafayette
- 100-Year Floodplain (FIS)
- Existing Detention Ponds
- Outfall Alignment
  (Outfall Name)

Note: 100-Year floodplain information from Boulder County Flood Insurance Study (FIS), FEMA, December 18, 2012

DRAINAGE PROBLEM AREAS

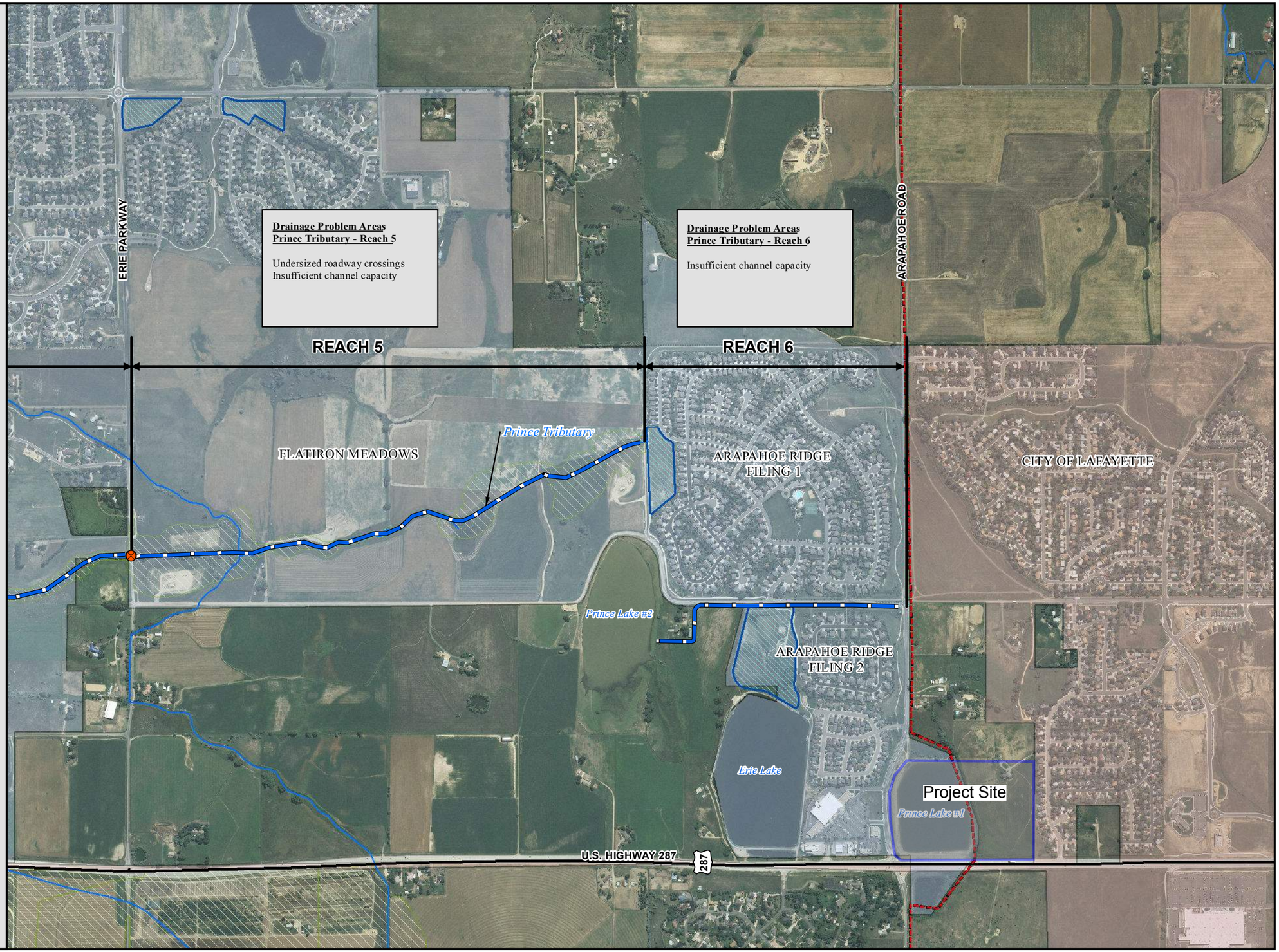
- Undersized/No Road Crossing
- Insufficient Channel Capacity
- Channel Degradation/Erosion
- Structures in 100yr Floodplain

KEY MAP



0 500 1,000 2,000 Feet

1 " = 1,000 FT



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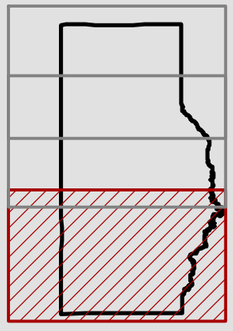
WRC ENGINEERING, INC.	WRC ENGINEERING, INC. 950 SOUTH CHERRY STREET, SUITE 404 DENVER, COLORADO 80246 PHONE: 303-757-8513 FAX: 303-758-3208	TOWN OF ERIE - CITY OF LAFAYETTE - BOULDER COUNTY URBAN DRAINAGE AND FLOOD CONTROL DISTRICT	TOWN OF ERIE OUTFALL SYSTEMS PLAN (WEST OF COAL CREEK)	DRAINAGE PROBLEM AREAS PRINCE TRIBUTARY	FIGURE C-5

LEGEND

- Study Area Boundary
- Town of Erie
- City of Lafayette
- Subbasin Boundary
- Major Watershed Boundary
- Regional Detention Ponds

XXX — Subbain ID
XX | X X — % Impervious (Existing Land Use) / % Impervious (Future Land Use)
Area (Acres)

KEY MAP



N
W E
S

0 750 1,500 3,000 Feet

1 " = 1,500 FT

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WRC ENGINEERING, INC.
950 SOUTH CHERRY STREET, SUITE 404
DENVER, COLORADO 80246
PHONE: 303-757-8513
FAX: 303-758-3208

TOWN OF ERIE
URBAN DRAINAGE AND FLOOD CONTROL DISTRICT

TOWN OF ERIE OUTFALL SYSTEMS PLAN (WEST OF COAL CREEK)

SUBBASIN MAP

FIGURE B-2

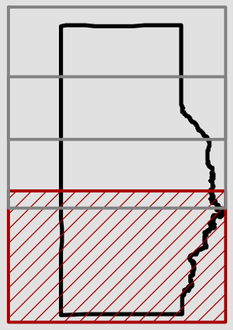
LEGEND

- Study Area Boundary
- Town of Erie
- City of Lafayette
- Subbasin Boundary
- Major Watershed Boundary
- Regional Detention Ponds

SWMM Elements

- xxx — Subbasin
- xxx — Design Point
- xxx — Conveyance Element
- xxx — Detention Facility
- xxx — Outfall

KEY MAP



N
W E
S

0 750 1,500 3,000 Feet

1 " = 1,500 FT

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950 SOUTH CHERRY STREET, SUITE 404
DENVER, COLORADO 80246
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FAX: 303-758-3208

TOWN OF ERIE
URBAN DRAINAGE AND FLOOD CONTROL DISTRICT

TOWN OF ERIE OUTFALL SYSTEMS PLAN (WEST OF COAL CREEK)

SWMM ROUTING MAP

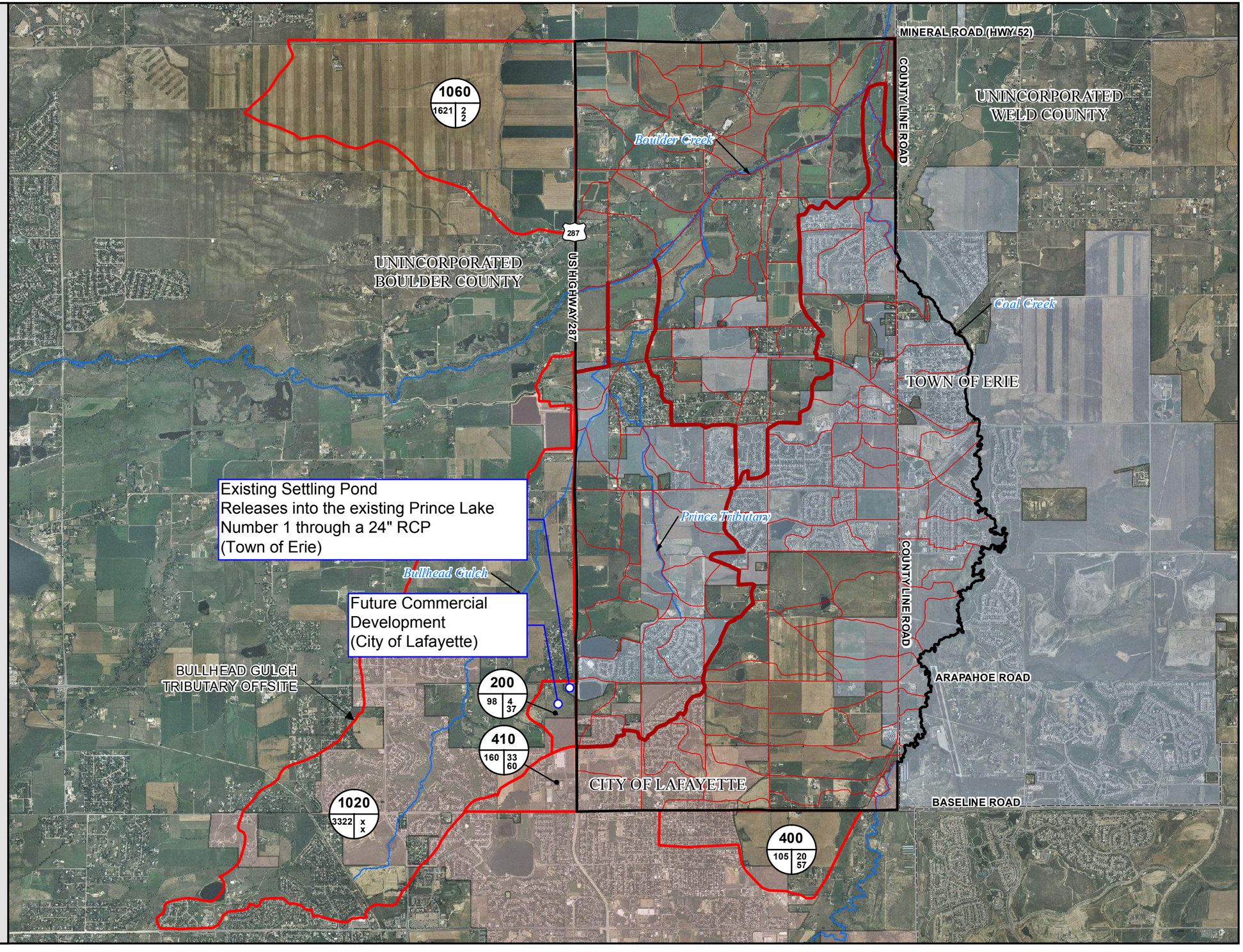
FIGURE B-6

LEGEND

- Study Area Boundary
- Town of Erie
- City of Lafayette
- Offsite Subbasin Boundary
- Subbasin Boundary
- Major Watershed Boundary

XXX — Subbain ID
XX | X — % Impervious (Existing Land Use) / % Impervious (Future Land Use)
Area (Acres)

Note: Hydrographs for offsite subbasins taken from 2001 Outfall Systems Plan study for input to updated baseline hydrologic analysis



N
W E
S

0 2,000 4,000 8,000 Feet

1 " = 4,000 FT

M:\2234\GIS\2234 OFFSITE MAP B-5.MXD - 12/12/12 - NRT

WRC ENGINEERING, INC.
950 SOUTH CHERRY STREET, SUITE 404
DENVER, COLORADO 80246
PHONE: 303-757-8513
FAX: 303-758-3208

TOWN OF ERIE
URBAN DRAINAGE AND FLOOD CONTROL DISTRICT

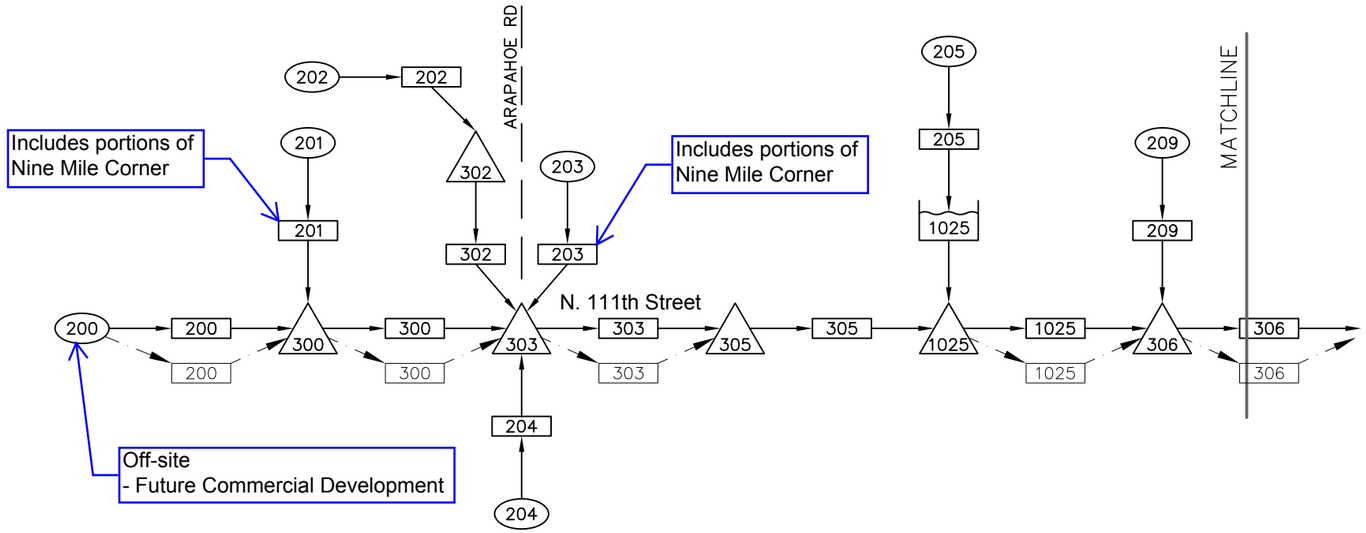
TOWN OF ERIE OUTFALL SYSTEMS PLAN
(WEST OF COAL CREEK)

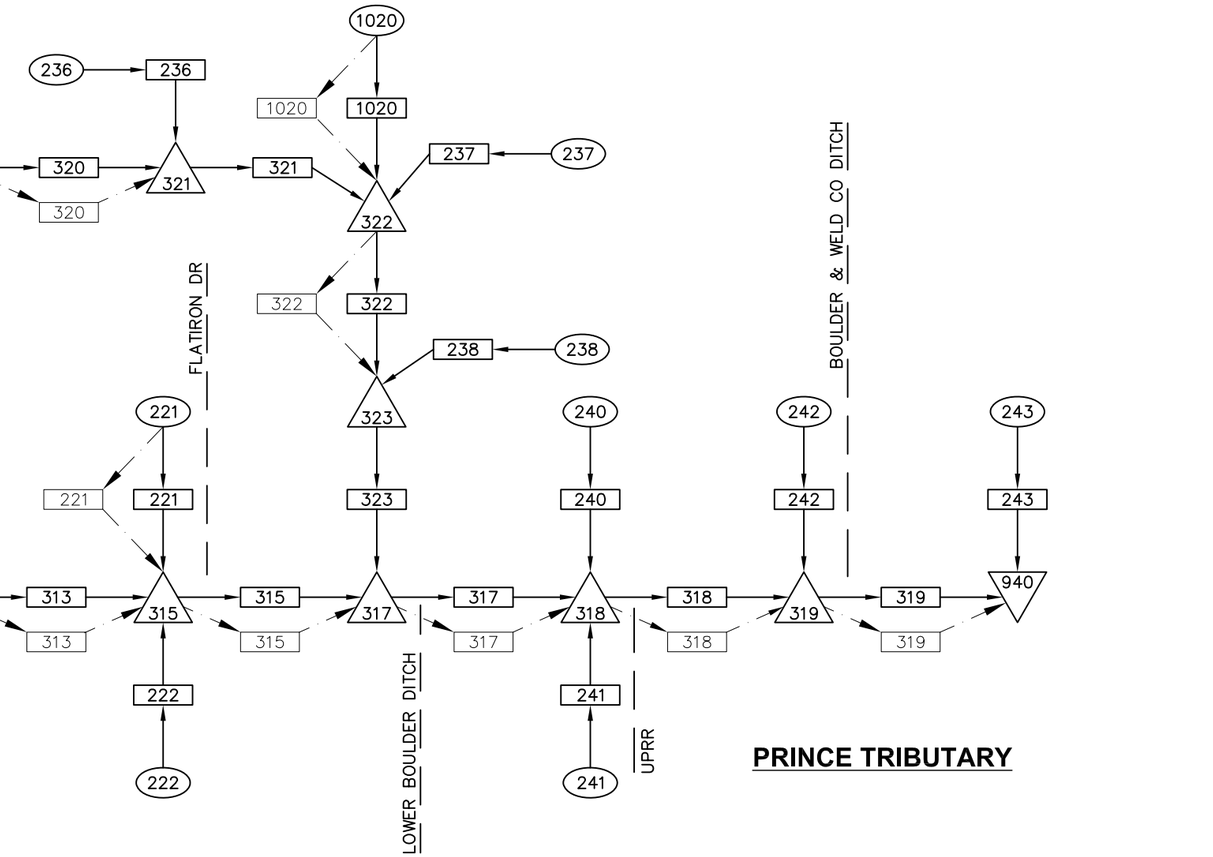
OFFSITE SUBBASIN MAP

FIGURE B-5

Table B-1
CUHP Input

Subbasin	Area (mi^2)	Distance to Centroid (mi)	Length (mi)	Slope (ft/ft)	Percent Imperviousness		Depression Storage		Horton's Infiltration Parameters		
					Existing Land Use	Future Land Use	Pervious	Impervious	Initial Rate (in/hr)	Decay Coefficient (1/sec)	Final Rate (in/hr)
200	0.151	0.239	0.481	0.026	4.0	37.3	0.38	0.10	4.50	0.0018	0.60
201	0.089	0.244	0.690	0.015	19.5	19.5	0.38	0.10	4.50	0.0018	0.60
202	0.067	0.186	0.502	0.017	47.9	48.1	0.38	0.10	4.50	0.0018	0.60
203	0.084	0.212	0.487	0.029	34.0	34.0	0.38	0.10	4.50	0.0018	0.60
204	0.133	0.177	0.439	0.019	31.2	31.2	0.38	0.10	4.50	0.0018	0.60
205	0.115	0.276	0.621	0.016	39.5	39.5	0.38	0.10	4.50	0.0018	0.60
206	0.112	0.437	0.709	0.013	30.4	30.4	0.38	0.10	4.50	0.0018	0.60
207	0.125	0.325	0.554	0.017	33.7	33.7	0.38	0.10	4.50	0.0018	0.60
208	0.045	0.139	0.379	0.014	4.6	8.9	0.38	0.10	4.50	0.0018	0.60
209	0.195	0.290	0.684	0.019	4.1	4.3	0.38	0.10	4.50	0.0018	0.60
210	0.041	0.162	0.402	0.020	3.3	32.4	0.38	0.10	4.47	0.0018	0.60
211	0.063	0.229	0.441	0.011	2.0	19.8	0.38	0.10	4.50	0.0018	0.60
212	0.120	0.184	0.398	0.022	16.4	16.7	0.38	0.10	4.39	0.0018	0.59
213	0.098	0.237	0.485	0.019	7.4	35.5	0.38	0.10	4.30	0.0018	0.59
215	0.127	0.489	0.862	0.015	2.1	27.6	0.38	0.10	4.50	0.0018	0.60
216	0.078	0.298	0.582	0.020	2.1	2.4	0.38	0.10	4.50	0.0018	0.60
217	0.191	0.466	0.924	0.020	2.5	32.9	0.38	0.10	4.34	0.0018	0.59
218	0.128	0.396	0.639	0.028	2.7	32.8	0.38	0.10	3.78	0.0018	0.55
219	0.110	0.343	0.579	0.013	18.1	18.1	0.38	0.10	4.50	0.0018	0.60
220	0.074	0.310	0.715	0.027	25.7	25.7	0.38	0.10	4.33	0.0018	0.59
221	0.117	0.188	0.494	0.020	28.1	28.1	0.38	0.10	3.66	0.0018	0.54
222	0.143	0.336	0.659	0.024	25.0	25.0	0.38	0.10	4.21	0.0018	0.58
235	0.191	0.378	0.877	0.027	2.0	2.0	0.38	0.10	4.50	0.0018	0.60
236	0.156	0.289	0.636	0.024	2.1	2.1	0.38	0.10	4.48	0.0018	0.60
237	0.092	0.358	0.767	0.017	5.4	5.4	0.38	0.10	4.30	0.0018	0.59
238	0.137	0.427	0.817	0.018	10.2	10.2	0.38	0.10	4.44	0.0018	0.60
240	0.077	0.330	0.582	0.009	3.4	3.4	0.38	0.10	4.50	0.0018	0.60
241	0.196	0.352	0.630	0.015	17.4	17.5	0.38	0.10	4.50	0.0018	0.60
242	0.100	0.174	0.443	0.007	2.9	16.1	0.38	0.10	4.26	0.0018	0.58
243	0.156	0.362	0.552	0.007	4.1	4.3	0.38	0.10	3.00	0.0018	0.50
401	0.041	0.243	0.391	0.017	4.2	4.2	0.38	0.10	3.05	0.0018	0.51
410	0.249	0.492	1.123	0.008	33.0	60.0	0.38	0.10	4.14	0.0018	0.58
411	0.140	0.308	0.586	0.022	55.4	64.0	0.38	0.10	3.55	0.0018	0.54
412	0.136	0.337	0.610	0.023	29.7	63.2	0.38	0.10	4.00	0.0018	0.57
413	0.046	0.298	0.580	0.022	14.7	14.7	0.38	0.10	4.50	0.0018	0.60
414	0.131	0.419	0.673	0.022	39.2	39.2	0.38	0.10	4.50	0.0018	0.60
415	0.125	0.286	0.585	0.023	26.0	26.0	0.38	0.10	4.10	0.0018	0.57
416	0.140	0.283	0.662	0.018	4.1	24.1	0.38	0.10	4.48	0.0018	0.60
417	0.063	0.424	0.842	0.021	38.8	63.9	0.38	0.10	4.19	0.0018	0.58
418	0.091	0.391	0.904	0.014	28.1	28.1	0.38	0.10	4.03	0.0018	0.57
423	0.020	0.235	0.434	0.011	32.9	32.9	0.38	0.10	3.74	0.0018	0.55





LEGEND

- 306 — DESIGN POINT
- 209 — SUBBASIN
- 1025 — DETENTION FACILITY
- 940 — OUTFALL
- 209 — CONVEYANCE ELEMENT
- 306 — OVERFLOW CONVEYANCE ELEMENT
- SURFACE OVERFLOW
- ROADWAY CROSSING

PRINCE TRIBUTARY

2234\DWG\SWMM SCHEMATIC.DWG, PRINCE TRIBUTARY - 1/29/13 - JHN

WRC ENGINEERING, INC.
950 SOUTH CHERRY STREET
SUITE 404
DENVER, COLORADO 80246
PHONE NO: (303) 757-8513
FAX NO: (303) 758-3208

DESIGNED NRT
DRAWN JHN
CHECKED NRT
DATE 1/29/13
AS-BUILT

NO.	BY	DATE	REVISION DESCRIPTION
.	.	.	.

TOWN OF ERIE
URBAN DRAINAGE AND FLOOD CONTROL DISTRICT

TOWN OF ERIE
OUTFALL SYSTEMS PLAN
(WEST OF COAL CREEK)

SWMM SCHEMATIC
PRINCE TRIBUTARY

PROJECT NUMBER
2234

FIGURE B-13

Olsson Associates
Erie Reach BP20 Preliminary Design
February 2006

OLSSON ASSOCIATES
ENGINEERS • PLANNERS • SCIENTISTS • SURVEYORS
143 Union Blvd. Suite 700 Lakewood, CO 80228 720-962-6072

MEMO

Date: February 14, 2006

To: Wendi Palmer, Town of Erie
Laura Kroeger, UDFCD

From: Deb Ohlinger

Re: Erie Reach BP20 Preliminary Design

Introduction

This memorandum summarizes an evaluation of the existing conditions and presents the preliminary design of Reach BP20 improvements. A progress meeting was held on December 15, 2005, during which design alternatives were discussed. After receiving direction from the project sponsors, OA proceeded with a preliminary design of the improvements. The preliminary design consists of three primary elements: conveyance of 350 cubic feet per second (cfs) along the west side of North 111th Street upstream of the Detention Basin 1025, conveyance of 525 cfs through the Schofield Farm property and into Prince Lake No. 2, and conveyance of a 0.4-inch storm along the east side of North 111th Street downstream of Detention Basin 1025.

Hydrology

Discharges for the 2-, 5-, 10-, 50-, and 100-year and 0.4-inch storm events were obtained from Table 9 of *Erie Outfall Systems Planning, Preliminary Design: Erie and Adjacent Boulder and Weld County Areas* (OSP), prepared by Love and Associates and dated May 2001. Table 1 shows the OSP peak discharges at three locations for the future (developed) condition. Also included are the cumulative watershed areas at the design points. Design point 303 is located at North 111th Street and Arapahoe Road; design point 305 is located downstream of detention basin 1025; and design point 306 is located near the discharge of Prince Lake No. 2.

Table 1. OSP Peak Discharges at Select Locations along Reach BP20

Design Points	0.4-inch cfs	2-year cfs	5-year cfs	10-year cfs	50-year cfs	100-year cfs	Cumulative Area Acres
303	37	139	207	283	585	745	334
305	47	167	254	347	728	921	408
306	19	68	180	303	754	976	533

Existing Conditions Evaluation

A topographic survey of the site was completed in October 2005. The existing conditions were then evaluated at six locations to determine the capacity of the existing road, ditches, and right-

of-way. Figures 1A and 1B show the existing survey with project stationing. The reach between Stations 25+00 and 41+50 was evaluated to determine the available capacity between the fences on both sides of North 111th Street, as compared to the 100-year storm. The 100-year discharge at these locations is 745 cfs. The water surface elevations were set at the fence line or high points within the right-of-way and are shown in the cross sections in Figure 2. The estimated capacities are presented in Table 2.

Table 2. Estimated Capacity at Select Locations

Location	Available Capacity, cfs	Depth of Flow at Crown, ft
Station 26+00	446	0.4
Station 30+00	170	0.1
Station 36+00	356	0.0
Station 38+00	664	0.9

On the east side of North 111th Street, the reach between Stations 10+00 and 25+00 was evaluated with comparison to the 0.4-inch storm presented in the OSP. The peak discharge for this storm along this reach would be 47 cfs. The flow area for this reach was considered to be between the edge of pavement and the right-of-way south and east of North 111th Street, as shown in the cross sections in Figure 2. Table 3 shows the estimated capacities.

Table 3. Estimated Capacity at Select Locations

Location	Available Capacity, cfs
Station 14+00	7
Station 19+00	48

Preliminary Channel Design

Channel along North 111th Street

At the December 2005 meeting, it was decided that OA would develop alternatives to convey 350 cfs south of Station 27+00 and 525 cfs north of Station 27+00 while maintaining a 12-foot wide travel lane clear of water. This flow rate is approximately equal to the 10-year discharge at OSP design point 305. The existing 42-inch diameter pipe on the east side of North 111th Street was evaluated to estimate its capacity, since it carries a portion of the target 350 cfs. The pipe has capacity to carry approximately 168 cfs, however, the flow that can enter the pipe is limited at the upstream end. The pipe entrance was evaluated to determine the quantity of water that could enter the culvert. It was estimated that 75 cfs could enter the culvert. Due to limited available headwater depth, there is no opportunity to improve the pipe inlet.

Channel geometries were estimated for the design discharge of 350 cfs, minus the 75 cfs that is carried in the existing 42-inch pipe. The design criteria were longitudinal slope of 0.6%, 3:1 channel side slopes, maximum depth of five feet, maximum velocity of 7 feet per second, and maximum Froude number of 0.8. Channels with depths of three and four feet were developed at Stations 26+00, 30+00, 36+00, and 38+00. To reduce conflicts with utilities, the three-foot-deep channel is recommended. Table 4 shows the channel geometries.

Table 4. Channel Geometry Stations 24+50 to 41+00

	Station 24+50 to 27+00	Station 27+00 to 41+00
Design discharge, cfs	350	275
Bottom width, ft	12	9
Top width (minimum), ft	30	27
Depth of flow, ft	3	3

The channel would require grade stabilization, and it should be noted that the channel would be deeper and wider downstream of the grade control structures. Approximately six grade control structures, ranging in height from 1 to 3 feet, would be needed. Figures 1A and 1B show the estimated extents of the proposed channel grading. Figure 2 shows the channel superimposed on the existing cross sections at Stations 26+00, 30+00, 36+00, and 38+00. Figure 2 also shows the existing utilities, for which the depths of some were estimated. 8-foot high by 4-foot wide box culverts would be needed at three road crossings. Discharge from the existing 42-inch pipe would outlet into the channel around Station 26+50. A diversion structure to divert up to 47 cfs to the east side of North 111th Street would be constructed near Station 24+70.

Adjustments to the water and gas utilities may be needed. Potholing is recommended to verify the depth and location of the utilities. Discussions with the utility owners will be needed to determine their requirements to relocate the utilities and whether relocation will be needed.

Channel through Schofield Farm Property

Two scenarios for conveying the design discharge through the Schofield Farm Property were investigated. One scenario was a large, swale-like channel that could potentially be farmed. During the December 2005 progress meeting, this scenario was discussed. It was determined that it could be difficult to maintain irrigation across the swale, that different crops and growth stages would impact the conveyance capacity, flow velocities and erosion potential of the swale, and that over time, the swale could be modified due to farming practices.

The second scenario, a trapezoidal channel located along the farmstead property line that would convey 525 cfs, and have a depth of five feet, was developed. The resulting channel has a bottom width of 4 feet, and side slopes of 3:1. The top width would range from approximately 40 to 80 feet. The proposed alignment is shown in Figure 1A. Access could be provided across the channel between the farmstead and the fields via a low-water crossing. Two or three 24-inch diameter pipes could be installed under the crossing to convey low flows.

Conveyance of 0.4-inch Storm Downstream of Schofield Farm

A portion of the reach intended to convey the 0.4-inch storm east and south of North 111th Street around Prince Lake No. 2 has enough capacity to do so, based on the existing conditions geometry at Station 19+00. Farther downstream, at Station 14+00, the capacity is approximately 7 cfs. In order to convey the 0.4-inch storm discharge of 47 cfs, a triangular channel approximately two feet deep, with 3 to 1 sideslopes and a top width of 12 feet would be required.

The channel improvements needed to convey the 0.4-inch storm could conflict with the Erie Lake Raw Water Line. A storm sewer alternative or adjustment of the raw water line design should be considered. For an estimated slope of 2.0%, a 30-inch diameter pipe would be required to convey the 0.4-inch storm. Adjustments to the raw water line may also be needed to

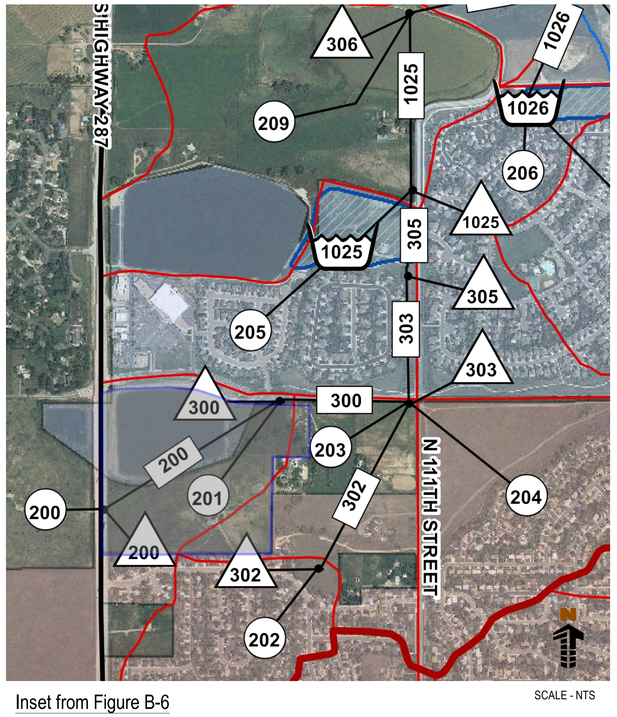
accommodate a storm sewer. OA recommends that the location of the raw water line be staked in the field so that the project sponsors can review the water line location with respect to the existing street and trail and proposed drainage improvements.

The *Preliminary Drainage Report for Meadow Sweet Farms, Erie Colorado,* dated May 13, 2005, shows Pond 1027 at the outlet of Prince Lake No 2, north and east of the curved portion of North 111th Street. It also shows a swale (designated D-D in the report) that collects local drainage and crosses under North 111th Street in a 12-foot by 4-foot box culvert. Discharge from the 0.4-inch storm could be conveyed to either proposed structure.



PRELIMINARY DRAINAGE PLAN
NINE MILE CORNER | ERIE, CO

SCALE - 1" = 150'



SCALE - NTS

Inset from Figure B-6
Town of Erie Outfall Systems Plan (West ofCoal Creek)
RESPEC Consulting & Services, January 2014

Galloway
Planning. Architecture. Engineering.
6162 S Willow Drive, Suite 320, Greenwood Village, CO 80111
303.770.8884 O
www.gallowayUS.com
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LEGEND:

- PROPOSED MAJOR CONTOUR (4900)
- PROPOSED MINOR CONTOUR (35)
- EXISTING MAJOR CONTOUR (4900)
- EXISTING MINOR CONTOUR
- EXISTING STORM SEWER
- PROPOSED STORM SEWER
- PROPOSED STORM INLET
- PROPOSED RIGHT-OF-WAY
- FUTURE RIGHT-OF-WAY
- PROPOSED LOTLINE
- FUTURE LOTLINE
- EASEMENT LINE

DRAINAGE SYMBOLS:



- C9 — DESIGN POINT
- OSP SWMM SUBBASIN BOUNDARY
- PROJECT SPECIFIC SUBBASIN BOUNDARY
- OVERLAND FLOW DIRECTION (I.E., LANDSCAPING)
- DIRECT FLOW DIRECTION - FUTURE (I.E., PAVEMENT, CURB AND GUTTER)

NOTES:

1. DETENTION POND FOOTPRINT (PROPOSED CONDITION) — 100-YEAR

Project No:	
Drawn By:	HHF
Checked By:	HHF

10/07/2016

NINE MILE CORNER
ERIE, COLORADO
N. 107th Street and Arapahoe Road

DR01	1 of 1

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PHASE III DRAINAGE REPORT

FOR

Outlook at Nine Mile
Erie, Colorado

April 27, 2017

Prepared for:

Evergreen
Development | Services | Investments

1873 S. Bellaire Street, Suite 1106
Denver, Colorado 80222
Phone: 303-757-0401

Prepared by:

HKS HARRIS KOCHER SMITH

Andrew Messer, P.E.
1120 Lincoln Street, Suite 1000
Denver, CO 80203
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Harris Kocher Smith Project No.: 160602

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ENGINEER'S CERTIFICATION

I hereby certify that this Phase III Drainage Report for Outlook at Nine Mile was prepared by me, or under my direct supervision, in accordance with the provisions of the *Town of Erie Standards and Specifications for Design and Construction* for the owners thereof. I understand that the Town of Erie (Town) does not and will not assume liability for drainage facilities designed by others, including the designs presented in this report.

Andrew T. Messer, P.E.
Registered Professional Engineer
State of Colorado License No. 50640
On Behalf of Harris Kocher Smith

TOWN ACCEPTANCE

This report has been reviewed and found to be in general compliance with the *Town of Erie Standards and Specifications for Design and Construction* and other TOWN requirements. **THE ACCURACY AND VALIDITY OF THE ENGINEERING DESIGN, DETAILS, DIMENSIONS, QUANTITIES, AND CONCEPTS IN THIS REPORT REMAINS THE SOLE RESPONSIBILITY OF THE PROFESSIONAL ENGINEER WHOSE STAMP AND SIGNATURE APPEAR HEREON**.

Accepted by: _____ _____

Deputy Public Works Director Date

If during the construction process or at any time within one year following the acceptance by the Town of the completed improvements, any deficiencies or errors are discovered in the construction plans, specifications, drainage reports, or the actual constructed improvements, the Town shall have the right to require the developer to make any and all corrections which may be deemed necessary by the Town. The costs associated with any such corrections shall be the sole responsibility of the developer.

CONTACT INFORMATION

Applicant:	Jeff Wikstrom
Company Name:	Evergreen
Email:	JWikstrom@evgre.com
Mailing Address:	1873 S. Bellaire St., Ste 1106
	Denver, CO 80222
Telephone #:	(602) 808-8600

Plan Preparation Consultant:

Company Name:	Harris Kocher Smith
Professional Engineer:	Andrew Messer, P.E.
Email:	amesser@hkseng.com
Mailing Address:	1120 Lincoln Street, Suite 1000
	Denver, CO 80203
Telephone #	(303) 623-6300
Fax #	(303) 623-6311

General Location & Description

A. Location

The Outlook at Nine Mile development project (Site) is within a greater PD-Development that is within a portion of the northeast quarter of Section 34, Township 1 North, Range 69 West and the southeast quarter of Section 27, Township 1 North, Range 69 West of the Sixth Principal Meridian, in the Town of Erie, County of Boulder, State of Colorado. The Site is located at the southeast corner of Arapahoe Road (variable width R.O.W.), and North 107th Street, aka State Highway 287 (variable width R.O.W.).

The Site is bounded by Arapahoe Road to the north, rural residential developments to the south and east, and E 107th Street to the west. The South Boulder Canyon Ditch (Ditch) meanders east to west through the northern portion of the Site. In the recent past, there was an existing pond, Prince Lake Number 1, to the west of the Site that has been removed as part of the Site's greater development, Nine Mile Corner Planned Development (PD). A draft of the PD Development Plan is included in Appendix E for reference.

The Site will be developed as multi-family residential housing with approximately 250 units. The proposed development will also include attached and detached garages, surface parking, a clubhouse with pool, and maintenance facilities, trash enclosures, and on-site stormwater conveyance and detention facilities with water quality treatment.

A Vicinity Map is located in Appendix A of this report.

B. Description of Property

The Site is comprised of approximately 15.15 acres of primarily undeveloped land, with a few permanent and temporary structures – residential and other. Primary existing ground cover appears to be native grasses and weeds, some dirt drives, and dense vegetation along the Ditch including trees and shrubs. Small tracts of farmland are also apparent.

According to the Natural Resources Conservation Service (NRCS) Web Soil Survey, the underlying surface soils are Ascalon sandy loam, which is classified as Hydrologic Group B (see Appendix A).

The north portion of the Site drains north with 3% to 6% slopes, to Arapahoe Road. The middle portion of the Site drains north-northeast with 3% to 6% slopes, to South Boulder Canyon Ditch, which flows generally east through the north portion of the Site. The south portion of the Site drains generally to the east with 5% to 6% slopes. A small portion, along the west edge of the north portion of the Site, drains to the west, toward (former) Prince Lake Number 1.

Irrigation facilities exist on and adjacent to the property; plans to re-route an existing on-site irrigation ditch are currently in place.

No major drainageways exist within or adjacent to the Site. The Site is not within the bounds of any existing FHAD according to Urban Drainage & Flood Control District.

There are no known designated wetland areas within the Site or affected by the development.

A gas easement runs along the north portion of the west property line; it's exact location and width is unknown. A 15-ft roadway and maintenance easement also exists along the north portion of the west property line, possibly overlapping said gas line/easement. A portion of an oil and gas lease exists in the south portion of the Site.

Drainage Basins

C. Major Basin Description

The Site is a part of the Erie Outfall Systems Planning Preliminary Design, issued in May 2001. The study shows the Site to be tributary to Bullhead Gulch, with all runoff originating on the Site flowing to Bullhead Gulch in both the historic and developed conditions.

Much of the major basin remains undeveloped, relatively pervious land. The intent of the study was to update the hydrology for the watershed and ensure proper measures are taken as the watershed develops to prevent flooding and treat stormwater. For private site development, the recommendations include runoff volume control practices including minimizing directly connected impervious areas, employing infiltrating BMPs, and utilizing stormwater detention.

The Site is shown to be in a Zone X (unshaded) Flood Area according to FIRM Map 08013C0438J effective December 18, 2012. Zone X (unshaded) is described by FEMA as areas determined to be outside the 500-year flood plain. A copy of the FEMA Firmette is included in Appendix A, for reference.

As mentioned above, South Boulder Canyon Ditch meanders through the Site. In order to develop the Site, the ditch will need to be re-routed to the South. A plan is in place and running concurrently with the development of the Site as part of the PD in order to shift the alignment of the Ditch to the south and alter the flow regime from open ditch to closed conduit for the section directly adjacent to the Site. A preliminary exhibit and letter can be found in Appendix E, for reference.

A previously existing pond to the west of the Site has been removed as part of the PD and will no longer be influenced by this Site.

D. Sub-basin Description

The Site is mostly undeveloped, pervious area with Type B soils and likely does not constitute a large portion of the runoff in the greater area. Runoff originating in the southern portion of the Site nearly entirely drains toward the Ditch, leaving the Site at

different locations but eventually making its way to the Ditch. The northern portion of the Site drains toward Arapahoe Road right of way.

There is only one sub-basin that drains onto the Site from an off-site area. The sub-basin is to the West of the Site and consists of pervious area to the east of an existing rural single-family house. Drainage from this basin passes through the Site on the way to the Ditch.

Drainage Design Criteria

E. Development Criteria Reference and Constraints

The principal design criteria used for this Phase III Drainage Report was the Town of Erie Standards and Specifications for Design and Construction of Public Improvements (Erie Standards), 2017 Edition.

In addition, the Urban Storm Drainage Criteria Manual (USDCM), Volumes 1-3 for Urban Drainage and Flood Control District (UDFCD) was also consulted.

F. Hydrological Criteria

The design storms analyzed for this Site are the 2-year and 100-year for the initial and major storm, respectively.

Rainfall intensities were taken from the following USDCM equation:

$$I = \frac{28.5P_1}{(10 + T_C)^{0.786}}$$

One hour rainfall P_1 values were taken from Table 800-2 in the Erie Standards. For the Site, the 2-year storm P_1=1.01 inches and for the 100-year storm, P_1=2.70 inches.

The Rational Method was used to analyze the initial and major storm for the design of storm sewer and inlets.

The empirical equations provided in Section 814.09 of the Erie Standards were used to compute the necessary 100-year detention volume for the EDB. The release rates were computed using Table 800-4 of the Erie Standards. The Site is comprised of Hydrologic Type B soil and will use a unit release rate of 0.85 cfs per acre, subtracting any flow leaving the Site undetained.

The following equation was used for the 100-year detention volume:

$V_{100}=K_{100}*A + ½$ WQCV where
$K_{100} = (1.78*I – 0.002*I^2-3.56)/900$
I = Developed basin imperviousness (%)
A = Tributary area
WQCV = Water Quality Capture Volume per USDCM

The EDB will use Full-Spectrum Detention. The USDCM was consulted in order to compute this volume and release rate. EDB volumes are tabulated in Section “I” of this report and calculations are provided in the appendices, for reference.

G. Hydraulic Criteria

Inlet capacity is based on fully developed conditions and designed utilizing the UDFCD spreadsheet “UD Inlet v4.05.xls”, released March 2017. Some on-grade inlets will bypass a portion of the major storm events. Roadway capacity will be adequate to convey all runoff during the major storm event minus discharge captured by roadway inlets. Cross-section capacity analysis has been provided in Appendix D, with cross-sections shown in the Final Drainage Plan in Appendix F.

All proposed storm sewer pipes will be sized to convey the major storm event. The existing ultimate receiving storm sewer system is being designed by others as part of the PD and will be adequate to receive the Site’s detained stormwater runoff. A copy of the Preliminary Drainage Plan (by others) including a schematic of the storm sewer outfall for the PD is included in Appendix E for reference.

Erie Standards were followed without variation or deviation, except where specifically noted.

Drainage Facility Design

H. General Concept

All impervious area developed within the Outlook at Nine Mile project will be routed to the proposed extended detention basin (EDB) along the north property boundary of the Site with the exception of a small portion of the private drive. The EDB will be designed for Full-Spectrum Detention and will outfall to a proposed storm sewer outfall designed by others as part of the PD.

The general concept of the drainage design is to route runoff into the major storm sewer inlets through grass swales, landscape & roof drains, and private drive curb & gutter. Inlets within the private drive are designed to be spaced at intervals that ensure the private drive is still passable to emergency vehicles during the major storm event.

The major storm sewer is routed through the Site generally from south to north toward the proposed EDB at the north end of the Site. Runoff will be conveyed to the EDB, detained and treated, and then be conveyed to the proposed storm sewer outfall (by others).

All private storm sewer & detention will be privately owned and maintained. Inspection and maintenance will be the responsibility of the property owner and shall be done in accordance with Town of Erie standards.

I. Specific Details

Runoff from nearly all Site sub-basins is captured via proposed storm sewer and routed to the proposed EDB at the north end of the Site. One small sub-basin will flow off the Site un-detained. Peak discharge to the EDB in the fully developed condition will be approximately 17 cfs during the initial storm event and approximately 68 cfs during the major storm event.

The following is a summary of each on-site drainage sub-basin:

Basin A1 (0.91 acres) consists of building, drive, sidewalk, and landscaping. Runoff originating within this basin will either surface-drain through curb & gutter or be captured and conveyed by roof & landscape drains to a proposed 10' Type R on-grade curb inlet (inlet A14) within the private drive. The peak runoff rate from basin A1 is calculated to be 1.8 cfs during the initial storm event and 6.1 cfs during the major storm event. During the initial storm event it is expected that the landscape drains will capture and convey all landscaping runoff. During the major storm event, some runoff may overtop the landscaped areas into the roadway and be conveyed by curb & gutter to the on-grade inlet. The inlet captures all runoff during the initial storm event and bypasses 0.6 cfs during the major storm event which will flow through curb & gutter to the inlet in downstream basin A3 (Design Point 1). In the event of a storm sewer clog, runoff will be conveyed through the private drive to Arapahoe Road right of way.

Basin L2 (0.40 acres) consists of building, sidewalk, and landscaping. Runoff originating within this basin will either surface-drain through grass swales or be captured and conveyed by roof & landscape drains to Design Point 1 in basin A2, described below. The peak runoff rate from basin L2 is calculated to be 0.8 cfs during the initial storm event and 2.8 cfs during the major storm event. During the initial and major storm events, all runoff should ultimately be collected and conveyed to Design Point 1 in basin A2. If the landscape drains clog, runoff will overtop the sump area and flow along a sidewalk to the private drive and eventually to Design Point 1.

Basin A2 (0.48 acres) consists of building, drive, sidewalk, and landscaping. Runoff originating within this basin will either surface-drain through curb & gutter or be captured and conveyed by roof & landscape drains to a proposed on-grade 10' Type R curb inlet (inlet A13) within the private drive (Design Point 1). During the initial storm event it is expected that the landscape drains will capture and convey all landscaping runoff. The peak runoff rate from basin A2 is calculated to be 0.9 cfs during the initial storm event, all of which will be captured by the inlet and conveyed via closed conduit to Design Point 2. During the major storm event, some runoff may overtop the landscaped areas into the roadway and be conveyed by curb & gutter to the on-grade inlet. During the major storm event the peak runoff originating in Basin A2, 3.3 cfs, will combine with bypassed flow from upstream basin A1 to total 3.4 cfs of surface flow routed to the inlet. The inlet will capture and convey 2.6 cfs from surface runoff and convey it to Design Point 2, along with 8.9 cfs conveyed via closed conduit from upstream basin A1 and L2 (a total of 10.2 cfs). The inlet will bypass 0.9 cfs to

Design Point 2. If the inlet clogs, runoff will be conveyed through the private drive to the next inlet, or ultimately, to Arapahoe Road right of way.

Basin A3 (0.73 acres) consists of building, drive, sidewalk, and landscaping. Runoff originating within this basin will either surface-drain through curb & gutter or be captured and conveyed by roof & landscape drains to a proposed on-grade 5' Type R curb inlet (inlet A12) within the private drive (Design Point 2). During the initial storm event it is expected that the landscape drains will capture and convey all landscaping runoff. The peak runoff rate from basin A3 is calculated to be 1.5 cfs during the initial storm event, all of which will be captured by the inlet and conveyed via closed conduit to Design Point 3. During the major storm event, some runoff may overtop the landscaped areas into the roadway and be conveyed by curb & gutter to the on-grade inlet. During the major storm event the peak runoff originating in basin A3, 5.2 cfs, will combine with bypassed flow from upstream basin A2 to total 5.2 cfs of surface flow routed to the inlet. The inlet will capture 3.2 cfs from surface runoff and convey it to Design Point 3, along with 10.2 cfs conveyed via closed conduit from upstream basins (a total of 12.8 cfs). The inlet will bypass 1.9 cfs to Design Point 3. If the inlet clogs, runoff will be conveyed through the private drive to the next inlet, or ultimately, to Arapahoe Road right of way.

Basin A4 (0.84 acres) consists of building, drive, sidewalk, and landscaping. Runoff originating within this basin will either surface-drain through curb & gutter or be captured and conveyed by roof & landscape drains to a proposed on-grade 5' Type R curb inlet (inlet A11) within the private drive (Design Point 3). During the initial storm event it is expected that the landscape drains will capture and convey all landscaping runoff. The peak runoff rate from basin A4 is calculated to be 1.7 cfs during the initial storm event, all of which will be captured by the inlet and conveyed via closed conduit to Design Point 5. During the major storm event, some runoff may overtop the landscaped areas into the roadway and be conveyed by curb & gutter to the on-grade inlet. During the major storm event the peak runoff originating in basin A4, 5.8 cfs, will combine with bypassed flow from upstream basin A3 to total 6.3 cfs of surface flow routed to the inlet. The inlet will capture and convey 3.5 cfs from surface runoff and convey it to Design Point 5, along with 12.8 cfs conveyed via closed conduit from upstream basins (a total of 15.1 cfs). The inlet will bypass 2.8 cfs to Design Point 3. If the inlet clogs, runoff will be conveyed through the private drive to the next inlet, or ultimately, to Arapahoe Road right of way.

Basin L4 (0.39 acres) consists of building, sidewalk, and landscaping. Runoff originating within this basin will either surface-drain through grass swales or be captured and conveyed by roof & landscape drains to Design Point 4 in basin A5, described below. The peak runoff rate from basin L4 is calculated to be 0.9 cfs during the initial storm event and 2.9 cfs during the major storm event. During the initial and major storm events, all runoff should ultimately be collected and conveyed to Design Point 4 in Basin A5. If the landscape drains clog, runoff will overtop the sump area and flow along a sidewalk to the private drive and eventually to Design Point 4.

Basin A5 (0.51 acres) consists of building, drive, sidewalk, and landscaping. Runoff originating within this basin will either surface-drain through curb & gutter or be captured and conveyed by roof & landscape drains to a proposed on-grade 5' Type R curb inlet (inlet A2-2) within the private drive (Design Point 4). During the initial storm event it is expected that the landscape drains will capture and convey all landscaping runoff. The peak runoff rate from basin A5 is calculated to be 0.9 cfs during the initial storm event, all of which will be captured by the inlet and conveyed via closed conduit to Design Point 5. During the major storm event, some runoff may overtop the landscaped areas into the roadway and be conveyed by curb & gutter to the on-grade inlet. During the major storm event the peak runoff originating in basin A5 is 3.3 cfs. The inlet will capture and convey 2.6 cfs from surface runoff and convey it to Design Point 5. The inlet will bypass 0.8 cfs to Design Point 6. If the inlet clogs, runoff will be conveyed through the private drive to the next inlet, or ultimately, to Arapahoe Road right of way.

Basin A6 (1.23 acres) consists of building, drive, sidewalk, and landscaping. Runoff originating within this basin will either surface-drain through curb & gutter or be captured and conveyed by roof & landscape drains to a proposed sump-condition 10' Type R curb inlet (inlet A8) within the private drive (Design Point 6). During the initial storm event it is expected that the landscape drains will capture and convey all landscaping runoff. The peak runoff rate from basin A6 is calculated to be 2.5 cfs during the initial storm event, all of which will be captured by the inlet and conveyed via closed conduit to Design Point 17. During the major storm event, some runoff may overtop the landscaped areas into the roadway and be conveyed by curb & gutter to the sump-condition inlet. During the major storm event the peak runoff originating in basin A6, 8.7 cfs, will combine with bypassed flow from upstreams basins A4 & A5 to total 9.3 cfs of surface flow routed to the inlet, all of which will be captured and conveyed by closed conduit to Design Point 17. If the inlet clogs, runoff will be conveyed through the private drive to the next inlet, or ultimately, to Arapahoe Road right of way.

Basin B1 (0.20 acres) consists of sidewalk and landscaping. Runoff originating within this basin will either surface-drain through grass swales or be captured and conveyed by landscape drains to a sump-condition Type C inlet and then conveyed by closed conduit at Design Point 7. The peak runoff rate from basin B1 is calculated to be negligible during the initial storm event and 0.8 cfs during the major storm event. During the initial and major storm events, all runoff should ultimately be collected and conveyed to Design Point 7 in basin B2. If the inlet clogs, runoff will overtop the sump area and flow into the private drive and eventually to Design Point 8, or ultimately, to Arapahoe Road right of way.

Basin B2 (0.70 acres) consists of building, drive, sidewalk, and landscaping. Runoff originating within this basin will either surface-drain through curb & gutter or be captured and conveyed by roof & landscape drains to a proposed sump-condition 5' Type R curb inlet (inlet B6) within the private drive. During the initial storm event it is expected that the landscape drains will capture and convey all landscaping runoff.

The peak runoff rate from basin B2 is calculated to be 1.4 cfs during the initial storm event, all of which will be captured by the inlet and conveyed via closed conduit to Design Point 7. During the major storm event, some runoff may overtop the landscaped areas into the roadway and be conveyed by curb & gutter to the sump-condition inlet. During the major storm event the peak runoff originating in basin B2, 4.9 cfs, will be captured and conveyed by closed conduit to Design Point 7. If the inlet clogs, runoff will be conveyed through the private drive to the next inlet, or ultimately, to Arapahoe Road right of way.

Basin B3 (0.53 acres) consists of building, sidewalk, and landscaping. Runoff originating within this basin will either surface-drain through grass swales or be captured and conveyed by roof & landscape drains to Design Point 8 in basin B4, described below. The peak runoff rate from basin B3 is calculated to be 0.8 cfs during the initial storm event and 3.3 cfs during the major storm event. During the initial and major storm events, all runoff should ultimately be collected and conveyed to Design Point 8 in basin B4. If the landscape drains clog, runoff will overtop the sump area and flow along a sidewalk to the private drive and eventually to Design Point 8.

Basin B4 (0.51 acres) consists of building, drive, sidewalk, and landscaping. Runoff originating within this basin will either surface-drain through curb & gutter or be captured and conveyed by roof & landscape drains to a proposed sump-condition 5' Type R curb inlet (inlet B1) within the private drive. During the initial storm event it is expected that the landscape drains will capture and convey all landscaping runoff. The peak runoff rate from basin B4 is calculated to be 1.1 cfs during the initial storm event and 3.7 cfs during the major storm event, all of which will be captured by the inlet and conveyed via closed conduit to Design Point 8. If the inlet clogs, runoff will be conveyed through the private drive to the next inlet, or ultimately, to Arapahoe Road right of way.

Basin B5 (0.24 acres) consists of building, drive, sidewalk, and landscaping. Runoff originating within this basin will either surface-drain through curb & gutter or be captured and conveyed by roof & landscape drains to a proposed sump-condition 5' Type R curb inlet (inlet B 1-2) within the private drive. During the initial storm event it is expected that the landscape drains will capture and convey all landscaping runoff. The peak runoff rate from basin B5 is calculated to be 0.5 cfs during the initial storm event and 1.7 cfs during the major storm event, all of which will be captured by the inlet and conveyed via closed conduit to Design Point 9. If the inlet clogs, runoff will be conveyed through the private drive to the next inlet, or ultimately, to Arapahoe Road right of way.

Basin C1 (0.52 acres) consists of sidewalk and landscaping. Runoff originating within this basin will either surface-drain through grass swales or be captured and conveyed by landscape drains to a sump-condition Type C inlet and then conveyed by closed conduit at Design Point 10. The peak runoff rate from basin C1 is calculated to be 0.2 cfs during the initial storm event and 2.3 cfs during the major storm event. During the initial and major storm events, all runoff should ultimately be collected and conveyed

to Design Point 10 in basin C2. If the inlet clogs, runoff will overtop the sump area and flow into the private drive and eventually to Design Point 10, or ultimately, to Arapahoe Road right of way.

Basin C2 (0.42 acres) consists of building, drive, sidewalk, and landscaping. Runoff originating within this basin will either surface-drain through curb & gutter or be captured and conveyed by roof & landscape drains to a proposed 5' Type R on-grade curb inlet (inlet C6) within the private drive. The peak runoff rate from basin C2 is calculated to be 1.0 cfs during the initial storm event and 3.1 cfs during the major storm event. During the initial storm event it is expected that the landscape drains will capture and convey all landscaping runoff. During the major storm event, some runoff may overtop the landscaped areas into the roadway and be conveyed by curb & gutter to the on-grade inlet. The inlet captures all runoff during the initial storm event and bypasses 0.6 cfs during the major storm event which will flow through curb & gutter to the inlet in downstream basin C6 (Design Point 13). All captured runoff will be conveyed by closed conduit to Design Point 12. In the event of a storm sewer clog, runoff will be conveyed through the private drive to Arapahoe Road right of way.

Basin L1 (0.29 acres) consists of building, sidewalk, and landscaping. Runoff originating within this basin will either surface-drain through grass swales or be captured and conveyed by roof & landscape drains to Design Point 11 in basin C3, described below. The peak runoff rate from basin L1 is calculated to be 0.5 cfs during the initial storm event and 2.0 cfs during the major storm event. During the initial and major storm events, all runoff should ultimately be collected and conveyed to Design Point 11 in basin C3. If the landscape drains clog, runoff will overtop the sump area and flow along a sidewalk to the private drive and eventually to Design Point 11.

Basin C3 (0.76 acres) consists of building, drive, sidewalk, and landscaping. Runoff originating within this basin will either surface-drain through curb & gutter or be captured and conveyed by roof & landscape drains to a proposed on-grade 5' Type R curb inlet (inlet C2-1) within the private drive (Design Point 11). During the initial storm event it is expected that the landscape drains will capture and convey all landscaping runoff. The peak runoff rate from basin C3 is calculated to be 1.3 cfs during the initial storm event, all of which will be captured by the inlet and conveyed via closed conduit to Design Point 12. During the major storm event, some runoff may overtop the landscaped areas into the roadway and be conveyed by curb & gutter to the on-grade inlet. During the major storm event the peak runoff originating in basin C3, 5.0 cfs, will surface flow to the inlet. The inlet will capture and convey 3.1 cfs from surface runoff and convey it to Design Point 12, along with 2.0 cfs conveyed via closed conduit from upstream basin L1 (a total of 5.1 cfs). The inlet will bypass 1.9 cfs to Design Point 13. If the inlet clogs, runoff will be conveyed through the private drive to the next inlet, or ultimately, to Arapahoe Road right of way.

Basin C4 (0.90 acres) consists of building, drive, sidewalk, and landscaping. Runoff originating within this basin will either surface-drain through curb & gutter or be captured and conveyed by roof & landscape drains to a proposed on-grade 5' Type R

curb inlet (inlet C4) within the private drive (Design Point 13). During the initial storm event it is expected that the landscape drains will capture and convey all landscaping runoff. The peak runoff rate from basin C4 is calculated to be 1.7 cfs during the initial storm event, all of which will be captured by the inlet and conveyed via closed conduit to Design Point 14. During the major storm event, some runoff may overtop the landscaped areas into the roadway and be conveyed by curb & gutter to the on-grade inlet. During the major storm event the peak runoff originating in basin C4, 6.2 cfs, will combine with bypassed flow from upstream basins C2 & C3 to total 7.1 cfs of surface flow routed to the inlet. The inlet will capture and convey 3.3 cfs from surface runoff and convey it to Design Point 14, along with 9.2 cfs conveyed via closed conduit from upstream basins (a total of 11.6 cfs). The inlet will bypass 3.8 cfs to Design Point 15. If the inlet clogs, runoff will be conveyed through the private drive to the next inlet, or ultimately, to Arapahoe Road right of way.

Basin C5 (0.39 acres) consists of sidewalk and landscaping. Runoff originating within this basin will either surface-drain through grass swales or be captured and conveyed by landscape drains to a sump-condition Type C inlet and then conveyed by closed conduit to Design Point 14. The peak runoff rate from basin C5 is calculated to be 0.2 cfs during the initial storm event and 1.9 cfs during the major storm event. During the initial and major storm events, all runoff should ultimately be collected and conveyed to Design Point 14 in basin C6. If the inlet clogs, runoff will overtop the sump area and flow into the private drive and eventually to Design Point 15, or ultimately, to Arapahoe Road right of way.

Basin C6 (0.64 acres) consists of building, drive, sidewalk, and landscaping. Runoff originating within this basin will either surface-drain through curb & gutter or be captured and conveyed by roof & landscape drains to a proposed on-grade 10’ Type R curb inlet (inlet C2) within the private drive (Design Point 15). During the initial storm event it is expected that the landscape drains will capture and convey all landscaping runoff. The peak runoff rate from basin C6 is calculated to be 1.3 cfs during the initial storm event, all of which will be captured by the inlet and conveyed via closed conduit to Design Point 17. During the major storm event, some runoff may overtop the landscaped areas into the roadway and be conveyed by curb & gutter to the on-grade inlet. During the major storm event the peak runoff originating in Basin C6, 4.5 cfs, will combine with bypassed flow from upstream basin C4 to total 7.1 cfs of surface flow routed to the inlet. The inlet will capture and convey 6.1 cfs from surface runoff and convey it to Design Point 17, along with 13.0 cfs conveyed via closed conduit from Design Point 14 (a total of 20.4 cfs). The inlet will bypass 1.0 cfs to Design Point 16. If the inlet clogs, runoff will be conveyed through the private drive to the next inlet, or ultimately, to Arapahoe Road right of way.

Basin L3 (0.31 acres) consists of building, sidewalk, and landscaping. Runoff originating within this basin will either surface-drain through grass swales or be captured and conveyed by roof & landscape drains to Design Point 15 in basin C6, described below. The peak runoff rate from basin L3 is calculated to be 0.6 cfs during the initial storm event and 2.1 cfs during the major storm event. During the initial and

major storm events, all runoff should ultimately be collected and conveyed to Design Point 15 in basin C6. If the landscape drains clog, runoff will overtop the sump area and flow along a sidewalk to the private drive and eventually to Design Point 15.

Basin C7 (1.12 acres) consists of building, drive, sidewalk, and landscaping. Runoff originating within this basin will either surface-drain through curb & gutter or be captured and conveyed by roof & landscape drains to a proposed on-grade 10' Type R curb inlet (inlet A1-1) within the private drive (Design Point 16). During the initial storm event it is expected that the landscape drains will capture and convey all landscaping runoff. The peak runoff rate from basin C7 is calculated to be 2.1 cfs during the initial storm event, all of which will be captured by the inlet and conveyed via closed conduit to Design Point 17. During the major storm event, some runoff may overtop the landscaped areas into the roadway and be conveyed by curb & gutter to the on-grade inlet. During the major storm event the peak runoff originating in basin C7, 7.7 cfs, will combine with bypassed flow from upstream basin C6, however basin C7 will peak before the routed flow from the upstream basin. The inlet will capture and convey 6.2 cfs from surface runoff and convey it to Design Point 17. The inlet will bypass 1.5 cfs to Design Point 20. If the inlet clogs, runoff will be conveyed through the private drive to the next inlet, or ultimately, to Arapahoe Road right of way.

Basin L5 (1.09 acres) consists of building, sidewalk, and landscaping. Runoff originating within this basin will either surface-drain through grass swales or be captured and conveyed by roof & landscape drains to Design Point 19. The peak runoff rate from basin L5 is calculated to be 0.3 cfs during the initial storm event and 4.1 cfs during the major storm event. During the initial and major storm events, all runoff should ultimately be collected and conveyed to Design Point 19 in Basin C6. If the landscape drains clog, runoff will overtop the sump area and flow over a sidewalk to the private drive and eventually to Design Point 20.

Basin A7 (0.26 acres) consists of building, drive, sidewalk, and landscaping. Runoff originating within this basin will either surface-drain through curb & gutter or be captured and conveyed by roof & landscape drains to a proposed on-grade 10' Type R curb inlet (inlet A2) within the private drive (Design Point 20). During the initial storm event it is expected that the landscape drains will capture and convey all landscaping runoff. The peak runoff rate from basin A7 is calculated to be 0.2 cfs during the initial storm event, all of which will be captured by the inlet and conveyed via closed conduit to Design Point 21. During the major storm event, some runoff may overtop the landscaped areas into the roadway and be conveyed by curb & gutter to the on-grade inlet. During the major storm event the peak runoff originating in Basin A7, 1.5 cfs, will combine with bypassed flow from upstream Basin C7 to total 2.5 cfs of surface flow routed to the inlet. All runoff will be captured and conveyed to the EDB (Design Point 21), along with 64.4 cfs conveyed via closed conduit from Design Point 19 (a total of 65.6 cfs). If the inlet clogs, runoff will be conveyed through the private drive to Arapahoe Road right of way.

Basin D1 (0.73 acres) consists of walk, landscaping, and EDB. All runoff originating in basin D1 will surface drain or be conveyed by landscape drains to the EDB where it will combine with all upstream runoff from the Site. Peak runoff during the initial and major storm events are negligible and 2.9 cfs, respectively.

Basin O1 (0.02 acres) consists of the small portion of private drive between the most downstream inlet in the private storm sewer system and the northern property boundary. Runoff originating in this basin totals 0.1 cfs and 0.2 cfs in the initial and major storm events, respectively. The major storm event runoff escaping the Site undetained into Arapahoe Road right of way is subtracted from the total allowable detention pond release.

The proposed EDB will outfall into a proposed storm sewer outfall location being designed by others as part of the PD. Controlled, detained runoff release will be conveyed from the outlet structure of the EDB to an outfall manhole along the northern property boundary of the Site. An overflow weir along the northern edge of the EDB will safely convey flows during outlet clogging or storms in excess of the 100-year event to Arapahoe Road right of way.

Due to the available footprint for the EDB, retaining walls were used to achieve adequate detention volume.

Design Storm Event	WSEL (feet)	Volume Provided CF	Volume Provided Acre-Feet	Release Rate (CFS)
WQCV	5241.14	20,123	0.462	40-Hour drain time
EURV	5243.91	55,452	1.273	12-32-Hour drain time*
100-Year + ½ WQCV	5246.73	99,840	2.292	12.7

*Independent of the WQCV

The EURV will be discharged through an orifice plate on the outlet box in standard conformance with the USDCM. Above the EURV water surface elevation, the outlet box will allow stormwater to flow into the outlet structure and discharge directly to the outlet pipe. The release will be controlled to the maximum allowable 12.7 cfs (15.15 acres * 0.85 cfs/acre – 0.2 cfs undetained release) via restrictor plate bolted over the outlet pipe designed to release 12.7 cfs with an accumulated head corresponding to the 100-year water surface elevation shown above.

Per Erie Standards, there is one foot of provided freeboard between the 100-year water surface elevation and the top of the berm. The weir has been designed to discharge the peak runoff rate during the major storm event at a flow depth of approximately 3 inches. The discharge will flow over the weir crest and down the reinforced pond berm to the outfall location in Arapahoe Road right of way.

Calculations for the pond hydraulic designs are included in Appendix D.

Construction will be phased in a way that will utilize the existing low point where the EDB is proposed as a temporary sediment basin to receive discharge that may be

conveying sediment during construction. As storm sewer and roadway infrastructure is built (from downstream to the southern corner of the Site), proper temporary BMPs will be put in place in order to limit the amount of sediment leaving the Site.

Summary & Conclusion

All proposed on-site drainage infrastructure shown on the Final Drainage Plan (Appendix F) will be designed to convey the major-storm event and all sumps will be designed to have points of overland relief in order to prevent property damage in the event of clogging.

Stormwater quality will be provided within the proposed EDB and where feasible, directly connected impervious areas will be avoided.

The proposed project will not adversely affect drainage patterns on the Site or negatively affect adjacent, upstream, or downstream property. The project was designed in accordance with the Town of Erie storm drainage criteria.

References

1. Town of Erie Standards and Specifications for Design and Construction of Public Improvements, Town of Erie, Colorado, 2017.

2. Town of Erie Outfall Systems Planning Preliminary Design, Town of Erie, Colorado, May 2001

3. Urban Storm Drainage Criteria Manual, Vol. 1 and 2, Urban Drainage and Flood Control District, Revised March 2017.

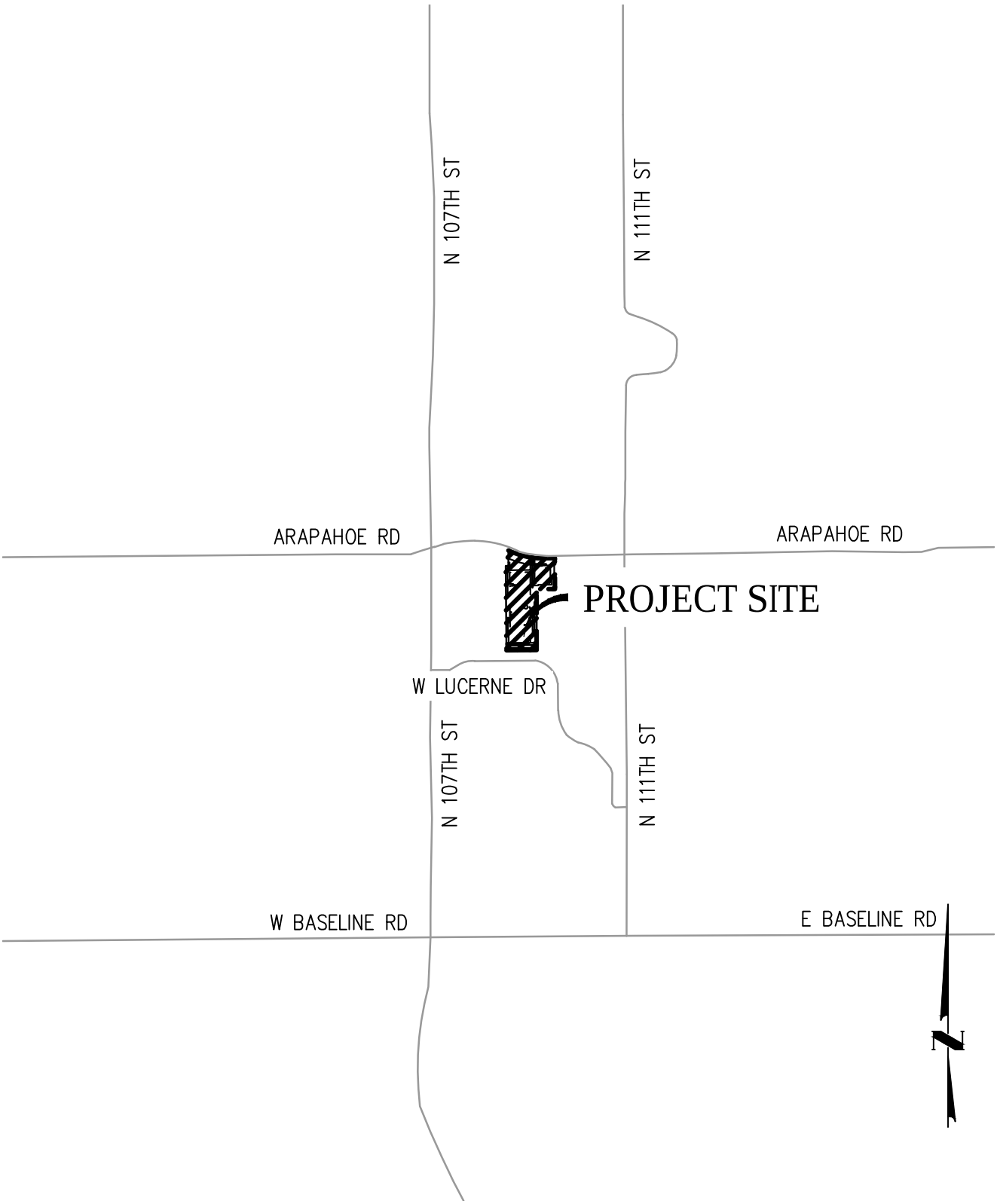
4. Urban Storm Drainage Criteria Manual, Vol. 3, Urban Drainage and Flood Control District, Revised November 2015.

5. United States Department of Agriculture, Natural Resources Conservation Service. Custom Soil Resource Report.

6. United States Department of Homeland Security, Federal Emergency Management Agency. Flood Insurance Rate Map. Map Number 08005C0194K, December 17, 2010

APPENDIX A

Vicinity Map
FEMA Firmette



Plotted: WED 04/26/17 4:37:12P By: Reggie Smith Filepath: p:\160602\engineering\xref\vicmap.dwg Layout: layout1

NO CHANGES ARE TO BE MADE TO THIS DRAWING WITHOUT WRITTEN PERMISSION OF HARRIS KOCHER SMITH.

ISSUE DATE: 09/19/2016	PROJECT #: 160602
DATE	REVISION COMMENTS

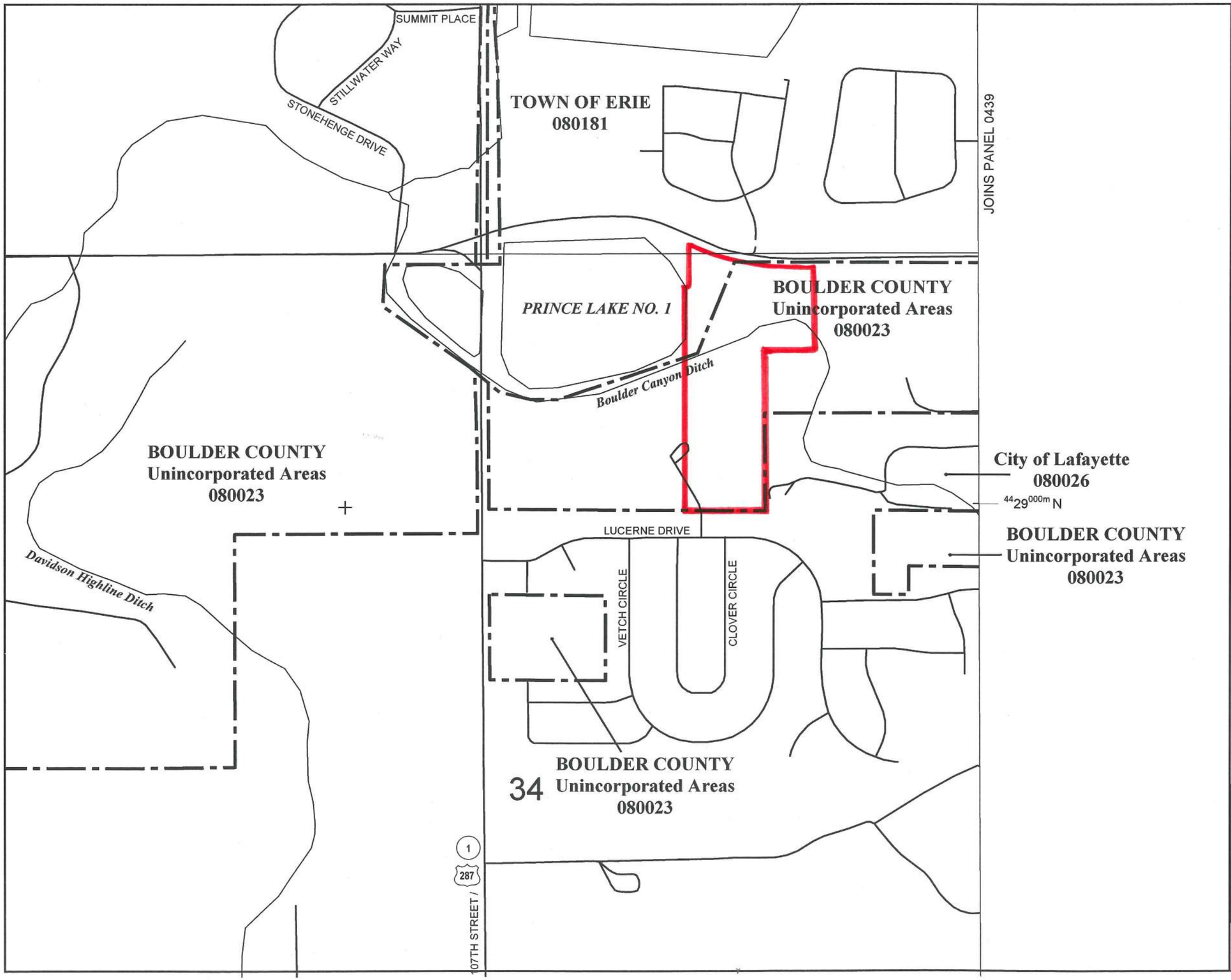
EVERGREEN

OUTLOOK AT NINE MILE
VICINITY MAP

HARRIS KOCHER SMITH
1120 Lincoln Street, Suite 1000
Denver, Colorado 80203
P: 303.623.6300 F: 303.623.6311
HarrisKocherSmith.com

DSN'D BY: MEG
CHK'D BY: TEG
DRAWN BY: MEG

SHEET NO.
1
1 OF 1



urance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

MET

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0438J

FIRM

FLOOD INSURANCE RATE MAP

BOULDER COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 438 OF 615

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BOULDER COUNTY	080023	0438	J
ERIE, TOWN OF	080181	0438	J
LAFAYETTE, CITY OF	080026	0438	J

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
08013C0438J

MAP REVISED
DECEMBER 18, 2012

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

APPENDIX B

Soils Information

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Boulder County Area, Colorado



July 18, 2016

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means

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AcC—Ascalon sandy loam, 3 to 5 percent slopes.....12
AcD—Ascalon sandy loam, 5 to 9 percent slopes.....13
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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

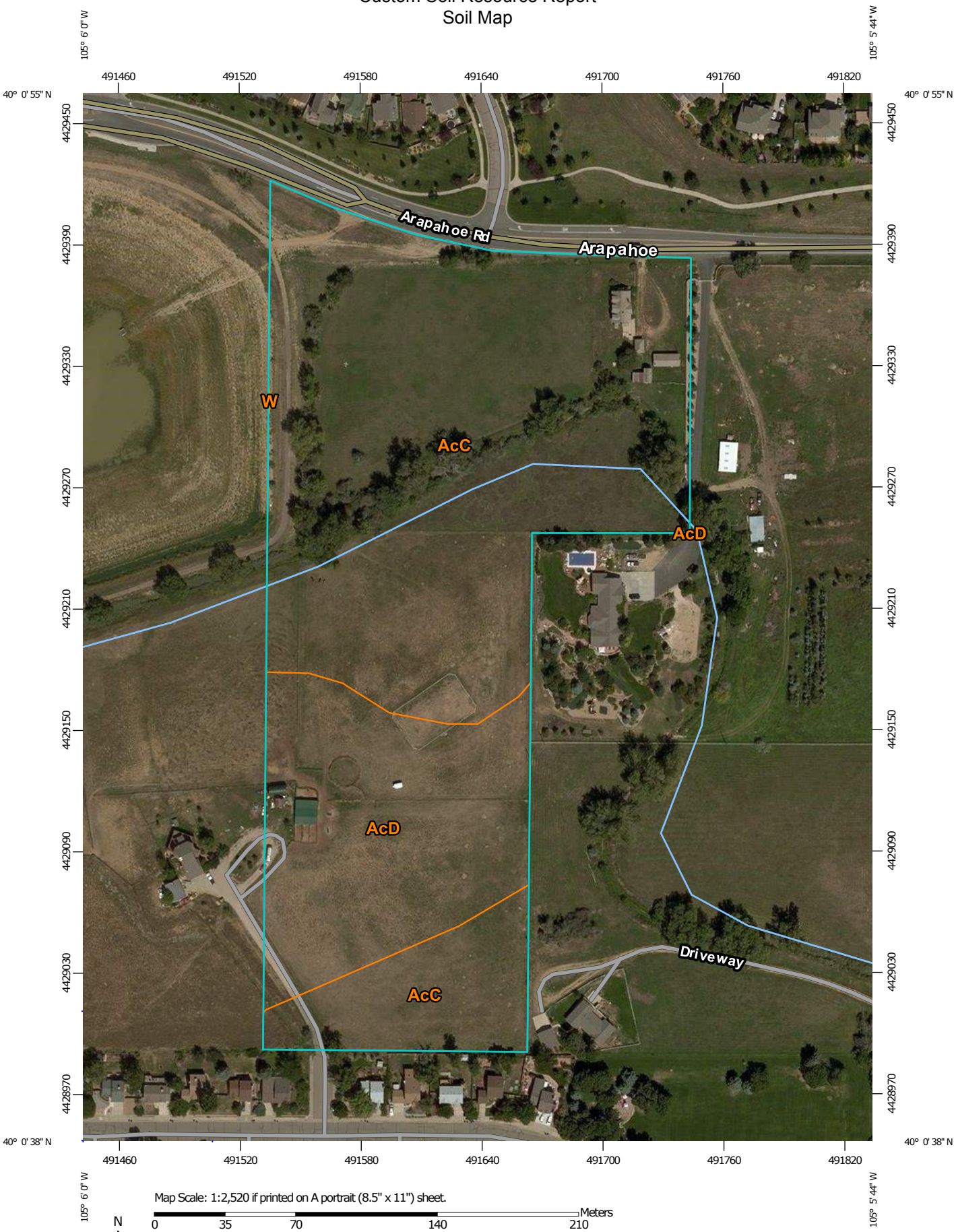
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:2,520 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 35 70 140 210

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Boulder County Area, Colorado
Survey Area Data: Version 12, Sep 22, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 30, 2014—Sep 18, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Boulder County Area, Colorado (CO643)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
AcC	Ascalon sandy loam, 3 to 5 percent slopes	11.9	74.6%
AcD	Ascalon sandy loam, 5 to 9 percent slopes	4.1	25.4%
W	Water	0.0	0.0%
Totals for Area of Interest		**15.9**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If

intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Boulder County Area, Colorado

AcC—Ascalon sandy loam, 3 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2tlnt
Elevation: 3,550 to 5,970 feet
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 46 to 57 degrees F
Frost-free period: 135 to 160 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Ascalon and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ascalon

Setting

Landform: Interfluves
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Wind-reworked alluvium and/or calcareous sandy eolian deposits

Typical profile

Ap - 0 to 6 inches: sandy loam
Bt1 - 6 to 12 inches: sandy clay loam
Bt2 - 12 to 19 inches: sandy clay loam
Bk - 19 to 35 inches: sandy clay loam
C - 35 to 80 inches: sandy loam

Properties and qualities

Slope: 3 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline (0.1 to 1.9 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 1.0
Available water storage in profile: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4c
Hydrologic Soil Group: B
Ecological site: Sandy Plains (R067BY024CO), Sandy (North) Draft (April 2010) (PE 16-20) (R072XA022KS)

Minor Components

Stoneham

Percent of map unit: 10 percent
Landform: Interfluves
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Loamy Plains (R067BY002CO), Loamy Upland (North) (PE 16-20) (R072XA015KS)

Vona

Percent of map unit: 8 percent
Landform: Interfluves
Landform position (two-dimensional): Backslope, footslope, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Sandy Plains (R067BY024CO), Sandy (North) Draft (April 2010) (PE 16-20) (R072XA022KS)

Platner

Percent of map unit: 2 percent
Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Loamy Plains (R067BY002CO), Loamy Upland (North) (PE 16-20) (R072XA015KS)

AcD—Ascalon sandy loam, 5 to 9 percent slopes

Map Unit Setting

National map unit symbol: jpr4
Elevation: 4,900 to 5,500 feet
Mean annual precipitation: 12 to 18 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 140 to 155 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Ascalon and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ascalon

Setting

Landform: Terraces
Landform position (three-dimensional): Side slope, tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed loamy alluvium and/or eolian deposits

Typical profile

H1 - 0 to 5 inches: sandy loam
H2 - 5 to 16 inches: sandy clay loam, sandy loam
H2 - 5 to 16 inches: fine sandy loam, loamy fine sand, sandy loam
H3 - 16 to 60 inches:
H3 - 16 to 60 inches:
H3 - 16 to 60 inches:

Properties and qualities

Slope: 5 to 9 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very high (about 16.9 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: Sandy (R067XB026CO)

Minor Components

Olney

Percent of map unit: 10 percent

Otero

Percent of map unit: 5 percent

Terry

Percent of map unit: 5 percent

W—Water

Map Unit Composition

Water: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Minor Components

Aquolls

Percent of map unit: 5 percent
Landform: Marshes

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APPENDIX C

Hydrologic Computations

Project Name: Outlook at Nine Mile

Composite C-Value Computations

Post-Development

Project No: 160602

Date: 04/20/17

Revised:

Design by: ATM

Checked by: ATM

BASIN	TOTAL AREA (ACRES)	ROOFS (90%)	DRIVES & WALKS (90%)	LANDSCAPE AREA (5%)	PERCENT IMPERVIOUS	C_2=	C_5=	C_{100}=
A1	0.91	0.11	0.65	0.16	75%	0.60	0.62	0.78
A2	0.48	0.20	0.18	0.10	72%	0.57	0.60	0.76
A3	0.73	0.14	0.45	0.14	73%	0.58	0.61	0.77
A4	0.84	0.20	0.52	0.13	77%	0.62	0.64	0.79
A5	0.51	0.18	0.22	0.11	71%	0.57	0.60	0.76
A6	1.23	0.24	0.77	0.22	74%	0.59	0.62	0.77
A7	0.26	0.01	0.11	0.15	39%	0.28	0.31	0.61
B1	0.20	0.00	0.01	0.19	5%	0.02	0.03	0.45
B2	0.70	0.22	0.34	0.13	73%	0.58	0.61	0.77
B3	0.55	0.25	0.10	0.20	57%	0.44	0.47	0.69
B4	0.51	0.17	0.26	0.08	75%	0.60	0.63	0.78
B5	0.24	0.05	0.15	0.04	76%	0.61	0.64	0.78
C1	0.52	0.00	0.12	0.40	21%	0.13	0.15	0.52
C2	0.42	0.08	0.30	0.03	83%	0.67	0.70	0.81
C3	0.76	0.28	0.25	0.23	63%	0.49	0.52	0.72
C4	0.90	0.28	0.43	0.19	71%	0.56	0.59	0.76
C5	0.39	0.00	0.10	0.29	23%	0.15	0.17	0.53
C6	0.64	0.17	0.35	0.12	74%	0.59	0.62	0.77
C7	1.12	0.28	0.58	0.26	69%	0.55	0.58	0.75
D1	0.73	0.00	0.02	0.72	2%	0.01	0.01	0.44
L1	0.29	0.13	0.08	0.08	66%	0.51	0.54	0.73
L2	0.40	0.20	0.12	0.08	71%	0.57	0.60	0.76
L3	0.31	0.16	0.08	0.06	71%	0.56	0.59	0.76
L4	0.39	0.27	0.08	0.03	82%	0.67	0.69	0.81
L5	1.09	0.14	0.08	0.87	18%	0.12	0.14	0.51
O1	0.02	0.00	0.02	0.00	90%	0.74	0.77	0.85

Project Name: Outlook at Nine Mile
Project No: 160602
Date: 04/20/17
Revised:

STANDARD FORM SF-2
TIME OF CONCENTRATION

Designed By: ATM
Checked By: ATM

SUB-BASIN DATA			INITIAL/OVERLAND TIME (T_i)			TRAVEL TIME (T_t)					Tc CHECK (URBANIZED BASINS)			FINAL	REMARKS
BASIN	AREA (AC)	C_5	LENGTH (FT)	SLOPE %	Ti (MIN)	LENGTH (FT)	SLOPE %	C_v	VELOCITY (FPS)	Tt (MIN)	COMPOS. Tc (MIN)	TOTAL LENGTH	Tc = (L/180) + 10 (MIN)	T_c (MIN)	
A1	0.91	0.62	24	2.00	3.39	341	1.06	20	2.06	2.76	6.15	365	12.03	6.15	
A2	0.48	0.60	23	2.00	3.49	208	1.42	20	2.38	1.45	5.00	231	11.28	5.00	
A3	0.73	0.61	21	2.00	3.28	149	1.50	20	2.45	1.01	5.00	170	10.94	5.00	
A4	0.84	0.64	22	2.00	3.11	388	1.25	20	2.24	2.89	6.00	410	12.28	6.00	
A5	0.51	0.60	45	2.00	4.93	165	1.04	20	2.04	1.35	6.28	210	11.17	6.28	
A6	1.23	0.62	26	2.00	3.58	161	1.23	20	2.22	1.21	5.00	187	11.04	5.00	
A7	0.26	0.31												5.00	By Inspection
B1	0.20	0.03												5.00	By Inpsection
B2	0.70	0.61	35	2.00	4.24	113	1.25	20	2.24	0.84	5.08	148	10.82	5.08	
B3	0.55	0.47	20	2.00	4.11	110	4.00	5	1.00	1.83	5.94	130	10.72	5.94	
B4	0.51	0.63	18	2.00	2.89	180	3.12	20	3.53	0.85	5.00	198	11.10	5.00	
B5	0.24	0.64												5.00	By Inspection
C1	0.52	0.15	10	2.00	4.35	251	5.00	8	1.79	2.34	6.69	261	11.45	6.69	
C2	0.42	0.70	10	2.00	1.85	115	3.00	20	3.46	0.55	5.00	125	10.69	5.00	
C3	0.76	0.52	10	33.00	1.05	15	33.00	8	4.60	0.05	5.00	25	10.14	5.00	
C4	0.90	0.59	10	2.00	2.34	226	1.32	20	2.30	1.64	5.00	236	11.31	5.00	By Inspection
C5	0.39	0.17												5.00	By Inpsection
C6	0.64	0.62												5.00	By Inpsection
C7	1.12	0.58	15	2.00	2.96	300	1.61	20	2.54	1.97	5.00	315	11.75	5.00	
D1	0.73	0.01												5.00	By Inpsection
L1	0.29	0.54												5.00	By Inpsection
L2	0.40	0.60												5.00	By Inpsection
L3	0.31	0.59												5.00	By Inpsection
L4	0.39	0.69												5.00	By Inspection
L5	1.09	0.14	93	10.00	7.91	205	4.00	8	1.60	2.14	10.05	298	11.66	10.05	
O1	0.02	0.77													

1-HR Rainfall

Return Interval (YR)	1-hour Rainfall
WQ	0.6
2	1.01
5	1.43
10	1.73
100	2.7

tc	WQ	2yr	5yr	5yr	100yr
5	2.035	3.426	4.850	5.868	9.158
6	1.934	3.256	4.610	5.578	8.705
7	1.844	3.105	4.396	5.318	8.300
8	1.763	2.968	4.203	5.084	7.935
9	1.690	2.845	4.028	4.873	7.605
10	1.623	2.732	3.869	4.680	7.305
11	1.562	2.630	3.723	4.504	7.030
12	1.506	2.535	3.590	4.343	6.777
13	1.454	2.448	3.466	4.193	6.545
14	1.407	2.368	3.352	4.056	6.329
15	1.362	2.293	3.246	3.927	6.130
16	1.321	2.223	3.148	3.808	5.943
17	1.282	2.158	3.056	3.697	5.770
18	1.246	2.097	2.970	3.593	5.607
19	1.212	2.040	2.889	3.495	5.455
20	1.180	1.987	2.813	3.403	5.311

Project Name: Outlook at Nine Mile
Project No: 160602
Date: 04/20/17
Revised:

STANDARD FORM SF-2
Post-Development
Rational Method Procedure

Designed By: ATM
Checked By: ATM
Design Storm: 2 YR

		DIRECT RUNOFF						TOTAL RUNOFF				STREET/INLET					STORM SEWER PIPE				TRAVEL TIME			CARRYOVER FLOWS					
BASIN (s)	DESIGN POINT	AREA (AC)	RUNOFF COEFF	Tc (min)	C x A (AC)	I (IN/HR)	DIRECT RUNOFF, Q (CFS)	Tc (MAX)	Σ(C x A) (AC)	I (IN/HR)	TOTAL RUNOFF, Q (CFS)	SLOPE (%)	STREET FLOW (CFS)	INLET DESIGN FLOW (CFS)	STREET OR INLET INTERCEPTION (CFS)	CARRYOVER (CFS)	DESIGN FLOW (CFS)	PIPE SLOPE (%)	PIPE SIZE (IN)	Q_{FULL} (CFS)	LENGTH (FT)	VELOCITY (FPS)	Tt (min)	Σ(C x A) BYPASS (AC)	LENGTH (FT)	SLOPE (%)	VELOCITY (FPS)	Tt (min)	REMARKS
A1		0.91	0.60	6.15	0.54	3.23	1.8																						**Surface flow to A14**
								6.15	0.50	3.23	1.6						1.8	1.25	18	15.3	215	8.6	0.41						Captured & Piped to DP-1
								6.15	0.05	3.23	0.2													0.0	215	1.08	2.1	1.72	Overland to DP-1
L2		0.40	0.57	5.00	0.23	3.43	0.8										0.8	1.00	8	1.6	88	4.5	0.33						Captured and Piped to DP-1
A2		0.48	0.57	5.00	0.27	3.43	0.9																						A2 Surface Flow to DP-1
	1							7.87	1.05	2.99	3.1																		Total Flow to DP-1
								7.87	0.32	2.99	1.0																		Surface Flow to DP-1
								7.87	0.32	2.99	1.0																		**Captured by A13**
								7.87	1.05	2.99	3.1						3.1	1.25	18	15.3	162	8.6	0.31						Total Piped to DP-2
								7.87	0.00	2.99	0.0													0.0	162	1.30	2.3	1.18	Bypass to DP-2
A3		0.73	0.58	5.00	0.42	3.43	1.5																						A3 Surface Flow to DP-2
	2							9.06	1.47	2.84	4.2																		Total Flow to DP-2
								9.06	0.42	2.84	1.2																		Surface Flow to DP-2
								9.06	0.42	2.84	1.2																		**Captured by A12**
								9.06	1.47	2.84	4.2						4.2	1.00	18	13.7	336	7.7	0.72						Total Piped to DP-2
								9.06	0.00	2.84	0.0													0.00	336	1.18	2.2	2.58	Bypass to DP-3
A4		0.84	0.62	6.00	0.52	3.26	1.7																						A4 Surface Flow to DP-3
	3							11.63	1.99	2.57	5.1																		Total Flow to DP-3
								11.63	0.52	2.57	1.3																		Surface Flow to DP-3
								11.63	0.52	2.57	1.3																		**Captured by A11**
								11.63	1.99	2.57	5.1						5.1	1.00	24	29.4	59	9.4	0.11						Total Piped to DP-5
								11.63	0.00	2.57	0.0													0.00	230	1.01	2.0	1.91	Bypass to DP-6
L4		0.39	0.67	5.00	0.26	3.43	0.9										0.9	1.00	8	1.6	88	4.5	0.33						Captured and Piped to DP-4
A5		0.51	0.57	6.28	0.29	3.21	0.9																						A5 Surface Flow to DP-3
	4							6.28	0.54	3.21	1.7																		Total Flow to DP-4
								6.28	0.29	3.21	0.9																		**Captured by A2-2**
								6.28	0.54	3.21	1.7						1.7	1.00	15	8.4	52	6.8	0.13						Piped to DP-5
								6.28	0.00	3.21	0.0													0.00	190	1.00	2.0	1.58	Bypass to DP-6
	5							11.74	2.53	2.56	6.5						6.5	0.75	24	25.5	159	8.1	0.33						Total Flow to DP-5 (Piped to DP-6)
A6		1.23	0.59	5.00	0.72	3.43	2.5																						A3 Surface Flow to DP-6
	6							13.54	3.26	2.40	7.8																		Total Flow to DP-6
								13.54	0.72	2.40	1.7																		**Captured by A8**
								13.54	3.26	2.40	7.8						7.8	0.81	30	48.0	207	9.8	0.35						Total Piped to DP-17
B1		0.20	0.02	5.00	0.00	3.43	0.0										0.0	1.43	15	10.0	52	8.2	0.11						**Captured by Type C Inlet (Piped to DP-7)**
B2		0.70	0.58	5.08	0.40	3.41	1.4										1.4	0.70	18	11.4	81	6.5	0.21						**Captured by B6 (Piped to DP-7)**
	7							5.29	0.41	3.37	1.4						1.4	1.00	18	13.7	285	7.7	0.62						Piped to DP-8
B3		0.55	0.44	5.94	0.24	3.27	0.8										0.8	1.00	8	1.6	150	4.5	0.56						Captured and Piped to DP-8
B4		0.51	0.60	5.00	0.31	3.43	1.1										1.1	0.50	18	9.7	7	5.5	0.02						**Captured BY B1 DP-8**
	8							6.50	0.96	3.18	3.0						3.0	0.50	24	20.8	85	6.6	0.21						Total Flow to DP-8 (Piped to DP-9)
B5		0.24	0.61	5.00	0.15	3.43	0.5										0.5	1.00	18	13.7	7	7.7	0.02						Captured and Piped to DP-9
	9							6.71	1.10	3.15	3.5						3.5	0.50	24	20.8	168	6.6	0.42						Total Flow to DP-9 (Piped to DP-xx)
C1		0.52	0.13	6.69	0.07	3.15	0.2										0.2	1.00	18	13.7	146	7.7	0.31						**Captured by Type C Inlet (Piped to DP-10)**
C2		0.42	0.67	5.00	0.28	3.43	1.0																						C2 Surface Flow to DP-10
	10							7.01	0.35	3.10	1.1																		Total Flow to DP-10
								7.01	0.31	3.10	1.0																		**Captured by C6**
								7.01	0.38	3.10	1.2						1.2	1.00	18	13.7	185	7.7	0.40						Piped to DP-12
								7.01	0.00	3.10	0.0													0.00	346	0.98	2.0	2.91	Bypass to DP-13
L1		0.29	0.51	5.00	0.15	3.43	0.5										0.5	1.00	10	2.8	100	5.2	0.32						Captured and Piped to DP-11
C3		0.76	0.49	5.00	0.37	3.43	1.3																						C3 Surface Flow to DP-11
	11							5.32	0.52	3.37	1.8																		Total Flow to DP-11
								5.32	0.38	3.37	1.3																		**Captured by C2-1**

								5.32	0.53	3.37	1.8						1.8	1.50	15	10.3	40	8.4	0.08						Total Piped to DP-12
								5.32	0.00	3.37	0.0													0.00	193	0.98	2.0	1.62	Bypass to DP-13
	12							7.40	0.91	3.05	2.8						2.8	1.00	18	13.7	158	7.7	0.34						Total Flow to DP-12 (Piped to DP-13)
C4		0.90	0.56	5.00	0.50	3.43	1.7																						C4 Surface Flow to DP-13
	13							9.92	1.41	2.74	3.9																		Total Flow to DP-13
								9.92	0.50	2.74	1.4																		Surface Flow to DP-13
								9.92	0.50	2.74	1.4																		**Captured by C4**
								9.92	1.41	2.74	3.9						3.9	1.00	24	29.4	129	9.4	0.23						Total Piped to DP-14
								9.92	0.00	2.74	0.0													0.00	129	1.00	2.0	1.08	Bypass to DP-15
C5		0.39	0.15	5.00	0.06	3.43	0.2										0.2	1.50	15	10.3	51	8.4	0.10						Piped to DP-14
	14							10.15	1.47	2.72	4.0						4.0	0.98	24	29.1	58	9.3	0.10						Total to DP-14 (Piped to DP-15)
L3		0.31	0.56	5.00	0.17	3.43	0.6										0.6	1.00	10	2.8	50	5.2	0.16						Captured and Piped to DP-15
C6		0.64	0.59	5.00	0.37	3.43	1.3																						C6 Surface Flow to DP-15
	15							10.99	2.02	2.63	5.3																		Total Flow to DP-15
								10.99	0.37	2.63	1.3																		Surface Flow to DP-15
								10.99	0.49	2.63	1.3																		**Captured by C2**
								10.99	2.13	2.63	5.6						5.6	1.05	30	54.6	307	11.1	0.46						Total Piped to DP-17
								10.99	0.00	2.63	0.0													0.00	301	1.60	2.5	1.98	Bypass to DP-16
C7		1.12	0.55	5.00	0.61	3.43	2.1																						C7 Surface Flow to DP-16
	16							12.98	0.61	2.45	1.5																		Surface Flow to DP-16
								12.98	0.85	2.45	2.1						2.1	2.50	15	13.3	31	10.8	0.05						**Captured by A1-1 (Piped to DP-17)**
								12.98	0.00	2.45	0.0													0.00	162	4.40	4.2	0.64	Bypass to DP-20
	17							13.90	6.24	2.38	14.8						14.8	1.01	36	67.0	97	9.5	0.17						Total Flow to DP-17 (Piped to DP-18)
	18							14.07	7.34	2.36	17.4						17.4	1.50	36	81.7	70	11.6	0.10						Total Flow to DP-18 (Piped to DP-19)
L5		1.09	0.12	10.05	0.13	2.73	0.3										0.3	1.00	12	4.6	50	5.9	0.14						Captured and Piped to DP-19
	19							14.17	7.47	2.35	17.6						17.6	1.40	36	78.9	36	11.2	0.05						Total Flow to DP-19 (Piped to DP-20)
A7		0.26	0.28	5.00	0.07	3.43	0.2																						A7Surface Flow to DP-20
	20							14.22	7.54	2.35	17.7																		Total Flow to DP-20
								13.62	0.07	2.40	0.2																		**Captured by A2 (Piped to DP-21)**
								14.22	7.54	2.35	17.7						17.7	3.75	36	129.2	71	18.3	0.06						Total Piped to DP-21
D1		0.73	0.01	5.00	0.01	3.43	0.0																						
	21							14.29	7.55	2.35	17.7																		**TOTAL TO POND**
O1		0.02	0.74	0.00	0.02	4.71	0.1																						**TOTAL OFF-SITE**

Project Name: Outlook at Nine Mile
Project No: 160602
Date: 04/20/17
Revised:

STANDARD FORM SF-2
Post-Development
Rational Method Procedure

Designed By: ATM
Checked By: ATM
Design Storm: 100 YR

		DIRECT RUNOFF						TOTAL RUNOFF				STREET/INLET					STORM SEWER PIPE				TRAVEL TIME			CARRYOVER FLOWS					
BASIN (s)	DESIGN POINT	AREA (AC)	RUNOFF COEFF	Tc (min)	C x A (AC)	I (IN/HR)	DIRECT RUNOFF, Q (CFS)	Tc (MAX)	Σ(C x A) (AC)	I (IN/HR)	TOTAL RUNOFF, Q (CFS)	SLOPE (%)	STREET FLOW (CFS)	INLET DESIGN FLOW (CFS)	STREET OR INLET INTERCEPTION (CFS)	CARRYOVER (CFS)	DESIGN FLOW (CFS)	PIPE SLOPE (%)	PIPE SIZE (IN)	Q_{FULL} (CFS)	LENGTH (FT)	VELOCITY (FPS)	Tt (min)	Σ(C x A) BYPASS (AC)	LENGTH (FT)	SLOPE (%)	VELOCITY (FPS)	Tt (min)	REMARKS
A1		0.91	0.78	6.15	0.71	8.64	6.1																						**Surface flow to A14**
								6.15	0.65	8.64	5.6						6.1	1.25	18	15.3	215	8.6	0.41						Captured & Piped to DP-1
								6.15	0.06	8.64	0.6													0.1	215	1.08	2.1	1.72	Overland to DP-1
L2		0.40	0.76	5.00	0.31	9.16	2.8										2.8	1.00	8	1.6	88	4.5	0.33						Captured and Piped to DP-1
A2		0.48	0.76	5.00	0.37	9.16	3.3																						A2 Surface Flow to DP-1
	1							7.87	1.38	7.98	11.0																		Total Flow to DP-1
								7.87	0.43	7.98	3.4																		Surface Flow to DP-1
								7.87	0.32	7.98	2.6																		**Captured by A13**
								7.87	1.28	7.98	10.2						10.2	1.25	18	15.3	162	8.6	0.31						Total Piped to DP-2
								7.87	0.11	7.98	0.9													0.1	162	1.30	2.3	1.18	Bypass to DP-2
A3		0.73	0.77	5.00	0.56	9.16	5.2																						A3 Surface Flow to DP-2
	2							9.06	1.95	7.59	14.8																		Total Flow to DP-2
								9.06	0.67	7.59	5.1																		Surface Flow to DP-2
								9.06	0.42	7.59	3.2																		**Captured by A12**
								9.06	1.69	7.59	12.8						12.8	1.00	18	13.7	336	7.7	0.72						Total Piped to DP-2
								9.06	0.25	7.59	1.9													0.25	336	1.18	2.2	2.58	Bypass to DP-3
A4		0.84	0.79	6.00	0.66	8.70	5.8																						A4 Surface Flow to DP-3
	3							11.63	2.61	6.87	17.9																		Total Flow to DP-3
								11.63	0.92	6.87	6.3																		Surface Flow to DP-3
								11.63	0.51	6.87	3.5																		**Captured by A11**
								11.63	2.20	6.87	15.1						15.1	1.00	24	29.4	59	9.4	0.11						Total Piped to DP-5
								11.63	0.41	6.87	2.8													0.41	230	1.01	2.0	1.91	Bypass to DP-6
L4		0.39	0.81	5.00	0.31	9.16	2.9										2.9	1.00	8	1.6	88	4.5	0.33						Captured and Piped to DP-4
A5		0.51	0.76	6.28	0.39	8.59	3.3																						A5 Surface Flow to DP-3
	4							6.28	0.70	8.59	6.0																		Total Flow to DP-4
								6.28	0.30	8.59	2.6																		**Captured by A2-2**
								6.28	0.61	8.59	5.2						5.2	1.00	15	8.4	52	6.8	0.13						Piped to DP-5
								6.28	0.09	8.59	0.8													0.09	190	1.00	2.0	1.58	Bypass to DP-6
	5							11.74	2.81	6.84	19.2						19.2	0.75	24	25.5	159	8.1	0.33						Total Flow to DP-5 (Piped to DP-6)
A6		1.23	0.77	5.00	0.95	9.16	8.7																						A3 Surface Flow to DP-6
	6							13.54	4.26	6.43	27.3																		Total Flow to DP-6
								13.54	1.45	6.43	9.3																		**Captured by A8**
								13.54	4.26	6.43	27.3						27.3	0.81	30	48.0	207	9.8	0.35						Total Piped to DP-17
B1		0.20	0.45	5.00	0.09	9.16	0.8										0.8	1.43	15	10.0	52	8.2	0.11						**Captured by Type C Inlet (Piped to DP-7)**
B2		0.70	0.77	5.08	0.54	9.12	4.9										4.9	0.70	18	11.4	81	6.5	0.21						**Captured by B6 (Piped to DP-7)**
	7							5.29	0.62	9.02	5.6						5.6	1.00	18	13.7	285	7.7	0.62						Piped to DP-8
B3		0.55	0.69	5.94	0.38	8.73	3.3										3.3	1.00	8	1.6	150	4.5	0.56						Captured and Piped to DP-8
B4		0.51	0.78	5.00	0.40	9.16	3.7										3.7	0.50	18	9.7	7	5.5	0.02						Captured and Piped to DP-8
	8							6.50	1.40	8.50	11.9						11.9	0.50	24	20.8	85	6.6	0.21						Total Flow to DP-8 (Piped to DP-9)
B5		0.24	0.78	5.00	0.19	9.16	1.7										1.7	1.00	18	13.7	7	7.7	0.02						Captured and Piped to DP-9
	9							6.71	1.59	8.41	13.4						13.4	0.50	24	20.8	168	6.6	0.42						Total Flow to DP-9 (Piped to DP-xx)
C1		0.52	0.52	6.69	0.27	8.42	2.3										2.3	1.00	18	13.7	146	7.7	0.31						**Captured by Type C Inlet (Piped to DP-10)**
C2		0.42	0.81	5.00	0.34	9.16	3.1																						C2 Surface Flow to DP-10
	10							7.01	0.61	8.30	5.1																		Total Flow to DP-10
								7.01	0.30	8.30	2.5																		**Captured by C6**
								7.01	0.57	8.30	4.8						4.8	1.00	18	13.7	185	7.7	0.40						Piped to DP-12
								7.01	0.07	8.30	0.6													0.07	346	0.98	2.0	2.91	Bypass to DP-13
L1		0.29	0.73	5.00	0.22	9.16	2.0										2.0	1.00	10	2.8	100	5.2	0.32						Captured and Piped to DP-11
C3		0.76	0.72	5.00	0.55	9.16	5.0																						C3 Surface Flow to DP-11
	11							5.32	0.76	9.01	6.9																		Total Flow to DP-11
								5.32	0.35	9.01	3.1																		**Captured by C2-1**

								5.32	0.56	9.01	5.1						5.1	1.50	15	10.3	40	8.4	0.08						Total Piped to DP-12
								5.32	0.21	9.01	1.9													0.21	193	0.98	2.0	1.62	Bypass to DP-13
	12							7.40	1.13	8.15	9.2						9.2	1.00	18	13.7	158	7.7	0.34						Total Flow to DP-12 (Piped to DP-13)
C4		0.90	0.76	5.00	0.68	9.16	6.2																						C4 Surface Flow to DP-13
	13							9.92	2.10	7.33	15.4																		Total Flow to DP-13
								9.92	0.97	7.33	7.1																		Surface Flow to DP-13
								9.92	0.44	7.33	3.3																		**Captured by C4**
								9.92	1.58	7.33	11.6						11.6	1.00	24	29.4	129	9.4	0.23						Total Piped to DP-14
								9.92	0.52	7.33	3.8													0.52	129	1.00	2.0	1.08	Bypass to DP-15
C5		0.39	0.53	5.00	0.21	9.16	1.9										1.9	1.50	15	10.3	51	8.4	0.10						Piped to DP-14
	14							10.15	1.79	7.26	13.0						13.0	0.98	24	29.1	58	9.3	0.10						Total to DP-14 (Piped to DP-15)
L3		0.31	0.76	5.00	0.23	9.16	2.1										2.1	1.00	10	2.8	50	5.2	0.16						Captured and Piped to DP-15
C6		0.64	0.77	5.00	0.49	9.16	4.5																						C6 Surface Flow to DP-15
	15							10.99	3.04	7.03	21.4																		Total Flow to DP-15
								10.99	1.01	7.03	7.1																		Surface Flow to DP-15
								10.99	0.87	7.03	6.1																		**Captured by C2**
								10.99	2.89	7.03	20.4						20.4	1.05	30	54.6	307	11.1	0.46						Total Piped to DP-17
								10.99	0.14	7.03	1.0													0.14	301	1.60	2.5	1.98	Bypass to DP-16
C7		1.12	0.75	5.00	0.84	9.16	7.7																						C7 Surface Flow to DP-16
	16							12.98	0.98	6.55	6.4																		Surface Flow to DP-16
								12.98	0.94	6.55	6.2						6.2	2.50	15	13.3	31	10.8	0.05						**Captured by A1-1 (Piped to DP-17)**
								12.98	0.24	6.55	1.5													0.24	162	4.40	4.2	0.64	Bypass to DP-20
	17							13.90	8.09	6.35	51.4						51.4	1.01	36	67.0	97	9.5	0.17						Total Flow to DP-17 (Piped to DP-18)
	18							14.07	9.68	6.32	61.2						61.2	1.50	36	81.7	70	11.6	0.10						Total Flow to DP-18 (Piped to DP-19)
L5		1.09	0.51	10.05	0.56	7.29	4.1										4.1	1.00	12	4.6	50	5.9	0.14						Captured and Piped to DP-19
	19							14.17	10.24	6.29	64.5						64.5	1.40	36	78.9	36	11.2	0.05						Total Flow to DP-19 (Piped to DP-20)
A7		0.26	0.61	5.00	0.16	9.16	1.5																						A7Surface Flow to DP-20
	20							14.22	10.64	6.28	66.8																		Total Flow to DP-20
								13.62	0.39	6.41	2.5																		**Captured by A2 (Piped to DP-21)**
								14.22	10.64	6.28	66.8						66.8	3.75	36	129.2	71	18.3	0.06						Total Piped to DP-21
D1		0.73	0.44	5.00	0.32	9.16	2.9																						
	21							14.29	10.96	6.27	68.7																		**TOTAL TO POND**
O1		0.02	0.85	0.00	0.02	12.60	0.2																						**TOTAL OFF-SITE**

APPENDIX D

Hydraulic Computations

Version 4.05 Released March 2017

INLET MANAGEMENT

Worksheet Protected

INLET NAME	A14	A13	A12	A11	A2-2	A8
Site Type (Urban or Rural)	URBAN	URBAN	URBAN	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET	STREET	STREET	STREET
Hydraulic Condition	On Grade	On Grade	On Grade	On Grade	On Grade	In Sump
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	1.8	1.0	1.2	1.3	0.9	2.5
Major Q_{Known} (cfs)	6.1	3.4	5.1	6.3	3.3	9.3

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0	0.0	0.0
Major Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0	0.0	0.0

Watershed Characteristics

Subcatchment Area (acres)						
Percent Impervious						
NRCS Soil Type						

Watershed Profile

Overland Slope (ft/ft)						
Overland Length (ft)						
Channel Slope (ft/ft)						
Channel Length (ft)						

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)						
One-Hour Precipitation, P_1 (inches)						

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)						
One-Hour Precipitation, P_1 (inches)						

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**1.8**	**1.0**	**1.2**	**1.3**	**0.9**	**2.5**
Major Total Design Peak Flow, Q (cfs)	**6.1**	**3.4**	**5.1**	**6.3**	**3.3**	**9.3**
Minor Flow Bypassed Downstream, Q_b (cfs)	0.0	0.0	0.0	0.0	0.0	N/A
Major Flow Bypassed Downstream, Q_b (cfs)	0.6	0.8	1.9	2.8	0.8	N/A

Minor Storm (Calculated) Analysis of Flow Time

C	N/A	N/A	N/A	N/A	N/A	N/A
C_5	N/A	N/A	N/A	N/A	N/A	N/A
Overland Flow Velocity, Vi	N/A	N/A	N/A	N/A	N/A	N/A
Channel Flow Velocity, Vt	N/A	N/A	N/A	N/A	N/A	N/A
Overland Flow Time, Ti	N/A	N/A	N/A	N/A	N/A	N/A
Channel Travel Time, Tt	N/A	N/A	N/A	N/A	N/A	N/A
Calculated Time of Concentration, T_c	N/A	N/A	N/A	N/A	N/A	N/A
Regional T_c	N/A	N/A	N/A	N/A	N/A	N/A
Recommended T_c	N/A	N/A	N/A	N/A	N/A	N/A
T_c selected by User	N/A	N/A	N/A	N/A	N/A	N/A
Design Rainfall Intensity, I	N/A	N/A	N/A	N/A	N/A	N/A
Calculated Local Peak Flow, Q_p	N/A	N/A	N/A	N/A	N/A	N/A

Major Storm (Calculated) Analysis of Flow Time

C	N/A	N/A	N/A	N/A	N/A	N/A
C_5	N/A	N/A	N/A	N/A	N/A	N/A
Overland Flow Velocity, Vi	N/A	N/A	N/A	N/A	N/A	N/A
Channel Flow Velocity, Vt	N/A	N/A	N/A	N/A	N/A	N/A
Overland Flow Time, Ti	N/A	N/A	N/A	N/A	N/A	N/A
Channel Travel Time, Tt	N/A	N/A	N/A	N/A	N/A	N/A
Calculated Time of Concentration, T_c	N/A	N/A	N/A	N/A	N/A	N/A
Regional T_c	N/A	N/A	N/A	N/A	N/A	N/A
Recommended T_c	N/A	N/A	N/A	N/A	N/A	N/A
T_c selected by User	N/A	N/A	N/A	N/A	N/A	N/A
Design Rainfall Intensity, I	N/A	N/A	N/A	N/A	N/A	N/A
Calculated Local Peak Flow, Q_p	N/A	N/A	N/A	N/A	N/A	N/A

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INLET MANAGEMENT

Worksheet Protected

INLET NAME	B6	B-1	C6	C2-1	C4	C2
Site Type (Urban or Rural)	URBAN	URBAN	URBAN	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET	STREET	STREET	STREET
Hydraulic Condition	In Sump	In Sump	On Grade	On Grade	On Grade	On Grade
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	1.4	1.1	1.0	1.3	1.4	1.3
Major Q_{Known} (cfs)	4.9	3.7	3.1	5.0	8.6	7.9

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0	0.0	0.0
Major Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0	0.0	0.0

Watershed Characteristics

Subcatchment Area (acres)						
Percent Impervious						
NRCS Soil Type						

Watershed Profile

Overland Slope (ft/ft)						
Overland Length (ft)						
Channel Slope (ft/ft)						
Channel Length (ft)						

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)						
One-Hour Precipitation, P_1 (inches)						

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)						
One-Hour Precipitation, P_1 (inches)						

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**1.4**	**1.1**	**1.0**	**1.3**	**1.4**	**1.3**
Major Total Design Peak Flow, Q (cfs)	**4.9**	**3.7**	**3.1**	**5.0**	**8.6**	**7.9**
Minor Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	0.0	0.0	0.0	0.0
Major Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	0.6	1.9	4.6	1.1

Minor Storm (Calculated) Analysis of Flow T

C	N/A	N/A	N/A	N/A	N/A	N/A
C_s	N/A	N/A	N/A	N/A	N/A	N/A
Overland Flow Velocity, Vi	N/A	N/A	N/A	N/A	N/A	N/A
Channel Flow Velocity, Vt	N/A	N/A	N/A	N/A	N/A	N/A
Overland Flow Time, Ti	N/A	N/A	N/A	N/A	N/A	N/A
Channel Travel Time, Tt	N/A	N/A	N/A	N/A	N/A	N/A
Calculated Time of Concentration, T_c	N/A	N/A	N/A	N/A	N/A	N/A
Regional T_c	N/A	N/A	N/A	N/A	N/A	N/A
Recommended T_c	N/A	N/A	N/A	N/A	N/A	N/A
T_c selected by User	N/A	N/A	N/A	N/A	N/A	N/A
Design Rainfall Intensity, I	N/A	N/A	N/A	N/A	N/A	N/A
Calculated Local Peak Flow, Q_p	N/A	N/A	N/A	N/A	N/A	N/A

Major Storm (Calculated) Analysis of Flow T

C	N/A	N/A	N/A	N/A	N/A	N/A
C_s	N/A	N/A	N/A	N/A	N/A	N/A
Overland Flow Velocity, Vi	N/A	N/A	N/A	N/A	N/A	N/A
Channel Flow Velocity, Vt	N/A	N/A	N/A	N/A	N/A	N/A
Overland Flow Time, Ti	N/A	N/A	N/A	N/A	N/A	N/A
Channel Travel Time, Tt	N/A	N/A	N/A	N/A	N/A	N/A
Calculated Time of Concentration, T_c	N/A	N/A	N/A	N/A	N/A	N/A
Regional T_c	N/A	N/A	N/A	N/A	N/A	N/A
Recommended T_c	N/A	N/A	N/A	N/A	N/A	N/A
T_c selected by User	N/A	N/A	N/A	N/A	N/A	N/A
Design Rainfall Intensity, I	N/A	N/A	N/A	N/A	N/A	N/A
Calculated Local Peak Flow, Q_p	N/A	N/A	N/A	N/A	N/A	N/A

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INLET MANAGEMENT

Worksheet Protected

INLET NAME	A1-1	A2
Site Type (Urban or Rural)	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET
Hydraulic Condition	On Grade	On Grade
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

User-Defined Design Flows

Minor Q_{Known} (cfs)	2.1	0.2
Major Q_{Known} (cfs)	7.7	2.5

Bypass (Carry-Over) Flow from Upstream

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0
Major Bypass Flow Received, Q_b (cfs)	0.0	0.0

Watershed Characteristics

Subcatchment Area (acres)		
Percent Impervious		
NRCS Soil Type		

Watershed Profile

Overland Slope (ft/ft)		
Overland Length (ft)		
Channel Slope (ft/ft)		
Channel Length (ft)		

Minor Storm Rainfall Input

Design Storm Return Period, T_r (years)		
One-Hour Precipitation, P_1 (inches)		

Major Storm Rainfall Input

Design Storm Return Period, T_r (years)		
One-Hour Precipitation, P_1 (inches)		

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	**2.1**	**0.2**
Major Total Design Peak Flow, Q (cfs)	**7.7**	**2.5**
Minor Flow Bypassed Downstream, Q_b (cfs)	0.0	0.0
Major Flow Bypassed Downstream, Q_b (cfs)	0.8	0.0

Minor Storm (Calculated) Analysis of Flow T

C	N/A	N/A
C_s	N/A	N/A
Overland Flow Velocity, Vi	N/A	N/A
Channel Flow Velocity, Vt	N/A	N/A
Overland Flow Time, Ti	N/A	N/A
Channel Travel Time, Tt	N/A	N/A
Calculated Time of Concentration, T_c	N/A	N/A
Regional T_c	N/A	N/A
Recommended T_c	N/A	N/A
T_c selected by User	N/A	N/A
Design Rainfall Intensity, I	N/A	N/A
Calculated Local Peak Flow, Q_p	N/A	N/A

Major Storm (Calculated) Analysis of Flow T

C	N/A	N/A
C_s	N/A	N/A
Overland Flow Velocity, Vi	N/A	N/A
Channel Flow Velocity, Vt	N/A	N/A
Overland Flow Time, Ti	N/A	N/A
Channel Travel Time, Tt	N/A	N/A
Calculated Time of Concentration, T_c	N/A	N/A
Regional T_c	N/A	N/A
Recommended T_c	N/A	N/A
T_c selected by User	N/A	N/A
Design Rainfall Intensity, I	N/A	N/A
Calculated Local Peak Flow, Q_p	N/A	N/A

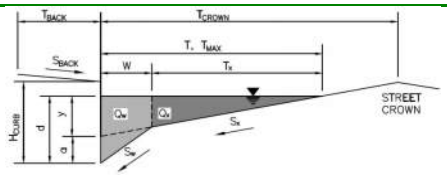
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ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Outlook at Nine Mile

Inlet ID: A14



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	10.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	25.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.010	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	15.0	20.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.0	4.5	inches
Allow Flow Depth at Street Crown (leave blank for no)				check = yes

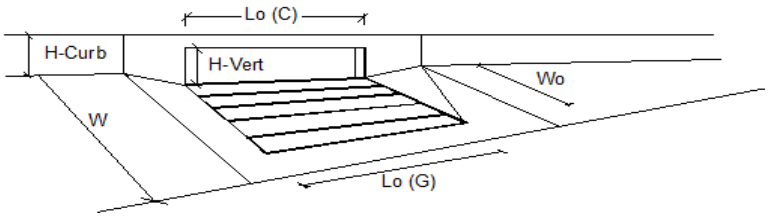
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**4.2**	**6.3**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

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Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**1.8**	**5.5**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.6**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**91**	**%**

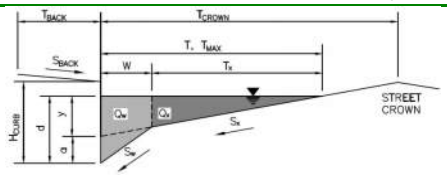
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ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Outlook at Nine Mile

Inlet ID: A13



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	5.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	25.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.028	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.016	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	15.0	15.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.0	4.0	inches
Allow Flow Depth at Street Crown (leave blank for no)				check = yes

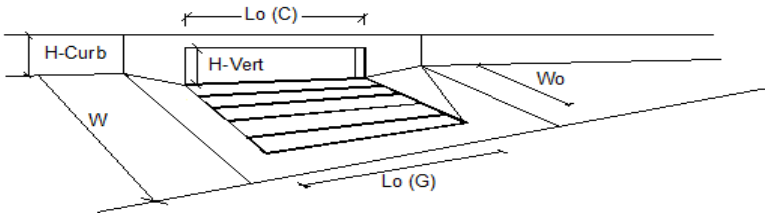
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**4.6**	**4.6**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**1.0**	**2.6**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.8**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**75**	**%**

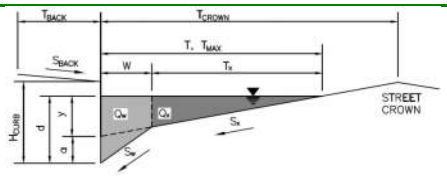
Version 4.05 Released March 2017

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Outlook at Nine Mile

Inlet ID: A12



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	5.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	15.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.010	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	10.0	15.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.0	4.5	inches
Allow Flow Depth at Street Crown (leave blank for no)				check = yes

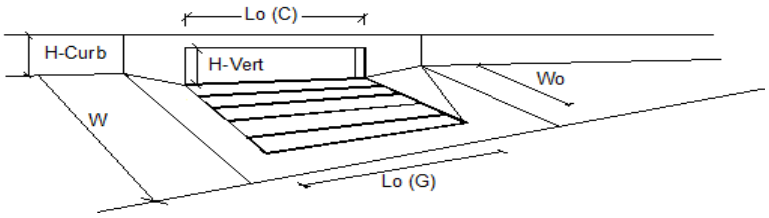
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**3.1**	**5.1**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**1.2**	**3.2**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**1.9**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**62**	**%**

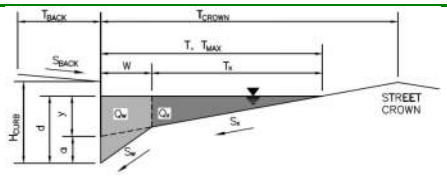
Version 4.05 Released March 2017

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Outlook at Nine Mile

Inlet ID: A11



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	5.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	25.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.010	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	10.0	15.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.0	5.0	inches
Allow Flow Depth at Street Crown (leave blank for no)				check = yes

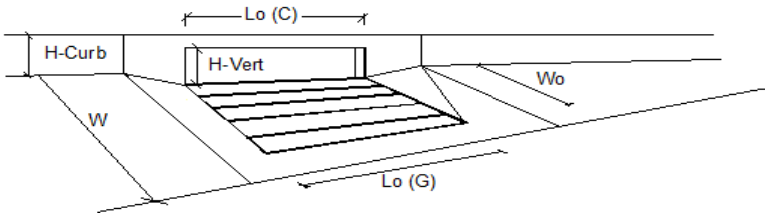
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**3.2**	**7.6**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**1.3**	**3.5**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**2.8**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**55**	**%**

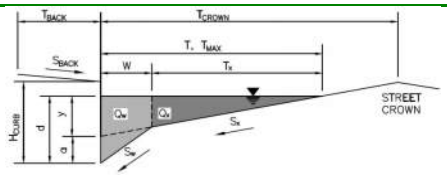
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ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Outlook at Nine Mile

Inlet ID: A2-2



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	5.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	25.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.019	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.010	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	10.0	15.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.0	4.0	inches
Allow Flow Depth at Street Crown (leave blank for no)				check = yes

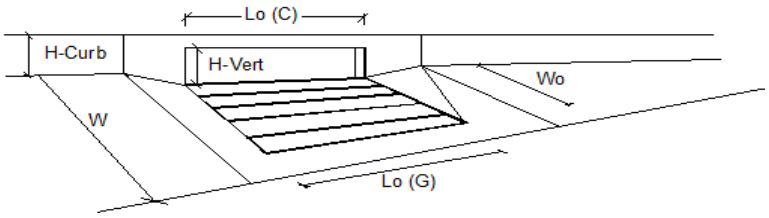
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**2.8**	**3.5**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**0.9**	**2.5**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.8**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**77**	**%**

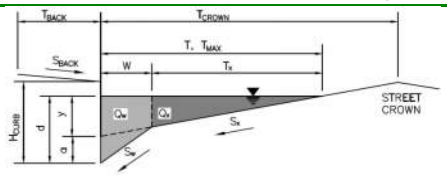
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ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Outlook at Nine Mile

Inlet ID: A8



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	5.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	30.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.012	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

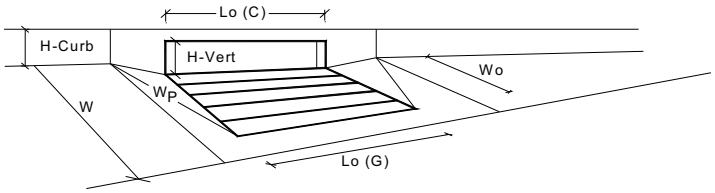
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	15.0	28.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.0	12.0	inches

Check boxes are not applicable in SUMP conditions

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	5.00	5.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	2	2	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	3.9	5.8	inches
Grate Information		MINOR	MAJOR	
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.16	0.32	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.37	0.55	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.78	0.92	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**2.9**	**9.7**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	2.5	9.3	cfs

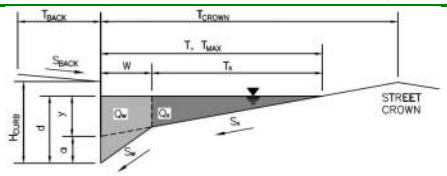
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ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Outlook at Nine Mile

Inlet ID: B6



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	5.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	25.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.033	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

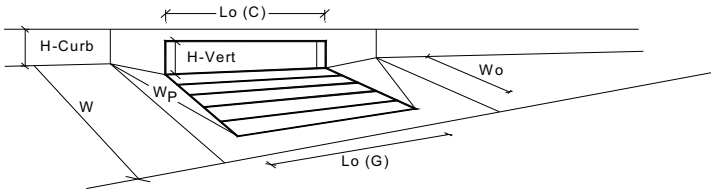
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	10.0	15.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.0	6.0	inches

Check boxes are not applicable in SUMP conditions

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	5.00	5.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.0	6.0	inches
Grate Information		MINOR	MAJOR	
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	

Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.17	0.33	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.51	0.77	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	

		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**1.9**	**5.4**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	1.4	4.9	cfs

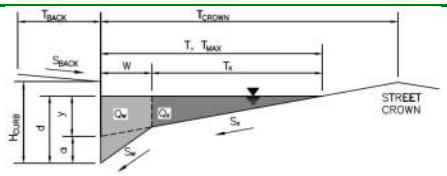
Version 4.05 Released March 2017

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Outlook at Nine Mile

Inlet ID: B-1



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	5.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	20.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

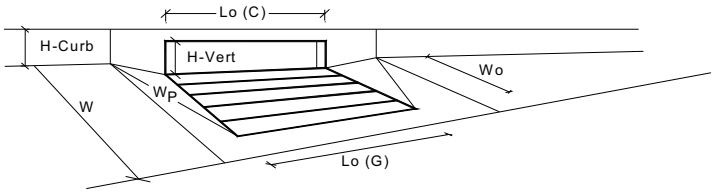
		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	10.0	20.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.0	6.0	inches

Check boxes are not applicable in SUMP conditions

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	5.00	5.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	3.9	6.0	inches
Grate Information		MINOR	MAJOR	
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.16	0.33	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.50	0.77	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**1.8**	**5.4**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	1.1	3.7	cfs

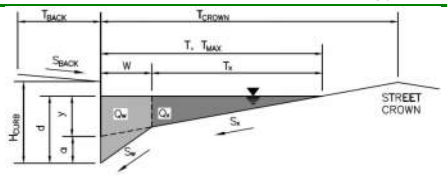
Version 4.05 Released March 2017

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Outlook at Nine Mile

Inlet ID: C6



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	5.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	15.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.022	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.010	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	10.0	15.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.0	5.0	inches
Allow Flow Depth at Street Crown (leave blank for no)				check = yes

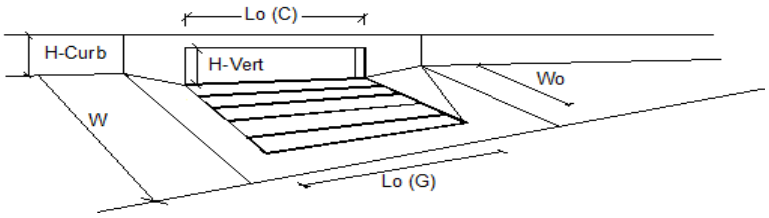
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**3.3**	**7.3**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**1.0**	**2.5**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.6**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**80**	**%**

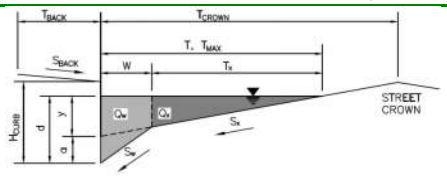
Version 4.05 Released March 2017

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Outlook at Nine Mile

Inlet ID: C2-1



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	5.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	20.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.007	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	10.0	15.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.0	5.0	inches
Allow Flow Depth at Street Crown (leave blank for no)				check = yes

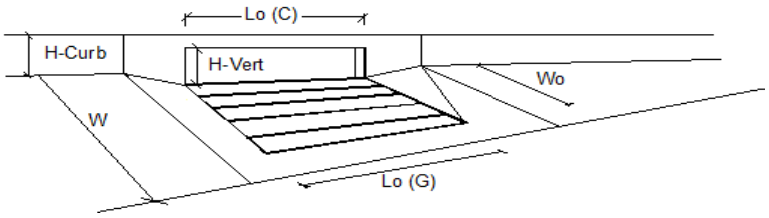
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**2.6**	**6.2**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**1.3**	**3.1**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**1.9**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**62**	**%**

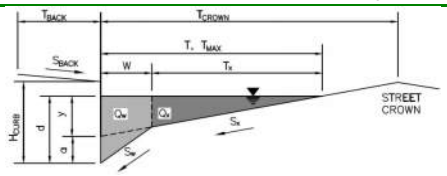
Version 4.05 Released March 2017

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Outlook at Nine Mile

Inlet ID: C4



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	5.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	20.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.010	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	15.0	20.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.0	6.0	inches
Allow Flow Depth at Street Crown (leave blank for no)			5	check = yes

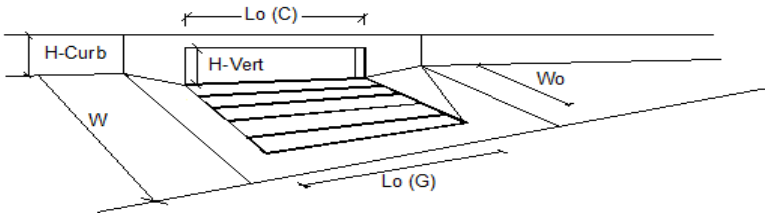
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**3.3**	**14.6**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**1.4**	**4.0**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**4.6**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**46**	**%**

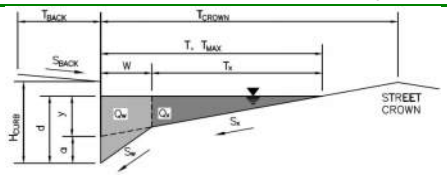
Version 4.05 Released March 2017

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Outlook at Nine Mile

Inlet ID: C2



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	5.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	20.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.022	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.010	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	10.0	15.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.0	6.0	inches
Allow Flow Depth at Street Crown (leave blank for no)				check = yes

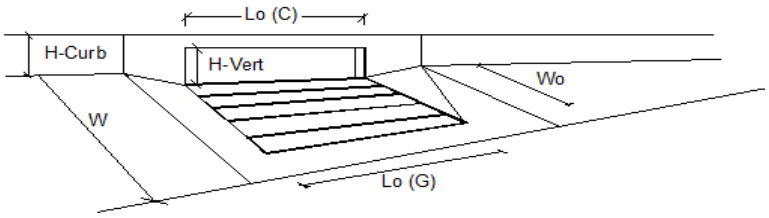
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**3.3**	**9.7**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	2	2	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**1.3**	**6.8**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**1.1**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**86**	**%**

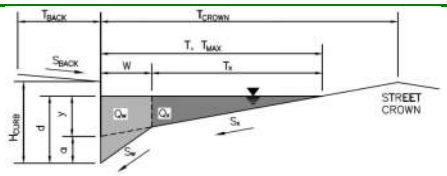
Version 4.05 Released March 2017

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Outlook at Nine Mile

Inlet ID: A1-1



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	5.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	15.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.027	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.029	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	15.0	15.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.0	5.0	inches
Allow Flow Depth at Street Crown (leave blank for no)				check = yes

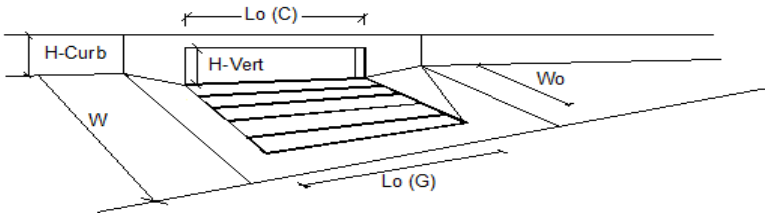
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**5.1**	**11.0**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	2	2	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**2.1**	**6.9**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.8**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**90**	**%**

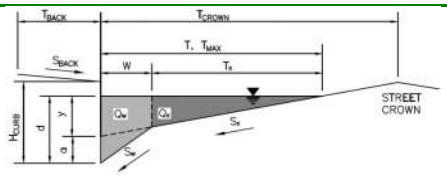
Version 4.05 Released March 2017

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: Outlook at Nine Mile

Inlet ID: A2



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	5.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	15.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.057	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.055	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	10.0	15.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.0	4.0	inches
Allow Flow Depth at Street Crown (leave blank for no)				check = yes

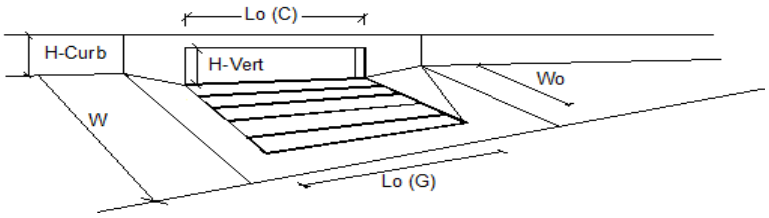
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**5.6**	**5.6**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.05 Released March 2017



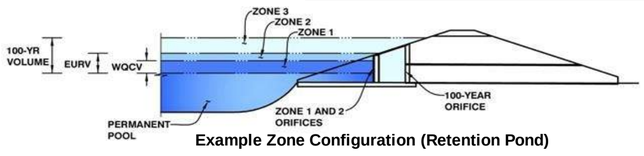
Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	5.0	5.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	2	2	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**0.2**	**2.5**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**100**	**%**

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: Outlook At Nine Mile

Basin ID:



Example Zone Configuration (Retention Pond)

Required Volume Calculation

Selected BMP Type =	EDB	
Watershed Area =	15.15	acres
Watershed Length =	1,800	ft
Watershed Slope =	0.015	ft/ft
Watershed Imperviousness =	76.00%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	100.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Desired WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	Erie	
Water Quality Capture Volume (WQCV) =	0.385	acre-feet
Excess Urban Runoff Volume (EURV) =	1.273	acre-feet
2-yr Runoff Volume (P1 = 1.01 in.) =	0.908	acre-feet
5-yr Runoff Volume (P1 = 1.43 in.) =	1.346	acre-feet
10-yr Runoff Volume (P1 = 1.73 in.) =	1.745	acre-feet
25-yr Runoff Volume (P1 = 1.84 in.) =	2.004	acre-feet
50-yr Runoff Volume (P1 = 2.4 in.) =	2.656	acre-feet
100-yr Runoff Volume (P1 = 2.7 in.) =	3.107	acre-feet
500-yr Runoff Volume (P1 = 3.89 in.) =	4.677	acre-feet
Approximate 2-yr Detention Volume =	0.851	acre-feet
Approximate 5-yr Detention Volume =	1.266	acre-feet
Approximate 10-yr Detention Volume =	1.639	acre-feet
Approximate 25-yr Detention Volume =	1.636	acre-feet
Approximate 50-yr Detention Volume =	1.972	acre-feet
Approximate 100-yr Detention Volume =	2.100	acre-feet

Optional User Override 1-hr Precipitation

1.01	inches
1.43	inches
1.73	inches
	inches
2.40	inches
2.70	inches
	inches

Stage-Storage Calculation

Zone 1 Volume (User Defined) =	0.462	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.811	acre-feet
Zone 3 (100yr + 1 / 2 WQCV - Zones 1 & 2) =	1.020	acre-feet
Total Detention Basin Volume =	2.292	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	ft^2
Volume of Basin Floor (V_{FLOOR}) =	user	ft^3
Depth of Main Basin (H_{MAIN}) =	user	ft
Length of Main Basin (L_{MAIN}) =	user	ft
Width of Main Basin (W_{MAIN}) =	user	ft
Area of Main Basin (A_{MAIN}) =	user	ft^2
Volume of Main Basin (V_{MAIN}) =	user	ft^3
Calculated Total Basin Volume (V_{total}) =	**user**	acre-feet

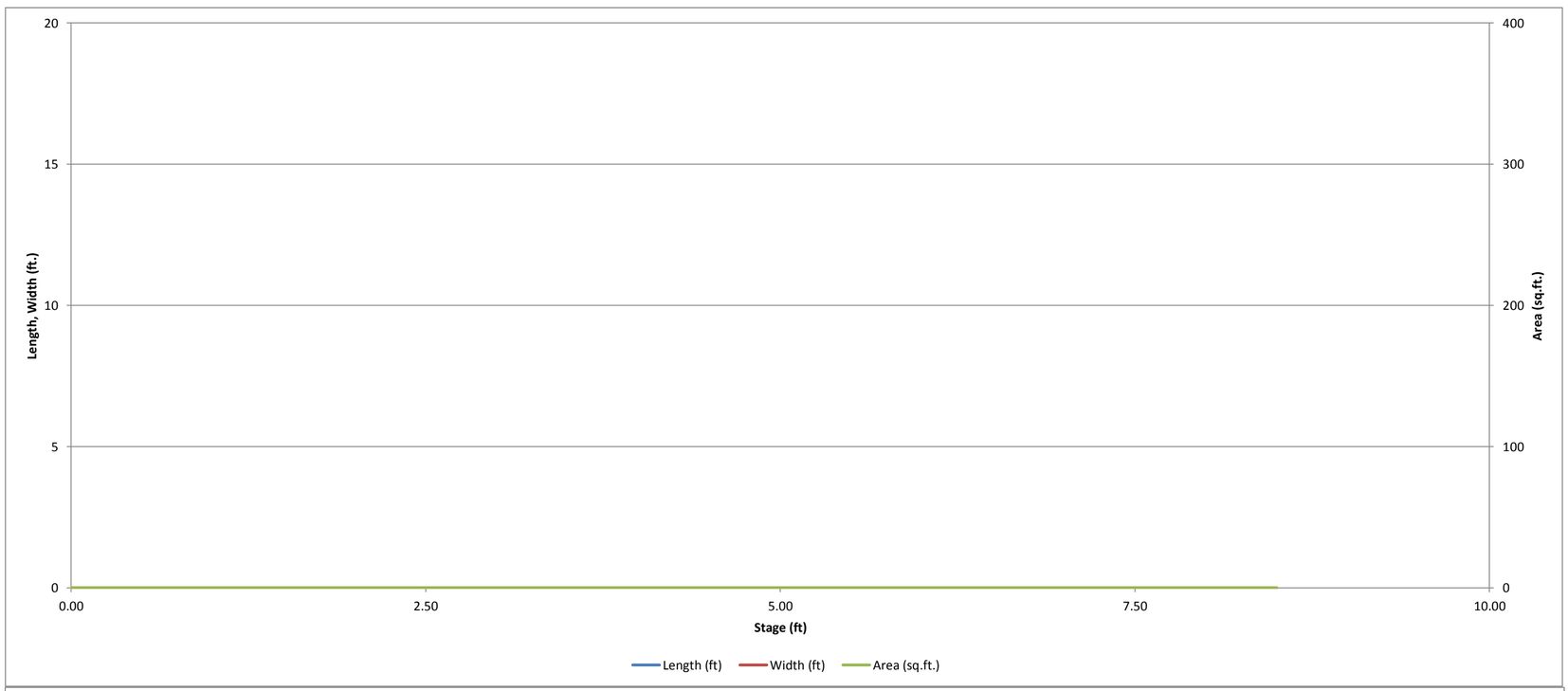
WQCV not provided!

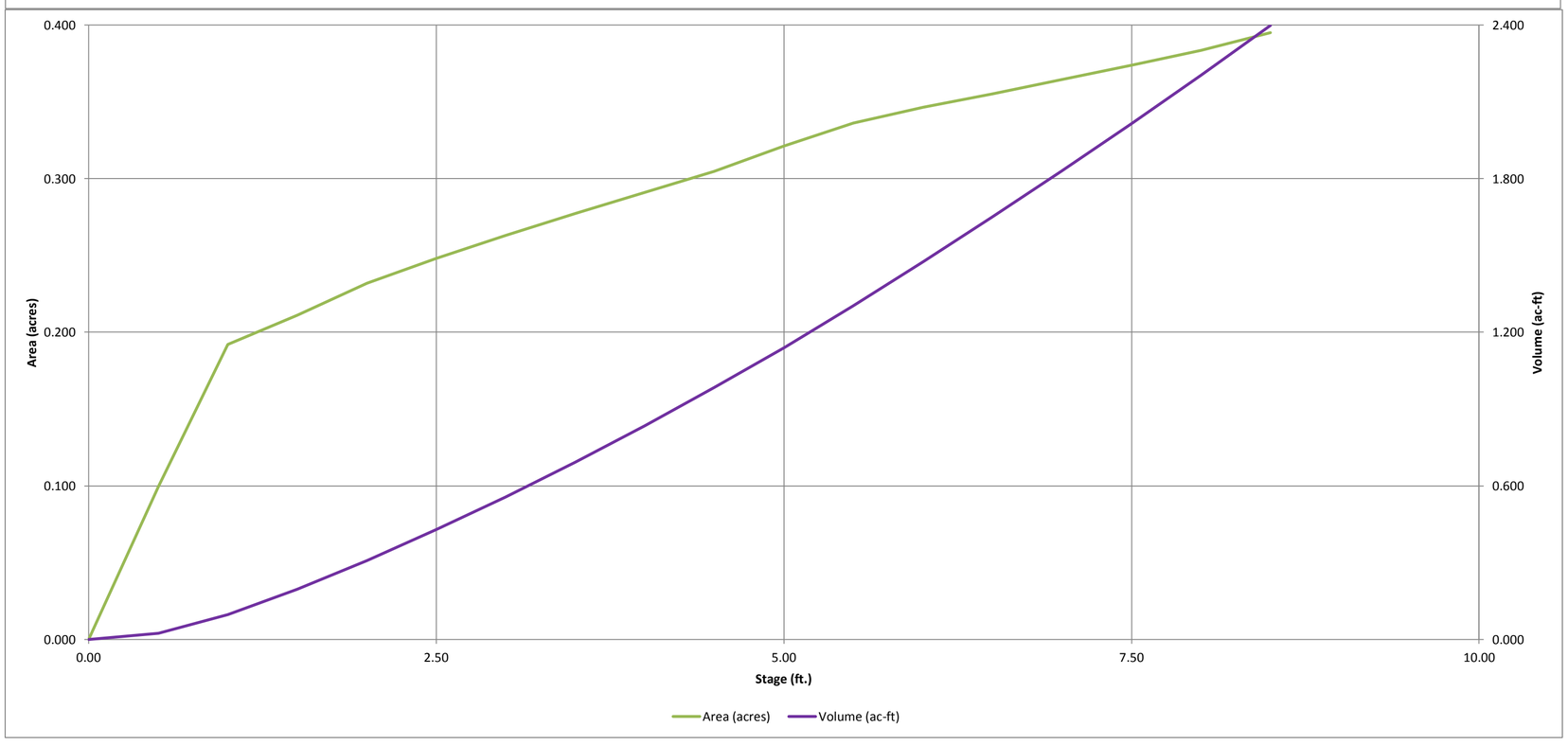
Depth Increment = 0.5 ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	0	0.000		
	--	0.50	--	--	--	4,334	0.099	1,040	0.024
	--	1.00	--	--	--	8,364	0.192	4,174	0.096
	--	1.50	--	--	--	9,197	0.211	8,556	0.196
	--	2.00	--	--	--	10,104	0.232	13,372	0.307
	--	2.50	--	--	--	10,811	0.248	18,702	0.429
	--	3.00	--	--	--	11,457	0.263	24,269	0.557
	--	3.50	--	--	--	12,079	0.277	30,153	0.692
	--	4.00	--	--	--	12,682	0.291	36,343	0.834
	--	4.50	--	--	--	13,283	0.305	42,835	0.983
	--	5.00	--	--	--	13,993	0.321	49,654	1.140
	--	5.50	--	--	--	14,640	0.336	56,812	1.304
	--	6.00	--	--	--	15,100	0.347	64,247	1.475
	--	6.50	--	--	--	15,478	0.355	71,892	1.650
	--	7.00	--	--	--	15,881	0.365	79,731	1.830
	--	7.50	--	--	--	16,291	0.374	87,774	2.015
	--	8.00	--	--	--	16,712	0.384	96,025	2.204
	--	8.50	--	--	--	17,215	0.395	104,507	2.399
	--		--	--	--				
	--		--	--	--				
	--		--	--	--			

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)



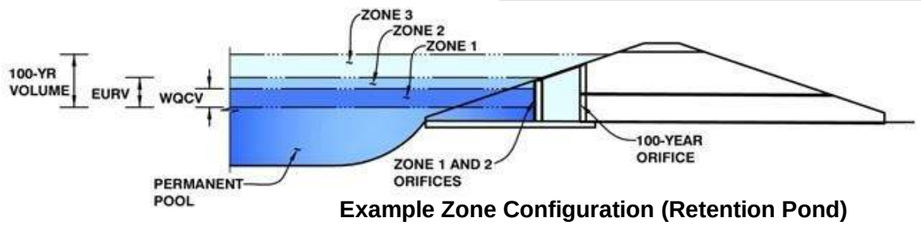


Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

Project: Outlook Seven Hills

Basin ID:



Example Zone Configuration (Retention Pond)

	Stage (ft)	Zone Volume (ac-ft)	Outlet Type
Zone 1 (User)	2.64	0.462	Orifice Plate
Zone 2 (EURV)	5.41	0.811	Orifice Plate
(100+1/2WQCV)	8.23	1.020	Weir&Pipe (Restrict)
		2.292	Total

User Input: Orifice at Underdrain Outlet (typically used to drain WQCV in a Filtration BMP)

Underdrain Orifice Invert Depth =	N/A	ft (distance below the filtration media surface)
Underdrain Orifice Diameter =	N/A	inches

Calculated Parameters for Underdrain

Underdrain Orifice Area =	N/A	ft^2
Underdrain Orifice Centroid =	N/A	feet

User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WQCV and/or EURV in a sedimentation BMP)

Invert of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate =	5.41	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	21.64	inches
Orifice Plate: Orifice Area per Row =	3.00	sq. inches (diameter = 1-15/16 inches)

Calculated Parameters for Plate

WQ Orifice Area per Row =	2.083E-02	ft^2
Elliptical Half-Width =	N/A	feet
Elliptical Slot Centroid =	N/A	feet
Elliptical Slot Area =	N/A	ft^2

User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	1.80	3.60	5.40				
Orifice Area (sq. inches)	3.00	3.00	3.00					

	Row 9 (optional)	Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)
Stage of Orifice Centroid (ft)								
Orifice Area (sq. inches)								

User Input: Vertical Orifice (Circular or Rectangular)

	Not Selected	Not Selected	
Invert of Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Diameter =	N/A	N/A	inches

Calculated Parameters for Vertical Orifice

	Not Selected	Not Selected	
Vertical Orifice Area =	N/A	N/A	ft^2
Vertical Orifice Centroid =	N/A	N/A	feet

User Input: Overflow Weir (Dropbox) and Grate (Flat or Sloped)

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	3.26	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	17.52	N/A	feet
Overflow Weir Slope =	0.00	N/A	H:V (enter zero for flat grate)
Horiz. Length of Weir Sides =	2.92	N/A	feet
Overflow Grate Open Area % =	60%	N/A	%, grate open area/total area
Debris Clogging % =	50%	N/A	%

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected	
Height of Grate Upper Edge, H_t =	3.26	N/A	feet
Over Flow Weir Slope Length =	2.92	N/A	feet
Grate Open Area / 100-yr Orifice Area =	29.02	N/A	should be ≥ 4
Overflow Grate Open Area w/o Debris =	30.70	N/A	ft^2
Overflow Grate Open Area w/ Debris =	15.35	N/A	ft^2

User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)

	Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	0.00	N/A	ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter =	18.00	N/A	inches
Restrictor Plate Height Above Pipe Invert =	10.40		inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Restrictor	Not Selected	
Outlet Orifice Area =	1.06	N/A	ft^2
Outlet Orifice Centroid =	0.49	N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	1.73	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	8.23	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	50.00	feet
Spillway End Slopes =	0.00	H:V
Freeboard above Max Water Surface =	1.00	feet

Calculated Parameters for Spillway

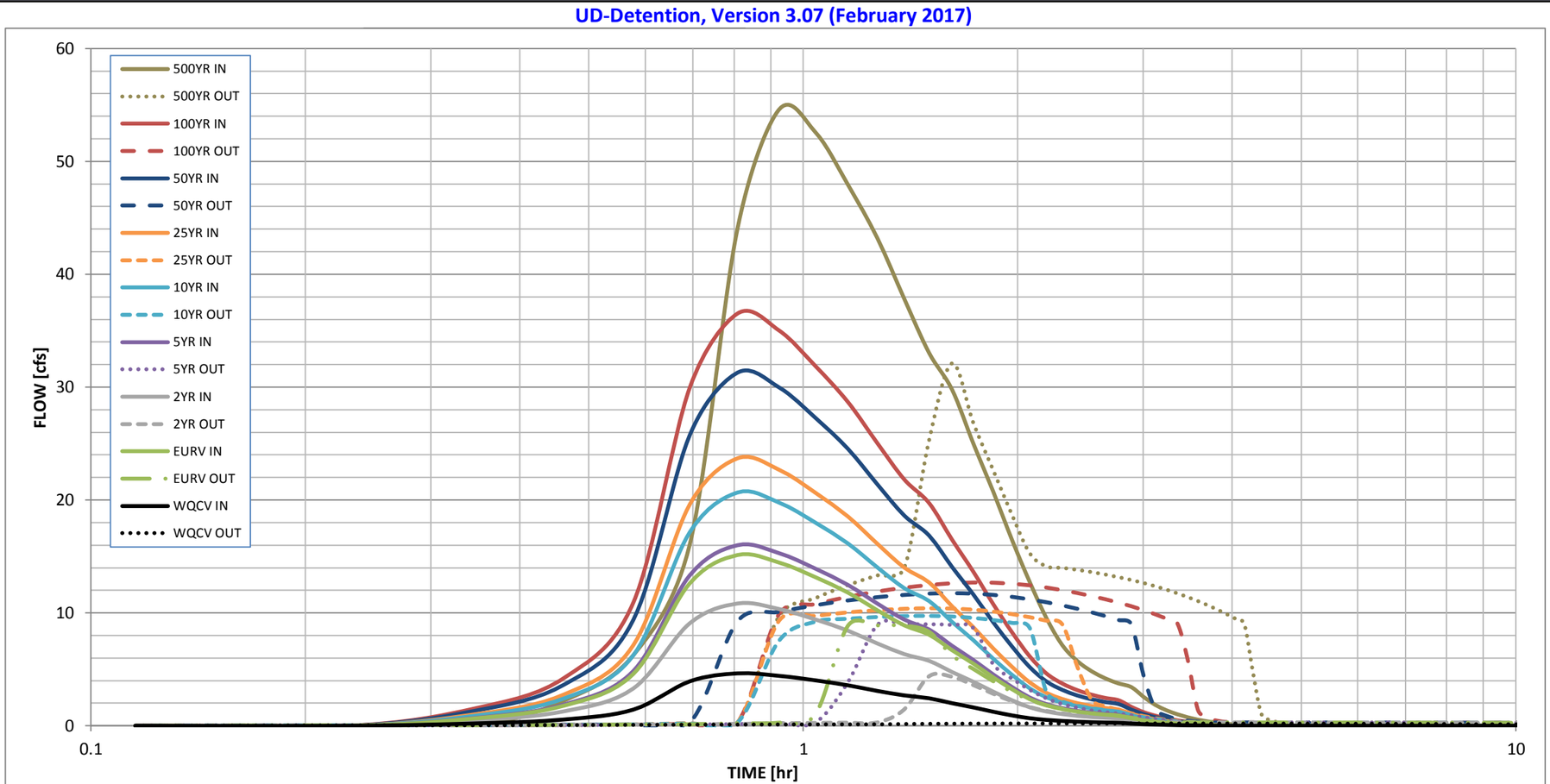
Spillway Design Flow Depth=	0.38	feet
Stage at Top of Freeboard =	9.61	feet
Basin Area at Top of Freeboard =	0.40	acres

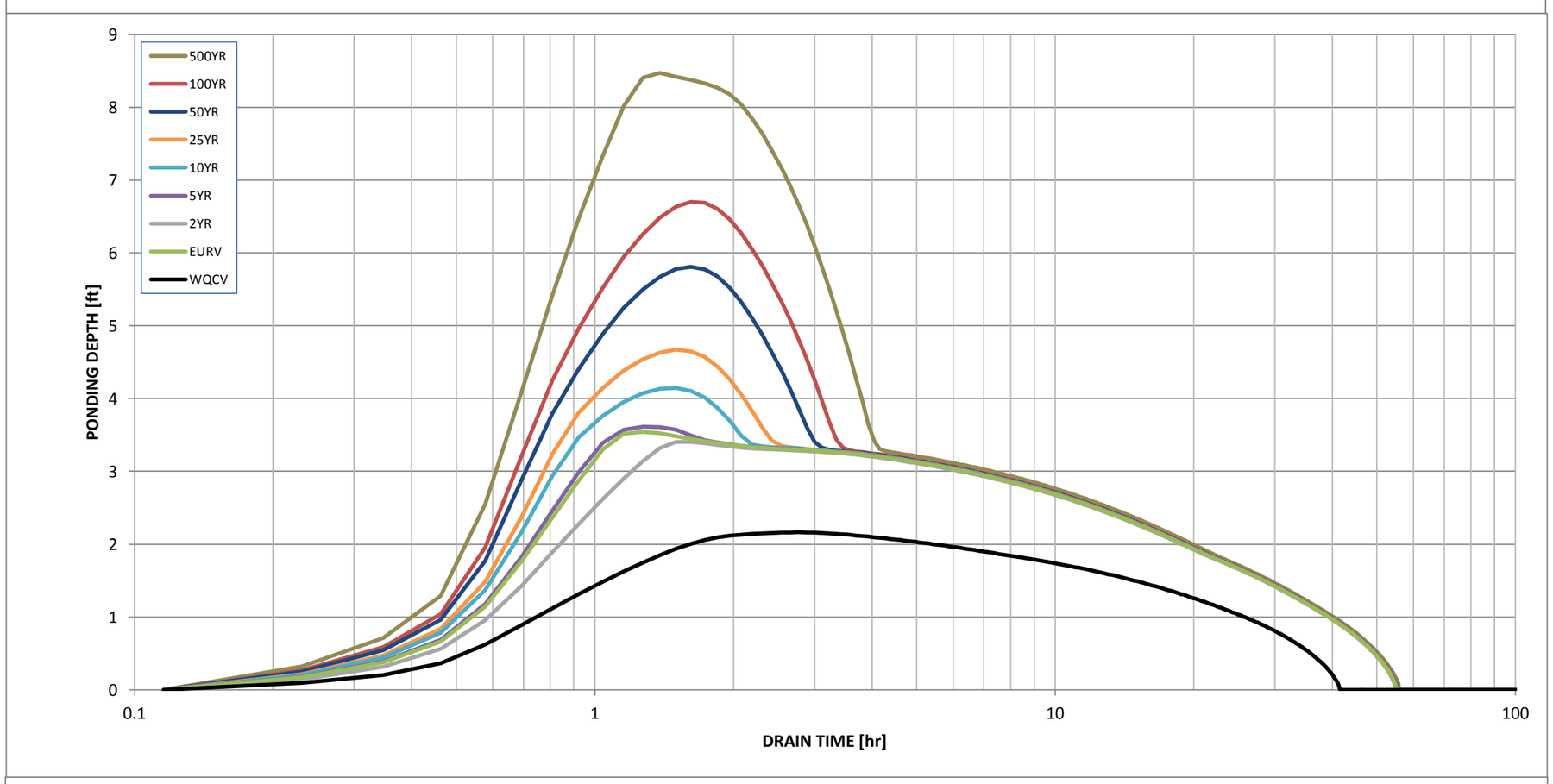
Routed Hydrograph Results

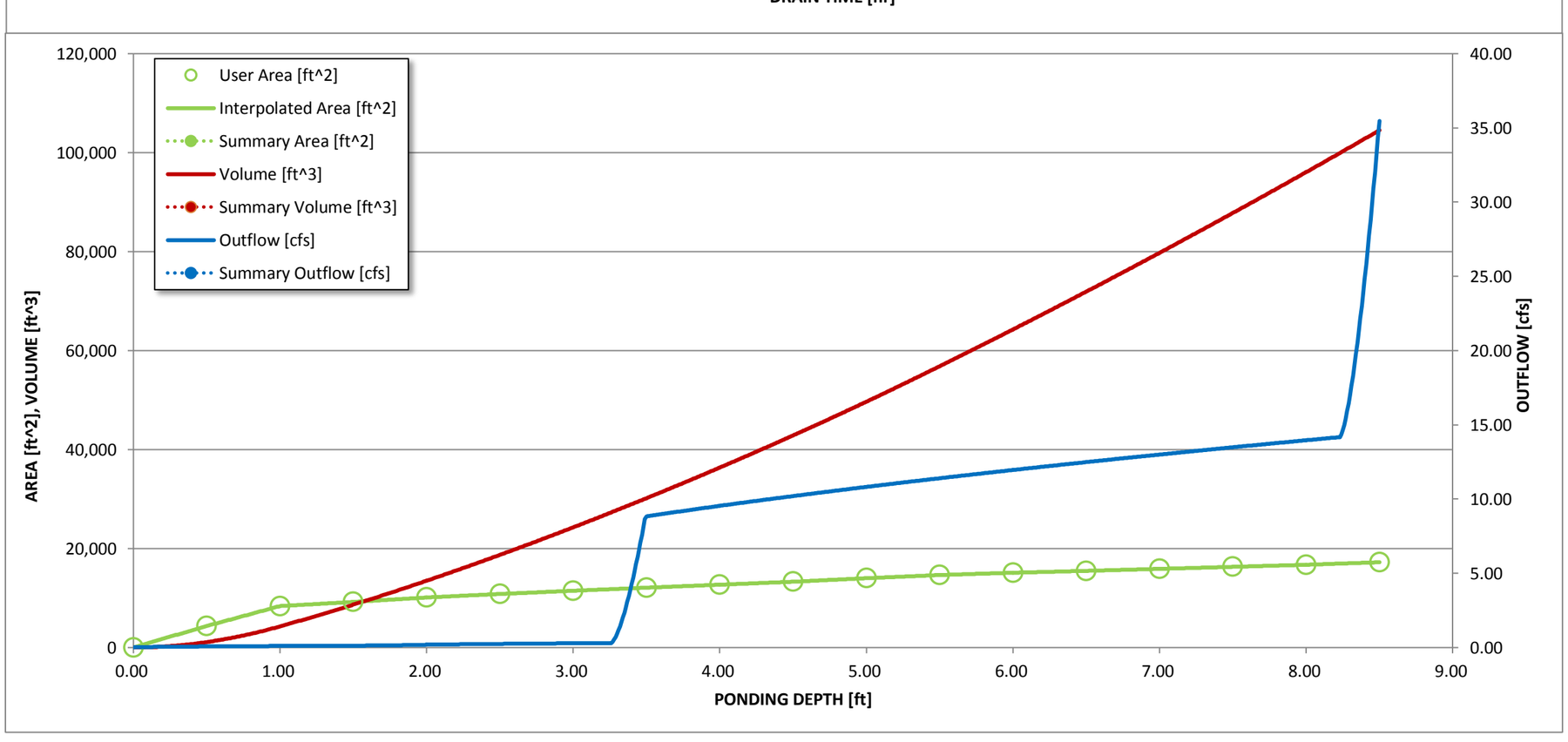
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	0.53	1.07	1.01	1.43	1.73	1.84	2.40	2.70	3.89
Calculated Runoff Volume (acre-ft) =	0.385	1.273	0.908	1.346	1.745	2.004	2.656	3.107	4.677
OPTIONAL Override Runoff Volume (acre-ft) =									
Inflow Hydrograph Volume (acre-ft) =	0.385	1.273	0.907	1.347	1.745	2.005	2.657	3.109	4.679
Predevelopment Unit Peak Flow, q (cfs/acre) =	0.00	0.00	0.01	0.01	0.13	0.42	0.67	0.92	1.58
Predevelopment Peak Q (cfs) =	0.0	0.0	0.1	0.2	1.9	6.3	10.1	13.9	24.0
Peak Inflow Q (cfs) =	4.6	15.1	10.8	16.0	20.7	23.7	31.3	36.5	54.6
Peak Outflow Q (cfs) =	0.2	8.9	4.4	9.0	9.7	10.4	11.7	12.7	32.1
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	45.0	5.1	1.7	1.2	0.9	1.3
Structure Controlling Flow =	Plate	Outlet Plate 1	Overflow Grate 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	0.28	0.13	0.3	0.3	0.3	0.4	0.4	0.4
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	39	47	49	47	45	44	42	40	36
Time to Drain 99% of Inflow Volume (hours) =	**40**	52	52	52	51	51	49	49	47
Maximum Ponding Depth (ft) =	2.16	3.54	3.40	3.61	4.15	4.67	5.81	6.70	8.47
Area at Maximum Ponding Depth (acres) =	0.24	0.28	0.27	0.28	0.30	0.31	0.34	0.36	0.39
Maximum Volume Stored (acre-ft) =	0.347	0.701	0.665	0.723	0.875	1.036	1.409	1.722	2.387

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)







S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			

Detention Basin Outlet Structure Design

Outflow Hydrograph Workbook Filename:

Storm Inflow Hydrographs **UD-Detention, Version 3.07 (February 2017)**

The user can override the calculated inflow hydrographs from this workbook with inflow hydrographs developed in a separate program.

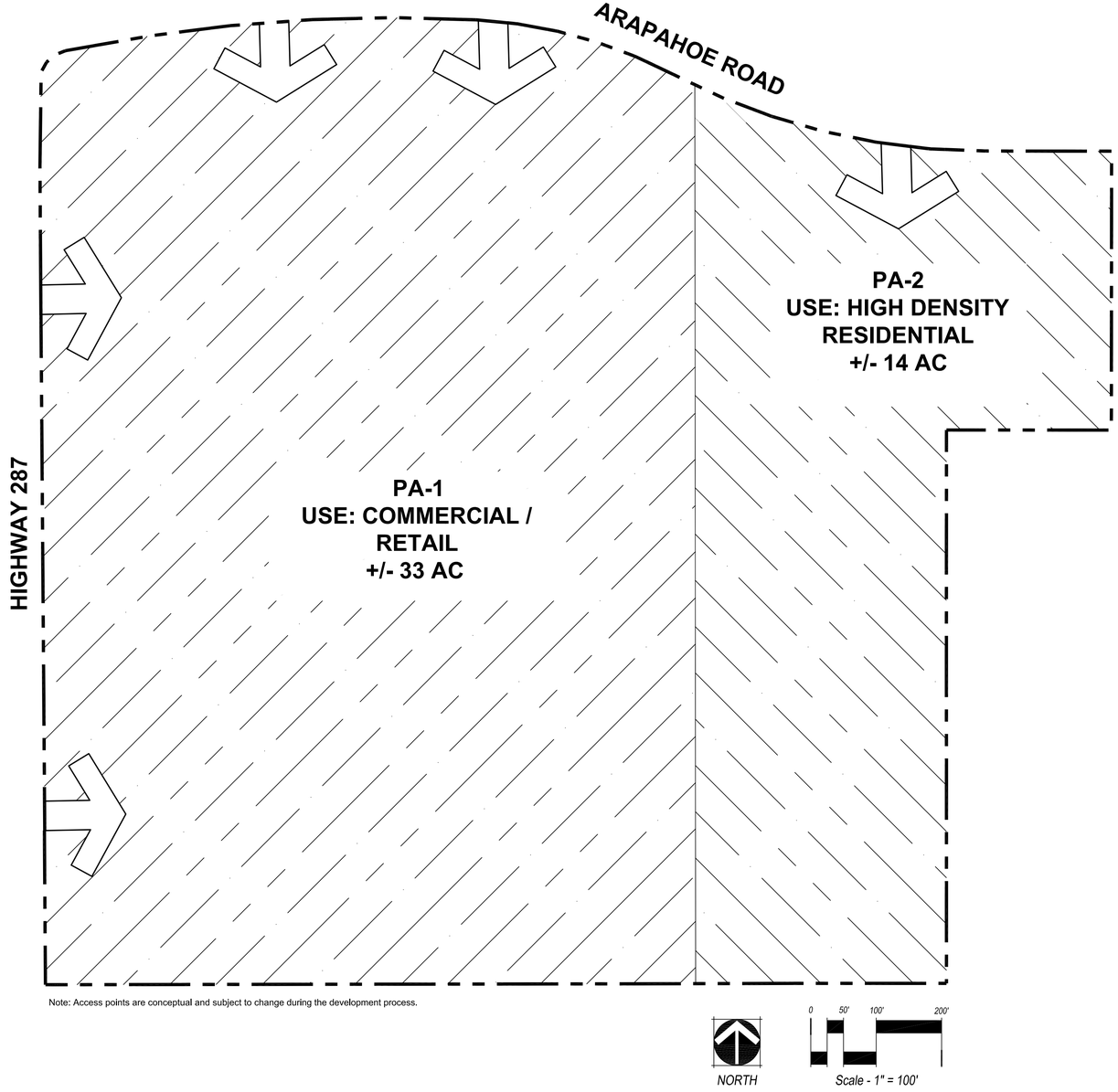
	SOURCE	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK
Time Interval	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
6.93 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:06:56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hydrograph	0:13:52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Constant	0:20:47	0.21	0.66	0.48	0.70	0.89	1.02	1.33	1.54	2.24
0.722	0:27:43	0.56	1.79	1.29	1.89	2.43	2.78	3.66	4.25	6.26
	0:34:39	1.43	4.59	3.31	4.85	6.25	7.15	9.39	10.92	16.07
	0:41:35	3.94	12.62	9.08	13.33	17.15	19.61	25.76	29.96	44.04
	0:48:31	4.64	15.13	10.83	16.00	20.66	23.69	31.28	36.52	54.57
	0:55:26	4.42	14.47	10.35	15.30	19.78	22.69	29.99	35.04	52.60
	1:02:22	4.03	13.17	9.42	13.93	18.00	20.65	27.29	31.88	47.95
	1:09:18	3.59	11.80	8.43	12.48	16.16	18.54	24.54	28.69	43.20
	1:16:14	3.09	10.23	7.29	10.82	14.03	16.12	21.39	25.04	37.83
	1:23:10	2.69	8.90	6.35	9.41	12.19	14.01	18.62	21.82	33.04
	1:30:05	2.44	8.07	5.75	8.53	11.05	12.70	16.86	19.74	29.80
	1:37:01	2.00	6.70	4.76	7.09	9.21	10.59	14.08	16.50	25.01
	1:43:57	1.63	5.50	3.90	5.83	7.59	8.73	11.63	13.65	20.74
	1:50:53	1.24	4.29	3.02	4.54	5.94	6.85	9.16	10.77	16.46
	1:57:49	0.92	3.23	2.26	3.43	4.51	5.22	7.02	8.28	12.74
	2:04:44	0.67	2.36	1.63	2.50	3.31	3.84	5.20	6.15	9.53
	2:11:40	0.52	1.80	1.26	1.91	2.52	2.91	3.93	4.63	7.13
	2:18:36	0.43	1.48	1.04	1.57	2.05	2.37	3.18	3.74	5.73
	2:25:32	0.36	1.25	0.88	1.32	1.73	2.00	2.68	3.15	4.82
	2:32:28	0.32	1.09	0.77	1.16	1.52	1.75	2.34	2.75	4.19
	2:39:23	0.29	0.98	0.69	1.04	1.36	1.57	2.09	2.46	3.74
	2:46:19	0.27	0.90	0.64	0.96	1.25	1.44	1.92	2.26	3.43
	2:53:15	0.20	0.66	0.47	0.70	0.92	1.06	1.42	1.67	2.56
	3:00:11	0.14	0.49	0.34	0.52	0.67	0.77	1.03	1.21	1.85
	3:07:07	0.11	0.36	0.25	0.38	0.49	0.57	0.76	0.90	1.37
	3:14:02	0.08	0.26	0.19	0.28	0.37	0.42	0.57	0.67	1.02
	3:20:58	0.05	0.19	0.13	0.20	0.26	0.31	0.41	0.49	0.75
	3:27:54	0.04	0.14	0.09	0.14	0.19	0.22	0.29	0.35	0.54
	3:34:50	0.03	0.10	0.07	0.10	0.14	0.16	0.21	0.25	0.39
	3:41:46	0.02	0.07	0.05	0.07	0.09	0.11	0.15	0.18	0.27
	3:48:41	0.01	0.04	0.03	0.04	0.06	0.07	0.09	0.11	0.18
	3:55:37	0.00	0.02	0.01	0.02	0.03	0.04	0.05	0.06	0.10
	4:02:33	0.00	0.01	0.00	0.01	0.01	0.02	0.02	0.03	0.05
	4:09:29	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01
	4:16:25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:23:20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:30:16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:37:12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:44:08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:51:04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:57:59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:04:55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:11:51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:18:47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:25:43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:32:38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:39:34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:46:30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:53:26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:00:22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:07:17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:14:13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:21:09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:28:05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:35:01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:41:56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:48:52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:55:48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	7:02:44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	7:09:40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	7:16:35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	7:23:31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	7:30:27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	7:37:23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	7:44:19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	7:51:14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	7:58:10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	8:05:06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	8:12:02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	8:18:58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix E

Referenced Information

Nine Mile Corner PD-Development Plan

A PORTION OF THE NORTHEAST QUARTER OF SECTION 34, TOWNSHIP 1 NORTH, RANGE 69 WEST
AND THE SOUTHEAST QUARTER OF SECTION 27, TOWNSHIP 1 NORTH, RANGE 69 WEST OF THE 6TH PRINCIPAL MERIDIAN,
TOWN OF ERIE, COUNTY OF BOULDER, STATE OF COLORADO.
47.15 ACRES
PD-000831-2016



Note: Access points are conceptual and subject to change during the development process.

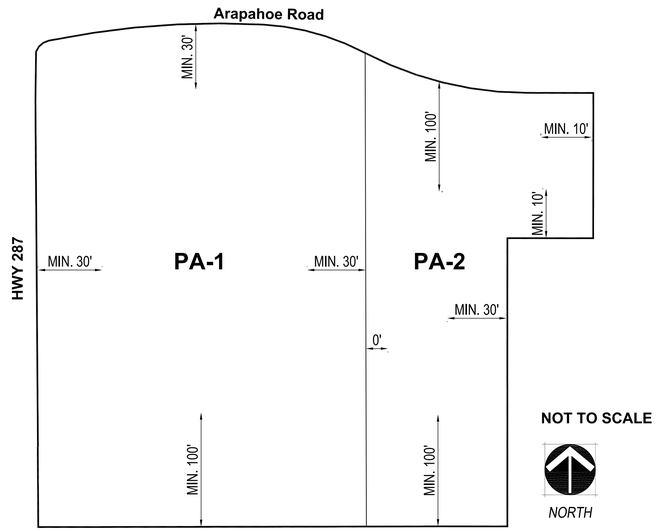
LAND USE SUMMARY TABLE				
TRACT	**AREA**	**USE**	**MAX DU**	**% OF TOTAL AREA**
PA-1	~33 AC	COMMERCIAL/RETAIL	N/A	70%
PA-2	~14 AC	HIGH DENSITY RESIDENTIAL	308	30%
TOTAL	**47.2 AC**		**308**	**100%**

DIMENSIONAL STANDARDS TABLE				
MINIMUM LOT STANDARDS				
PLANNING AREA	WIDTH (FT.)	AREA (S.F.)	MAX HEIGHT	MAX DENSITY
PA-1	N/A	N/A	PRINCIPAL: 49' ACCESSORY: 25'	N/A
PA-2	N/A	N/A	PRINCIPAL: 49' ACCESSORY: 25'	22 DU/AC

DIMENSIONAL STANDARDS TABLE (CONT.)								
MINIMUM BUILDING SETBACKS (FT.) **(see diagram below for further clarification)**								
PLANNING AREA	HWY 287 ROW	ARAPAHOE RD. ROW	PA-1	PA-2	EAST PROPERTY LINE	SOUTH PROPERTY LINE(LAFAYETTE)	INTERIOR LOT LINE	PRIVATE STREETS
PA-1	30'	30'	N/A	30'	N/A	See Building Setback Diagram	0'	0'
PA-2	N/A	100'	0'	N/A	See Building Setback Diagram	See Building Setback Diagram	0'	0'

(1) Multiple principal buildings on a single lot shall be separated by a distance equal to the distance that would be required if they were separated by a lot line.
(2) Setbacks shall allow for encroachments, providing they do not extend into easements or right of way, up to 3.0 feet beyond the building foundation for above-grade features including eaves, counterforts, fireplace box-out, stoops, bay windows, room cantilevers, and overhangs provided that the living space of the projection does not exceed 20 square feet in each instance and extend more than 2 feet. There shall be no more than two (2) above grade living space encroachments per elevation.
(3) Private streets, shared drives, and alleys are allowed if privately maintained.
(4) Maximum height of spires on religious facilities shall be 60 feet.
(5) The setbacks along Arapahoe Road shall be measured from the ultimate development platted ROW line.Typical street parkstrips/tree lawns and sidewalks are allowed outside of the ROW so long as they are placed within a dedicated pedestrian or sidewalk easement.

Building Setback Diagram



Note: The setbacks along Arapahoe Road shall be measured from the ultimate development platted ROW line. Typical street parkstrips/tree lawns and sidewalks are allowed outside of the ROW so long as they are placed within a dedicated pedestrian or sidewalk easement.

CHECKED BY: RM
DRAWN BY: ML

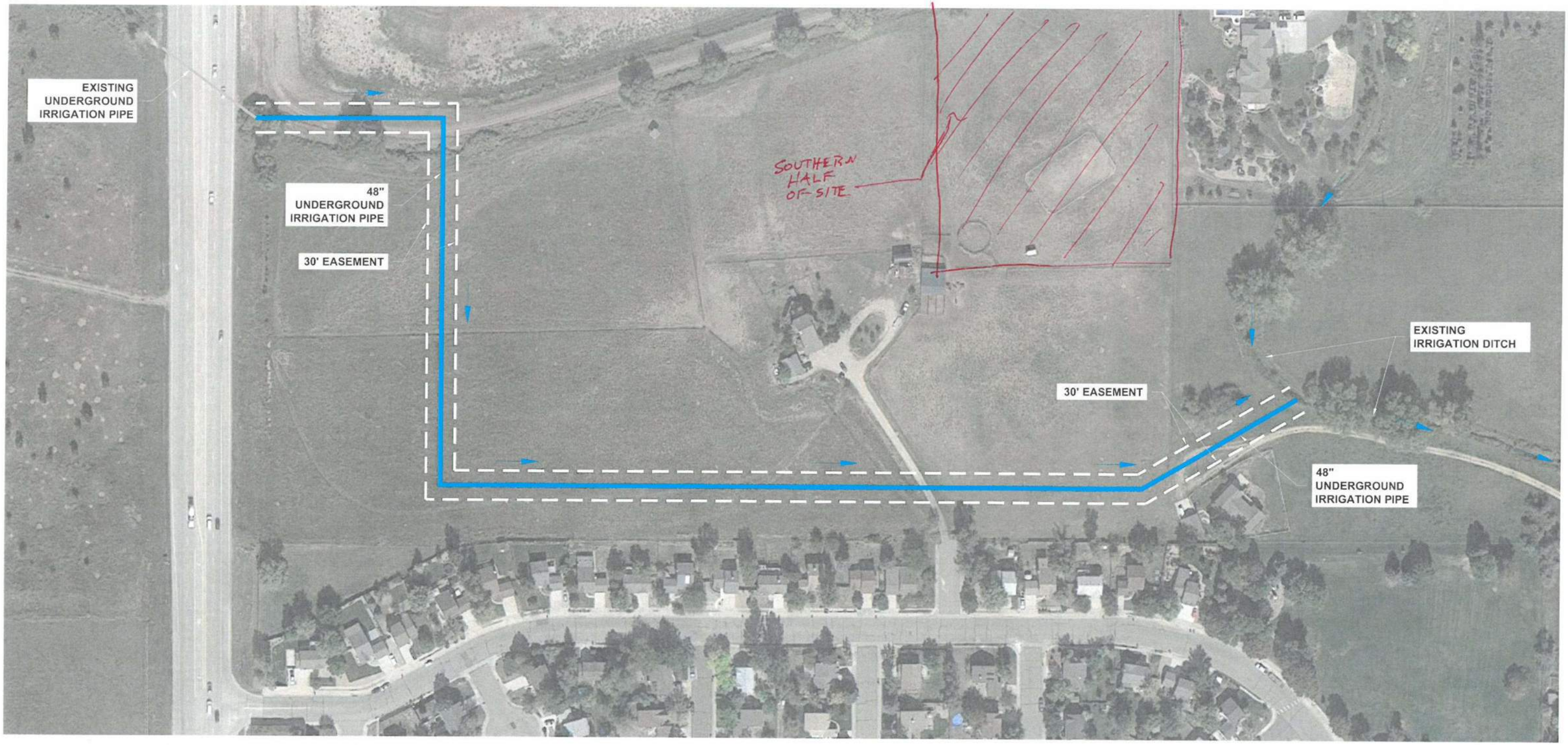
NORRIS DESIGN
www.norris-design.com
1101 Bannock Street
Denver, Colorado 80204
P 303.892.1166
F 303.892.1186

NINE MILE CORNER
PLANNED DEVELOPMENT - DEVELOPMENT PLAN
TOWN OF ERIE, COUNTY OF BOULDER, STATE OF COLORADO

OWNER:
TOWN OF ERIE
645 HOLBROOK STREET
P.O. BOX 750
ERIE, CO 80516

DATE:
11-16-16
12-09-16
03-03-17

SHEET TITLE:
PD-DP MAP


EXISTING
UNDERGROUND
IRRIGATION PIPE
48"
UNDERGROUND
IRRIGATION PIPE
30' EASEMENT
SOUTHERN
HALF
OF SITE
EXISTING
IRRIGATION DITCH
30' EASEMENT
48"
UNDERGROUND
IRRIGATION PIPE

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, OMAHA DISTRICT
DENVER REGULATORY OFFICE, 9307 SOUTH WADSWORTH BOULEVARD
LITTLETON, COLORADO 80128-6901

May 3, 2016

SUBJECT: Action No. NWO-2016-00977-DEN, South Boulder Canon Ditch maintenance

Jody Lambert
South Boulder Canon Ditch
P.O. Box 750
Erie, CO 80516

Dear Mr. Lambert,

Reference is made to the above-mentioned proposed project located at approximately latitude 40.01285, longitude-105.1008, in Boulder County, Colorado. The work as described in your submittal will consist of piping a potion of South Boulder Canon Ditch.

This project has been reviewed in accordance with Section 404 of the Clean Water Act under which the U.S. Army Corps of Engineers regulates the discharge of dredge and fill material and certain excavation activities in waters of the United States. Waters of the U.S. includes ephemeral, intermittent and perennial streams, their surface connected wetlands and adjacent wetlands and certain lakes, ponds, drainage ditches and irrigation ditches that have a nexus to interstate commerce.

This letter is to inform you that the proposed work to the South Boulder Canon Ditch as depicted and described in the submittal, is the type of activity that is included in the Section 404(f) exemption found at 33 C.F.R. Part 323.4(a)(3) Construction or maintenance of farm or stock ponds or irrigation ditches, or the maintenance (but not construction) of drainage ditches. Discharges associated with siphons, pumps, headgates, wingwalls, weirs, diversion structures, and such other facilities as are appurtenant and functionally related to irrigation ditches are included in this exemption. Based on the information provided, a Department of the Army permit will not be required for this activity.

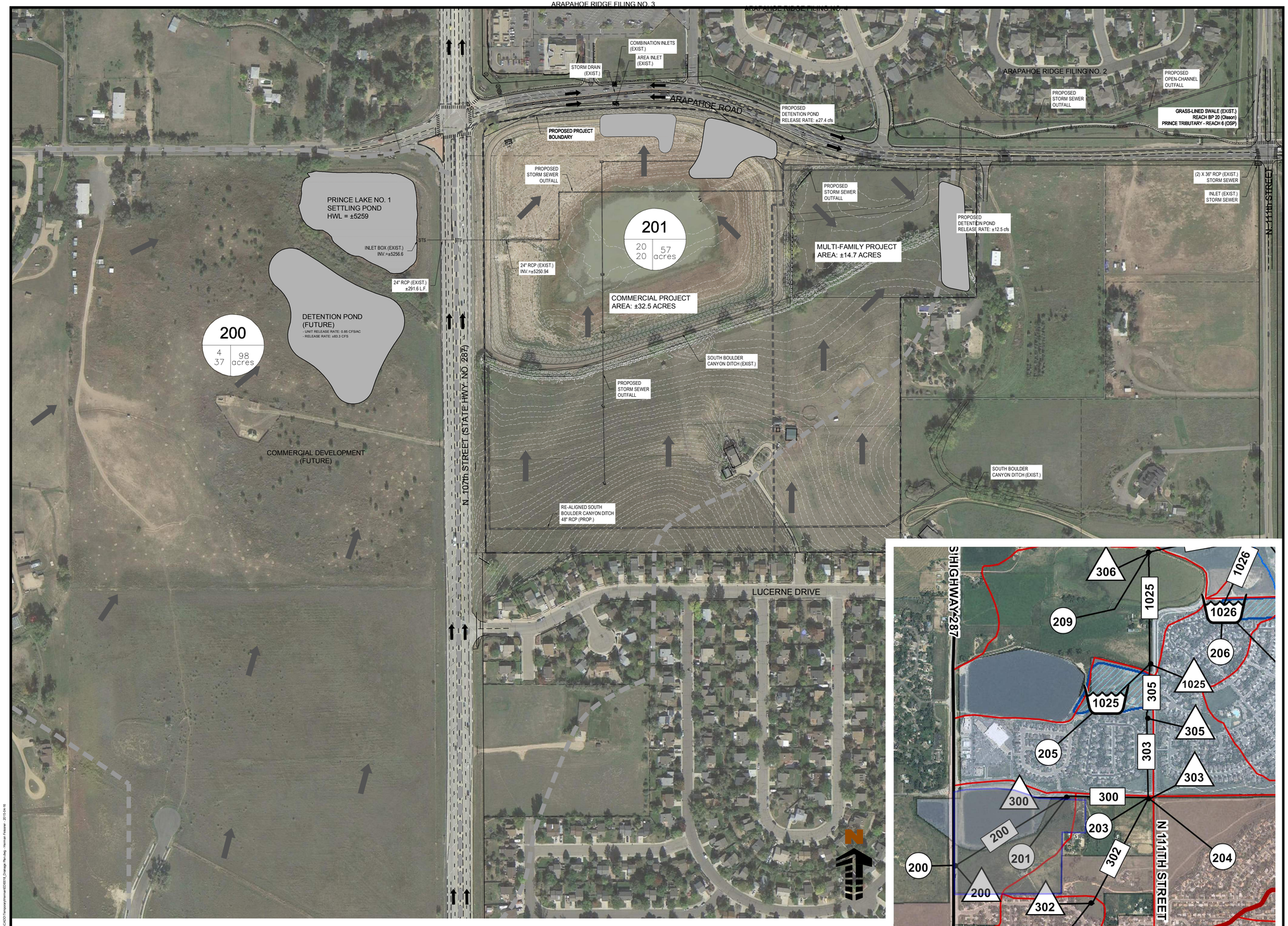
Although a Department of the Army permit will not be required for these activities, this does not eliminate the requirements that other applicable federal, state, tribal, and local permits are obtained if needed. If there are any questions, please feel free to contact Angelle Greer (303) 979-4120 or by e-mail at Angelle.V.Greer@usace.army.mil, and reference Corps File No. NWO-2016-00977-DEN.

Sincerely,

Angelle Greer

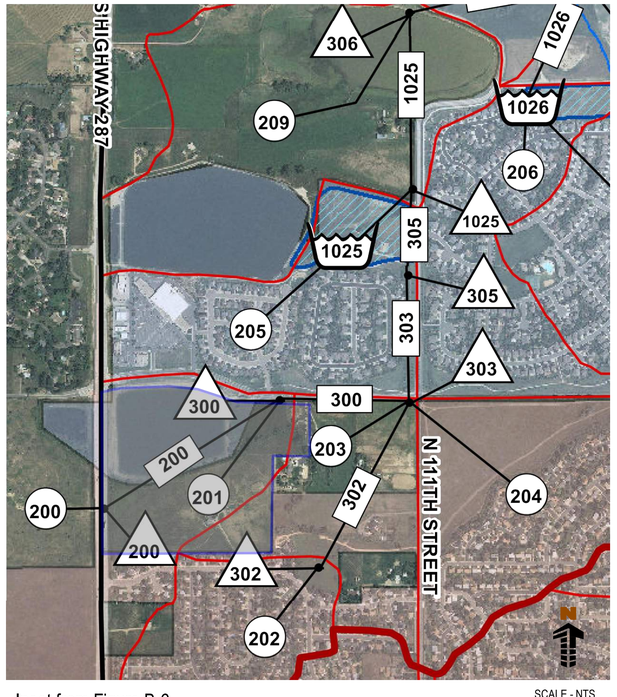
Angelle Greer
Senior Project Manager
Denver Regulatory Office

CF: (via email) Sarah Fowler, USEPA



PRELIMINARY DRAINAGE PLAN
NINE MILE CORNER | ERIE, CO

SCALE - 1" = 150'



Inset from Figure B-6
Town of Erie Outfall Systems Plan (West ofCoal Creek)
RESPEC Consulting & Services, January 2014

SCALE - NTS

Galloway
Planning. Architecture. Engineering.
6162 S Willow Drive, Suite 320, Greenwood Village, CO 80111
303.770.8884 O
www.gallowayUS.com
©2016 Galloway & Company, Inc. All Rights Reserved

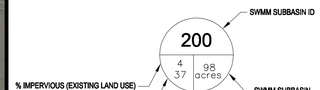
Evergreen
Development | Services | Investments

COPYRIGHT
THESE PLANS ARE AN INSTRUMENT OF SERVICE AND ARE THE PROPERTY OF GALLOWAY, AND MAY NOT BE DUPLICATED, DISCLOSED, OR REPRODUCED WITHOUT THE WRITTEN CONSENT OF THE ARCHITECT. COPYRIGHTS AND INFRINGEMENTS WILL BE ENFORCED AND PROSECUTED.

LEGEND:

- PROPOSED MAJOR CONTOUR (4900)
- PROPOSED MINOR CONTOUR (35)
- EXISTING MAJOR CONTOUR (4900)
- EXISTING MINOR CONTOUR
- EXISTING STORM SEWER
- PROPOSED STORM SEWER
- PROPOSED STORM INLET
- PROPOSED RIGHT-OF-WAY
- FUTURE RIGHT-OF-WAY
- PROPOSED LOTLINE
- FUTURE LOTLINE
- EASEMENT LINE

DRAINAGE SYMBOLS:



- C9 — DESIGN POINT
- OSP SWMM SUBBASIN BOUNDARY
- PROJECT SPECIFIC SUBBASIN BOUNDARY
- OVERLAND FLOW DIRECTION (I.E., LANDSCAPING)
- DIRECT FLOW DIRECTION - FUTURE (I.E., PAVEMENT, CURB AND GUTTER)

NOTES:

1. DETENTION POND FOOTPRINT (PROPOSED CONDITION) — 100-YEAR

Project No:	
Drawn By:	HHF
Checked By:	HHF

10/07/2016

NINE MILE CORNER

ERIE, COLORADO

N. 107th Street and Arapahoe Road

DR01	1 of 1

H:\Evergreen Development\CO, Erie\12000018 - Nine Mile Corner_28TM\Arapahoe\CAD\Improvements\EC00018_Drainage Plan.dwg, Herman Fraese, 2016-04-16

BULLHEAD GULCH/PRINCE TRIBUTARY

BULLHEAD GULCH OFFSITE
SEE FIGURE: 3

COAL CREEK TRIBUTARIES

COAL CREEK OFFSITE
SEE FIGURE: 3

MATCHLINE SEE FIGURE 12b

STUDY AREA BOUNDARY

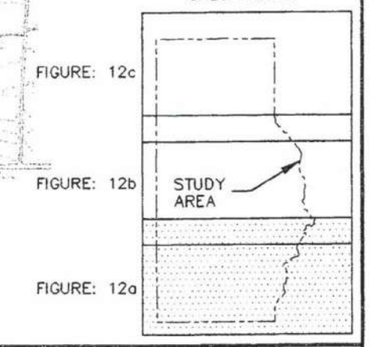
SCALE: 1"=1500'

NORTH 107TH STREET
NORTH 111TH STREET
US HWY 287
NORTH 119TH STREET
NORTHEAST COUNTY LINE ROAD
BOULDER CO
WELD CO
COAL CREEK
ARAPAHOE RD.
BASELINE ROAD

LEGEND

- CATCHMENT I.D. (800 / 60.5 CATCHMENT ACRE)
- WATERSHED DIVIDE
- CATCHMENT BOUNDARY
- MINOR CATCHMENT BOUNDARY
- OUTFALL FLOW PATH
- STUDY AREA BOUNDARY
- DETENTION AREA (2000)
- UDSWM CHANNEL/PIPE ELEMENT (2000)
- OFFSITE CATCHMENT (800 / SWMM CATCHMENT SOURCE)
- DESIGN POINT/NODE (902)

SHEET INDEX



Lore & Associates, Inc. water resource consultants 841 Front Street Louisville, Colorado 80027-1849 Phone: 303-673-9795 Fax: 303-673-9796	DESIGNED: RJP DRAWN: DM CHECKED: DJL DATE: 02-01	TOWN OF ERIE URBAN DRAINAGE AND FLOOD CONTROL DISTRICT	ERIE AND ADJACENT AREAS OUTFALL SYSTEMS PLANNING	OUTFALL SYSTEMS MAP	Figure 12a Page V-3

DATE: FEBRUARY 2,2001
C:\PROJECTS\9922B\DWGS\OUTFALL-SYS-MAP.DWG

SCALE: 1"=2300'

COAL CREEK TRIBUTARIES

STUDY AREA BOUNDARY

NORTHEAST COUNTY LINE ROAD

WELD CO

BOULDER CO

CC 10

CC 20

CC 30

CC 50

CC 60

CC 70

CC 80

CC 90

JAY ROAD

KENOSHA ROAD

BOULDER CREEK

ARAPAHOE ROAD

BASELINE ROAD

NORTH 119TH STREET

BC 30

BC 20

BC 10

HWY 52

NORTH 115TH STREET

JASPER ROAD

U.P.R.R.

BROWNSVILLE

LEON A. WURL PKWY. (ISABELLE RD)

BP 40

BP 20

BP 50

NORTH 111TH STREET

MINERAL ROAD

LOOKOUT ROAD

NORTH 109TH STREET

BP 10

NORTH 107TH STREET

US HWY 287

BOULDER CREEK TRIBUTARIES

BULLHEAD GULCH AND PRINCE TRIBUTARIES

LEGEND

- WATERSHED
- CATCHMENT BOUNDARY
- MINOR CATCHMENT BOUNDARY
- OUTFALL FLOW PATH
- DESIGN POINT (800)

IMPROVEMENTS

- REGIONAL DETENTION FACILITY (0000)
- EXISTING DETENTION FACILITY (0000)
- DIVERSION ELEMENT (0000)
- REGIONAL FLOW PATH (000)
- REACH IDENTIFIER (BP 10)

DATE: JANUARY 3, 2001
C:\PROJECTS\9922B\OPTIONS.DWG

Love & Associates, Inc.
water resource consultants
841 Front Street
Louisville, Colorado 80027-1849
Phone: 303-673-9795
Fax: 303-673-9796

DESIGNED:	RJP
DRAWN:	DM
CHECKED:	DJL
DATE:	01-01

TOWN OF ERIE
URBAN DRAINAGE AND FLOOD CONTROL DISTRICT

ERIE AND ADJACENT AREAS
OUTFALL SYSTEMS PLANNING

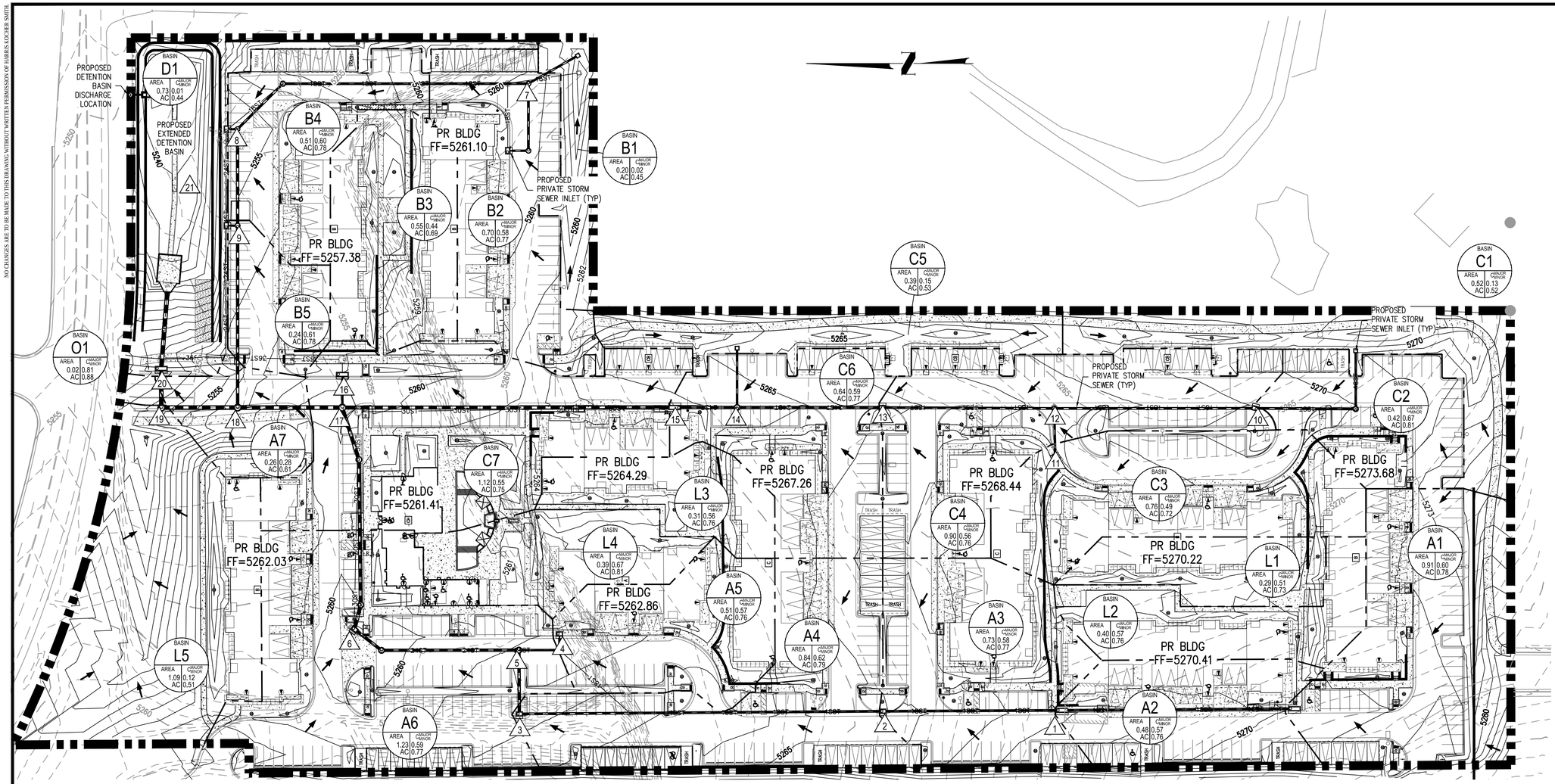
PROPOSED DRAINAGE FACILITIES
UDSWM ELEMENTS

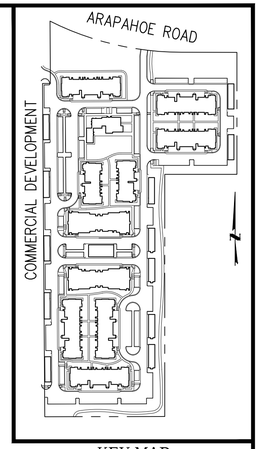
Figure ES-2
Page ES-6

APPENDIX F

Final Drainage Plan

NO CHANGES ARE TO BE MADE TO THIS DRAWING WITHOUT WRITTEN PERMISSION OF HARRIS KOCHER SMITH





KEY MAP
SCALE: 1" = 250'

LEGEND

PROPERTY LINE
EXISTING RIGHT-OF-WAY
EXISTING CONTOURS 5170
PROPOSED CONTOURS 5173 5170
PROPOSED STORM SEWER
PROPERTY DRAINAGE BOUNDARY
DRAINAGE BASIN BOUNDARY
SURFACE FLOW DIRECTION

BASIN DESIGNATION — BASIN OS 1 — 2-YR RATIONAL C COEFFICIENT
BASIN SIZE IN ACRES — AREA 1.23 — MAJOR/MINOR 0.45/0.67 — 100-YR RATIONAL C COEFFICIENT
1 BASIN DESIGN POINT

RUNOFF SUMMARY TABLE

BASIN	AREA (AC)	Q2 (CFS)	Q100 (CFS)
A1	0.91	1.8	6.1
A2	0.48	0.9	3.3
A3	0.73	1.5	5.2
A4	0.84	1.7	5.8
A5	0.51	0.9	3.3
A6	1.23	2.5	8.7
A7	0.26	0.2	1.5
B1	0.20	0.0	0.8
B2	0.70	1.4	4.9
B3	0.55	0.8	3.3
B4	0.51	1.1	3.7
B5	0.24	0.5	1.7
C1	0.52	0.2	2.3
C2	0.42	1.0	3.1
C3	0.76	1.3	5.0
C4	0.90	1.7	6.2
C5	0.39	0.2	1.9
C6	0.64	1.3	4.5
C7	1.12	2.1	7.7
D1	0.73	0.0	2.9
L1	0.29	0.5	2.0
L2	0.40	0.8	2.8
L3	0.31	0.6	2.1
L4	0.39	0.9	2.9
L5	1.09	0.3	4.1
O1	0.02	0.1	0.2

DESIGN POINT RUNOFF SUMMARY TABLE

DP	Q2 (CFS)	Q100 (CFS)
1	3.1	11.0
2	4.2	14.8
3	5.1	17.9
4	1.7	6.0
5	6.5	19.2
6	7.8	27.3
7	1.4	5.6
8	3.0	11.9
9	3.5	13.4
10	1.1	5.1
11	1.8	6.9
12	2.8	9.2
13	3.9	15.4
14	4.0	13.0
15	5.3	21.4
16	2.1	7.7
17	14.8	51.4
18	17.4	61.2
19	17.6	64.5
20	17.7	66.8
21	17.7	68.7

EXTENDED DETENTION BASIN TABLE

STORM EVENT	WSEL (FEET)	VOLUME (AC-FT)	RELEASE RATE (CFS)
WQCV	5241.14	0.462	40-HOUR
EURV	5243.91	1.273	52-HOUR
100-YR	5246.73	2.292	12.7

811 Know what's below. Call before you dig.
CALL 3 BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES.

50 0 50 100
SCALE: 1" = 50'

DESIGNED BY: ATM
CHECKED BY: ATM
DRAWN BY: ATM

HARRIS KOCHER SMITH
1120 Lincoln Street, Suite 1000
Denver, Colorado 80203
P: 303.623.6300 F: 303.623.6311
HarrisKocherSmith.com

EVERGREEN DEVCO, INC.

OUTLOOK AT NINE MILE
FINAL DRAINAGE PLAN

ISSUE DATE: 04-28-2017 | PROJECT #: 160602

DATE	REVISION COMMENTS

PRELIMINARY NOT FOR CONSTRUCTION

SHEET NO. 1
1 OF 1

FILEPATH: P:\160602\ENGINEERING\DRAINAGE\DRAINAGE PLAN - REV. POST_RECOVERED.DWG LAYOUT: PRE-DEVELOPED DRAINAGE MAP
8 XREFs: e-anet[U], e-base_ssv, layt, kvmap, p-base, pl-rgd[U], p-utl, stmp-cd, usgs[U]
PLOTTED: THU 04/27/17 11:59:47A BY: ANDREW WESSER

Preliminary Utility Report

FOR

Nine Mile Corner
at
Nine Mile Subdivision Filing 1

Legal Description:

Nine Mile Subdivision Filing 1
Situated in Northeast ¼ of Section 34 and the Northwest ¼ of Section 27,
Township 1 North, Range 69 West of the 6th P.M.
Town of Erie, County of Boulder,
State of Colorado.

Preparation Date: April 28, 2017

Prepared for:
Evergreen Development Co., Inc.
1873 South Bellaire Street
Denver, Colorado 80222
Phone (602) 567-7129
Attn: Russell Perkins

Prepared by:
Galloway & Company, Inc.
6162 South Willow Drive, Suite 320
Greenwood Village, CO 80111
Phone (303) 770-8884
Fax (303) 770-3636
Attn: Brandon S. McCrary, P.E.

ENGINEER'S STATEMENT

The enclosed utility report, and exhibits, were prepared by me or under my direct supervision and is correct to the best of my knowledge and belief. Said utility report has been prepared in accordance with applicable Town of Erie criteria and is in conformance with the master utility plans for the affected area. I accept responsibility for any liability caused by negligent acts, errors or omissions on my part in preparing this report.

_____ _____

Brandon S. McCrary, PE 40276 Date
For and on behalf of Galloway & Company

OWNER/DEVELOPER STATEMENT:

As Owner/Developer of land identified within this report; I agree to proceed, implement and comply with all recommendations and requirements outlined herein.

_____

Name of Developer

_____

Authorized Signature

Table of Contents

Project Location and Description 2
Calculated Water Demands 3
Existing Water System 5
Proposed Water System 5
Proposed Water System Analysis and Modeling 5
Calculated Waste Water Flows 5
Existing Waste Water System 7
Proposed Waste Water System 8
Proposed Waste Water System Analysis and Modeling 8
Future Development Requirements 8
References 8
APPENDICES 9

APPENDIX A. Maps and Plans
a. Wet Utility Map
APPENDIX B. Water and Sewer Demand Calculations
APPENDIX C. Hydrant Flow Test

Project Location and Description

Location

The Nine Mile Subdivision Filing 1 is located in the Town of Erie, County of Boulder, Colorado at the southeast corner of Arapahoe Road and N. 107th Street. The site is contained within the Northeast ¼ of Section 34, and the Southeast ¼ of Section 27, Township 1 North, Range 69 West of the 6th Principal Meridian. The site is bordered by N. 107th Street right-of-way and roadway to the west, Arapahoe Road right-of-way and roadway to the north, vacant land and N. 111th Street right-of-way and roadway to the east, and a single-family residential development to the south.



Vicinity Map

NTS

Description of Property

The project site consists of approximately 47.2 acres of vacant land. The proposed commercial area comprises approximately 32.5 acres and the proposed multi-family area comprises approximately 14.7 acres. Vegetative cover is comprised of native

grasses and bare ground with approximately 40% coverage. The existing ground generally slopes from south to north, with slopes ranging from 0.5% to 25%. The site will be subdivided into 1 commercial block and 1 multi-family residential block. Construction will include overlot grading, installation of internal roadway and utility infrastructure, and construction of the retail and multi-family buildings.

The proposed land use will include several commercial developments and approximately 300 units in a multi-family area. The Nine Mile Corner development will be served by six access points, two along N. 107th Street, three along Arapahoe Road, and one along Lucerne Drive from the neighborhood to the south. These access points will connect to internal private access drives. Two detention/water quality ponds are proposed to accommodate runoff from the development. Arapahoe Road will be widened on the south side as part of this development.

All proposed water and sanitary sewer infrastructure associated with the development will be publicly owned, maintained and dedicated to the Town of Erie as part of the Nine Mile Corner improvements. Onsite utilities serving the blocks will connect into these improvements in the future.

Calculated Water Demands

Average Day Demands/Peak Hour Demands

Average Daily Demand (ADD) for the water distribution flows were calculated based upon the Town of Erie Public Work Standards and Specifications Section 600 – Water Facilities, being 1651 gallons/day/acre for commercial buildings. A flow of 140 gallons/capita/day was utilized for the multi-family units. The Peak Hour Demand (PHD) was calculated by multiplying the ADD by the Peak Hour Demand Factor of 3.
The Water System Average Daily Demand (ADD) has been calculated to be 95,971 gpd and the Peak Hour Demand (PHD) has been calculated to be 226.36 gpm. Average Daily and Peak Hour Demands for the development are as follows:

Water Demand Calculations

Lot/Parcel	Land Use	Area (acre)	Capita	ADF/Unit* Gal/Unit/Day	ADF (gpd)	PHD Factor **	PHD (gpm)	PDD Factor ***	PDD (gpm)
Block 1	Commercial	32.52		1,651	53,691	3	111.86	2.0	74.57
Block 2	Multi-Family		302	140	42,280	3.9	114.51	2.6	76.34
				Total Flow	95,971		226.36		150.91

Fire Flow Demands

Fire flow was calculated based on 2015 International Fire Code flow rates. All buildings were assumed to be construction type IIIB or better. It was also assumed that only one fire would be fought at a time. Based on Table B 105.1, a minimum fire flow demand of 7,000 GPM was derived. An automatic commercial sprinkler system is to be installed within the buildings allowing a 50% reduction in flow, resulting in a final required fire flow of 3,500 GPM for a 3-hour duration. An excerpt of Table B 105.1 is below for reference.

TABLE B105.1
MINIMUM REQUIRED FIRE-FLOW AND FLOW DURATION FOR BUILDINGS

FIRE-FLOW CALCULATION AREA (square feet)					FIRE-FLOW (gallons per minute)[b]	FLOW DURATION (hours)
Type IA and IB[a]	Type IIA and IIIA[a]	Type IV and V-A[a]	Type IIB and IIIB[a]	Type V-B[a]		
0-22,700	0-12,700	0-8,200	0-5,900	0-3,600	1,500	
22,701-30,200	12,701-17,000	8,201-10,900	5,901-7,900	3,601-4,800	1,750	
30,201-38,700	17,001-21,800	10,901-12,900	7,901-9,800	4,801-6,200	2,000	
38,701-48,300	21,801-24,200	12,901-17,400	9,801-12,600	6,201-7,700	2,250	2
48,301-59,000	24,201-33,200	17,401-21,300	12,601-15,400	7,701-9,400	2,500	
59,001-70,900	33,201-39,700	21,301-25,500	15,401-18,400	9,401-11,300	2,750	
70,901-83,700	39,701-47,100	25,501-30,100	18,401-21,800	11,301-13,400	3,000	
83,701-97,700	47,101-54,900	30,101-35,200	21,801-25,900	13,401-15,600	3,250	3
97,701-112,700	54,901-63,400	35,201-40,600	25,901-29,300	15,601-18,000	3,500	
112,701-128,700	63,401-72,400	40,601-46,400	29,301-33,500	18,001-20,600	3,750	
128,701-145,900	72,401-82,100	46,401-52,500	33,501-37,900	20,601-23,300	4,000	
145,901-164,200	82,101-92,400	52,501-59,100	37,901-42,700	23,301-26,300	4,250	
164,201-183,400	92,401-103,100	59,101-66,000	42,701-47,700	26,301-29,300	4,500	
183,401-203,700	103,101-114,600	66,001-73,300	47,701-53,000	29,301-32,600	4,750	
203,701-225,200	114,601-126,700	73,301-81,100	53,001-58,600	32,601-36,000	5,000	
225,201-247,700	126,701-139,400	81,101-89,200	58,601-65,400	36,001-39,600	5,250	
247,701-271,200	139,401-152,600	89,201-97,700	65,401-70,600	39,601-43,400	5,500	
271,201-295,900	152,601-166,500	97,701-106,500	70,601-77,000	43,401-47,400	5,750	
295,901-Greater	166,501-Greater	106,501-115,800	77,001-83,700	47,401-51,500	6,000	4
—	—	115,801-125,500	83,701-90,600	51,501-55,700	6,250	
—	—	125,501-135,500	90,601-97,900	55,701-60,200	6,500	
—	—	135,501-145,800	97,901-106,800	60,201-64,800	6,750	
—	—	145,801-156,700	106,801-113,200	64,801-69,600	7,000	
—	—	156,701-167,900	113,201-121,300	69,601-74,600	7,250	
—	—	167,901-179,400	121,301-129,600	74,601-79,800	7,500	
—	—	179,401-191,400	129,601-138,300	79,801-85,100	7,750	
—	—	191,401-Greater	138,301-Greater	85,101-Greater	8,000	

For SI: 1 square foot = 0.0929 m^2, 1 gallon per minute = 3.785 L/m, 1 pound per square inch = 6.895 kPa.
a. Types of construction are based on the *International Building Code*.
b. Measured at 20 psi residual pressure.

Existing Water System

Existing Distribution System

An existing 12” water main is located along the north side of Arapahoe Road. Hydrant flow tests have been performed and results are provided in Appendix C of this report.

Proposed Water System

Proposed Distribution System

The proposed on-site water infrastructure will be designed to accommodate the entire development. Service sizes for the future buildings are currently unknown.

The water system will be looped throughout the commercial and multi-family residential areas of the development and will connect to the existing water main located along the north side of Arapahoe Road. The water main will be connected at two locations: the intersection of Arapahoe Road and the Safeway drive aisle, and the intersection of Arapahoe Road and Beasley Drive. This will complete the main loop for the proposed development.

Proposed Water System Analysis and Modeling

Pressure scenarios, system analysis, modeling and schematics will be provided in the Final Utility Report for Nine Mile Corner at Nine Mile Subdivision Filing 1.

Calculated Waste Water Flows

Average Daily Flows

Average Daily Flows (ADF) for wastewater were calculated per the Town of Erie Public Works Standards and Specifications Section 700 – Sanitary Sewer Facilities, being 1000 gallons/acre/day for commercial buildings. A flow of 115 gallons/unit/day was

utilized for the multi-family units. This information is based off multi-family buildings with similar occupancy.

Peak Daily Flows were determined by multiplying the Average Daily Flow by the Peaking Factor (PF). The Peaking Factor is calculated using the following equation:

$$PF = 3.8/(ADF)^{0.17}$$

The Peaking Factor shall not be less than 2.5 or greater than 5 per Town of Erie criteria, however Merrick & Company is currently evaluating this consideration on behalf of the Town of Erie.

The Design Flow rate is calculated by multiplying the Average Design Flows with the Peaking Factor. The sanitary sewers must convey the peak flow at a maximum flow depth of 80% of the pipe diameter. Sewer mains 12” or larger in diameter may be designed to flow full at the peak design flow rate. Merrick & Company is currently evaluating the overall downstream system on behalf of the Town of Erie and some alternate capacity considerations may be allowed.

The Peak Design Flow rate has been calculated to be 336,250 gpd or 0.52 cfs

Average Design Flows and Peak Design Flows for the development are as follows:

Sanitary Flow Calculations

Multi-Family Area		
	302	Units*
	2.1	Capita/Unit
	115	Gal/Unit/Day
Average Day	34,730	Gal/Day
	0.05	cfs
	5	Peaking Factor
Max Flow Rate	173,650	Gal/Day
	0.27	cfs
Commercial Area		
	32.52	Acrea
	1,000	Gal/Acre
Average Day	32,520	Gal/Day
	0.25	cfs
	5	Peaking Factor
Max Flow Rate	162,600	Gal/Day
	0.25	cfs
Total Bob's Corner Flows		
Average Day	67,250	Gal/Day
	0.31	cfs
Max Flow Rate	336,250	Gal/Day
	0.52	cfs
* This development will include two 44-unit buildings, six 28-unit buildings, two 18-unit buildings, four 3-unit buildings, and one clubhouse.		

Existing Waste Water System

Existing Collection System

An existing 8” sanitary main is located approximately 175 feet north of the property within the Arapahoe Road roadway and right-of-way adjacent to the existing intersection with Beasley Drive.

Proposed Waste Water System

Proposed Collection System

The proposed on-site sanitary infrastructure will be designed to accommodate the entire development. Service sizes for the future buildings are currently unknown.

The sanitary infrastructure will generally flow northeast within the development. A sanitary extension will connect the commercial and multi-family flows to the existing 8" sewer main located adjacent to the intersection of Arapahoe Road and Beasley Drive.

Proposed Waste Water Facilities

No new waste water facilities will be constructed as part of this development.

Proposed Waste Water System Analysis and Modeling

Scenarios, system analysis, modeling and schematics will be provided in the Final Utility Report for Nine Mile Corner at Nine Mile Subdivision Filing 1.

Future Development Requirements

Future development of water and/or sanitary infrastructure and service stubs have been incorporated within the design.

References

- Town of Erie Public Works Standards and Specifications Section 600 – Water Facilities
- Town of Erie Public Works Standards and Specifications Section 700 – Sanitary Sewer Facilities

APPENDICES

APPENDIX A

MAPS & PLANS

(Refer to Construction Documents included with this submittal)

APPENDIX B

WATER AND SEWER DEMAND CALCULATIONS

PROJECT: Candelas Point Commercial
LOCATION: Candelas Parkway & State Highway 72
Arvada, CO

Project No.: EDI000018.01
Date: April 27, 2017
Designed By: Jessica Greenough
Checked By: Brandon McCrary, PE

Water Demand Calculations

Lot/Parcel	Land Use	Area (acre)	Capita	ADF/Unit* Gal/Unit/Day	ADF (gpd)	PHD Factor **	PHD (gpm)	PDD Factor ***	PDD (gpm)
Block 1	Commercial	32.52		1,651	53,691	3	111.86	2.0	74.57
Block 2	Multi-Family		302	140	42,280	3.9	114.51	2.6	76.34
				Total Flow	95,971		226.36		150.91

* ADF taken from Water Facilities, Section 611, Town of Erie Public Works Standards and Specifications
** PHD = 3 per Commercial, 3.9 per Multi-Family - Water Facilities, Section 611, Town of Erie Public Works Standards and Specifications
*** PDD = 2 per Commercial, 2.6 per Multi-Family - Water Facilities, Section 611, Town of Erie Public Works Standards and Specifications

Galloway
Planning. Architecture. Engineering.

6162 S. Willow Drive, Suite 320
Greenwood Village, CO 80111
(303) 770-8884 (Phone)

Date: 04/27/17
Project: Nine Mile Corner
Location: Erie, Colorado
By: Brandon McCrary

Multi-Family Area

	302	Units*
	2.1	Capita/Unit
	115	Gal/Unit/Day
Average Day	34,730	Gal/Day
	0.05	cfs
	5	Peaking Factor
Max Flow Rate	173,650	Gal/Day
	0.27	cfs

Commercial Area

	32.52	Acres
	1,000	Gal/Acre
Average Day	32,520	Gal/Day
	0.25	cfs
	5	Peaking Factor
Max Flow Rate	162,600	Gal/Day
	0.25	cfs

Total Bob's Corner Flows

Average Day	67,250	Gal/Day
	0.31	cfs
Max Flow Rate	336,250	Gal/Day
	0.52	cfs

* This development will include two 44-unit buildings, six 28-unit buildings, two 18-unit buildings, four 3-unit buildings, and one clubhouse.

APPENDIX C

HYDRANT FLOW TEST

Hydrant 10 minute full flow report with pumps on

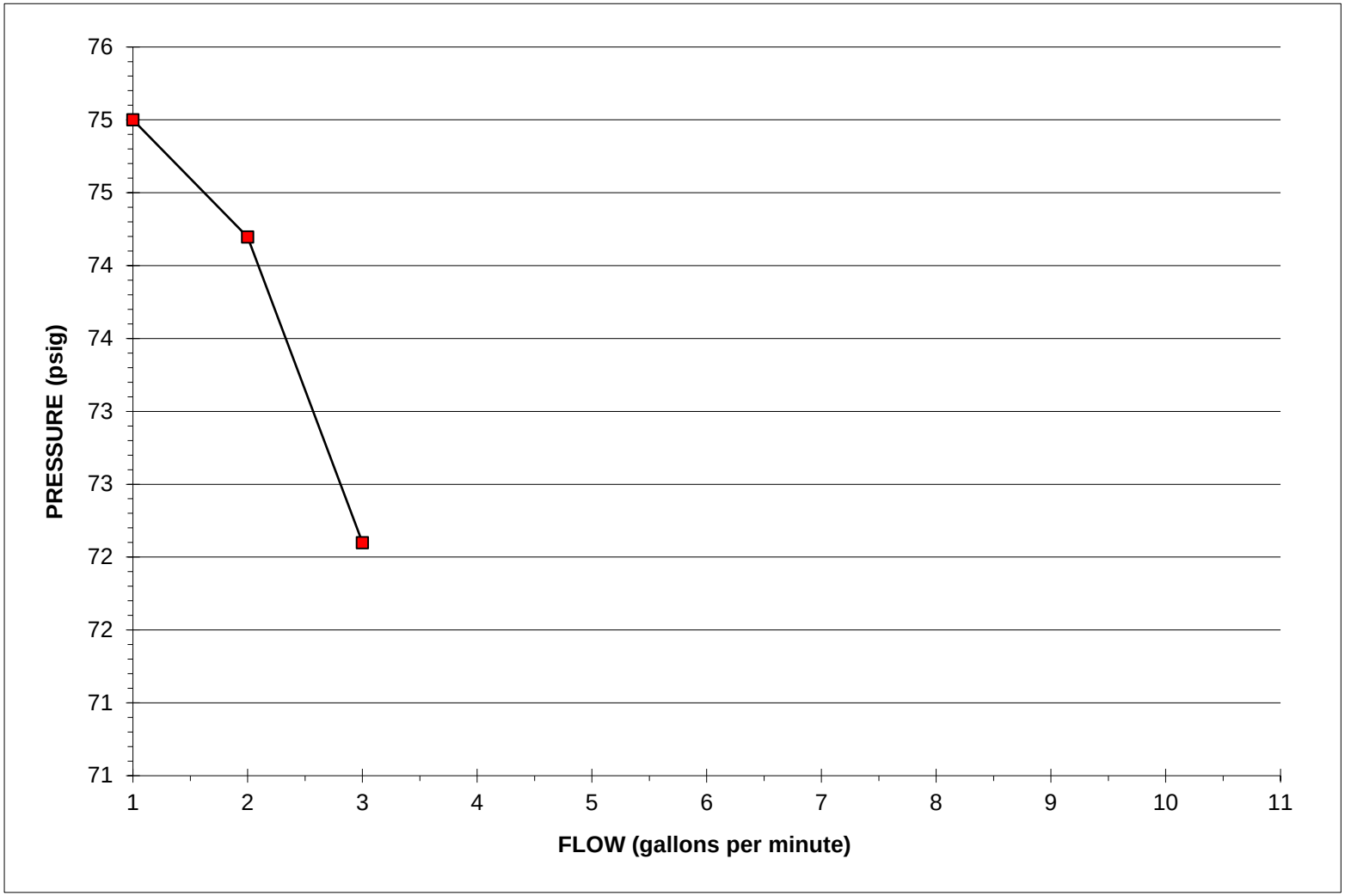
HYDRANT FLOW TEST

	Test Hydrant	Flow Hydrant	Flow Hydrant	Flow Hydrant	Flow Hydrant
Location	Behind Safeway	South end of Safeway Parking Lot			
Hydrant ID					
Coefficient		0.9	0.9		
Diameter (to 1/16")					
Gage ID		4" flow meter			
Static Pressure (psi)	75				
Residual Pressure (psi)	50				
Flow Pressure (psi)					
GPM Flowing		1600			
GPM Available @ 20 psi	2,449				

Total Flow During Test: 1600 gpm

Date of test 28-Jul-16
Time of test 10:03
Supervised by Jim Maxwell FireTest Witnessed by Scott Sutak Erie public works

Hydrant 10 minute full flow report with pumps on



ARAPAHOE RD
3338
3330
12" PVC
FLOW
750 GPM
12"
8" PVC
Service Line
Fire Line
3331
Fireline
12" PVC
Fire line
SAFEWAY
3333
Sprinkler Service
8"
Fire line
3335
12" PVC
12"
S=18, R=30
RESIDENTIAL
BILLINGTON DR
3268
3272
3276
3278
3282
3286
3290
3294
3298
3302
3306

CTL | THOMPSON INCORPORATED

DRAFT

GEOTECHNICAL INVESTIGATION
NINE MILE CORNER - APARTMENTS
SOUTHEAST OF HIGHWAY 287 AND
ARAPAHOE ROAD
ERIE, COLORADO

Prepared for:

EVERGREEN DEVELOPMENT
1873 South Bellaire Street, #1106
Denver, Colorado 80222

Attention: Angie Grendahl
Ron Wolford

Project No. DN48,647-125

February 17, 2017

1971 West 12th Avenue | Denver, Colorado 80204 | Phone: 303-825-0777 | Fax: 303-825-4252 | www.ctlt.com

DRAFT

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SCOPE

This report presents the results of our Geotechnical Investigation for the apartments planned at Nine Mile Corner, southeast of Highway 287 and Arapahoe Road in Erie, Colorado (Fig. 1). We are concurrently performing a Preliminary Geotechnical Investigation for the commercial area of the property. The purpose of this investigation was to evaluate the subsurface conditions in order to provide geotechnical design and construction recommendations for the planned apartments. The scope was described in our Proposal (DN 16-0532R) dated December 6, 2016. Evaluation of the property for the possible presence of potentially hazardous materials (Environmental Site Assessment) was not included in our scope.

This report is based on conditions found in our exploratory borings, results of field and laboratory tests, engineering analysis of field and laboratory data, and our experience with similar conditions and projects. It includes our opinions and recommendations for design criteria and construction details for site development, foundations and floor systems, slabs-on-grade, and drainage precautions. The report was prepared for the exclusive use of Evergreen Development and your team in design and construction of the apartment project. Other types of construction may require revision of this report and the recommended design criteria. A brief summary of our conclusions and recommendations follows, with more detailed discussion and design criteria provided within the report.

SUMMARY

1. Strata found in our borings generally consisted of about 7 to 20 feet of natural clay and sand underlain in most borings by weathered to comparatively unweathered claystone and interbedded claystone/sandstone bedrock to the maximum explored depth of 35 feet. Bedrock was not encountered in TH-25 and TH-36. The natural clay and claystone are variably expansive. The interbedded claystone/sandstone is low swelling and we judge the sand is non-expansive.

2. Groundwater was encountered during drilling in three borings at depths of about 18 to 22 feet. When the holes were checked after drilling, water was measured in eleven borings at depths of about 15.5 to 34 feet. We do not expect groundwater will impact the planned construction. Water levels may fluctuate seasonally and rise in response to precipitation and landscape irrigation.

3. The presence of expansive soils and bedrock constitutes a geologic hazard. There is risk that slabs-on-grade and foundations will experience heave and damage. Our investigation revealed expansive materials present at depths likely to influence performance of improvements. We estimate up to about 8 inches of potential ground heave is possible with normal post-construction wetting. We believe the recommendations in this report will help to control risk of damage; they will not eliminate the risk. Slabs-on-grade and, in some instances, foundations may be damaged by movement of the soils. Sub-excavation is a means to reduce potential heave by providing a layer of low swelling fill below improvements.

4. We understand post-tensioned slab (PTS) foundations are desired. Footings may be used for detached garage buildings. PTS foundations are suitable provided sub-excavation is performed as discussed in the report. Design and construction criteria for PTS and footing foundations are presented in the report.

5. Potential heave should be reduced to about 2 inches or less for all buildings after sub-excavation. For PTS, the foundations are structurally integral with the floor and should perform better than a conventional slab-on-grade floor. Conventional slabs-on-grade and exterior flatwork will likely experience movement and cracking.

6. Automobile parking areas can be paved using at least 6 inches of hot-mix asphalt or 5 inches of Portland cement concrete. Access drives/fire lanes should have at least 7 inches of asphalt or 6 inches of concrete. To enhance pavement performance, we advocate sub-excavating and moisture conditioning at least 3 feet of pavement subgrade. Equivalent composite sections and pavement discussion are presented in the report.

7. Surface drainage should be designed, constructed, and maintained to provide rapid removal of surface runoff away from the proposed buildings and off pavements and flatwork. The site soils are moisture-sensitive. Conservative irrigation practices should be followed to avoid excessive wetting.

8. The design and construction criteria for foundations and floor system alternatives in this report were compiled with the expectation that all other recommendations will be incorporated into the project and that the owner

will use prudent irrigation practices and maintain the structures and surface drainage. It is critical that all recommendations in this report are followed.

SITE CONDITIONS

The apartments are planned on the eastern side of the proposed Nine Mile Corner development (Fig. 1 and Photo 1). The site is bordered by Arapahoe Road on the north, Highway 287 to the west, and existing single-family residences to the south and east. The ground surface is covered with grass, weeds, bushes and trees. The site generally slopes from south to north, with overall relief of about 50 feet. The northwest portion of the site was previously occupied by Prince Lake No.1, which was used as a water storage reservoir. Based on Google Earth aerial photos, the reservoir appears to have been constructed in 2003 and remained in use until about 2015 when it was drained and partially backfilled. An existing ditch traverses the middle portion of the property from west-to-east.

PROPOSED CONSTRUCTION

Plans provided show construction will include ten apartment buildings with tuck under garages, a clubhouse building, and fifteen detached garage buildings serviced by buried utilities and paved access drives. We anticipate the apartment buildings will be three or four-story, wood-framed buildings. PTS foundations are desired. No below-grade areas are planned. The clubhouse and garage buildings will likely be one-story wood-framed structures with PTS foundations or footings with slab-on-grade floors. Partial brick or stone exterior veneer may be used. We anticipate relatively light to moderate foundation loads. We anticipate a pool will be constructed adjacent to the clubhouse. Based on site topography and provided grading plans, up to about 10 feet or fill and 8 feet of cut are planned to reach final construction grades (Fig. 4).



Photo 1 – Google Earth© Aerial Site Photo, October 2015

INVESTIGATION

We investigated subsurface conditions by drilling and sampling 15 exploratory borings in the apartment area at the approximate locations shown on Fig. 1. Prior to drilling, we contacted the Utility Notification Center of Colorado and local sewer and water districts to identify locations of buried utilities. Boring locations were staked and elevations provided by Galloway & Company Inc. prior to drilling. The borings were drilled to depths of 25 to 35 feet below existing grades using 4-inch diameter, continuous-flight, solid-stem auger and truck-mounted drill rigs. We obtained samples at 5 to 10-foot intervals using a 2.5-inch diameter (O.D.) modified California barrel sampler driven by blows of an automatic 140-pound hammer falling 30 inches. Bulk samples of the surficial soils were also obtained from auger cuttings. Our field representatives were present to observe drilling operations, log the strata encountered and obtain samples. Upon completion of drilling, hand-slotted PVC pipe was installed in some holes to allow delayed groundwater measurements. Graphical logs of the borings are presented in Appendix A.

Samples were returned to our laboratory where they were examined and testing was assigned. Laboratory tests included moisture content, dry density, particle-size analysis (gradation, hydrometer, and percent silt and clay-sized particles passing No. 200 sieve), Atterberg limits, swell-consolidation, soil suction, and water-soluble sulfate concentration. Swell-consolidation tests were performed by wetting the samples under approximate anticipated overburden pressure (the pressure exerted by overlying soils). Load-back analysis was performed on select samples to estimate swelling pressure. Results of laboratory tests are presented in Appendix B and summarized in Table B-I.

SUBSURFACE CONDITIONS

Strata encountered in our exploratory borings consisted of about 7 to 20 feet of natural clay and sand underlain in most borings by weathered to comparatively un-weathered claystone and interbedded claystone/sandstone bedrock to the maximum explored depth of 35 feet. Bedrock was not encountered in TH-25 and TH-36. Pertinent engineering characteristics of the soil and bedrock are described in the following para-graphs.

Natural Clay and Sand

We found about 6 to 14.5 feet of natural sandy clay from the ground surface in all fifteen borings. Clayey sand was encountered below the clay in three borings. About 5 feet of silty gravel was found below the clay in TH-37. The clay was stiff to very stiff and the sand and gravel were medium dense to dense based on result of field penetration resistance tests. Six clay samples compressed 0.1 to 0.6 percent, two did not swell, and fifteen swelled 0.1 to 3.9 percent when wetted. Eight clay samples had soil suction values of 2.85 to 4.86 pF. Two clay samples contained 55 and 69 percent silt and clay sized particles and exhibited moderate plasticity. One sand sample compressed 0.6 percent when wetted. Three sand samples contained 27 to 37 percent silt and clay sized particles and exhibited low plasticity. Laboratory testing indicates the sandy clay is low to moderately expansive and we judge the sand is non-expansive.

Bedrock

Weathered to comparatively unweathered claystone and interbedded claystone/sandstone bedrock was encountered below the natural soils in thirteen borings. The bedrock was weathered to very hard. Three claystone samples compressed 0.1 to 1.2 percent, one did not swell, and eight swelled 0.5 to 8.2 percent when wetted. Three claystone samples contained 62 to 100 percent silt and clay sized particles, with one exhibiting high plasticity. Five claystone samples had soil suction values of 3.17 to 4.51 pF. Three interbedded claystone/sandstone samples compressed 0.3 to 1.5 percent, and one swelled 3.4 percent when wetted. A different interbedded claystone/sandstone sample contained 74 percent silt and clay sized particles. The claystone is low to high swelling and the interbedded claystone/sandstone is predominately non-expansive. Estimated bedrock surface elevations are shown on Fig. 2.

Groundwater

Groundwater was encountered during drilling in three borings at depths of 18 to 22 feet. When the holes were checked after drilling, water was measured in eleven borings at depths of 15.5 to 34 feet. Measured depths to groundwater and corresponding surface elevations are presented on Fig. 3. We do not expect groundwater will influence the planned construction. Water levels may fluctuate seasonally and rise in response to precipitation and landscape irrigation.

Seismicity

The soil and bedrock are not expected to respond unusually to seismic activity. According to the 2015 International Building Code (Standard Penetration Resistance method) and based upon the results of our investigation, we judge the site classifies as Seismic Site Class C. The subsurface conditions indicate nil susceptibility to liquefaction.

GEOLOGIC HAZARDS

Colorado is a challenging location to practice geotechnical engineering. The climate is relatively dry and the near-surface soils are typically dry and comparatively stiff. These soils and related sedimentary bedrock formations react to changes in moisture conditions. Some of the soils swell as they increase in moisture and are referred to as expansive soils. Other soils can compress significantly upon wetting and are identified as compressible soils. Most of the land available for development east of the Front Range is underlain by expansive clay or claystone bedrock near the surface. The soils that exhibit compressible behavior are more likely west of the Continental Divide; however, both types of soils occur throughout the state.

Covering the ground with buildings, roadways, parking lots, etc., coupled with lawn irrigation and changing drainage patterns, leads to an increase in subsurface moisture conditions. As a result, some soil movement due to heave or settlement is inevitable. It is critical that all recommendations in this report are followed to increase the chances that the foundations and slabs-on-grade will perform satisfactorily. After construction, the owner and/or property manager must assume responsibility for maintaining the structures and use appropriate practices regarding drainage and landscaping.

Expansive soil and bedrock are present at this site. The presence of expansive soils and bedrock constitutes a geologic hazard. Slabs-on-grade and, in some instances, foundations may be damaged by movement of the swelling soils. The risk of foundation and slab movements can be mitigated, but not eliminated, by careful design, construction, and maintenance procedures. We believe the recommendations in this report will help control risk of foundation and slab damage; they will not eliminate that risk. The builder and owner should understand that slabs-on-grade and, in some instances, foundations may be affected by movement of the subsoils. Owner or property manager maintenance will be required to control risk.

SITE DEVELOPMENT

There are no geologic hazards or geotechnical concerns that will preclude development of the site. The primary geotechnical concern that could influence development is the presence of expansive soil and bedrock. We believe this concern can be mitigated with proper planning, engineering, design, and construction. The following sections discuss site development recommendations.

Excavation

We believe the soil and bedrock encountered in our exploratory borings can be excavated with conventional, heavy-duty excavation equipment. We recommend the owner and the contractor become familiar with applicable local, state and federal safety regulations, including the current OSHA Excavation and Trench Safety Standards. We anticipate the clay and bedrock will classify as Type B soils, which require maximum slope inclinations of 1:1 (horizontal:vertical) for temporary excavations in dry conditions. Flatter slopes will be required below groundwater or if seepage is present. The contractor's "competent person" should review excavation conditions and refer to OSHA Standards when worker exposure is anticipated. Stockpiles and equipment should not be placed within horizontal distance equal to one-half the excavation depth, from the edge of the excavation. A Registered Professional Engineer should design excavations greater than 20 feet deep.

Sub-Excavation

Variably expansive materials are present across the site. We estimate potential ground heave could be as much as about 8 inches with post-construction wetting to 20 feet. Without mitigation, drilled pier foundations and structurally supported floors would be required to safely develop the site. We recommend sub-excavating at least 7 to 10 feet below proposed grades to reduce potential heave to acceptable levels, and create a relatively uniform fill depth across building pads, and allow use of post-tensioned slab-

on-grade foundations. Fig. 5 presents sub-excavation recommendations for each building. We recommend the pool and pool deck area be sub-excavated to the same depth as the clubhouse.

We anticipate you can tolerate more movement of the garage buildings compared to the apartments. We recommend sub-excavation to 5 feet below proposed grades.

The existing soils can be reused in new fill. Sub-excavation should extend at least 3 feet outside the lateral extent of foundations. A conceptual sub-excavation profile is shown on Fig. 6. Provided the sub-excavation fill is low swelling, we estimate potential differential movements of about 2 inches or less.

In order for the sub-excavation procedure to be performed properly, close control of fill placement to specifications is required. Sub-excavation fill should be placed in thin, loose lifts, moisture conditioned and compacted to at least 95 percent of standard Proctor maximum dry density (ASTM D 698). Clay fill should be moisture conditioned to between optimum moisture content and 3 percent above optimum and sand fill should be moistened to within 2 percent of optimum. Our field representative should observe and test compaction of fill during placement.

Sub-excavation has been used in the Denver area with satisfactory performance for the large majority of the sites where this ground modification method has been completed. The base of the sub-excavation across a building should be at a uniform elevation or step-down (ramp) relative to the proposed grades. The extent and depth of sub-excavation should be surveyed and an “as-built” plan of the sub-excavated areas should be prepared. We have seen isolated instances where settlement of sub-excavation fill has led to damage to buildings supported on shallow foundations. In most cases, the settlement was caused by wetting associated with poor surface drainage and/or poorly compacted fill placed at the horizontal limits of the sub-excavation. Special precautions should be taken for compaction of fill at corners, access ramps and

edges of the excavations due to equipment access constraints. The contractor should have the appropriate equipment to reach and compact these areas.

The excavation contractor should be chosen based on experience with sub-excavation and processing high moisture content clay fills, and have the necessary mixing and compaction equipment. The contractor should provide a construction disc to break down fill materials. The operation will be relatively slow. Soil and bedrock chunks should be broken down to about 4 inches or less.

We advocate at least 3 feet of sub-excavation, moisture-conditioning and re-compaction below pavements to reduce potential heave and improve performance.

Fill and Backfill

The on-site soils are suitable for reuse as new fill, provided they are free of debris, vegetation/organics and other deleterious materials. Soil particles larger than about 4 inches in diameter should not be used for fill unless broken down. Prior to fill placement, the ground surface should be scarified to a depth of at least 8 inches, moisture conditioned, and compacted to the criteria below. Subsequent fill should be placed and compacted in accordance with recommendations presented in Sub-Excavation.

Water and sewer lines are often constructed beneath slabs and pavements. Compaction of utility trench backfill can have a significant effect on the life and service-ability of floor slabs, pavements and exterior flatwork. We recommend utility trench backfill be placed and compacted as outlined above. Our experience indicates use of self-propelled compactors results in more reliable performance compared to fill com-pacted by a sheepsfoot wheel attachment on a backhoe or trackhoe. The upper portion of the trenches should be widened to allow the use of a self-propelled compactor. The placement and compaction of utility trench backfill should be observed and tested by a representative of our firm during construction.

Our experience indicates fill and backfill can settle, even if properly compacted to criteria provided above. Factors that influence the amount of settlement are depth of fill, material type, degree of compaction, amount of wetting and time. The degree of compression of properly compacted fill under its own weight may be about 1 to 2 percent of the fill depth.

We recommend permanent cut and fill slopes be designed with a maximum grade of 4:1 (horizontal to vertical). Surface drainage should not be allowed to sheet flow across slopes or pond near the crest of slopes. All cut and fill slopes should be designed and re-vegetated as soon as possible after grading to reduce potential for erosion problems. Excavation contractors should evaluate ground conditions and control slopes in accordance with OSHA criteria.

FOUNDATIONS

Our investigation revealed variably expansive sandy clay and claystone at depths likely to influence performance of shallow foundations. Based on 20 feet depth of wetting, we estimate total potential ground heave may range from 0.9 to 7.9 inches. After the recommended sub-excavation, we judge potential heave should be reduced to 4 inches or less. The majority of this heave is attributed to highly expansive claystone below the fill. We judge there is low likelihood heave from the claystone below sub-excavation depths will affect shallow foundations and floors, and the fill will likely act as a buffer to distribute heave more evenly. We judge total potential differential movements will likely be 2 inches or less provided excessive wetting does not occur.

We believe PTS foundations can be used provided sub-excavation is performed as described previously. We should observe the process and test compaction (moisture and density) and swell potential of the fill during placement. Fig. 5 shows the recommended sub-excavation depth by building and Fig. 6 presents a conceptual sub-excavation profile. Footing foundations are a suitable foundation alternative for garages only. Design and construction criteria for PTS and footings are presented below.

Post-Tensioned Slab-On-Grade Foundation

PTS foundation design is based on a method developed by the Post-Tensioning Institute (PTI) and is outlined in PTI's third edition of *Design of Post-Tensioned Slabs-On-Ground* (2004). Various climate and relevant soil factors are required to evaluate the PTI design criteria. These include the Thornthwaite Moisture Index (I_m), suction compression index (γ_h), unsaturated diffusion coefficient (α), depth of probable moisture variation, initial and final soil suction profiles, and percent clay fraction and predominant clay mineral. In the Denver Metro area, I_m is about -25.

The PTS foundation design method is based on the potential differential movement of the slabs due to both settlement and heave of the subsoils that is primarily controlled by climate. In the 2004 design manual, PTI estimates movements for a depth of wetting of 9 feet below the ground surface. Based on our experience and field and laboratory test results, the depth of wetting can be about 15 to 20 feet or more below the ground surface. It is likely that wetting will not penetrate this deep; however, we believe it is a reasonable design assumption for this site. For depths of wetting deeper than 9 feet, ground movements can be estimated based on swell or soil suction profiles or using a computer program (such as "VOLFLO" by Geostructural Tool Kit, Inc.). The PTI design method does not predict soil movement caused by site conditions such as irrigation or poor surface drainage. If deeper wetting occurs, the foundation movement may exceed the design movements estimated in the PTI design method.

In the PTI design method, two mechanisms of soil movement (edge lift and center lift) are evaluated based on assumptions that wetting and drying of the foundation soils are primarily affected by the climate. Our experience indicates the foundation soils will normally undergo an increase in moisture due to covering the ground surface with buildings and flatwork, coupled with the introduction of landscape irrigation. Considering the limitations of the current PTI design method, we believe a conservative approach with reasonable engineering judgment is merited in PTS foundation design.

Design criteria for PTS foundations are presented below. Criteria were developed from analysis of field and laboratory data, the PTS design method outlined in PTI's third edition of *Design and Construction of Post-Tensioned Slabs-On-Ground* (2004), and our experience.

1. PTS foundations should be constructed on new, moisture conditioned and compacted fill. If fill/backfill or soft/loose soils are exposed in excavations or are the result of the excavation/forming process, these soils should be removed and re-compacted as recommended in Fill and Backfill.

2. PTS foundations should be designed for a maximum allowable soil pressure of 3,000 psf. We recommend a differential soil movement (y_m) of 2 inches for both edge and center lift conditions.

3. The PTI 3rd Edition includes two methods for determining the edge moisture variation distance (e_m) and states that the higher values should be used. Based on the Thornthwaite Index, center lift and edge lift e_m values of 5.4 feet and 2.5 feet are indicated, respectively. Based on the unsaturated diffusion coefficient, center lift and edge lift e_m values of 9 feet and 4.2 feet are indicated, respectively. We believe it is probable that use of average values (7.2 feet and 3.4 feet) may yield acceptable performance and can consult with the structural engineer further as design progresses.

4. We understand the PTI design method assumes the slab is somewhat flexible. The above-grade construction, such as framing, drywall, brick, and stucco are not as flexible. We are aware of situations where minor differential slab movement has caused distress to finish materials. One way to enhance performance would be to place reinforcing steel in the bottoms of stiffening beams. The structural engineer should evaluate the merits of this approach, as well as other potential alternatives to reduce damage to finish materials.

5. Stiffening beams may be poured "neat" into excavated trenches. Soil may cave or slough during trench excavation for the stiffening beams. Disturbed soil should be removed from trench bottoms prior to placement of concrete. Formwork or other methods may be required for proper stiffening beam installation.

6. Exterior stiffening beams should be protected from frost action. Normally 3 feet of frost cover is assumed in the area. If exterior patios are incorporated into PTS, we believe the stiffening beams around the patios should be as deep as those around the building exterior to increase the likelihood they will perform similarly to the rest of the PTS.

7. For slab tensioning design, a coefficient of friction value of 0.75 or 1.0 can be assumed for slabs on polyethylene sheeting or a sand layer, respectively. A coefficient of friction of 2.0 should be used for slabs on clay fill. We believe use of polyethylene is preferable because it serves as a vapor retarder which helps to control moisture migration up through the slabs.

8. A representative of our firm should observe the completed excavations. A representative of the structural engineer or our firm should observe the placement of the reinforcing tendons and any mild reinforcement prior to placing the slabs and beams.

Footings (Garages Only)

1. The footings should be constructed on new, moisture conditioned and compacted fill. If soft/loose soils are exposed in footing excavations or are the result of the excavation/forming process, these soils should be removed and recompacted as recommended in Fill and Backfill.

2. Footings should be designed for a maximum allowable soil pressure of 2,500 psf and a minimum deadload pressure of 600 psf. Lateral earth pressures (if any) can be calculated based on equivalent fluid density using at least 55 pcf. Footing translation can be resisted using an equivalent fluid density of 250 pcf for the passive case, providing backfill is similar to the site soils, is well compacted and remains in-place. The coefficient of friction for sliding may be taken as 0.35. These values have not been factored. The structural engineer should apply appropriate factors of safety in design.

3. Footings should have a minimum width of 16 inches. Larger sizes may be required depending upon the loads and structural system used.

4. If interrupted footings are necessary to maintain deadload, a 4-inch (or thicker) continuous void should be constructed below grade beams or foundation walls, between the pads.

5. Foundation walls should be well-reinforced. We recommend reinforcement sufficient to span an unsupported distance of at least 10 feet. Reinforcement should be designed by the structural engineer considering lateral earth pressure (if any) on wall performance.

6. Exterior footings must be protected from frost action. Normally, 3 feet of frost cover is assumed in the area.

7. The completed foundation excavation should be observed by a representative of our firm to confirm subsurface conditions are as anticipated from our borings. Our representative should observe and test moisture and compaction of the fill.

8. Excessive wetting of foundation soils during and after construction can cause heave or softening and settlement of foundation soils and result in footing and slab movements. Proper surface drainage around the buildings is critical to control wetting.

FLOOR SYSTEMS

With the recommended sub-excavation, we estimate potential differential movements of about 2 inch or less for slab-on-grade floors built on new fill placed and compacted as discussed in Sub-Excavation. Conventional slab-on-grade floors are suitable for the garages provided risk of heave and distress is acceptable to the owner. The garage floors may heave more than 2 inches. For PTS, the foundations are structurally integral with the floor and should perform better than a conventional slab-on-grade floor. PTS can be used for finished areas.

Where conventional slabs-on-grade are used, we recommend the following design and construction criteria. These recommendations will not prevent movement. Rather, they tend to reduce damage if movement occurs.

1. Slabs that are not part of a PTS foundation system should be separated from exterior walls and interior bearing members with a slip joint that allows free vertical movement of the slabs. This detail can reduce cracking if movement occurs.

2. Slabs should be placed directly on properly moisture conditioned, well-compacted fill. The 2015 International Building Code (IBC) requires a vapor retarder between base course or subgrade soils and the concrete slab-on-grade floor. The merits of installation of a vapor retarder below floor slabs depend on the sensitivity of floor coverings and building use to moisture. A properly installed vapor retarder (6 mil minimum; 10 mil for increased durability) is more beneficial below concrete slab-on-grade floors where floor coverings, painted floor surfaces or products stored on the floor will be sensitive to moisture. The vapor retarder is most effective when concrete is placed directly on top of it, rather than placing a sand or

gravel leveling course between the vapor retarder and the floor slab. The placement of concrete on the vapor retarder may increase the risk of shrinkage cracking and curling. Use of concrete with reduced shrinkage characteristics including minimized water content, maximized coarse aggregate content, and reasonably low slump will reduce the risk of shrinkage cracking and curling. Considerations and recommendations for the installation of vapor retarders below concrete slabs are outlined in Section 3.2.3 of the 2006 report of American Concrete Institute (ACI) Committee 302, "Guide for Concrete Floor and Slab Construction (ACI 302.R1-04)".

3. Slab-bearing partition walls (if any) should be designed and constructed to allow at least 3 inches of slab movement. If the slip joint is provided at the top of partitions, the connection between slab-supported partitions and foundation-supported walls should be detailed to allow differential movement. The owner should monitor partition voiding and other connections, and re-establish the gap when it closes to less than ½-inch.

4. Plumbing and utilities that pass through the slabs should be isolated from the slabs and constructed with flexible couplings. Utilities, as well as electrical and mechanical equipment should be constructed with sufficient flexibility to allow movement.

5. HVAC systems supported by the slabs (if any) should be provided with flexible connections capable of withstanding at least 3 inches of movement.

6. Exterior flatwork and sidewalks should be separated from the structures, or made part of the PTS foundation. Otherwise, these slabs should be detailed to function as independent units. Movement of these slabs should not be transmitted to the foundations.

7. The American Concrete Institute (ACI) recommends frequent control joints be provided in slabs to reduce problems associated with shrinkage cracking and curling. To reduce curling, the concrete mix should have a high aggregate content and a low slump. If desired, a shrinkage compensating admixture could be added to the concrete to reduce the risk of shrinkage cracking. We can perform a mix design or assist the design team in selecting a pre-existing mix.

Exterior Flatwork

We recommend exterior flatwork and sidewalks (which are not part of the PTS foundation) be isolated from foundations to reduce the risk of transferring heave, settlement or freeze-thaw movement to the structure. One alternative would be to construct

the inner edges of the flatwork on haunches or steel angles bolted to the foundation walls and detailing the connections such that movement will cause less distress to the building, rather than tying the slabs directly into the building foundation. Construction on haunches or steel angles and reinforcing the sidewalks and other exterior flatwork will reduce the potential for differential settlement and better allow them to span across wall backfill. Frequent control joints should be provided to reduce problems associated with shrinkage. Panels that are approximately square perform better than rectangular areas.

POOL AND DECK

We anticipate a pool will be constructed adjacent to the clubhouse. The pool will likely be about 4 to 6 feet deep and be cast-in-place concrete or gunite. Rigid concrete or gunite pools are brittle and can crack from shrinkage and movement. Use of well-reinforced gunite or concrete pool can reduce cracking.

The pool deck is normally constructed as slab-on-grade. The most common problem with swimming pool performance in this area is heave or settlement and cracking of the deck slabs surrounding the pool. Our testing indicates heave should be comparatively low (2.5 inches or less) after sub-excavation to 10 feet below proposed grade in the pool area. Infiltration of surface water from precipitation or pool splash can cause moisture seepage through cracks in the pool deck and the joints between the deck and pool. This wetting causes the underlying soils to swell or compress and results in cracking and distress of the deck, and potentially nearby building foundations.

The deck and surrounding areas should be sloped to provide positive drainage. we recommend slabs be isolated from the building foundations and pool, and well reinforced to function as independent units. Cracks and joints in the deck should be sealed regularly. Cracking of the pool and pool deck can allow water to infiltrate the subgrade soils which leads to soil movement problems and possibly hydrostatic uplift of the pool shell. This free water should be captured in a gravel drain to reduce the potential for excessive heave or softening of the subsoils. The drain should be sloped to a

sump where the water can be removed by pumping. In addition, impermeable plastic sheeting (20 mil or thicker) should be placed between the gravel drain and the sub-grade. A conceptual detail for construction of the pool drainage layer is shown on Fig. 7.

PAVEMENTS

Pavement areas will be used for automobile parking, access drives and truck/fire lanes. Our investigation indicates pavement subgrade will likely consist of low to moderately expansive sandy clay, which is considered to be relatively poor subgrade. Pavements can experience heave due to expansive clay and claystone, or settlement due to compression of clay or utility trench backfill. For the private parking lots and access drives, we advocate sub-excavation to 3 feet or more to reduce risk of distress caused by swelling subgrade. We typically recommend the pavement subgrade be proof-rolled to disclose soft areas. Soft areas should be stabilized. Subgrade areas that pass proof-roll should be stable enough to pave.

We provide pavement alternatives for full-depth portland cement concrete and composite section consisting of asphalt over aggregate base course below. The sections assume compacted subgrade with similar engineering characteristics to the soils we tested.

SUMMARY OF RECOMMENDED MINIMUM PAVEMENT ALTERNATIVES

Anticipated Traffic Type	Hot-Mix Asphalt (HMA)	Hot-Mix Asphalt + Aggregate Base Course (HMA +ABC)	Portland Cement Concrete (PCC)
Automobile Parking	5.5” HMA	4” HMA + 6” ABC	5” PCC
Access Drives and Fire/Truck Lanes	6.5” HMA	4” HMA + 9” ABC	6” PCC

The effects of expansive subgrade can be controlled by constructing a thicker total pavement “section” (pavement and moisture treated fill zone). The goal is to achieve more uniform movement and lower potential differential movement. To create a mois-

ture conditioned soil zone will require sub-excavation to a depth of at least 3 feet below subgrade level and placing the material as moistened, properly compacted fill.

Our experience indicates problems with pavements can occur where heavy trucks drive into loading and unloading zones at low speeds. In areas of concentrated loading and turning movements by heavy trucks, such as at intersections, entrances, and trash collection areas, we recommend Portland cement concrete placed directly on prepared subgrade. We recommend a 6-inch or thicker Portland cement concrete pad be constructed at dumpster locations and other areas where trucks will stop or turn. The concrete pads should be of sufficient size to accommodate truck turning and trash pickup.

The design of a pavement system is as much a function of paving materials as support characteristics of the subgrade. If the pavement system is constructed of inferior material, then the life and serviceability of the pavement will be substantially reduced. Materials and placement methods should conform to CDOT requirements. All materials planned for construction should be tested to confirm their compliance with project specifications.

Recommended material properties and construction criteria for pavements are provided in Appendix C. These criteria were developed from analysis of the field and laboratory data and our experience. If the materials cannot meet these recommendations, then the pavement design should be re-evaluated based upon available materials. All materials planned for construction should be submitted and the applicable laboratory tests performed to verify compliance with the specifications.

Control joints should separate concrete pavements into panels with patterns and spacing as recommended by ACI. No de-icing salts should be used on paving concrete for at least one year after placement. Routine maintenance, such as sealing and repair of cracks and overlays at 5 to 7-year intervals, are necessary to achieve long-term performance of an asphalt system. We recommend application of a rejuvenating sealant

such as fog seal after the first year. Deferring maintenance usually results in accelerated deterioration of pavements leading to higher future maintenance costs. Maintenance guidelines are provided in Appendix C.

A primary cause of early pavement deterioration is water infiltration into the pavement system. The addition of moisture usually results in softening of the subgrade and eventual failure of the pavement. We recommend drainage be designed for rapid removal of surface runoff. Curb and gutter should be backfilled and the backfill compacted to reduce ponding adjacent to the pavements. Final grading of the subgrade should be carefully controlled so that design cross-slope is maintained and low spots in the subgrade which could trap water are eliminated. A seal should be provided between curb and pavement to reduce moisture infiltration. Landscaped areas and detention ponds in pavements should be avoided.

CONCRETE

Concrete in contact with soil can be subject to sulfate attack. We measured water-soluble sulfate concentrations of 0.03 to 0.19 percent in three samples from this study. For the highest level of sulfate concentration, ACI indicates concrete shall be made with ASTM C150 Type II cement, or an ASTM C595 or C1157 hydraulic cement meeting moderate sulfate-resistant hydraulic cement (MS) designation. In our experience, superficial damage may occur to the exposed faces of highly permeable concrete. To control this risk and to resist freeze-thaw deterioration, the water-to-cementitious material ratio should not exceed 0.50 for concrete in contact with soils that are likely to stay moist. Concrete should have a total air content of 6 percent ± 1.5 percent.

SURFACE DRAINAGE

Performance of foundations, pavements and flatwork is influenced by the moisture conditions within the foundation or subgrade soils. Overall surface drainage should be designed, constructed, and maintained to provide rapid removal of surface water

runoff away from the proposed buildings and structures, and off of pavements and flatwork. Final grading of pavement subgrade should be carefully controlled so that the designed slopes are maintained and low spots in the subgrade that could trap water are eliminated. We recommend the following precautions be observed during construction and maintained at all times after construction is completed.

1. Wetting or drying of open foundation, utility and earthwork excavations should be avoided.

2. Positive drainage should be provided away from the buildings. We recommend a minimum slope of at least 5 percent in the first 5 to 10 feet away from the foundations in landscaped areas. Paved surfaces should be sloped to drain away from the buildings; a minimum slope of 2 percent is suggested. More slope is desirable. Concrete curbs and sidewalks may "dam" surface runoff adjacent to the buildings and disrupt proper flow. Use of "chase" drains or weep holes at low points in the curb should be considered to promote proper drainage.

3. Backfill around foundations should be moistened and compacted according to criteria presented in Fill and Backfill. Areas behind curb and gutter should be backfilled and well compacted to reduce ponding of surface water. Seals should be provided between the curb and pavement to reduce infiltration.

4. Landscaping should be carefully designed to minimize irrigation. Plants used close to foundation walls should be limited to those with low moisture requirements. Irrigation should be limited to the minimum amount sufficient to maintain vegetation. Application of more water will increase likelihood of slab and foundation movements and associated damage. Landscaped areas should be adequately sloped to direct flow away from the buildings and improvements. Use of area drains can be considered for areas where adequate slope cannot be provided.

5. Impervious plastic membranes should not be used to cover the ground surface immediately surrounding foundations. These membranes tend to trap moisture and prevent normal evaporation from occurring. Geotextile fabrics can be used to control weed growth and allow evaporation.

6. Roof drains should be directed away from the buildings and discharge beyond backfill zones or into appropriate storm sewer or detention areas. Downspout extensions and splash blocks should be provided at all discharge points. Roof drains can also be connected to buried, solid pipe out-

lets. Roof drains should not be directed below slab-on-grade floors. Roof drain outlets should be maintained.

CONSTRUCTION OBSERVATIONS

This report has been prepared for the exclusive use of Evergreen Development and your design/construction team for the purpose of providing geotechnical design and construction criteria for the proposed project. The information, conclusions, and recommendations presented herein are based upon consideration of many factors including, but not limited to, the type of structures proposed, the geologic setting, and the subsurface conditions encountered. The conclusions and recommendations contained in the report are not valid for use by others. Standards of practice evolve in the area of geotechnical engineering. The recommendations provided are appropriate for about three years. If the project is not constructed within about three years, we should be contacted to determine if we should update this report.

We recommend that CTL | Thompson, Inc. provide construction observation services to allow us the opportunity to verify whether soil conditions are consistent with those found during this investigation. If others perform these observations, they must accept responsibility to judge whether the recommendations in this report remain appropriate.

GEOTECHNICAL RISK

The concept of risk is an important aspect with any geotechnical evaluation, primarily because the methods used to develop geotechnical recommendations do not comprise an exact science. We never have complete knowledge of subsurface conditions. Our analysis must be tempered with engineering judgment and experience. Therefore, the recommendations presented in any geotechnical evaluation should not be considered risk-free. Our recommendations represent our judgment of those measures that are necessary to increase the chances that the structures and improvements will perform satisfactorily. It is critical that all recommendations in this report are

followed. Owners or property managers must assume responsibility for maintaining the structures and use appropriate practices regarding drainage and landscaping. Improvements after construction should be completed in accordance with recommendations provided in this report and may require additional soil investigation and consultation.

LIMITATIONS

Our borings were spaced to obtain a reasonably accurate picture of subsurface conditions at this site. The borings are representative of conditions encountered only at the location drilled. Subsurface variations not indicated by our borings are possible.

We believe this investigation was conducted in a manner consistent with that level of care and skill ordinarily used by geotechnical engineers practicing under similar conditions. No warranty, express or implied, is made. If we can be of further service in discussing the contents of this report, or in the analysis of the influence of the subsurface conditions on the design of the buildings or any other aspect of the proposed construction, please call.

CTL | THOMPSON, INC.

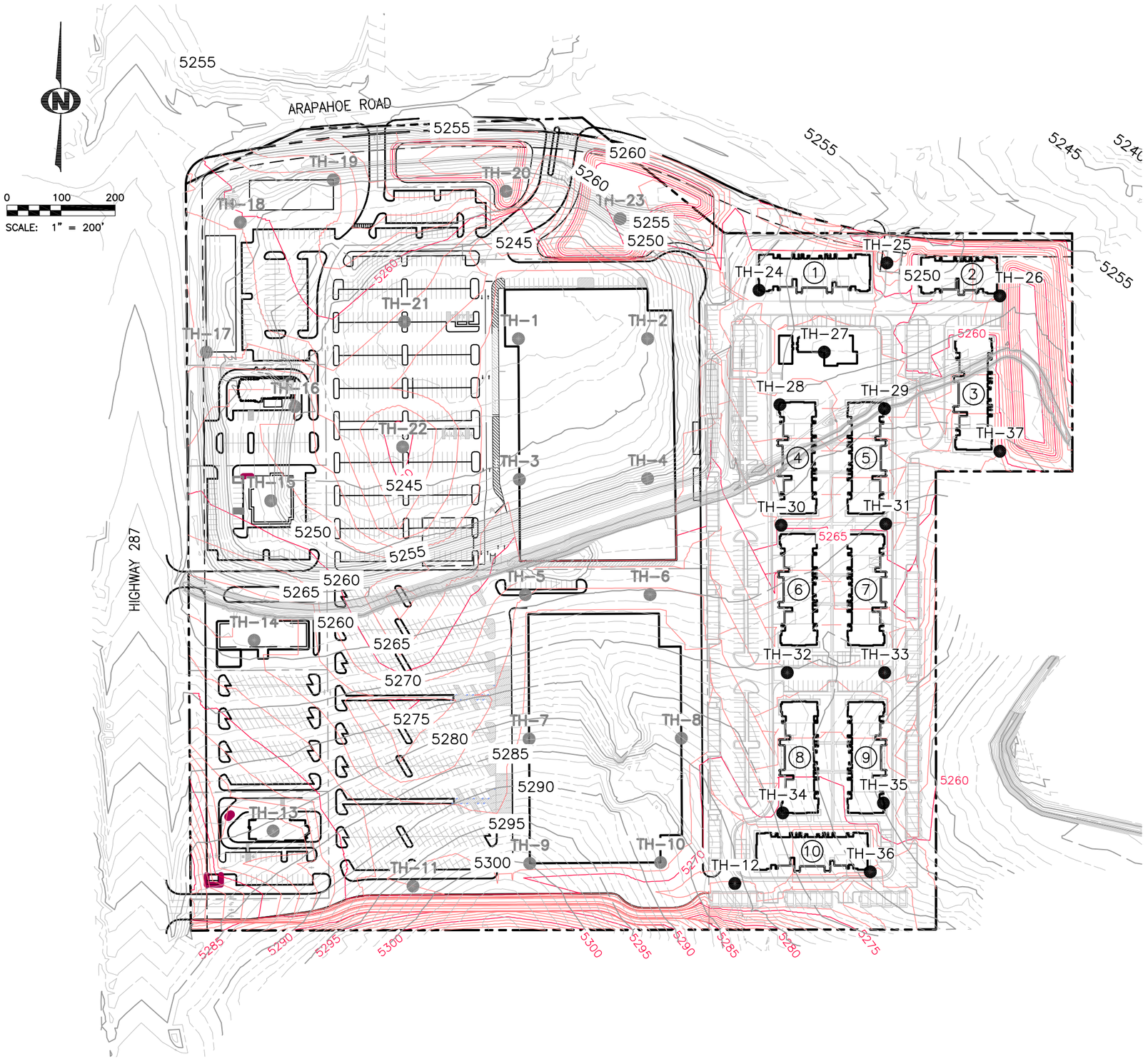
Chris Fitzsimmons, E.I.T.
Staff Engineer

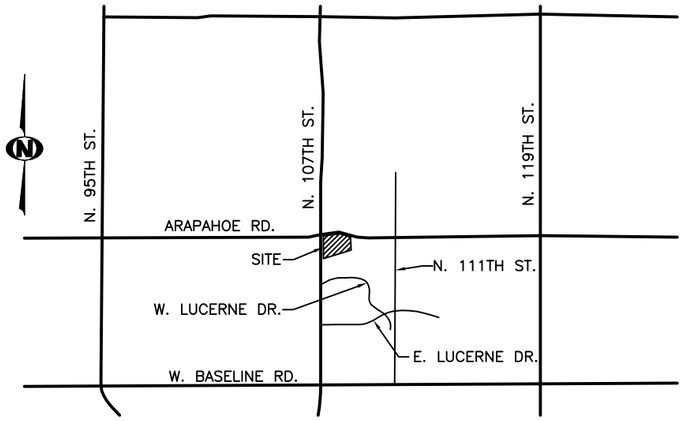
Reviewed by:

Ronald M. McOmber, P.E.
Chairman & CEO

CF:RMM/nn
(3 copies)

Via e-mail: rwolford@evgre.com
agrendahl@evgre.com





VICINITY MAP
NOT TO SCALE

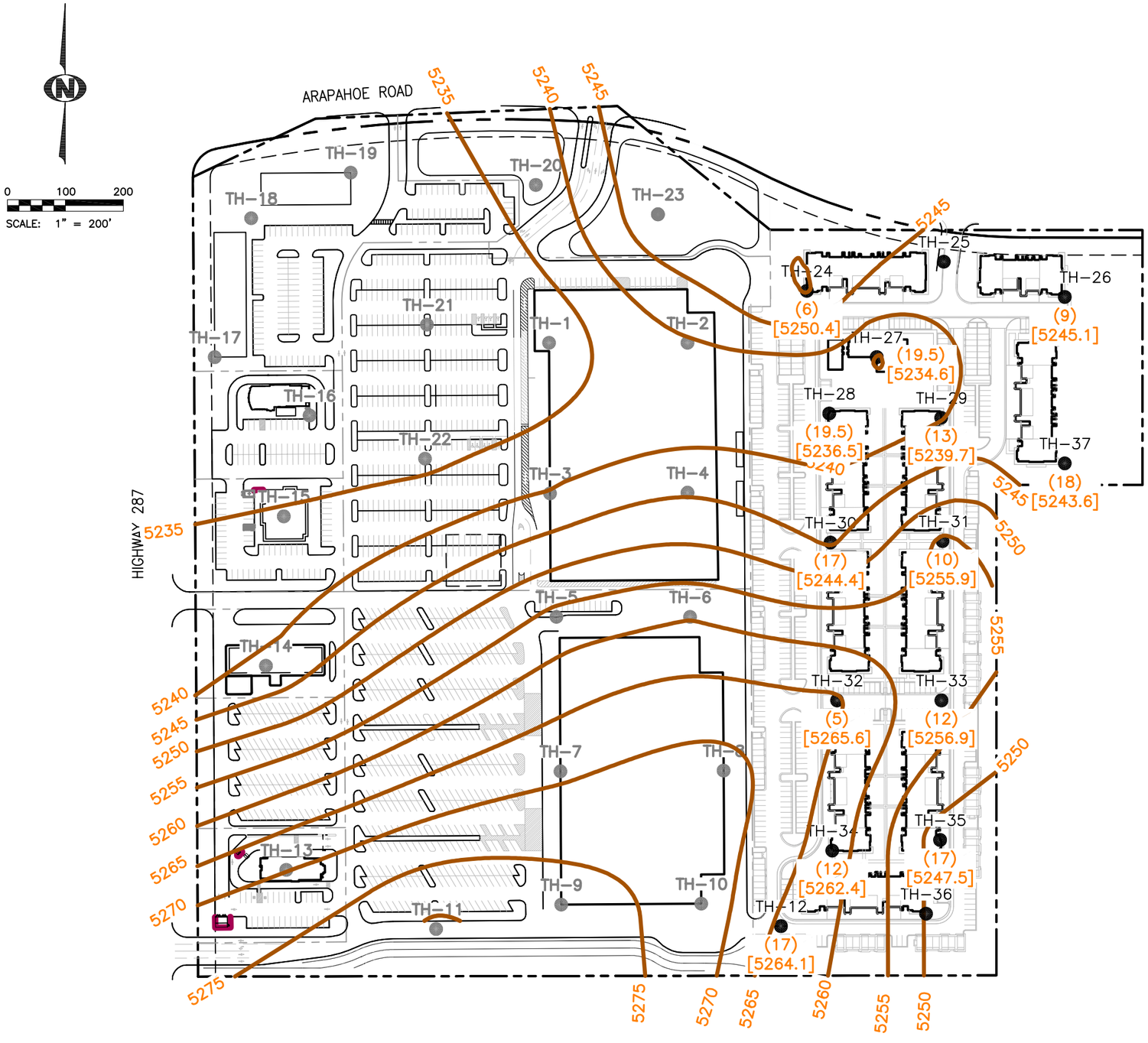
LEGEND:

TH-12 ●	APPROXIMATE LOCATION OF EXPLORATORY BORING
TH-1 ●	APPROXIMATE LOCATION OF EXPLORATORY BORING INCLUDED IN SEPARATE INVESTIGATION
①	INDICATES BUILDING NUMBER
5260 – – – –	INDICATES EXISTING GROUND SURFACE ELEVATION (FEET)
5300 ———	INDICATES PROPOSED GROUND SURFACE ELEVATION (FEET)

EVERGREEN DEVELOPMENT
NINE MILE CORNER APARTMENTS
CTL\T Project No. DN48,647-125-R2

Locations of Exploratory Borings

Fig. 1



LEGEND:

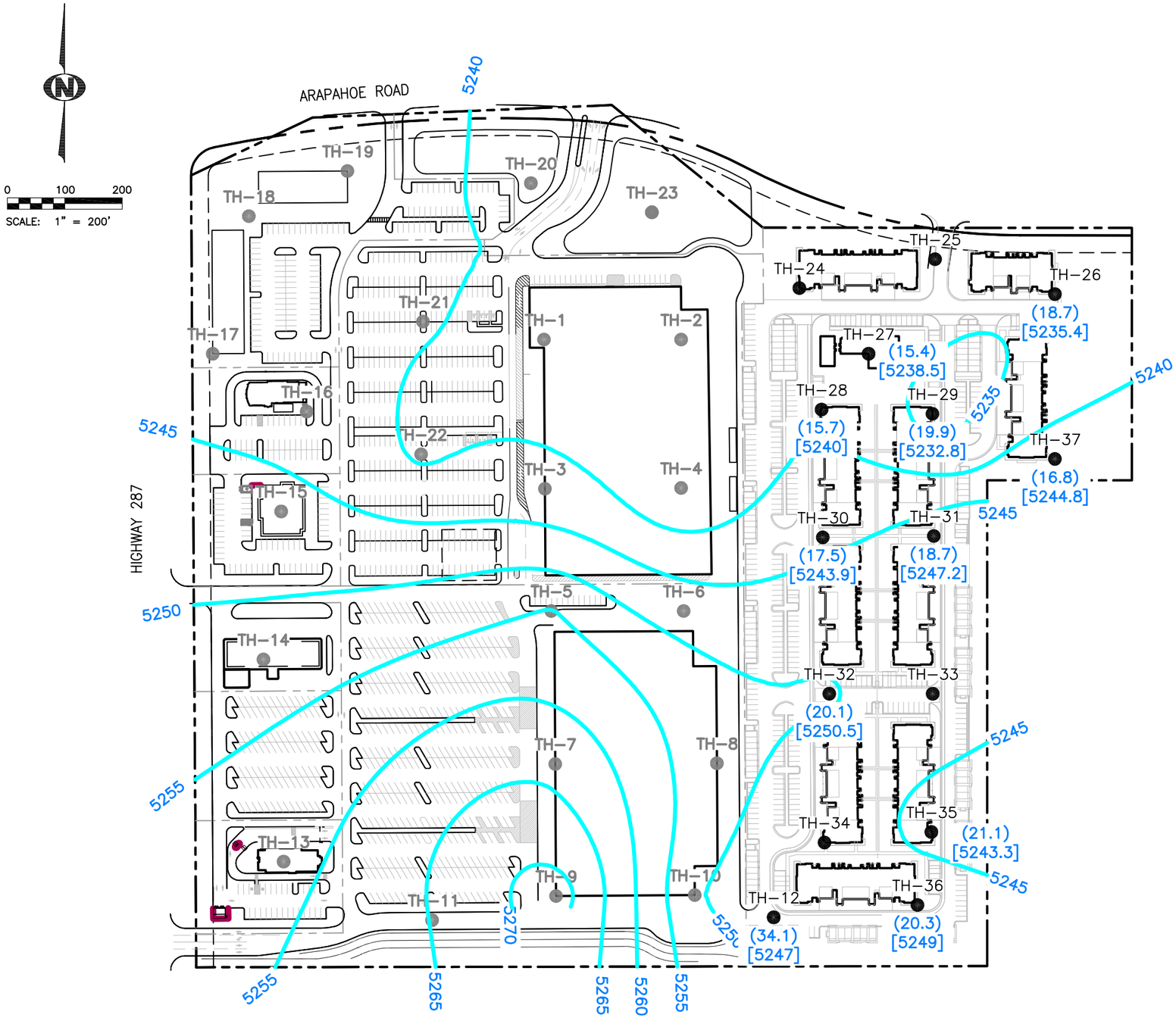
TH–12 ●	APPROXIMATE LOCATION OF EXPLORATORY BORING
TH–1 ●	APPROXIMATE LOCATION OF EXPLORATORY BORING INCLUDED IN SEPARATE INVESTIGATION
(11)	INDICATES DEPTH TO BEDROCK AT BORING LOCATION (FEET)
[5269.9]	INDICATES BEDROCK ELEVATION AT BORING LOCATION (FEET)
5250	INDICATES ESTIMATED BEDROCK SURFACE ELEVATION (FEET)

NOTE: THIS ESTIMATE WAS BASED UPON A SUBJECTIVE ANALYSIS OF DRILL HOLE DATA AND MAY NOT REFLECT LOCAL VARIATIONS.

EVERGREEN DEVELOPMENT
NINE MILE CORNER APARTMENTS
CTL\T Project No. DN48,647-125-R2

Estimated Bedrock Surface Elevations

Fig. 2



LEGEND:

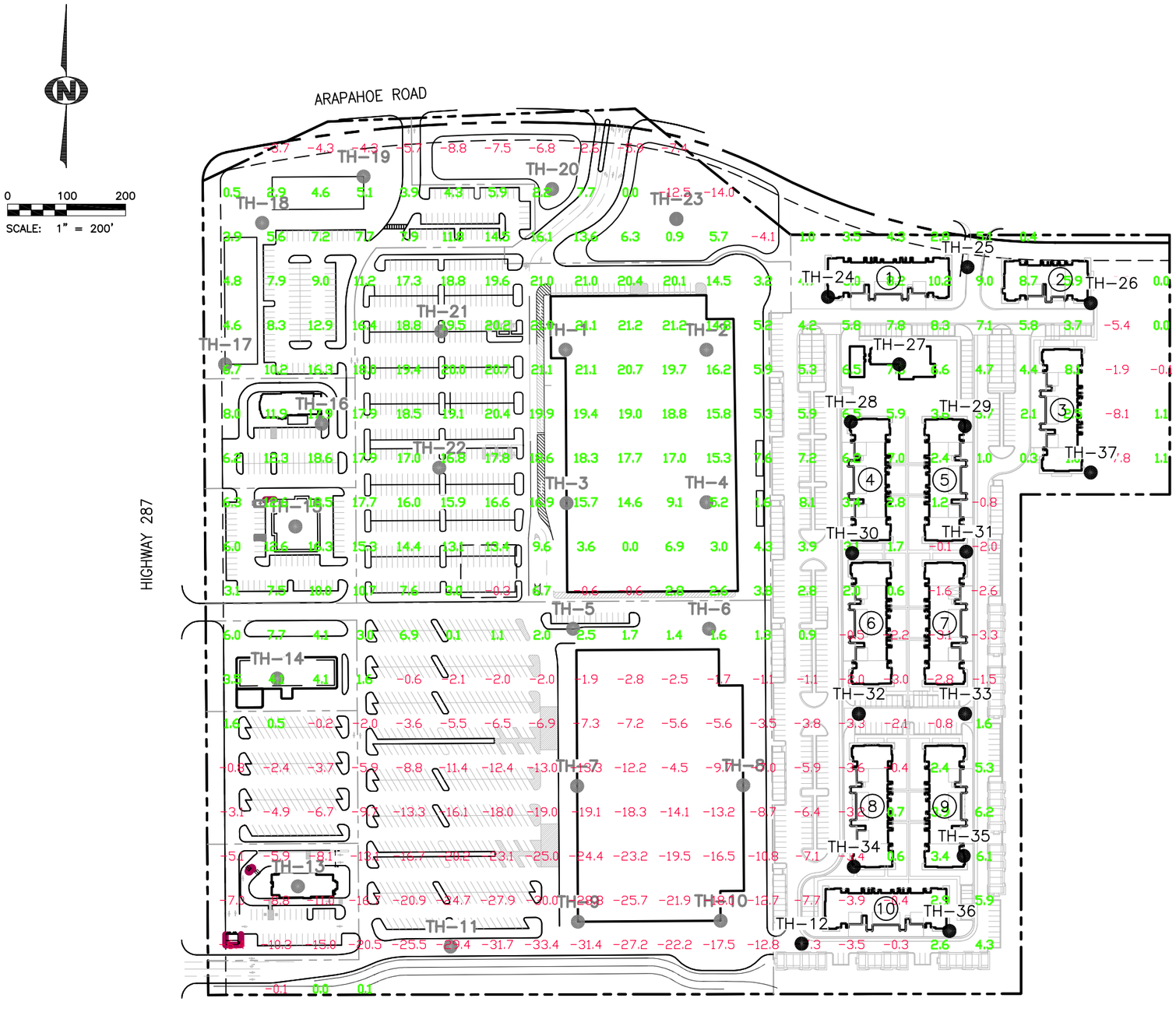
TH–12 ●	APPROXIMATE LOCATION OF EXPLORATORY BORING
TH–1 ●	APPROXIMATE LOCATION OF EXPLORATORY BORING INCLUDED IN SEPARATE INVESTIGATION
(22.6)	INDICATES MEASURED DEPTH TO GROUNDWATER AT BORING LOCATION (FEET)
[5258.3]	INDICATES GROUNDWATER ELEVATION AT BORING LOCATION (FEET)
5245	INDICATES ESTIMATED GROUNDWATER SURFACE ELEVATION (FEET)

NOTE: THIS ESTIMATE WAS BASED UPON A SUBJECTIVE ANALYSIS OF DRILL HOLE DATA AND MAY NOT REFLECT LOCAL VARIATIONS AND SEASONAL FLUCTUATIONS.

EVERGREEN DEVELOPMENT
NINE MILE CORNER APARTMENTS
CTL\T Project No. DN48,647-125-R2

Estimated Groundwater Surface Elevations

Fig. 3



0 100 200

SCALE: 1" = 200'

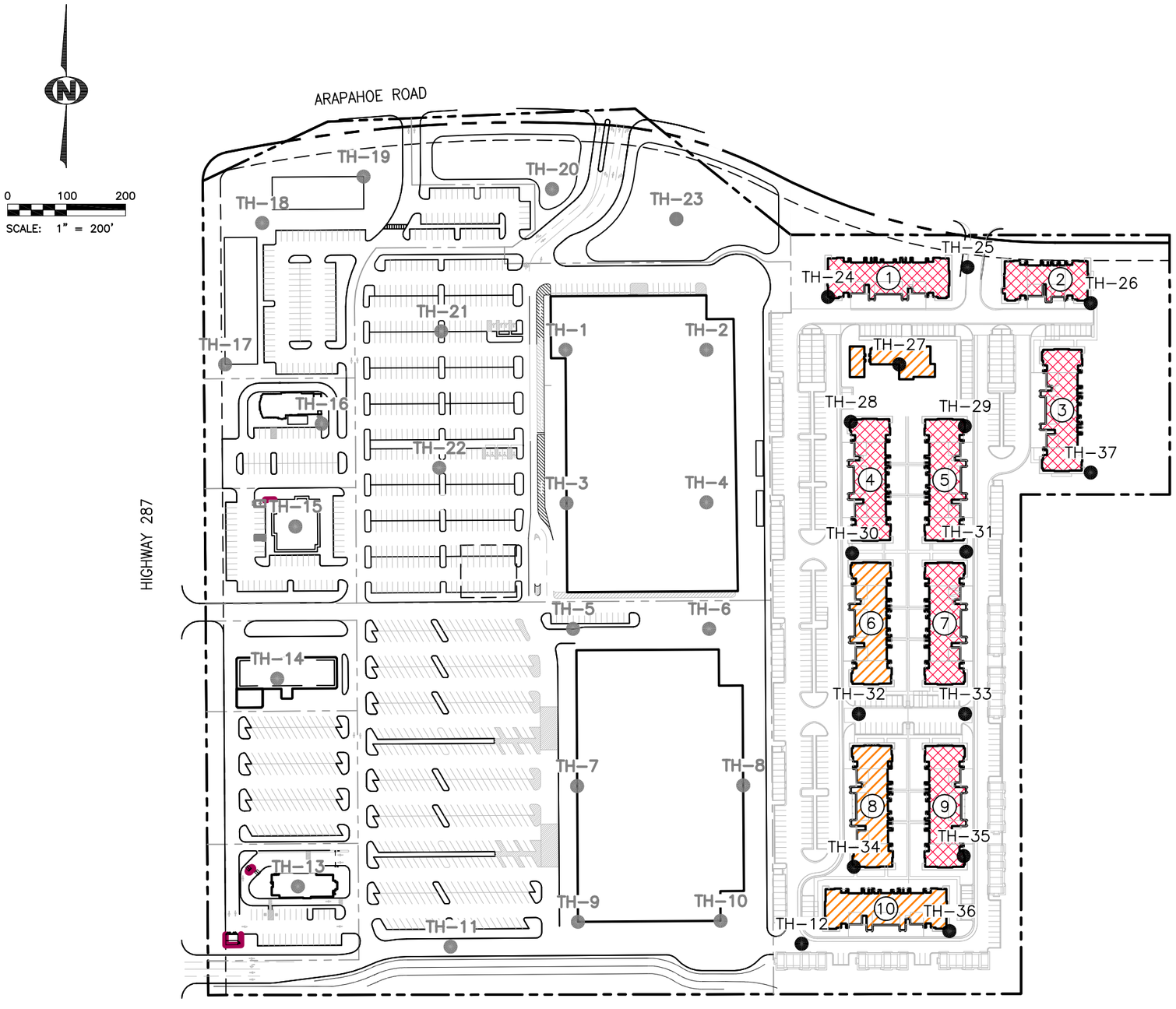
LEGEND:

TH-12 ●	APPROXIMATE LOCATION OF EXPLORATORY BORING
TH-1 ●	APPROXIMATE LOCATION OF EXPLORATORY BORING INCLUDED IN SEPARATE INVESTIGATION
①	INDICATES BUILDING NUMBER
21.1	INDICATES PROPOSED FILL (FEET)
−12.2	INDICATES PROPOSED CUT (FEET)

EVERGREEN DEVELOPMENT
NINE MILE CORNER APARTMENTS
CTL\T Project No. DN48,647-125-R2

Cut/Fill Tick Map

Fig. 4



LEGEND:

TH-12 ● APPROXIMATE LOCATION OF EXPLORATORY BORING

TH-1 ● APPROXIMATE LOCATION OF EXPLORATORY BORING INCLUDED IN SEPARATE INVESTIGATION

① INDICATES BUILDING NUMBER

INDICATES SUB-EXCAVATION TO 7 FEET BELOW PROPOSED GRADE

INDICATES SUB-EXCAVATION TO 10 FEET BELOW PROPOSED GRADE

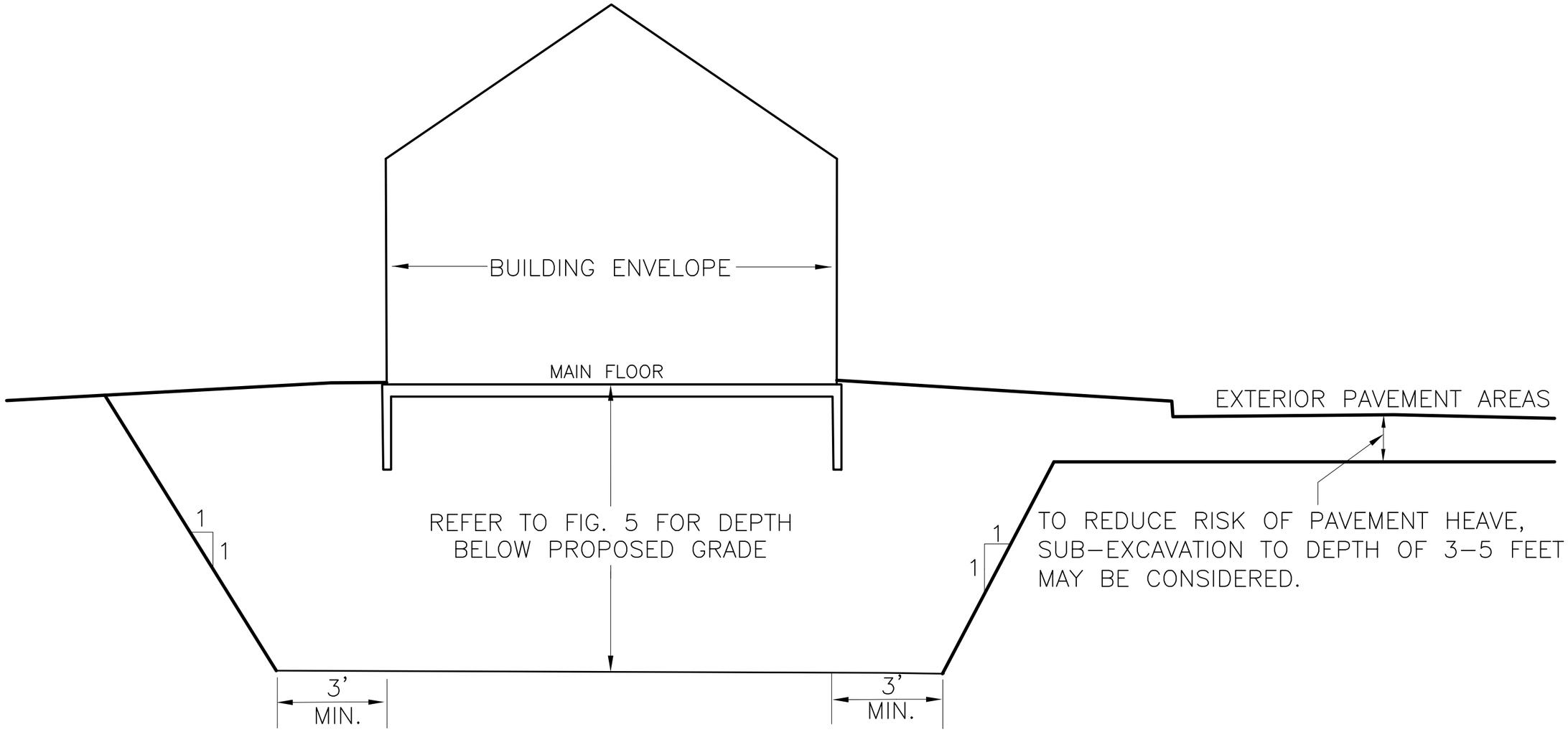
NOTE: 5 FEET OF SUB-EXCAVATION IS RECOMMENDED BELOW PROPOSED GRADE AT GARAGE BUILDINGS ASSUMING MOVEMENT IS TOLERABLE.

EVERGREEN DEVELOPMENT
NINE MILE CORNER APARTMENTS
CTL\T Project No. DN48,647-125-R2

Sub-Excavation Recommendations

Fig. 5

95-SUB-EXCAVATION_05

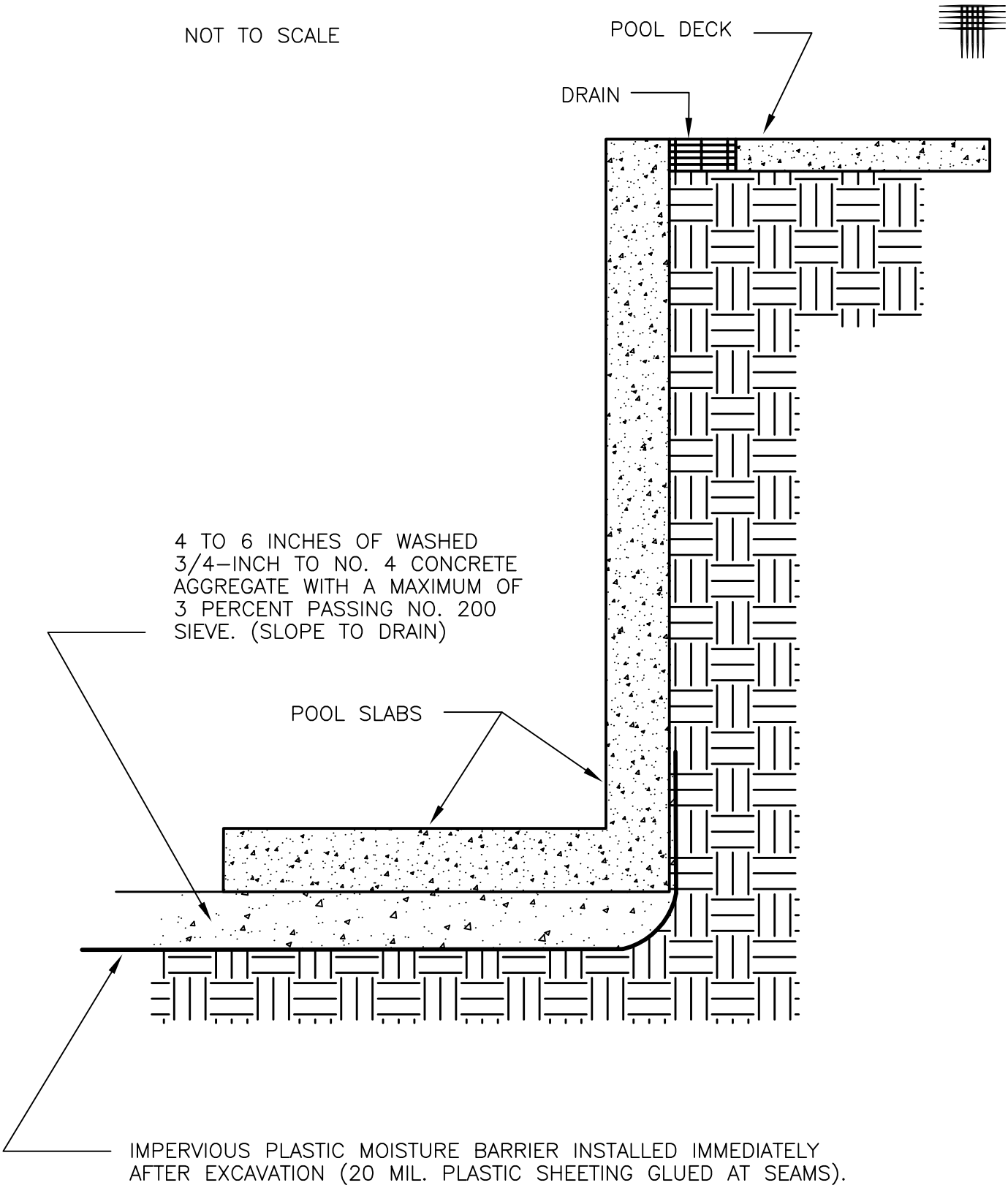


EVERGREEN DEVELOPMENT
NINE MILE CORNER APARTMENTS
CTL\T Project No. DN48,647-125-R2

Conceptual Sub-Excavation Profile

Fig. 6

NOT TO SCALE



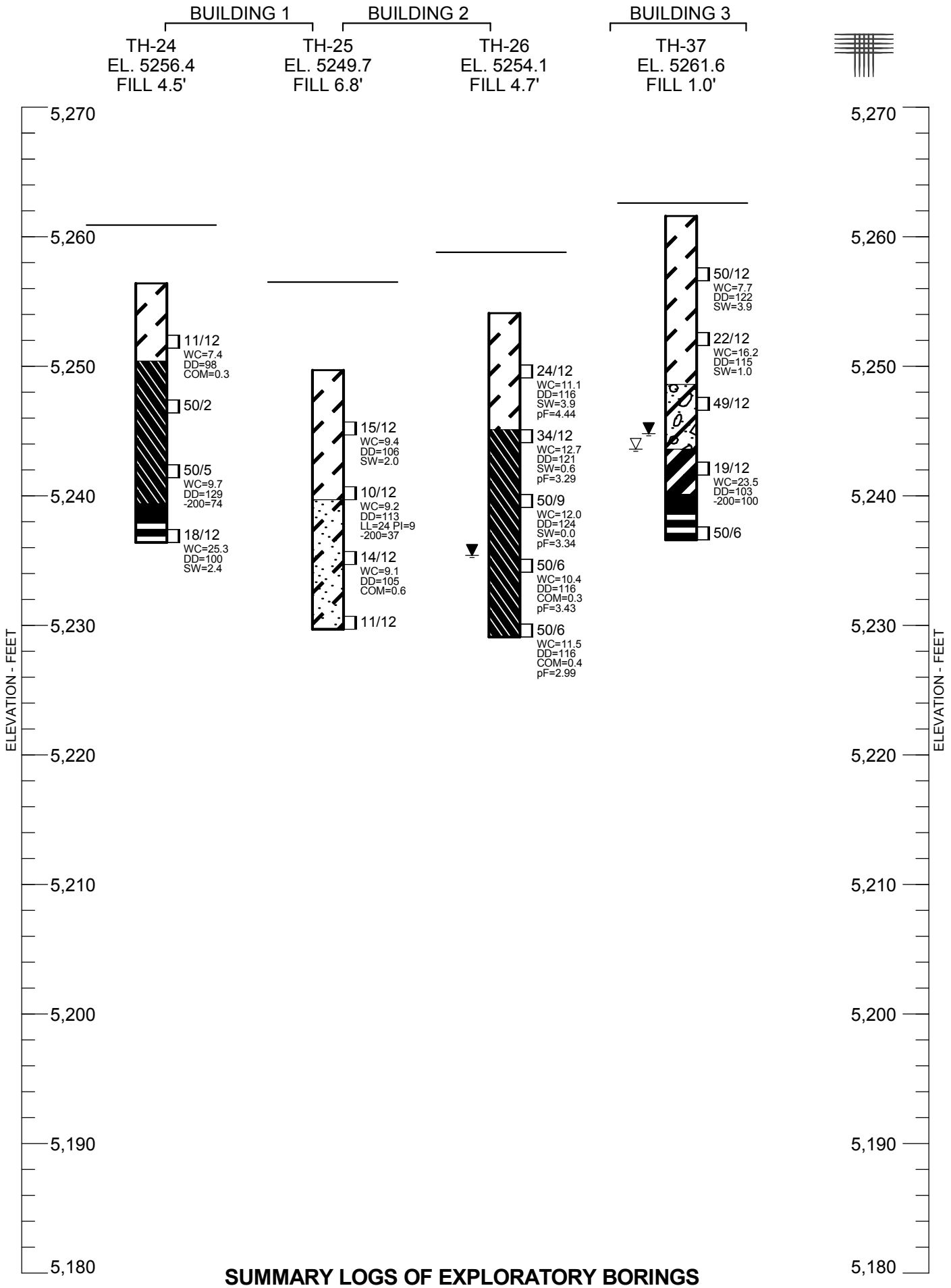
Conceptual Pool Drain Detail

EVERGREEN DEVELOPMENT
NINE MILE CORNER APARTMENTS
CTL \ T Project No. DN48,647-125-R2

Fig. 7

APPENDIX A

SUMMARY LOGS OF EXPLORATORY BORINGS

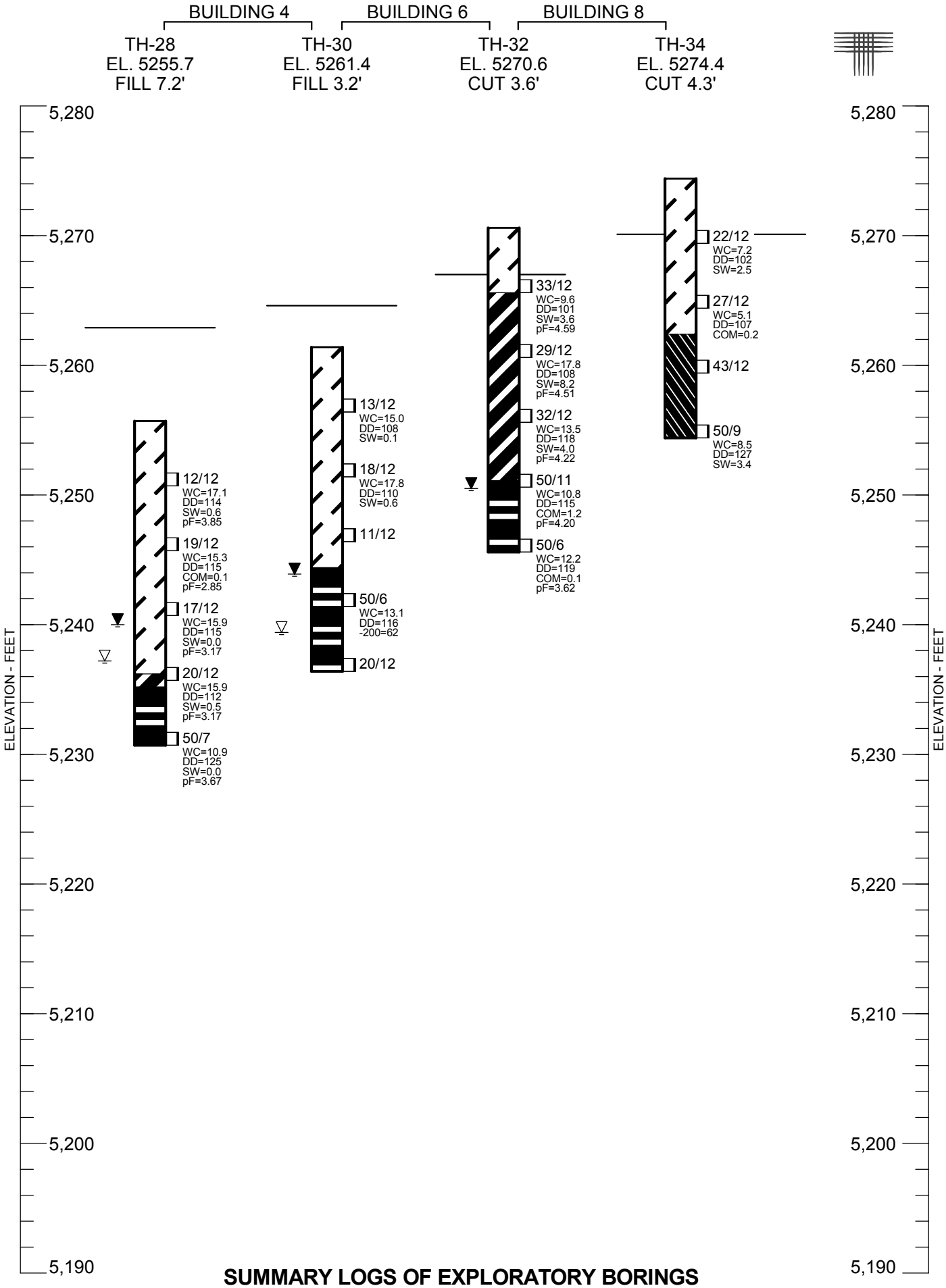


C:\USERS\TCOX\APPDATA\LOCAL\BOX\BOX EDIT\DOCUMENTS\0CPQ8XCPAKSON7RWYRIT5G=\DN48647-125-R2-G.GPJ

SUMMARY LOGS OF EXPLORATORY BORINGS

EVERGREEN DEVELOPMENT
NINE MILE CORNER APARTMENTS
PROJECT NO. DN48,647-125-R2

FIG. A- 1

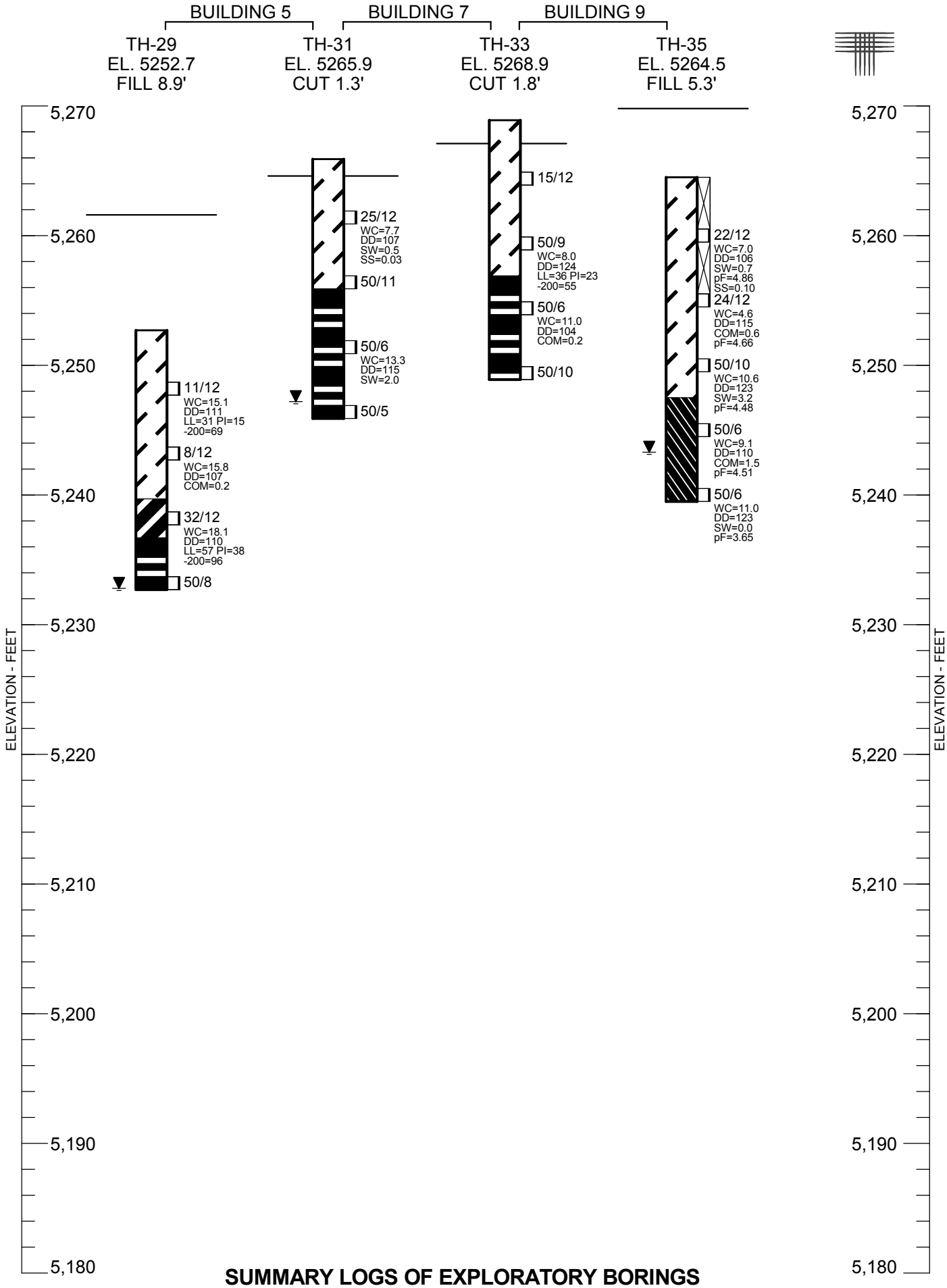


C:\USERS\TCOX\APPDATA\LOCAL\BOX\BOX EDIT\DOCUMENTS\0CPQ8XCPAKSON7RWYRIT5G=\DN48647-125-R2-G.GPJ

SUMMARY LOGS OF EXPLORATORY BORINGS

EVERGREEN DEVELOPMENT
NINE MILE CORNER APARTMENTS
PROJECT NO. DN48,647-125-R2

FIG. A- 2

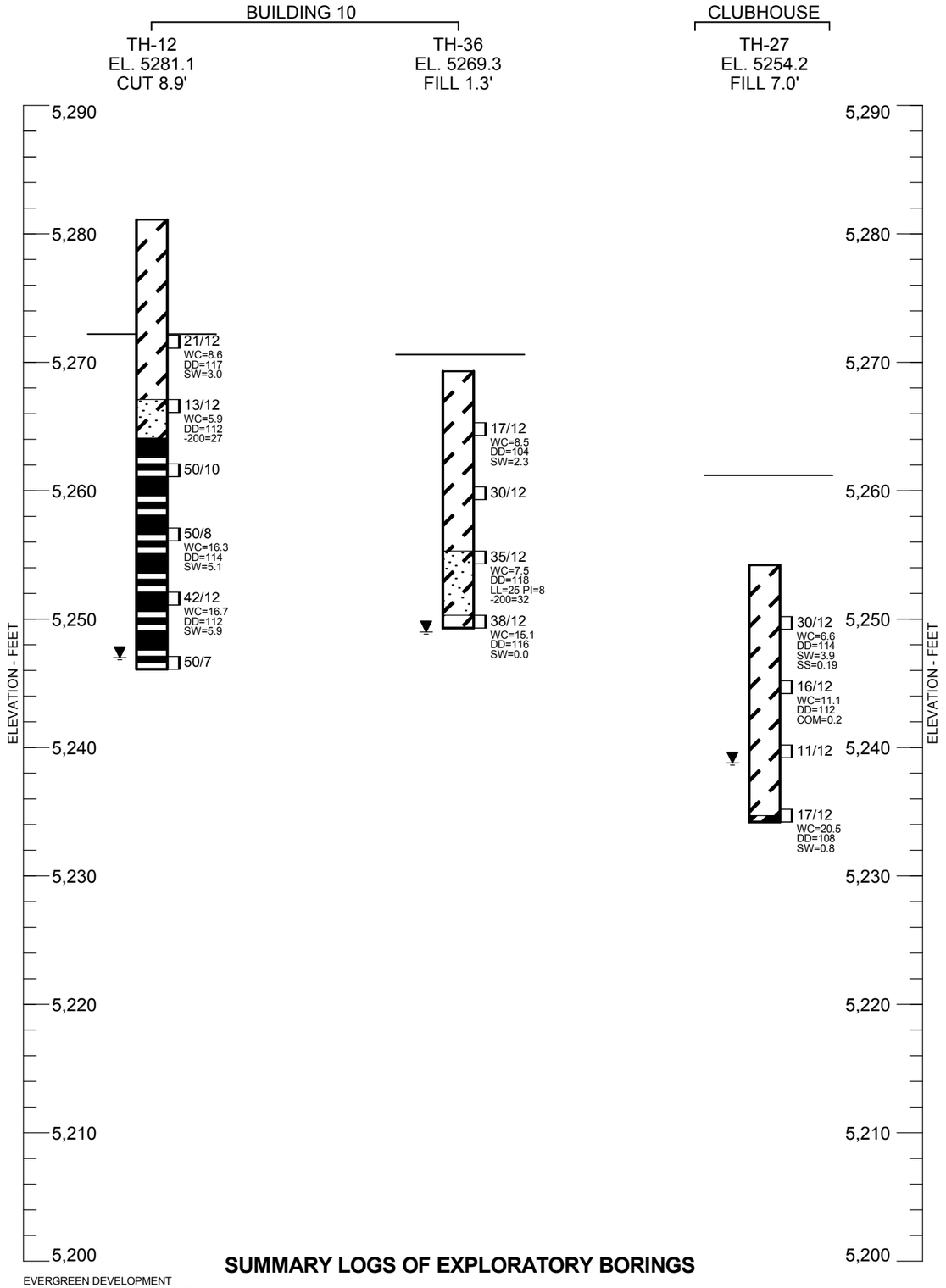


C:\USERS\TCOX\APPDATA\LOCAL\BOX\BOX EDIT\DOCUMENTS\0CPQ8XCPAKSON7RWYRIT5G==\DN48647-125-R2-G.GPJ

SUMMARY LOGS OF EXPLORATORY BORINGS

EVERGREEN DEVELOPMENT
NINE MILE CORNER APARTMENTS
PROJECT NO. DN48,647-125-R2

FIG. A- 3



SUMMARY LOGS OF EXPLORATORY BORINGS

EVERGREEN DEVELOPMENT
NINE MILE CORNER APARTMENTS
PROJECT NO. DN48,647-125-R2

LEGEND:

- CLAY, SANDY, SILTY, OCCASIONAL GRAVEL, STIFF TO VERY STIFF, DRY TO MOIST, BROWN, GRAY, TAN, LIGHT BROWN (CL).
- SAND, CLAYEY, MEDIUM DENSE TO DENSE, DRY TO MOIST, BROWN, LIGHT BROWN (SC).
- GRAVEL, SILTY, DENSE, SLIGHTLY MOIST, BROWN (GM).
- WEATHERD CLAYSTONE, SLIGHTLY MOIST TO MOIST, BROWN, LIGHT BROWN, GRAY, TAN, RUST.
- INTERBEDDED CLAYSTONE/SANDSTONE, MEDIUM HARD TO VERY HARD, DRY TO SLIGHTLY MOIST, BROWN, GRAY, TAN, RUST, LIGHT BROWN.
- BEDROCK, CLAYSTONE, MEDIUM HARD TO VERY HARD, DRY TO SLIGHTLY MOIST, BROWN, GRAY, TAN, RUST.
- DRIVE SAMPLE. THE SYMBOL 11/12 INDICATES 11 BLOWS OF AN AUTOMATIC 140-POUND HAMMER FALLING 30 INCHES WERE REQUIRED TO DRIVE A 2.5-INCH O.D. SAMPLER 12 INCHES.
- BULK SAMPLE COLLECTED FROM AUGER CUTTINGS.
- WATER LEVEL MEASURED AT TIME OF DRILLING.
- WATER LEVEL MEASURED AFTER DRILLING.
- INDICATES PROPOSED GRADE.

NOTES:

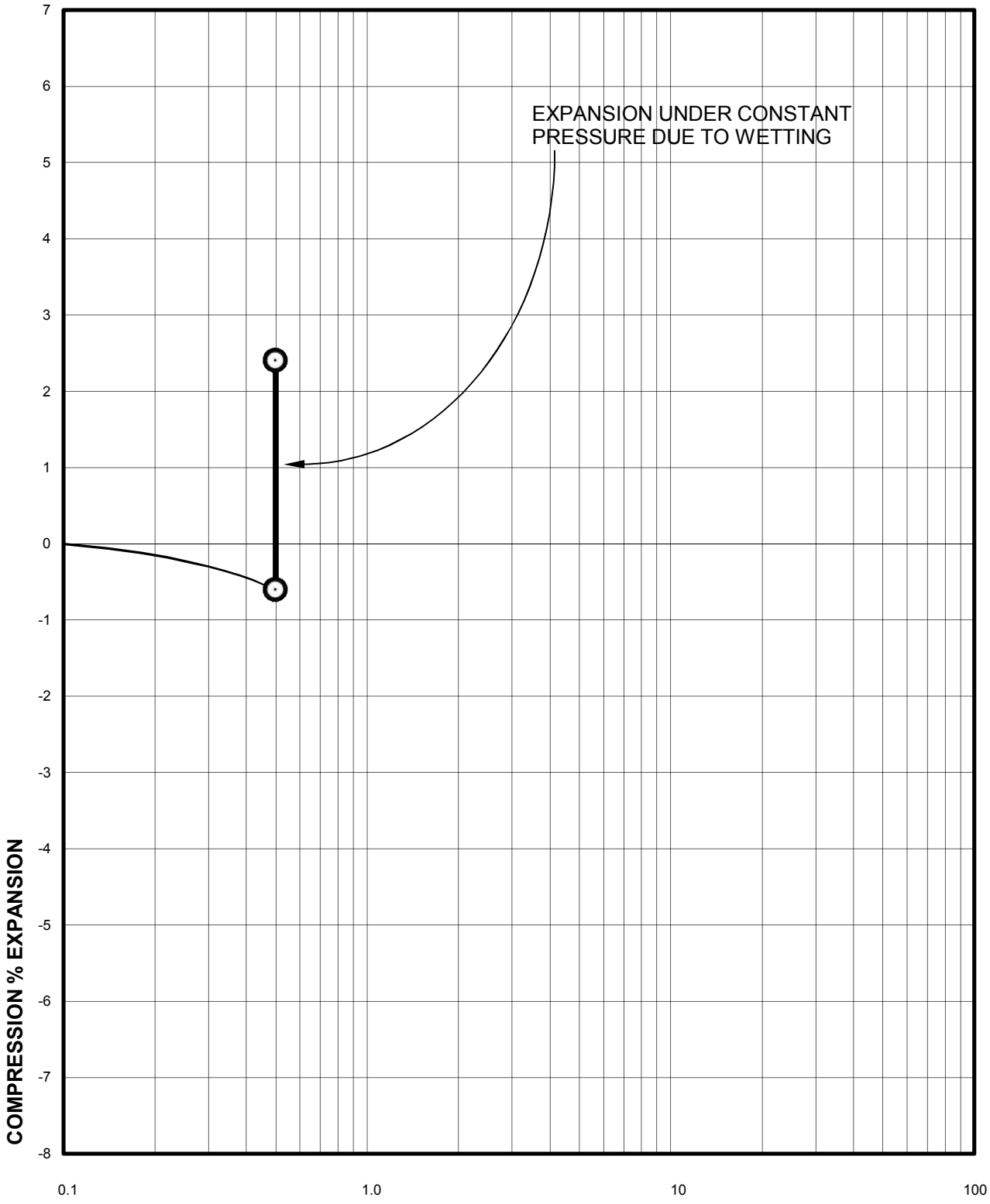
1. THE BORINGS WERE DRILLED DECEMBER 30, 2016 THROUGH FEBRUARY 9, 2017 USING 4-INCH DIAMETER, CONTINUOUS-FLIGHT SOLID-STEM AUGER AND A TRUCK-MOUNTED CME-45 OR CME-55 DRILL RIG.
2. BORING LOCATIONS AND ELEVATIONS WERE SURVEYED BY GALLOWAY & COMPANY, INC.
3. WC - INDICATES MOISTURE CONTENT (%).
   DD - INDICATES DRY DENSITY (PCF).
   SW - INDICATES SWELL WHEN WETTED UNDER APPLIED PRESSURE (%).
   COM - INDICATES COMPRESSION WHEN WETTED UNDER APPLIED PRESSURE (%).
   LL - INDICATES LIQUID LIMIT.
   PI - INDICATES PLASTICITY INDEX.
   -200 - INDICATES PASSING NO. 200 SIEVE (%).
   SS - INDICATES WATER-SOLUBLE SULFATE CONTENT (%).
   pF - INDICATES SOIL SUCTION VALUE (pF).
4. THESE LOGS ARE SUBJECT TO THE EXPLANATIONS, LIMITATIONS AND CONCLUSIONS CONTAINED IN THIS REPORT.

FIG. A- 4

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APPENDIX B

LABORATORY TEST RESULTS



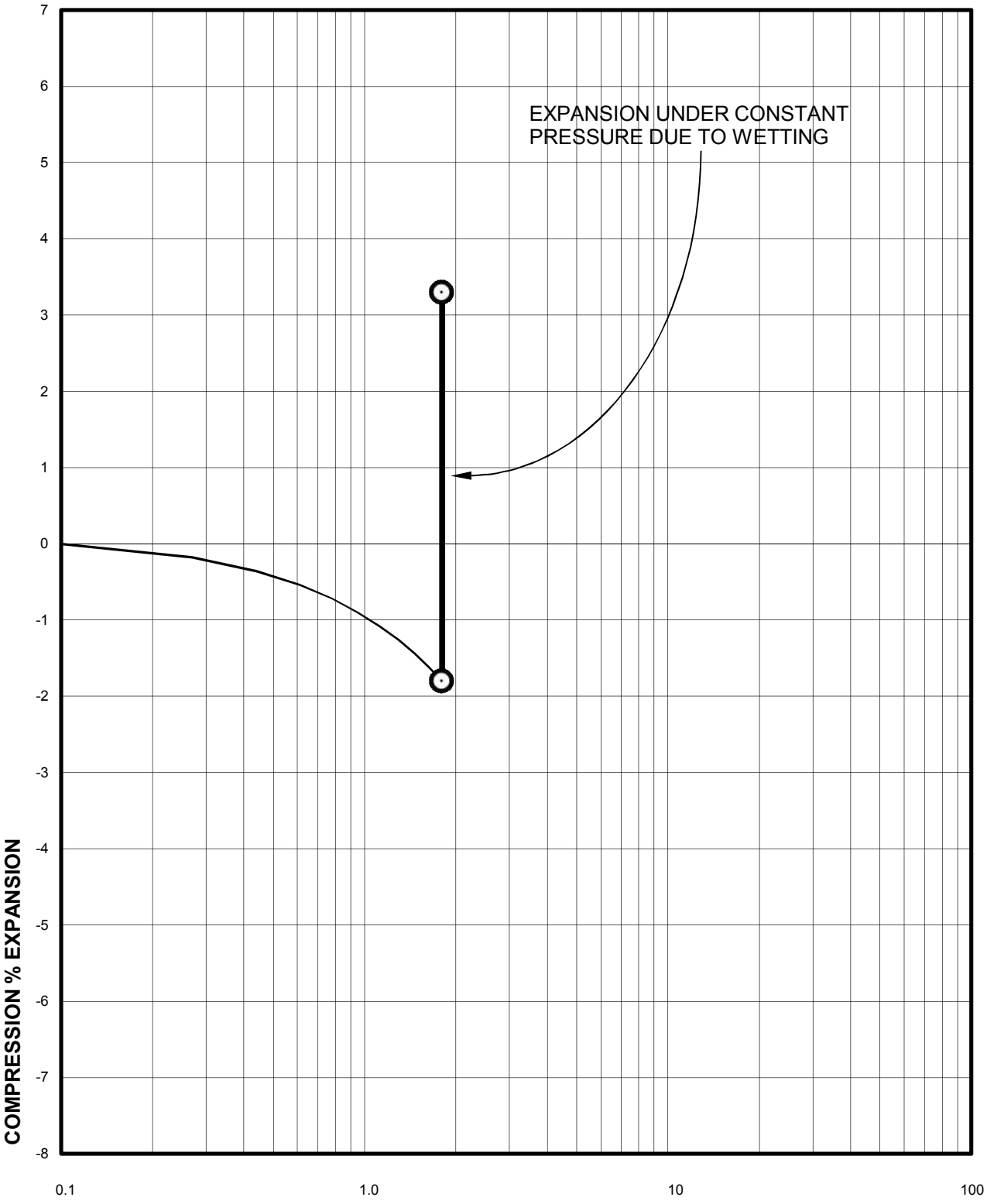
Sample of CLAY, SANDY (CL)
From TH-12 AT 9 FEET

DRY UNIT WEIGHT= 117 PCF
MOISTURE CONTENT= 8.6 %

Swell Consolidation Test Results

FIG. B-1

EVERGREEN DEVELOPMENT
NINE MILE CORNER APARTMENTS
CTL|T PROJECT NO. DN48,647-125-R2



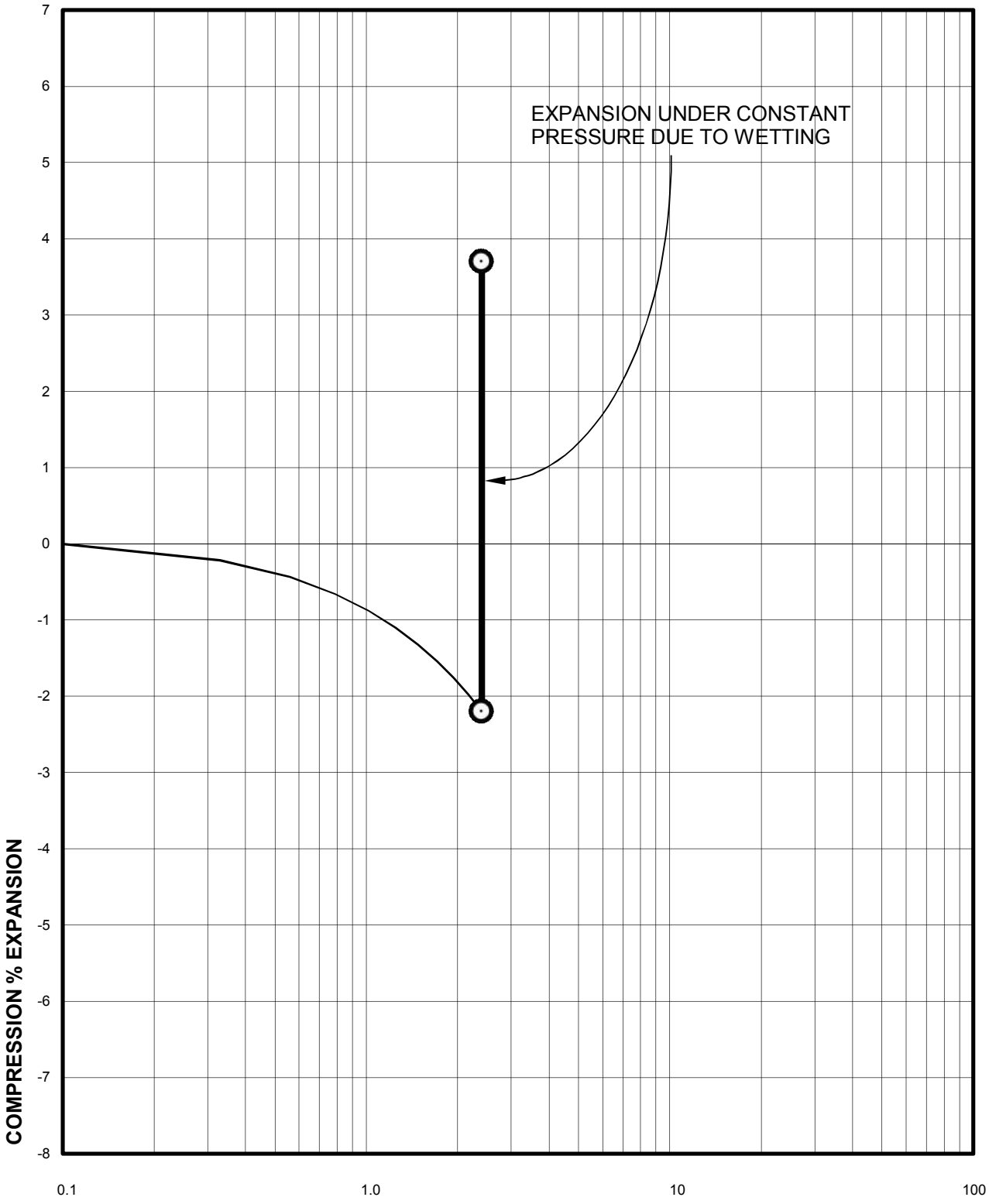
Sample of CLAYSTONE
From TH-12 AT 24 FEET

DRY UNIT WEIGHT= 114 PCF
MOISTURE CONTENT= 16.3 %

Swell Consolidation Test Results

FIG. B-2

EVERGREEN DEVELOPMENT
NINE MILE CORNER APARTMENTS
CTL|T PROJECT NO. DN48,647-125-R2



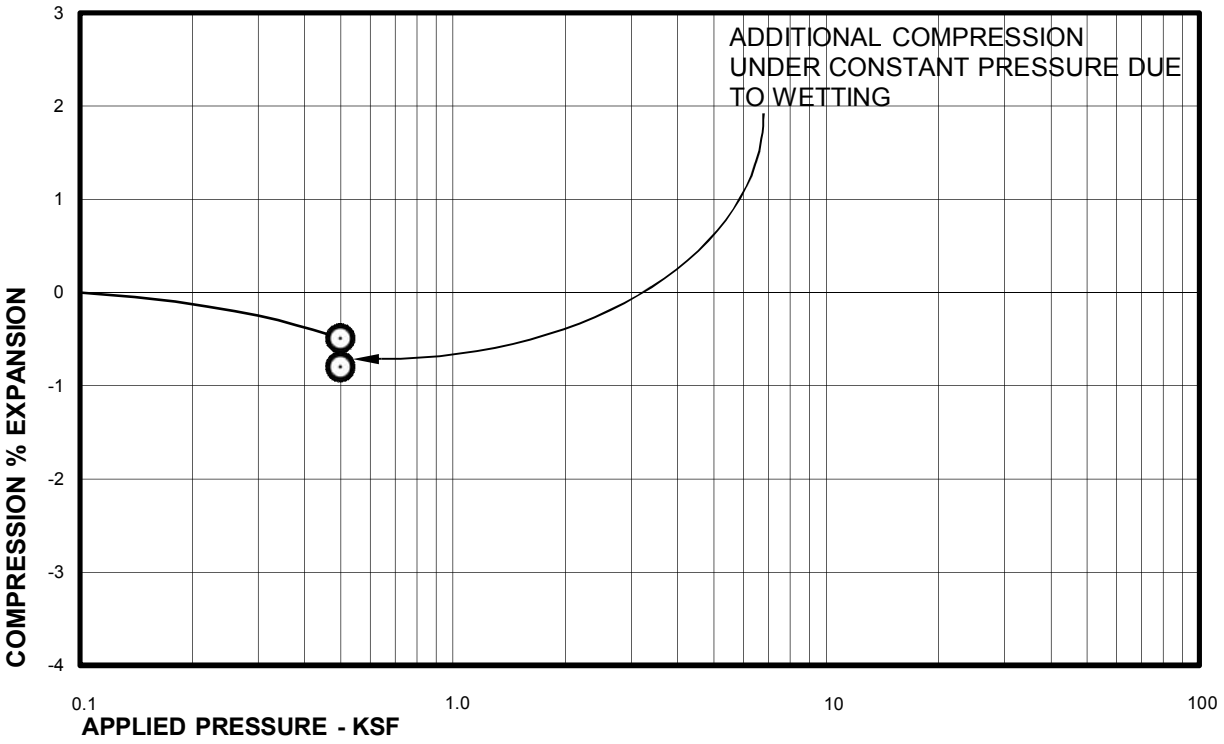
Sample of CLAYSTONE
From TH-12 AT 29 FEET

DRY UNIT WEIGHT= 112 PCF
MOISTURE CONTENT= 16.7 %

Swell Consolidation Test Results

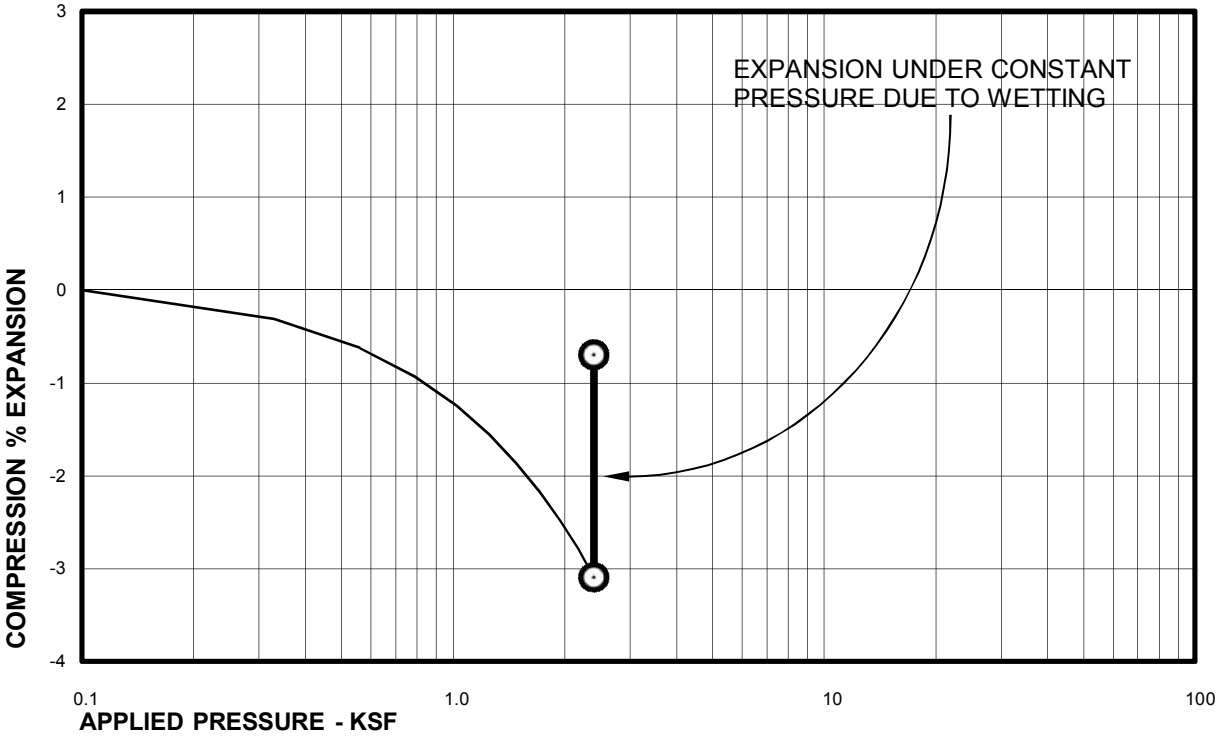
FIG. B-3

EVERGREEN DEVELOPMENT
NINE MILE CORNER APARTMENTS
CTL|T PROJECT NO. DN48,647-125-R2



Sample of CLAY, SANDY (CL) DRY UNIT WEIGHT= 98 PCF

From TH-24 AT 4 FEET MOISTURE CONTENT= 7.4 %



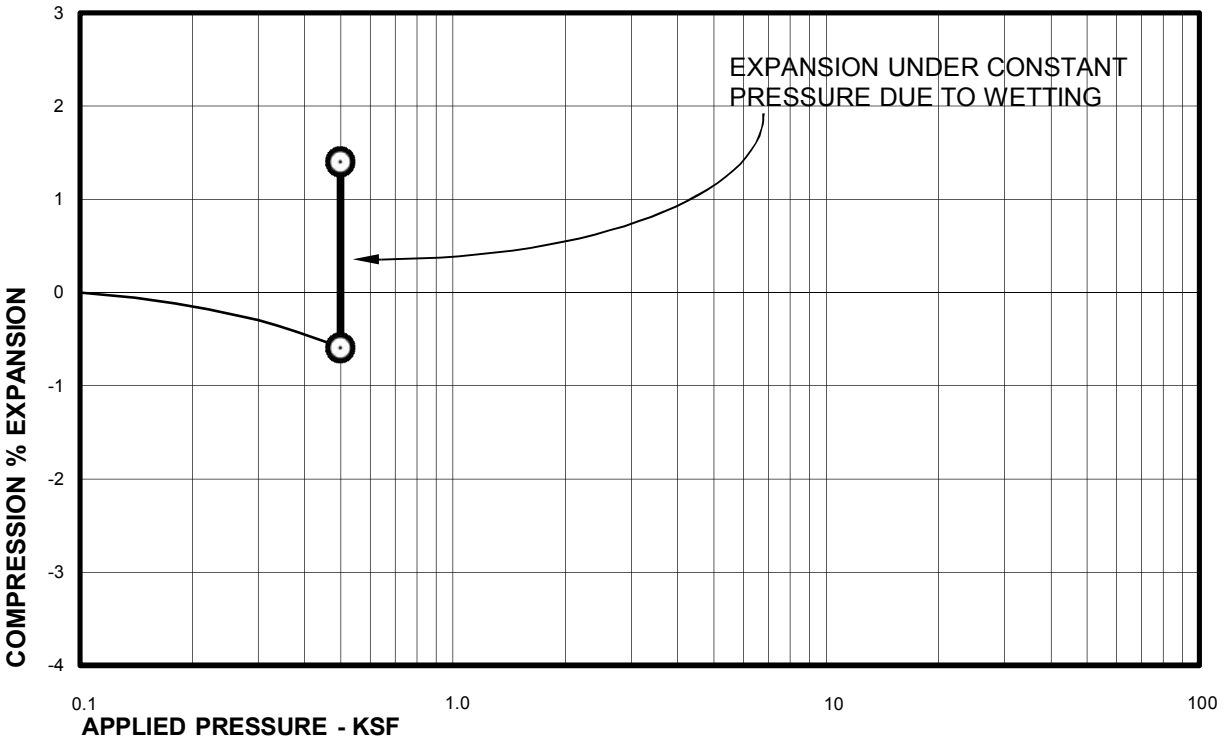
Sample of CLAYSTONE DRY UNIT WEIGHT= 100 PCF

From TH-24 AT 19 FEET MOISTURE CONTENT= 25.3 %

Swell Consolidation Test Results

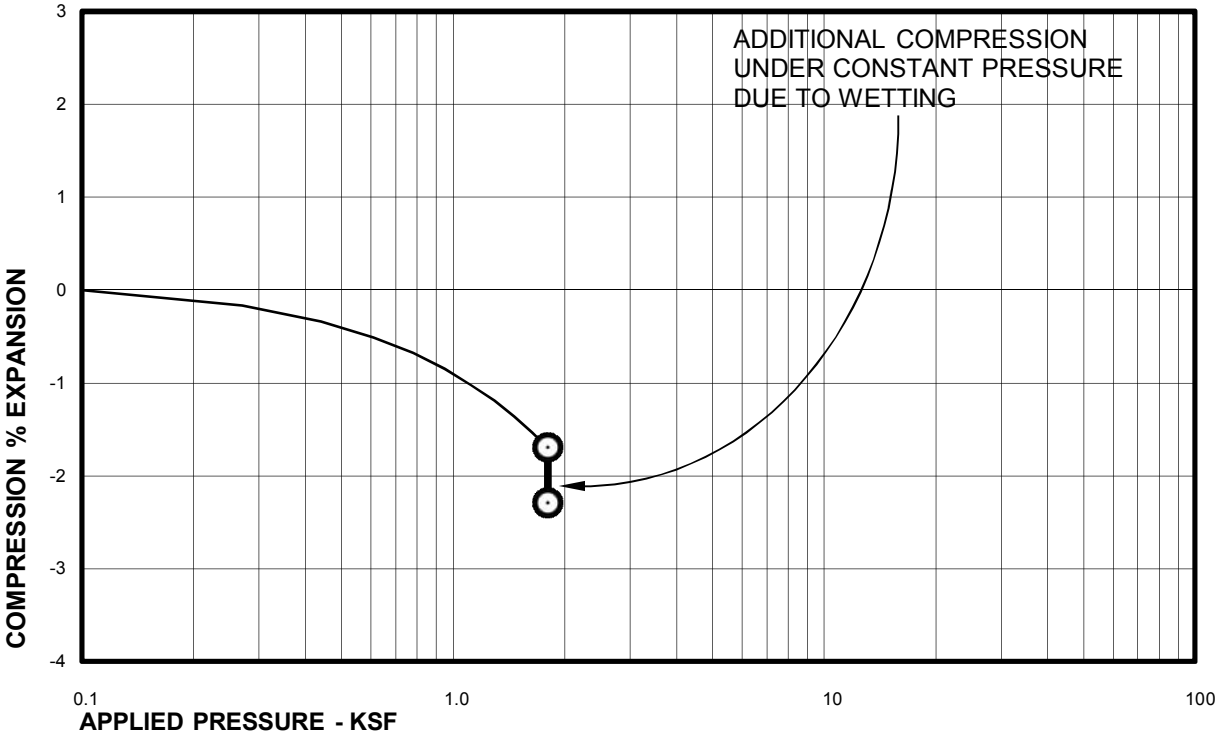
FIG. B-4

EVERGREEN DEVELOPMENT
NINE MILE CORNER APARTMENTS
CTL|T PROJECT NO. DN48,647-125-R2



Sample of CLAY, SANDY (CL)
From TH-25 AT 4 FEET

DRY UNIT WEIGHT= 106 PCF
MOISTURE CONTENT= 9.4 %



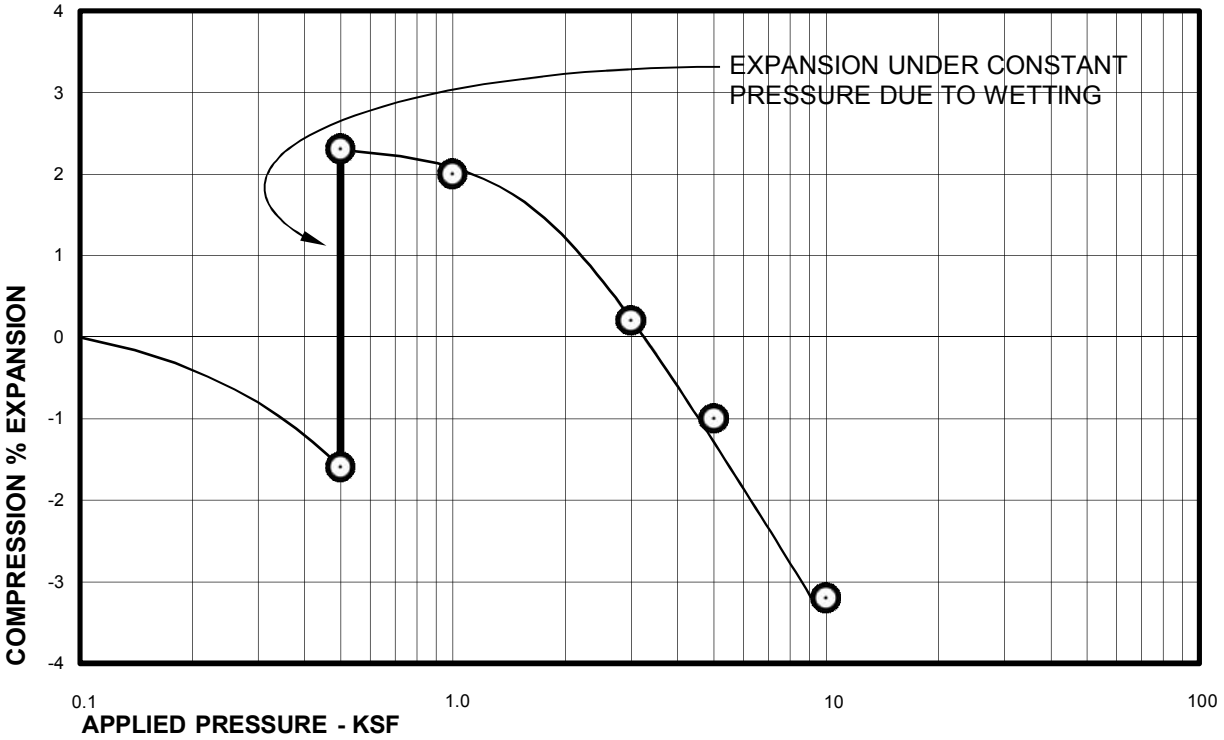
Sample of SAND, CLAYEY (SC)
From TH-25 AT 14 FEET

DRY UNIT WEIGHT= 105 PCF
MOISTURE CONTENT= 9.1 %

Swell Consolidation Test Results

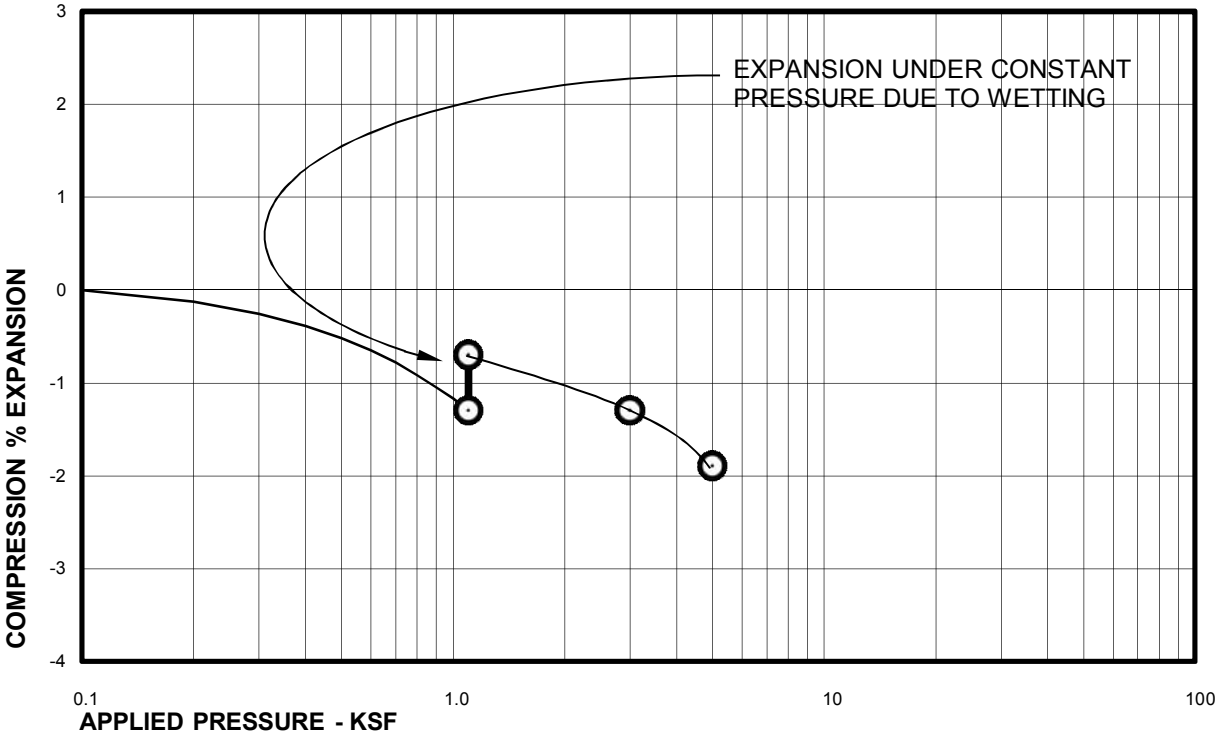
FIG. B-5

EVERGREEN DEVELOPMENT
NINE MILE CORNER APARTMENTS
CTL|T PROJECT NO. DN48,647-125-R2



Sample of CLAY, SANDY (CL) DRY UNIT WEIGHT= 116 PCF

From TH-26 AT 4 FEET MOISTURE CONTENT= 11.1 %



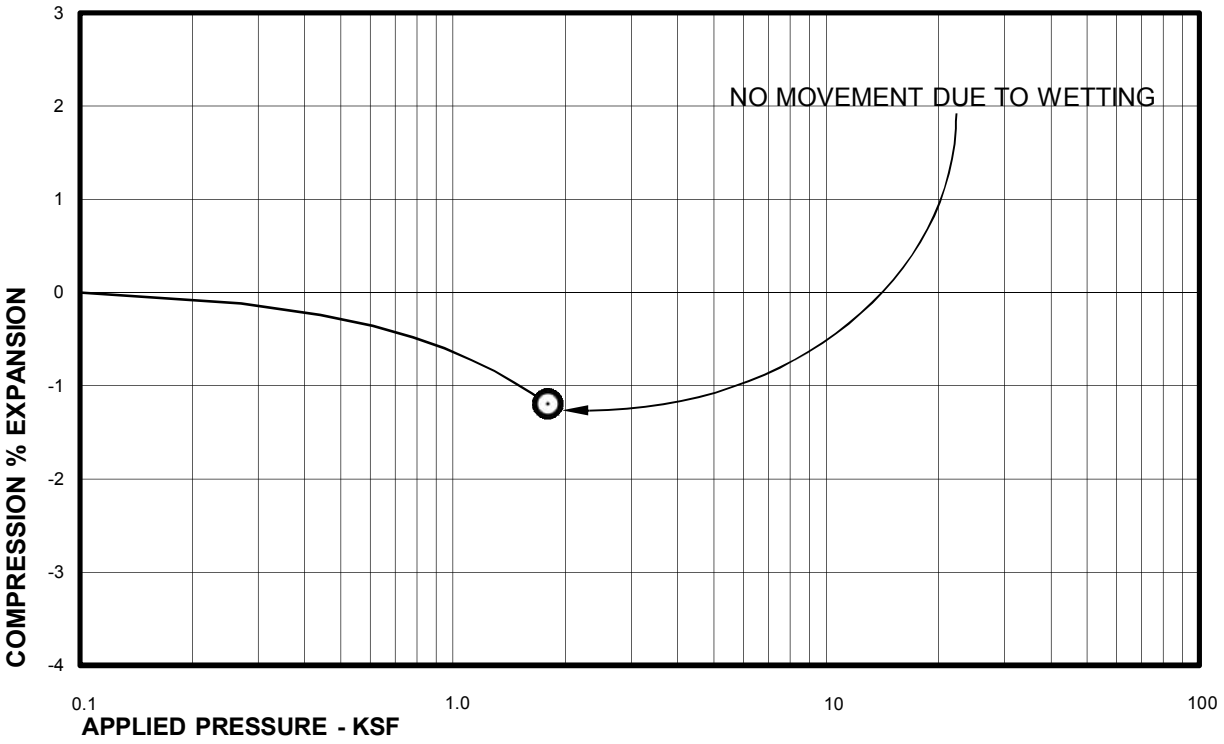
Sample of INTERBEDDED CLAYSTONE/SANDSTONE DRY UNIT WEIGHT= 121 PCF

From TH-26 AT 9 FEET MOISTURE CONTENT= 12.7 %

Swell Consolidation Test Results

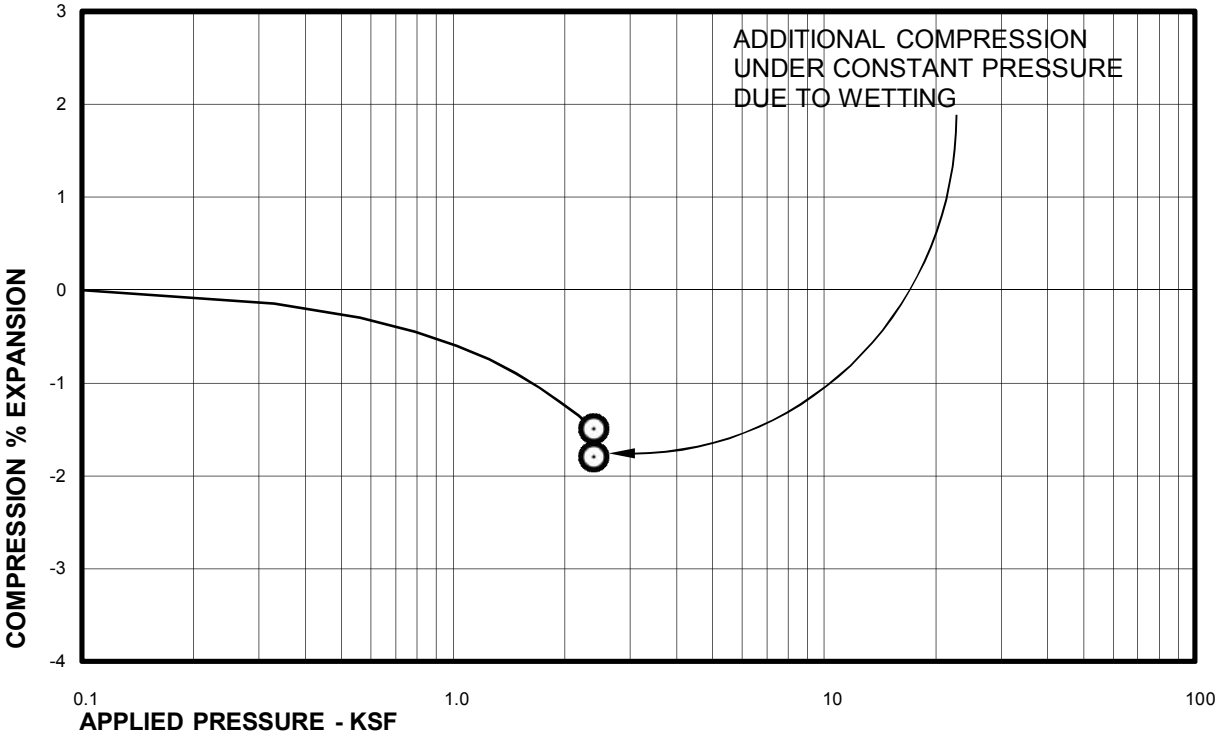
FIG. B-6

EVERGREEN DEVELOPMENT
NINE MILE CORNER APARTMENTS
CTL|T PROJECT NO. DN48,647-125-R2



Sample of INTERBEDDED CLAYSTONE/SANDSTONE
From TH-26 AT 14 FEET

DRY UNIT WEIGHT= 124 PCF
MOISTURE CONTENT= 12.0 %



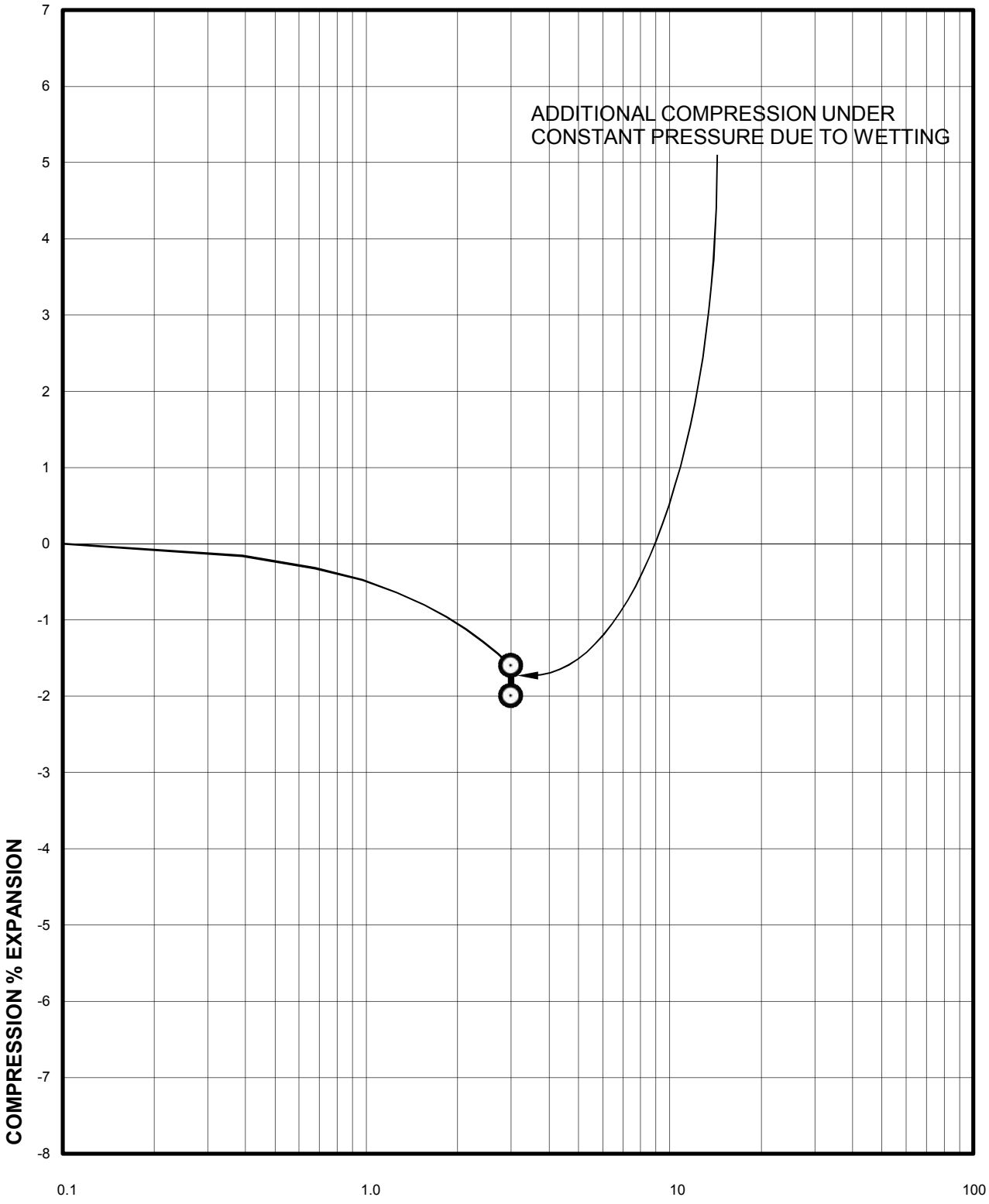
Sample of INTERBEDDED CLAYSTONE/SANDSTONE
From TH-26 AT 19 FEET

DRY UNIT WEIGHT= 116 PCF
MOISTURE CONTENT= 10.4 %

Swell Consolidation Test Results

FIG. B-7

EVERGREEN DEVELOPMENT
NINE MILE CORNER APARTMENTS
CTL|T PROJECT NO. DN48,647-125-R2



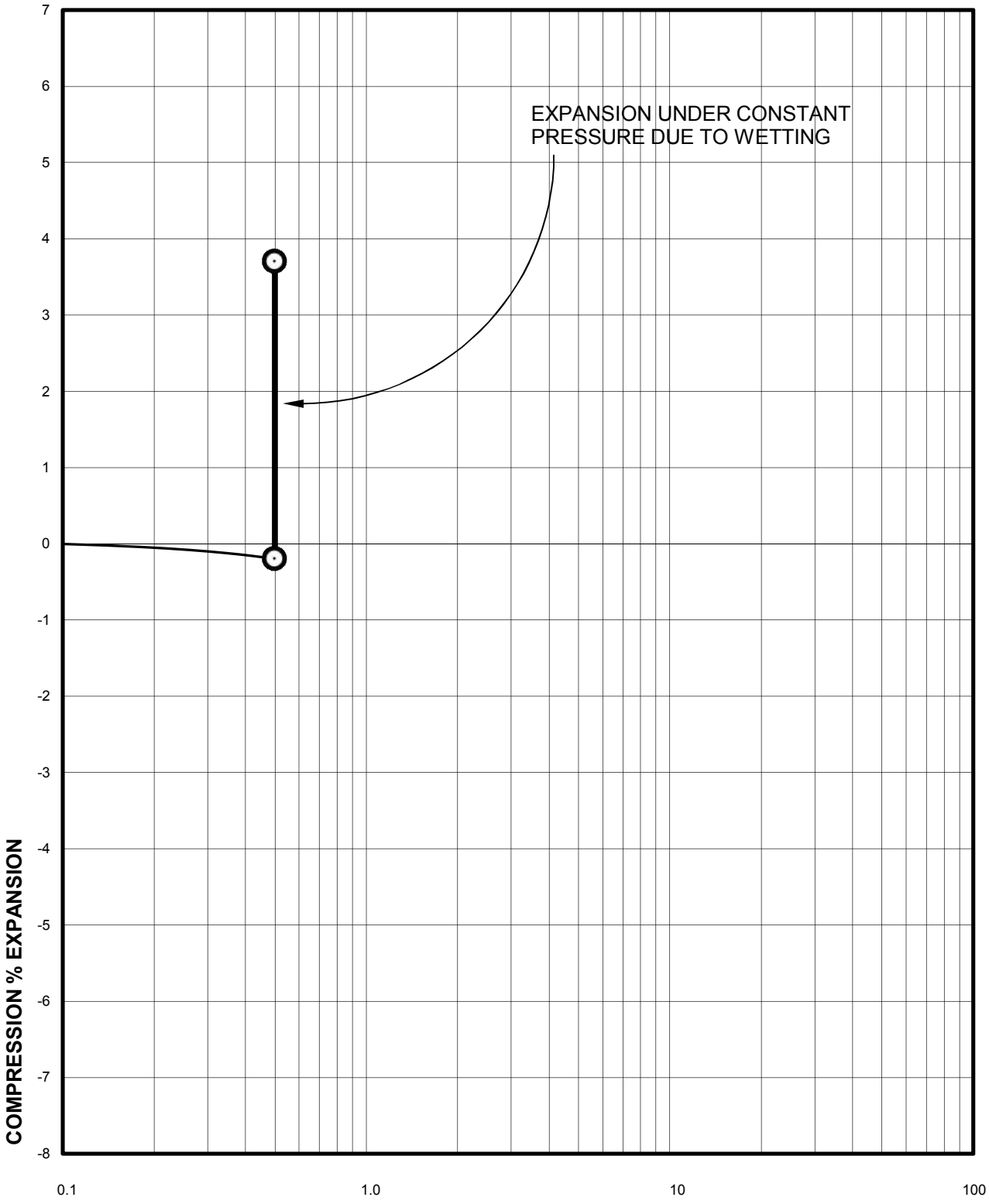
Sample of INTERBEDDED CLAYSTONE/SANDSTONE
From TH-26 AT 24 FEET

DRY UNIT WEIGHT= 116 PCF
MOISTURE CONTENT= 11.5 %

Swell Consolidation Test Results

FIG. B-8

EVERGREEN DEVELOPMENT
NINE MILE CORNER APARTMENTS
CTL|T PROJECT NO. DN48,647-125-R2



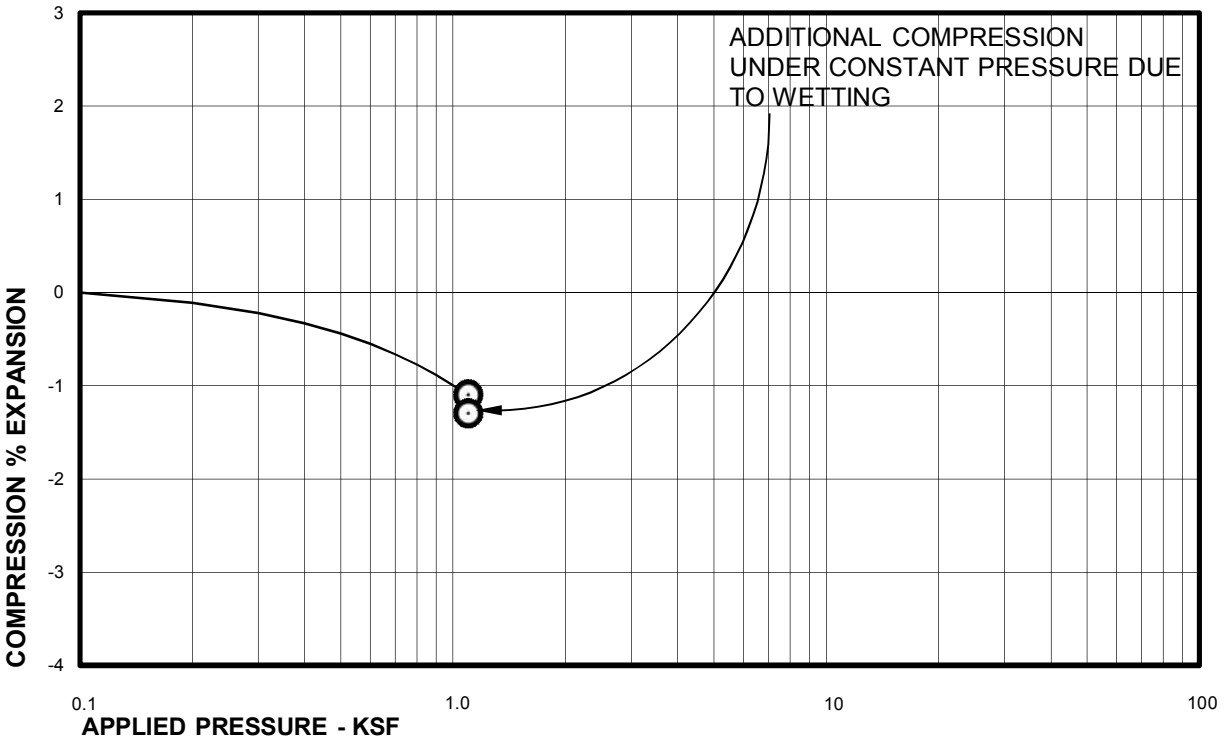
Sample of CLAY, SANDY (CL)
From TH-27 AT 4 FEET

DRY UNIT WEIGHT= 114 PCF
MOISTURE CONTENT= 6.6 %

Swell Consolidation Test Results

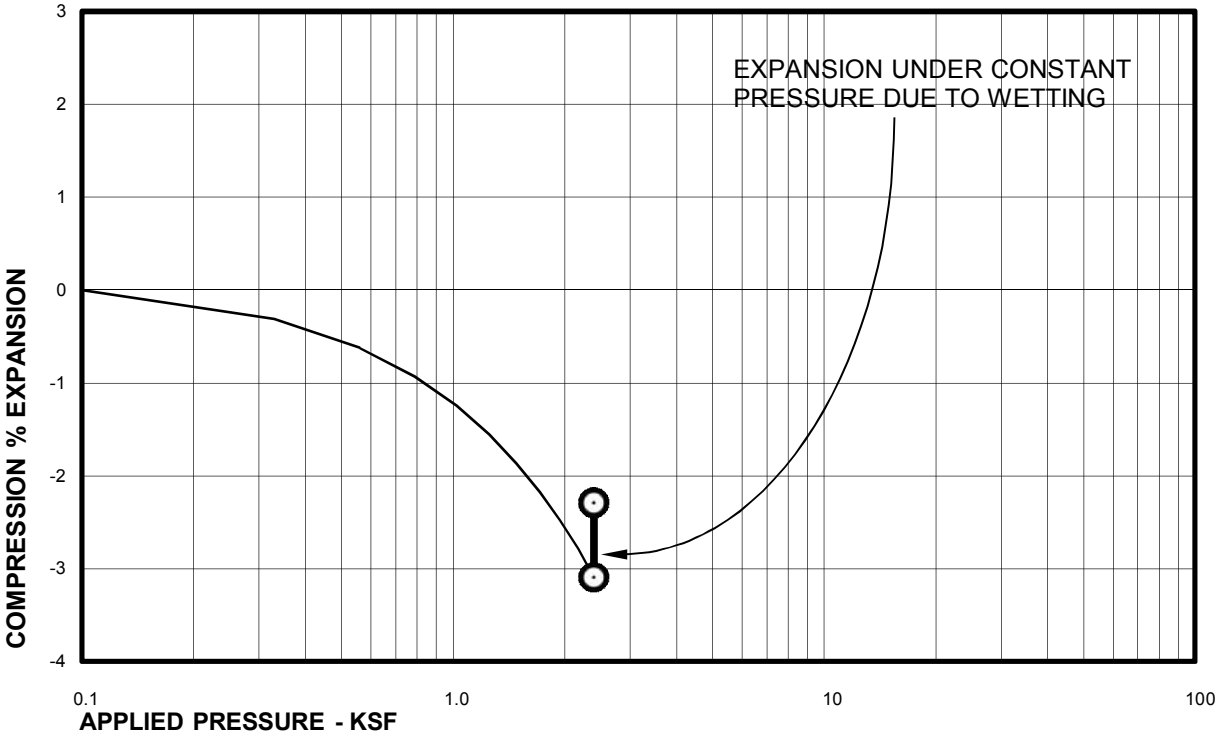
FIG. B-9

EVERGREEN DEVELOPMENT
NINE MILE CORNER APARTMENTS
CTL|T PROJECT NO. DN48,647-125-R2



Sample of CLAY, SANDY (CL)
From TH-27 AT 9 FEET

DRY UNIT WEIGHT= 112 PCF
MOISTURE CONTENT= 11.1 %



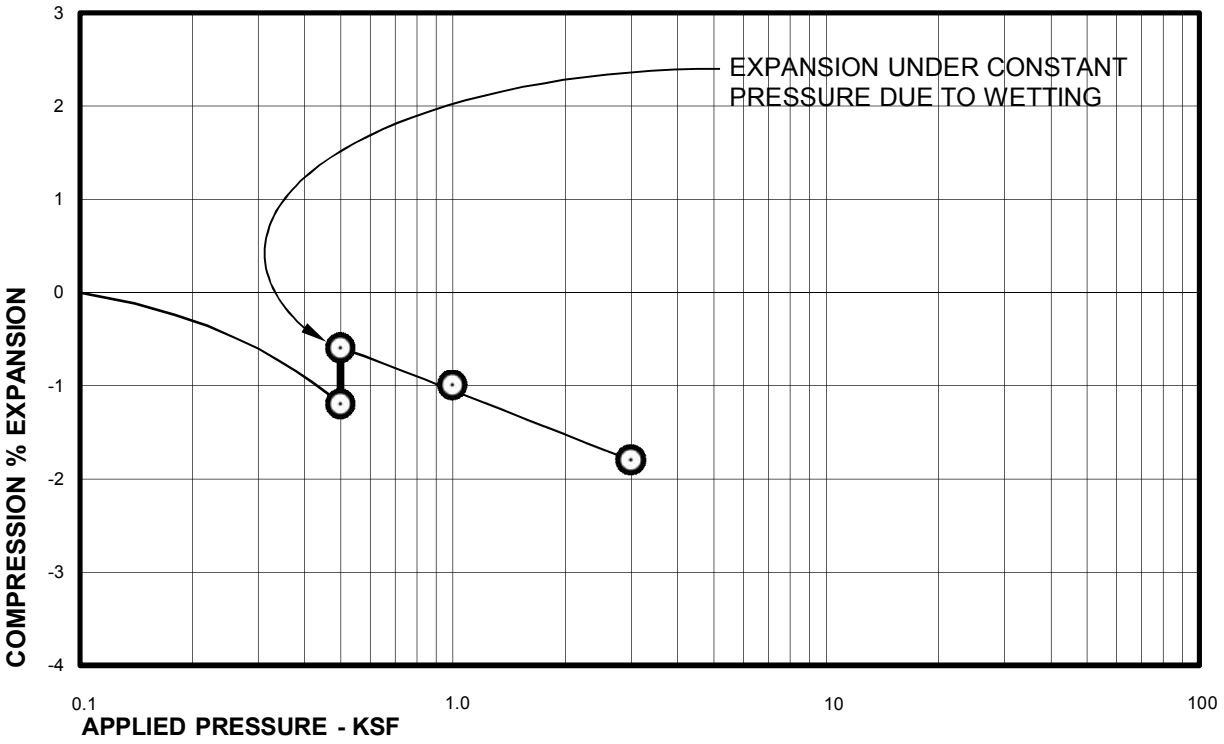
Sample of WEATHERED CLAYSTONE
From TH-27 AT 19 FEET

DRY UNIT WEIGHT= 108 PCF
MOISTURE CONTENT= 20.5 %

Swell Consolidation Test Results

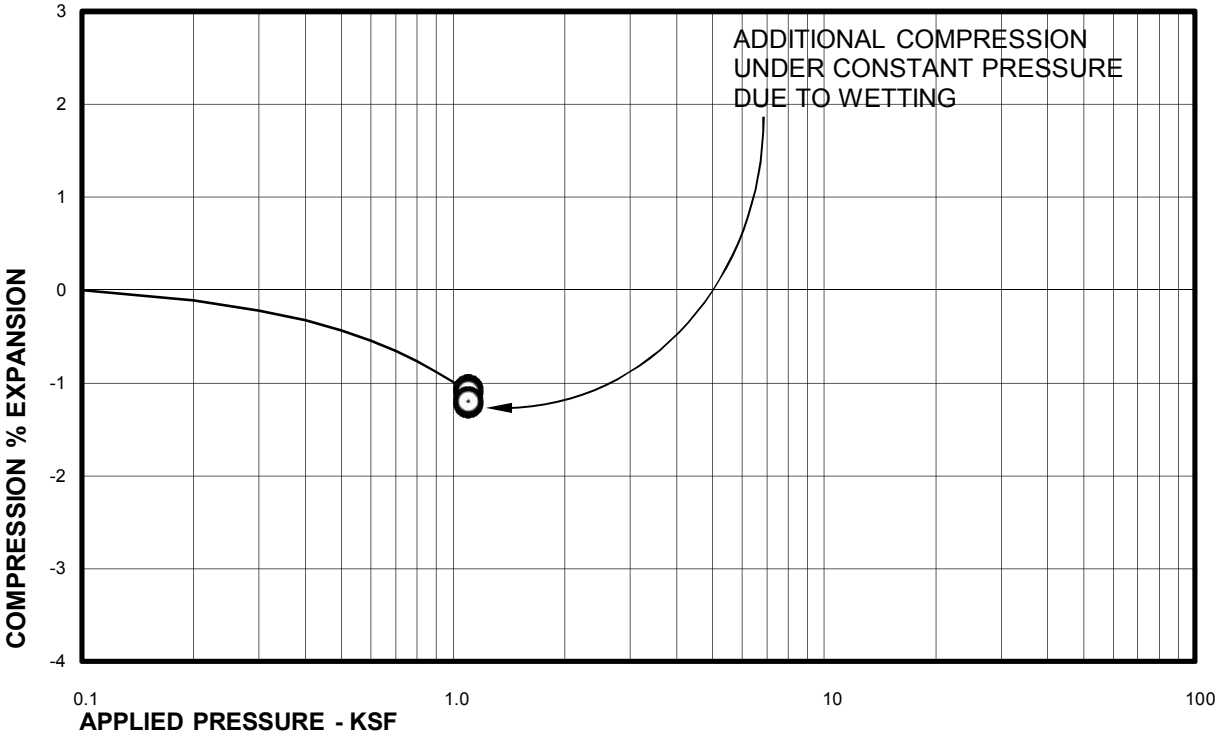
FIG. B-10

EVERGREEN DEVELOPMENT
NINE MILE CORNER APARTMENTS
CTL|T PROJECT NO. DN48,647-125-R2



Sample of CLAY, SANDY (CL)
From TH-28 AT 4 FEET

DRY UNIT WEIGHT= 114 PCF
MOISTURE CONTENT= 17.1 %



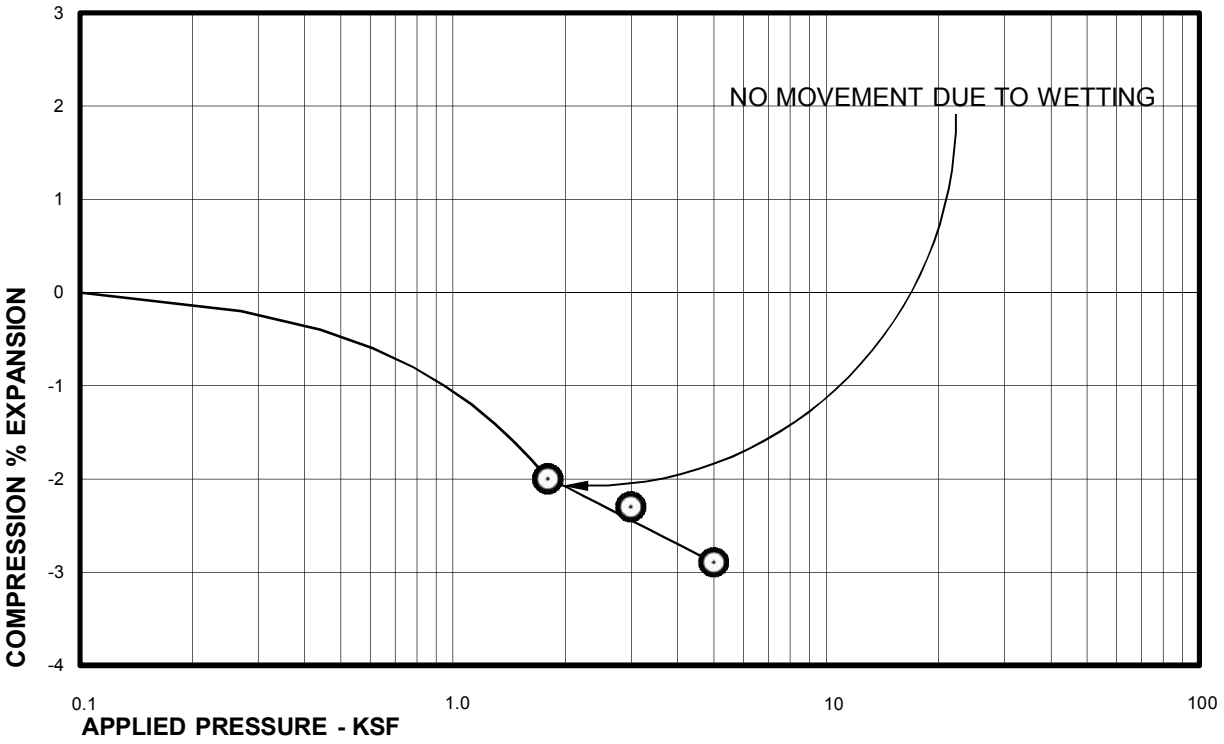
Sample of CLAY, SANDY (CL)
From TH-28 AT 9 FEET

DRY UNIT WEIGHT= 115 PCF
MOISTURE CONTENT= 15.3 %

Swell Consolidation Test Results

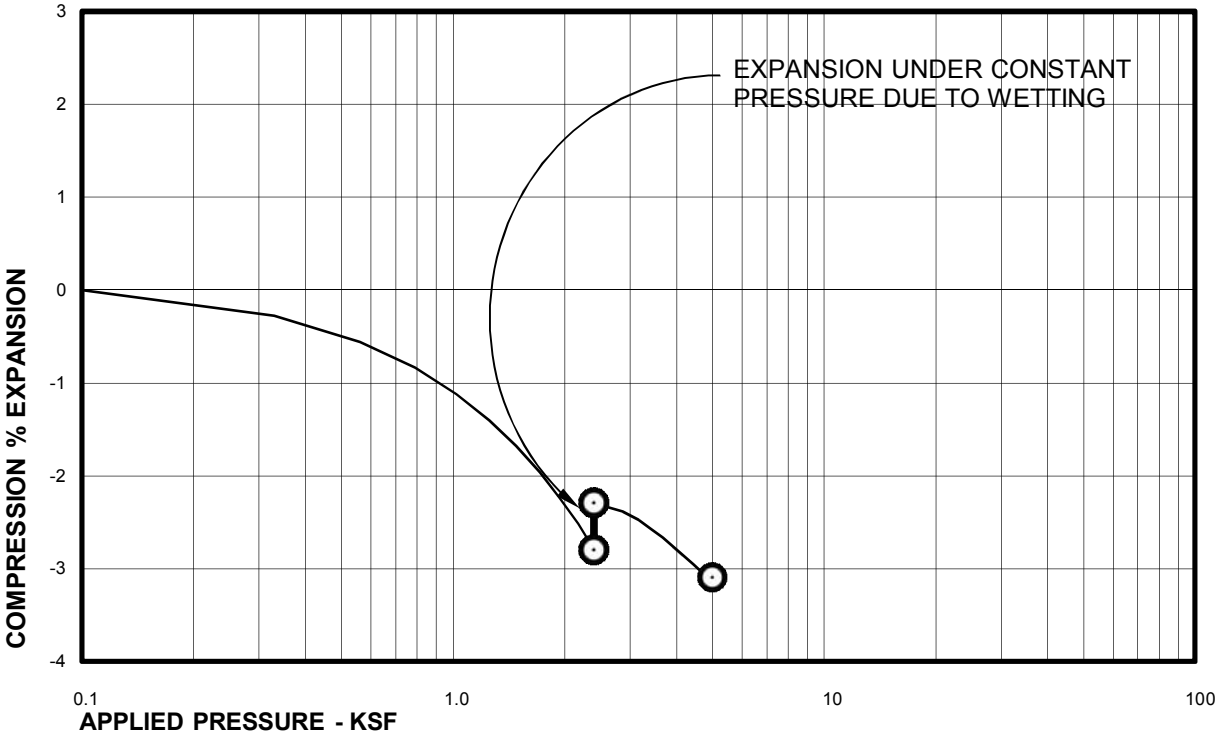
FIG. B-11

EVERGREEN DEVELOPMENT
NINE MILE CORNER APARTMENTS
CTL|T PROJECT NO. DN48,647-125-R2



Sample of CLAY, SANDY (CL)
From TH-28 AT 14 FEET

DRY UNIT WEIGHT= 115 PCF
MOISTURE CONTENT= 15.9 %



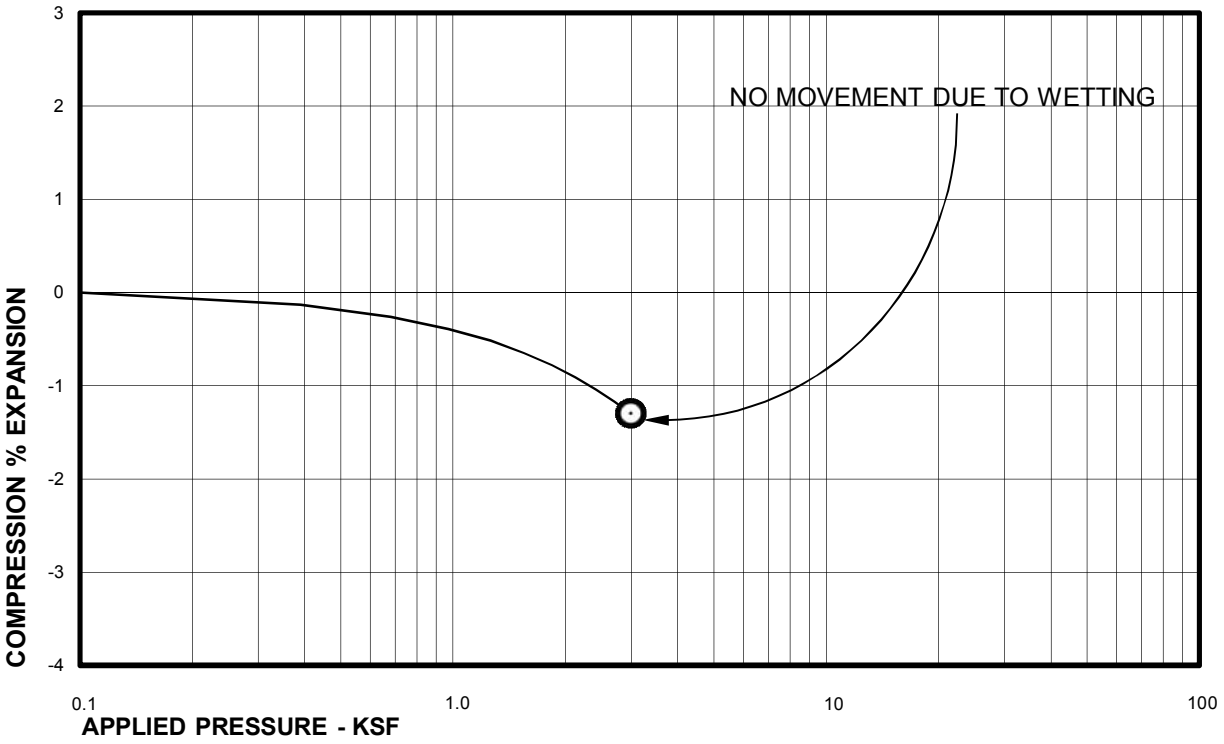
Sample of WEATHERED CLAYSTONE
From TH-28 AT 19 FEET

DRY UNIT WEIGHT= 112 PCF
MOISTURE CONTENT= 15.9 %

Swell Consolidation Test Results

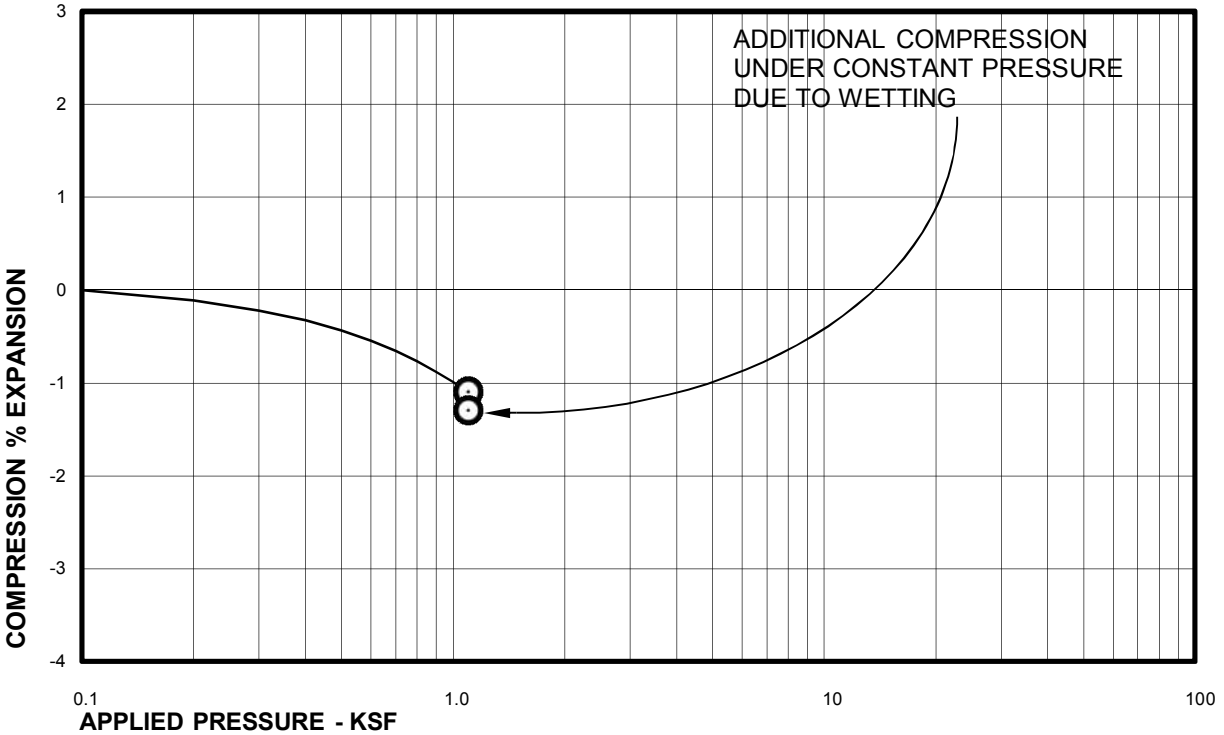
FIG. B-12

EVERGREEN DEVELOPMENT
NINE MILE CORNER APARTMENTS
CTL|T PROJECT NO. DN48,647-125-R2



Sample of CLAYSTONE
From TH-28 AT 24 FEET

DRY UNIT WEIGHT= 125 PCF
MOISTURE CONTENT= 10.9 %



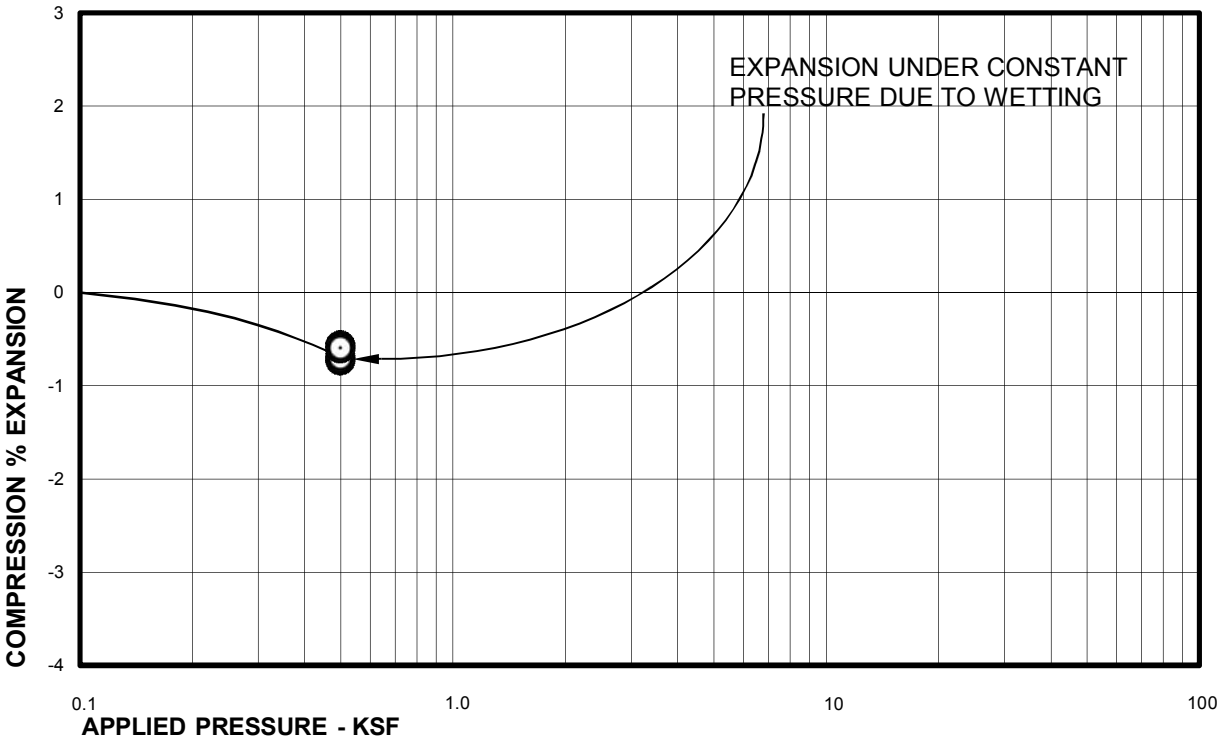
Sample of CLAY, SANDY (CL)
From TH-29 AT 9 FEET

DRY UNIT WEIGHT= 107 PCF
MOISTURE CONTENT= 15.8 %

Swell Consolidation Test Results

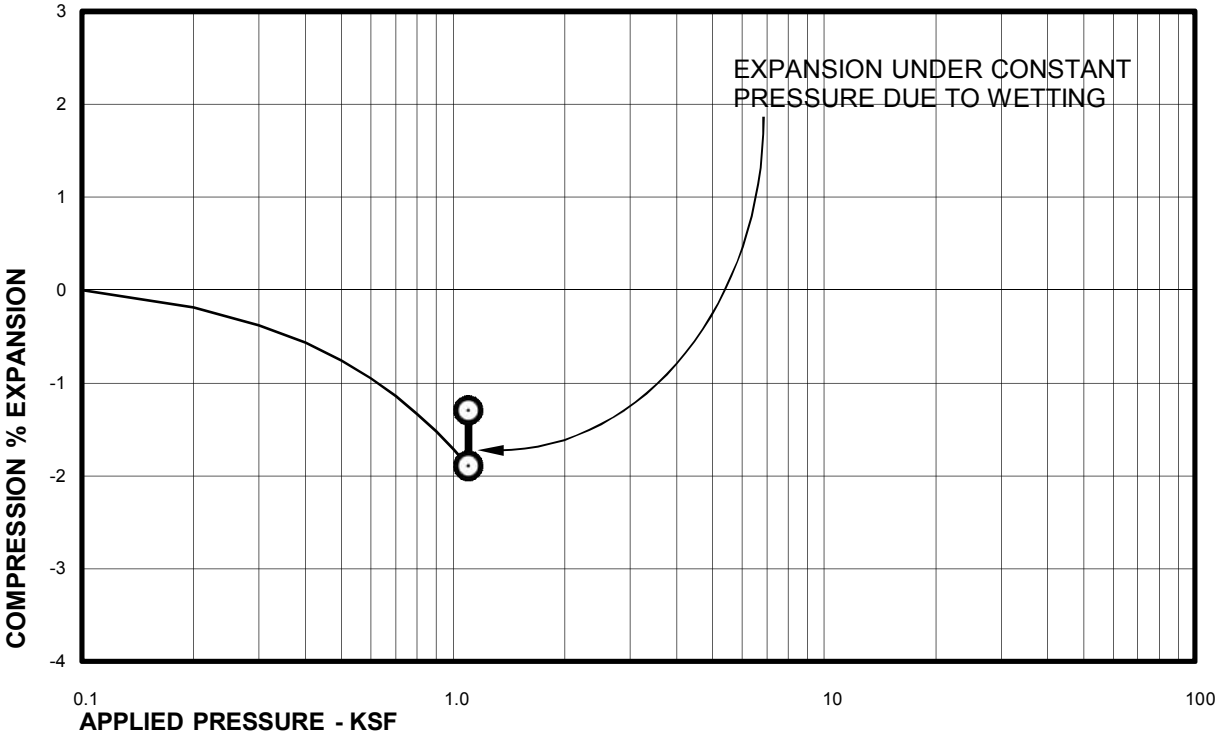
FIG. B-13

EVERGREEN DEVELOPMENT
NINE MILE CORNER APARTMENTS
CTL|T PROJECT NO. DN48,647-125-R2



Sample of CLAY, SANDY (CL)
From TH-30 AT 4 FEET

DRY UNIT WEIGHT= 108 PCF
MOISTURE CONTENT= 15.0 %



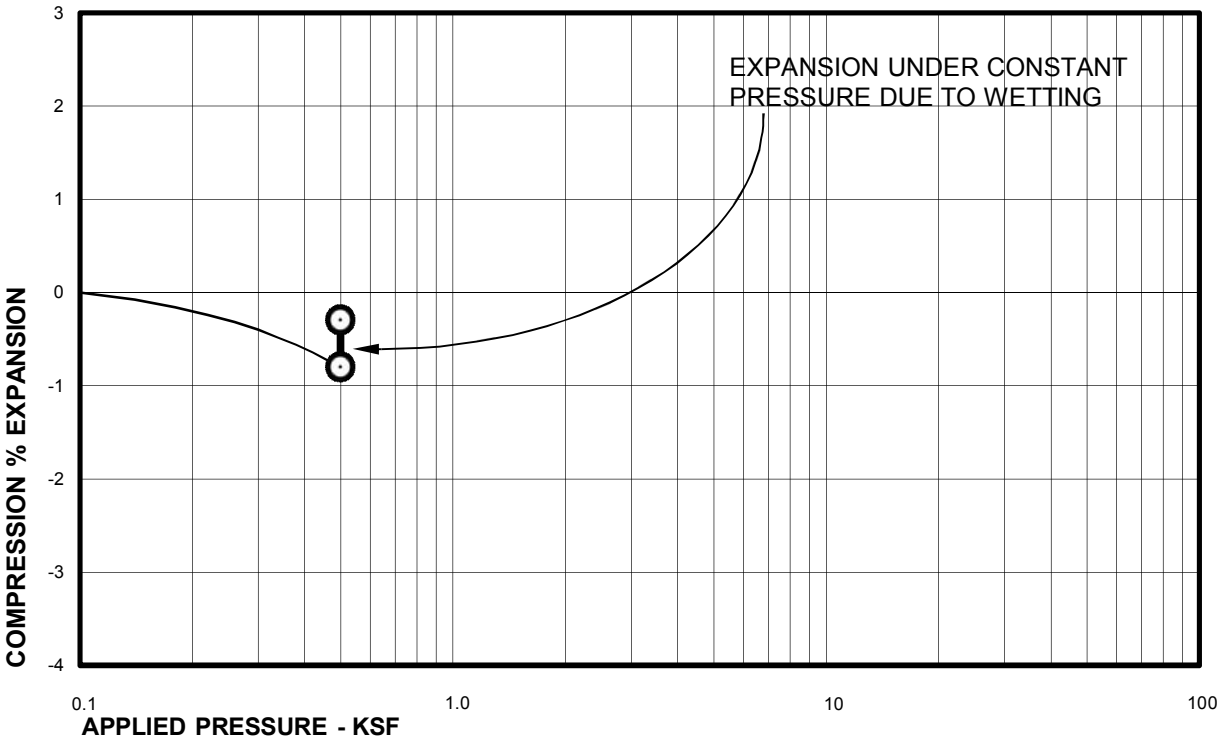
Sample of CLAY, SANDY (CL)
From TH-30 AT 9 FEET

DRY UNIT WEIGHT= 110 PCF
MOISTURE CONTENT= 17.8 %

Swell Consolidation Test Results

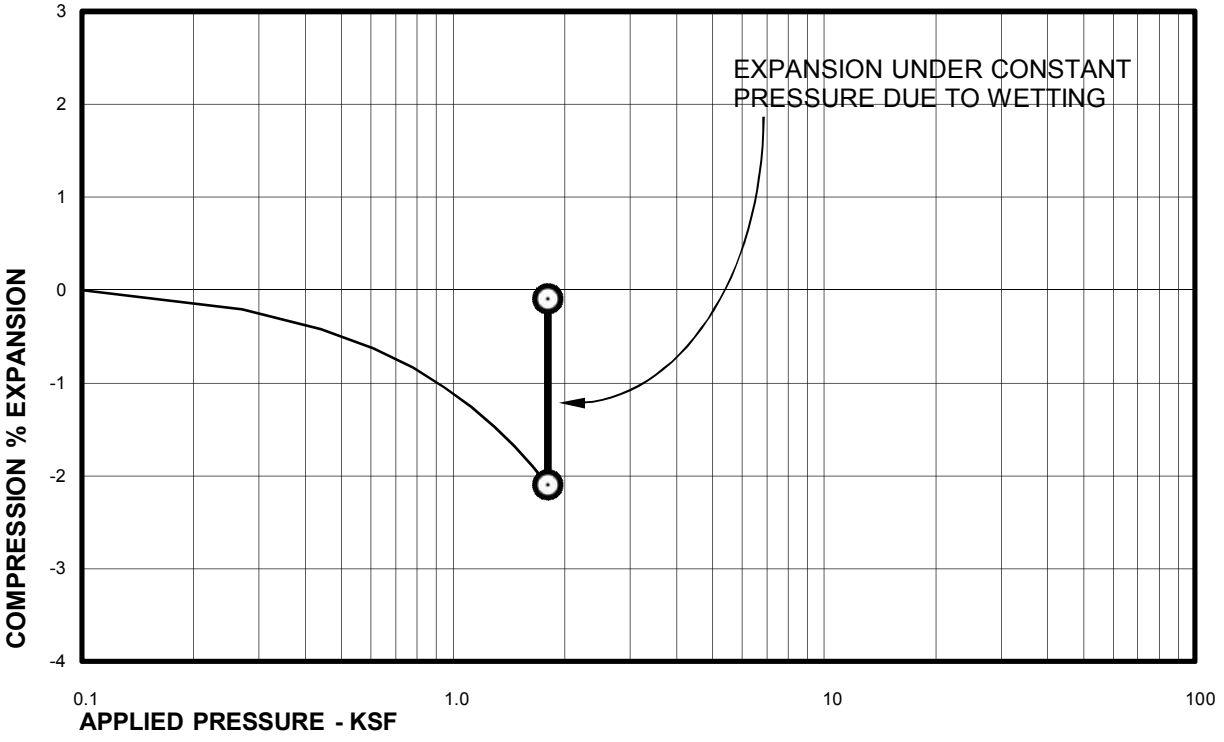
FIG. B-14

EVERGREEN DEVELOPMENT
NINE MILE CORNER APARTMENTS
CTL|T PROJECT NO. DN48,647-125-R2



Sample of CLAY, SANDY (CL) DRY UNIT WEIGHT= 107 PCF

From TH-31 AT 4 FEET MOISTURE CONTENT= 7.7 %



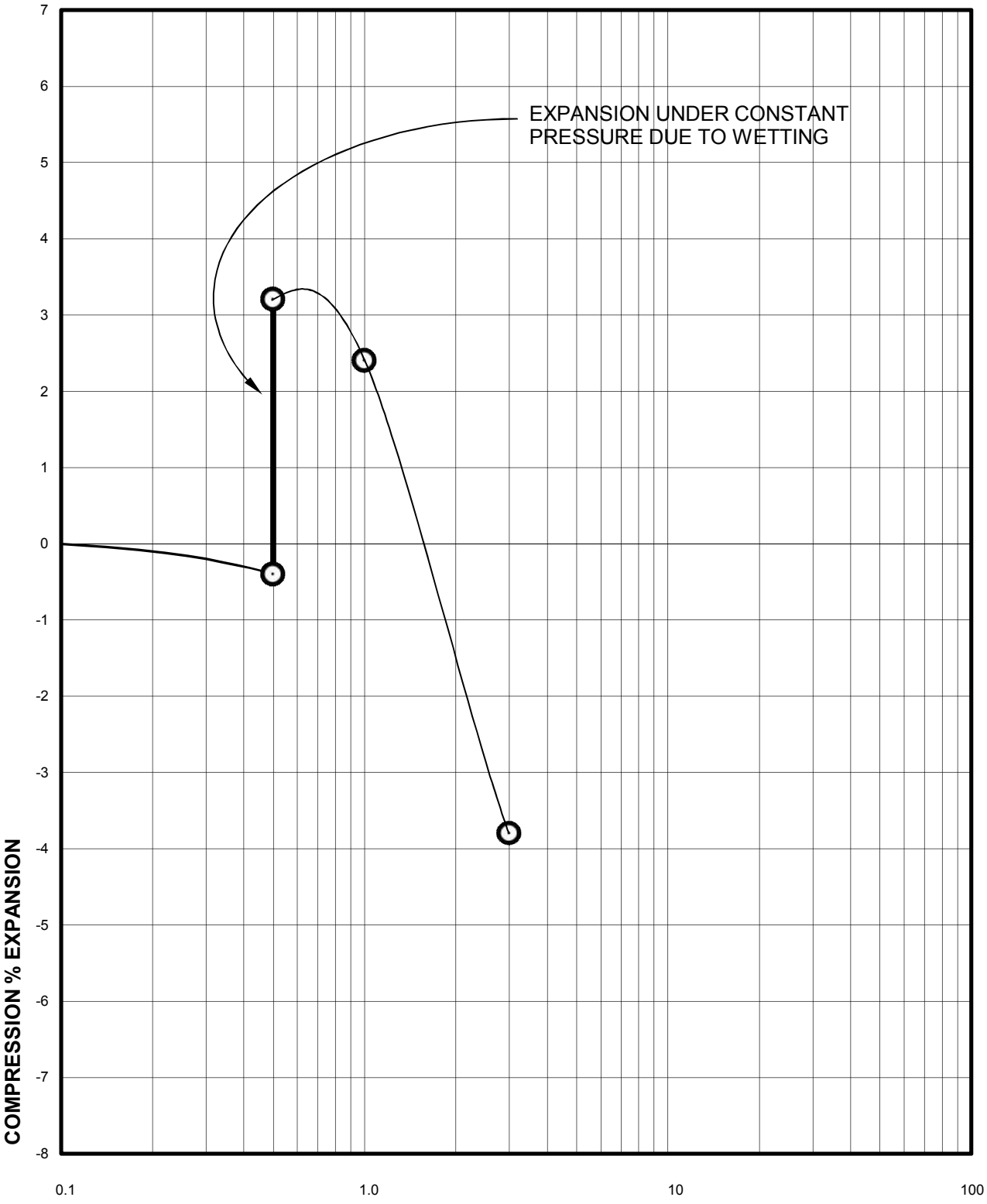
Sample of CLAYSTONE DRY UNIT WEIGHT= 115 PCF

From TH-31 AT 14 FEET MOISTURE CONTENT= 13.3 %

Swell Consolidation Test Results

FIG. B-15

EVERGREEN DEVELOPMENT
NINE MILE CORNER APARTMENTS
CTL|T PROJECT NO. DN48,647-125-R2



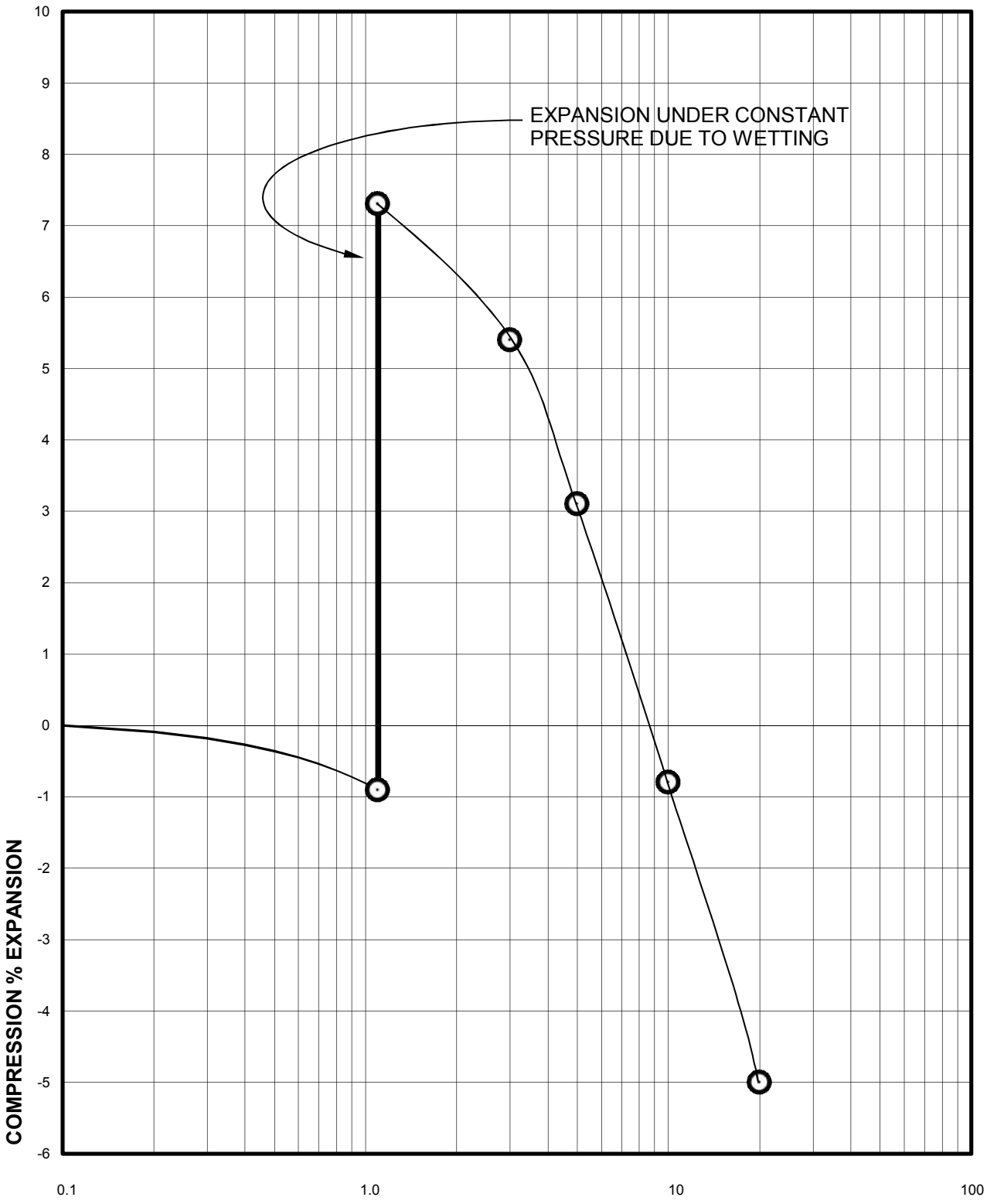
Sample of CLAY, SANDY (CL)
From TH-32 AT 4 FEET

DRY UNIT WEIGHT= 101 PCF
MOISTURE CONTENT= 9.6 %

Swell Consolidation Test Results

FIG. B-16

EVERGREEN DEVELOPMENT
NINE MILE CORNER APARTMENTS
CTL|T PROJECT NO. DN48,647-125-R2



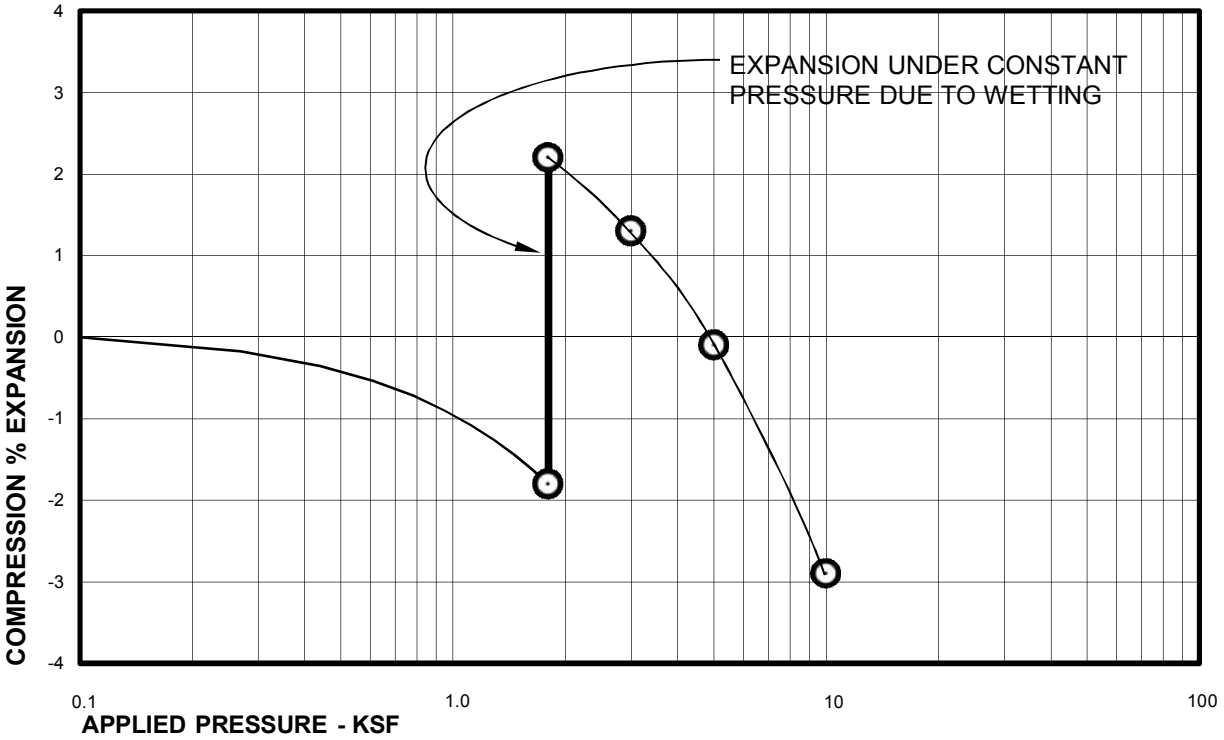
Sample of WEATHERED CLAYSTONE
From TH-32 AT 9 FEET

DRY UNIT WEIGHT= 108 PCF
MOISTURE CONTENT= 17.8 %

Swell Consolidation Test Results

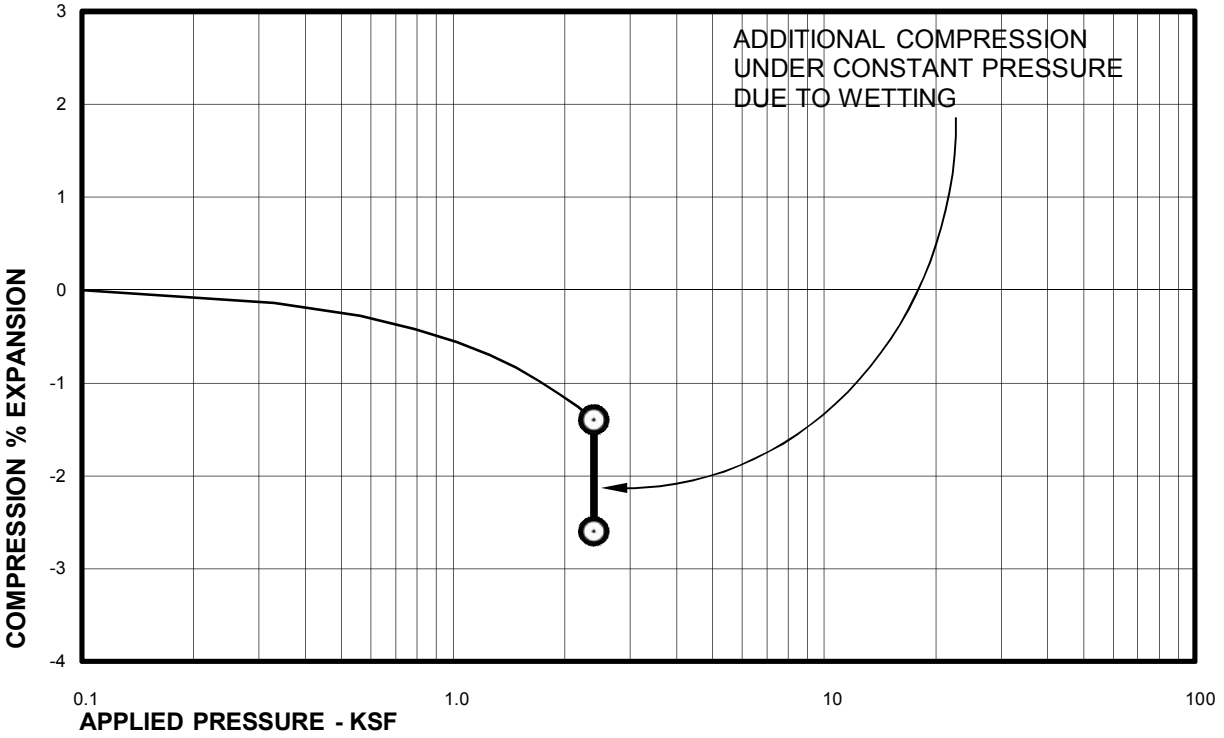
FIG. B-17

EVERGREEN DEVELOPMENT
NINE MILE CORNER APARTMENTS
CTL|T PROJECT NO. DN48,647-125-R2



Sample of WEATHERED CLAYSTONE
From TH-32 AT 14 FEET

DRY UNIT WEIGHT= 118 PCF
MOISTURE CONTENT= 13.5 %



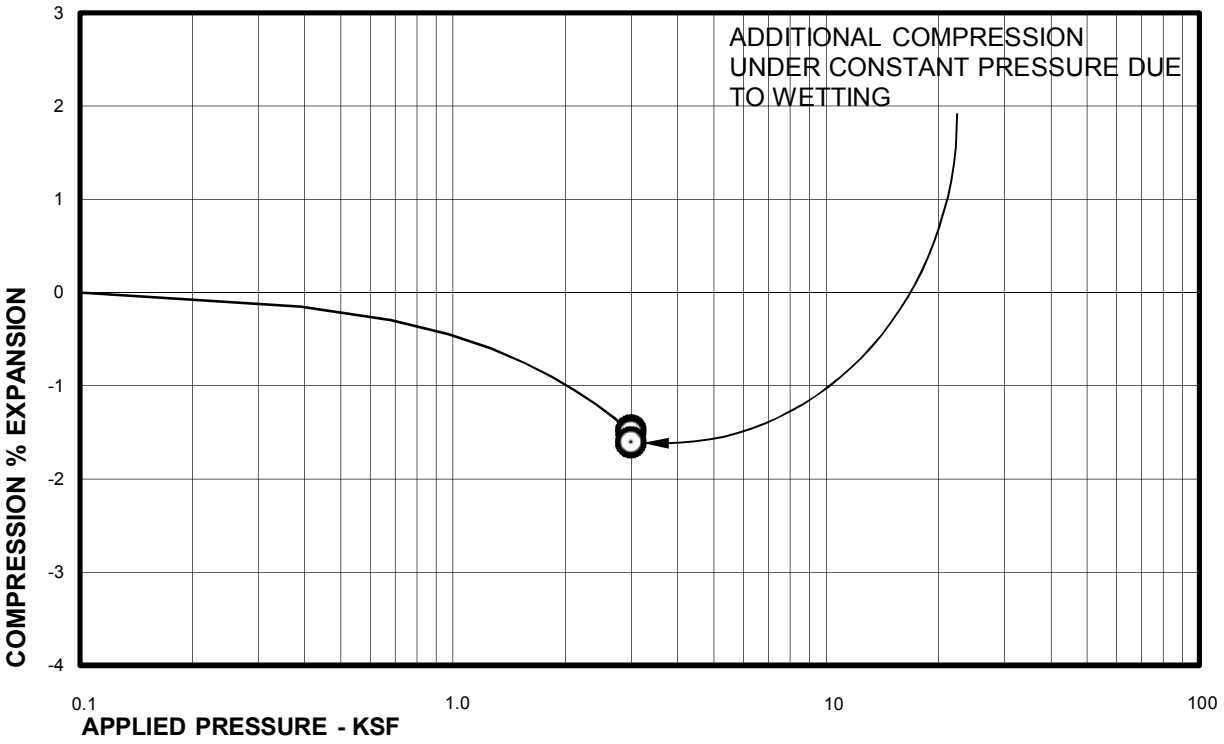
Sample of CLAYSTONE
From TH-32 AT 19 FEET

DRY UNIT WEIGHT= 115 PCF
MOISTURE CONTENT= 10.8 %

Swell Consolidation Test Results

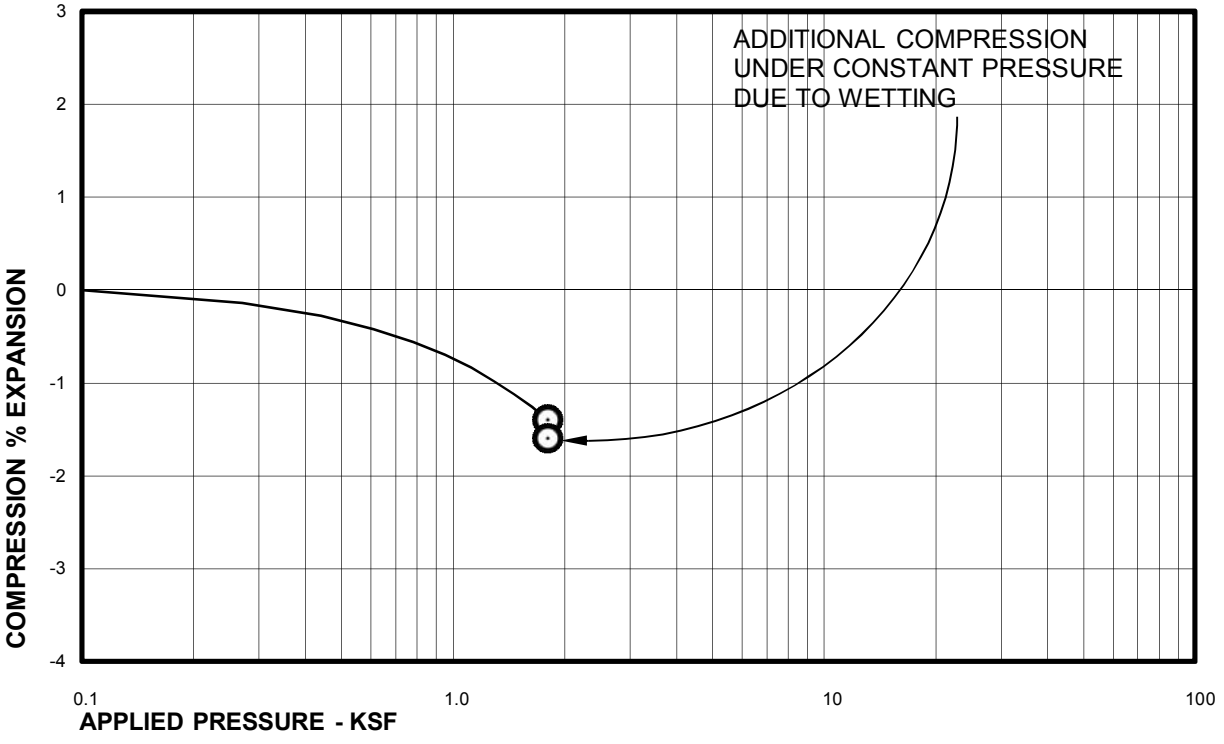
FIG. B-18

EVERGREEN DEVELOPMENT
NINE MILE CORNER APARTMENTS
CTL|T PROJECT NO. DN48,647-125-R2



Sample of CLAYSTONE
From TH-32 AT 24 FEET

DRY UNIT WEIGHT= 119 PCF
MOISTURE CONTENT= 12.2 %



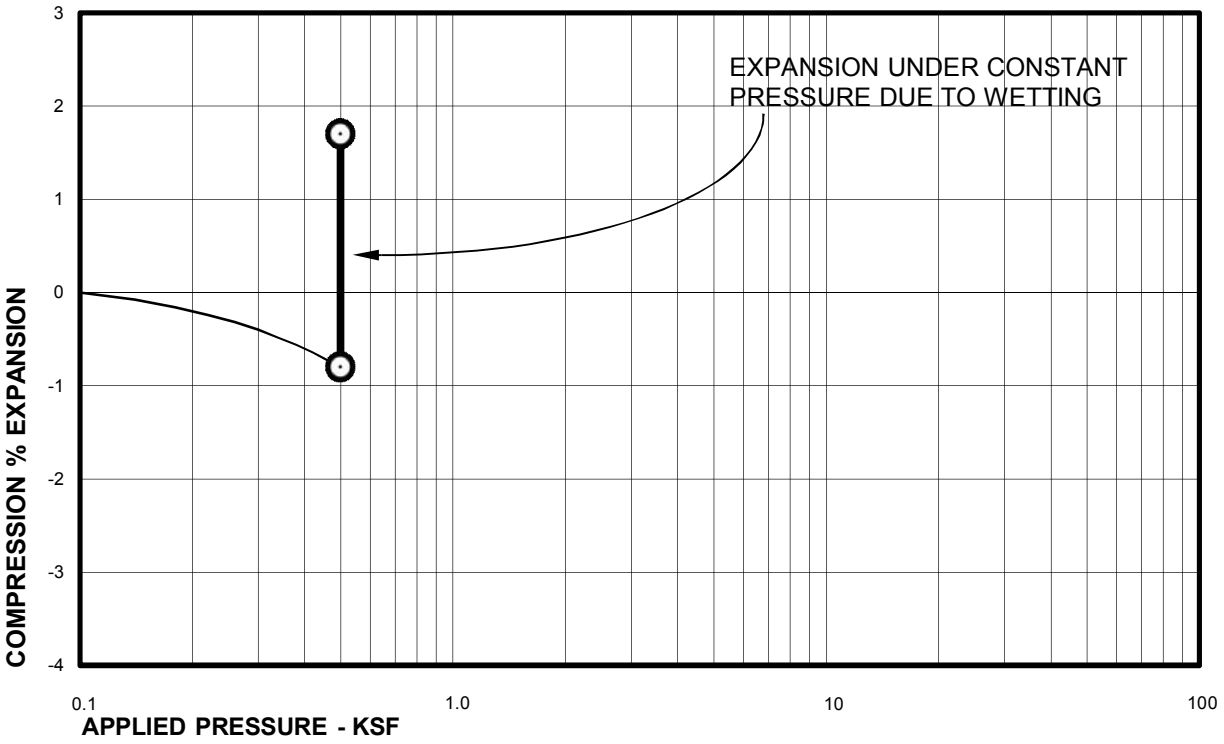
Sample of CLAYSTONE
From TH-33 AT 14 FEET

DRY UNIT WEIGHT= 104 PCF
MOISTURE CONTENT= 11.0 %

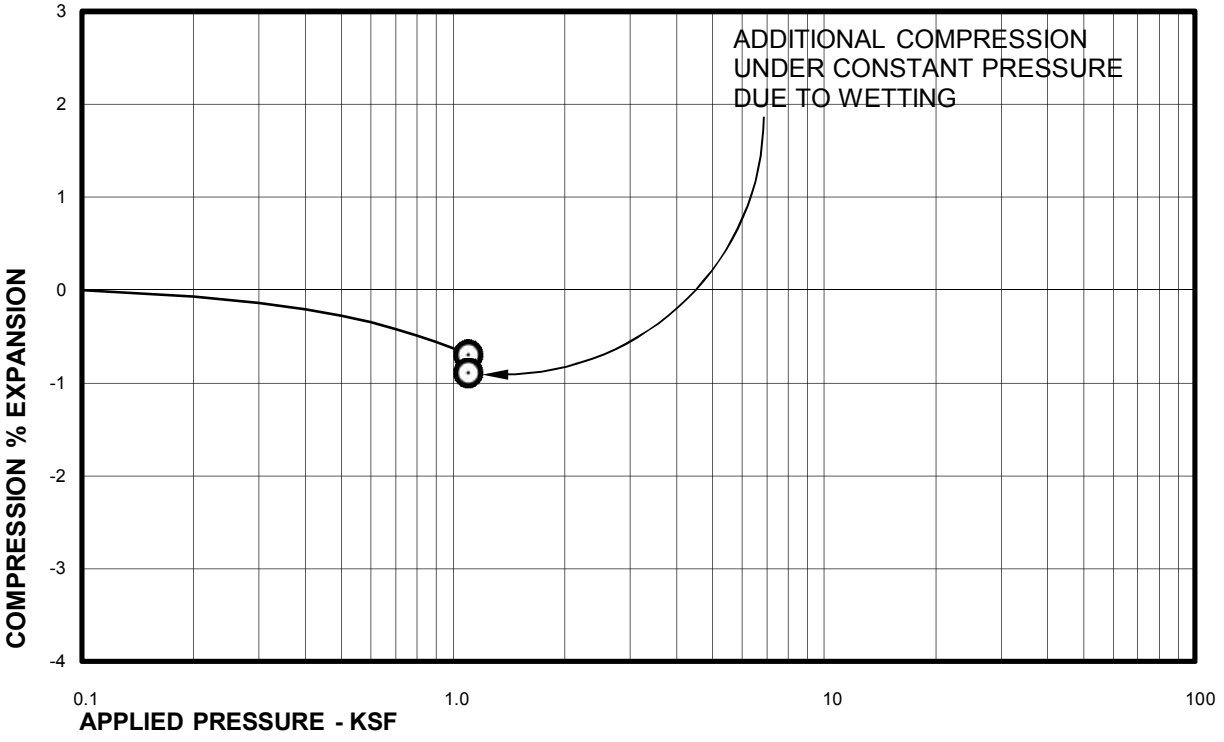
Swell Consolidation Test Results

FIG. B-19

EVERGREEN DEVELOPMENT
NINE MILE CORNER APARTMENTS
CTL|T PROJECT NO. DN48,647-125-R2



Sample of CLAY, SANDY (CL) DRY UNIT WEIGHT= 102 PCF
From TH-34 AT 4 FEET MOISTURE CONTENT= 7.2 %

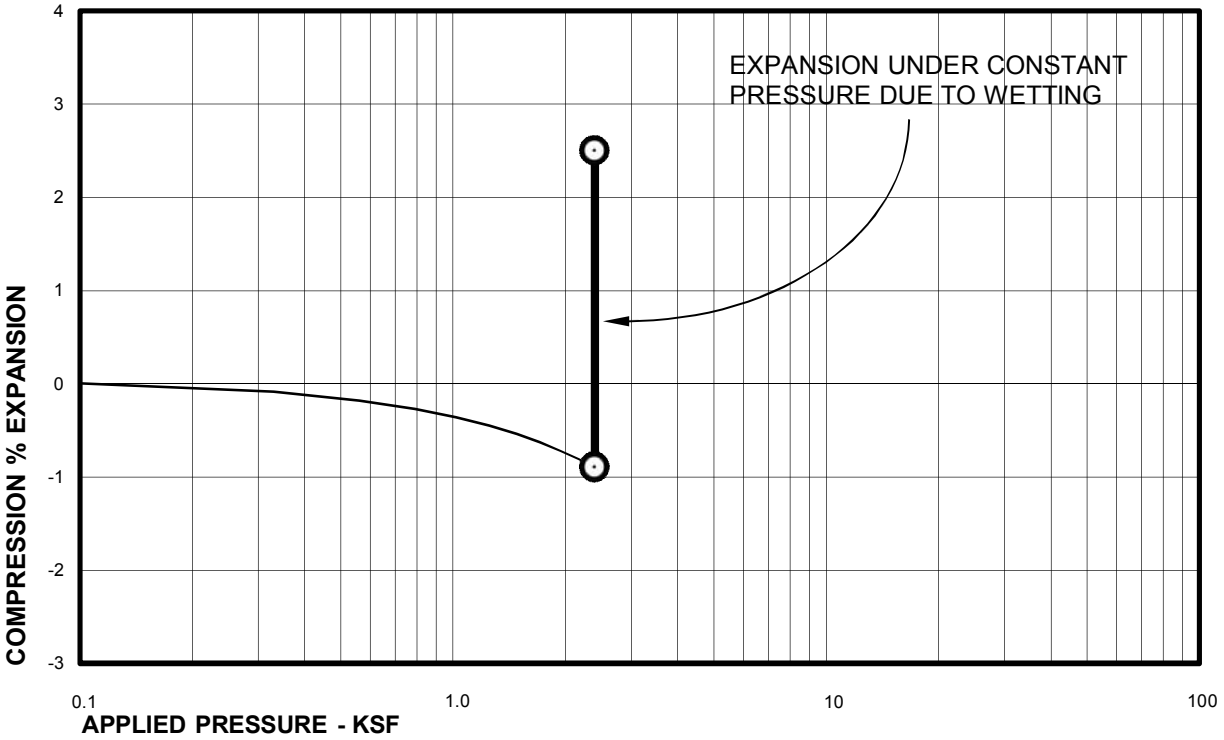


Sample of CLAY, SANDY (CL) DRY UNIT WEIGHT= 107 PCF
From TH-34 AT 9 FEET MOISTURE CONTENT= 5.1 %

Swell Consolidation Test Results

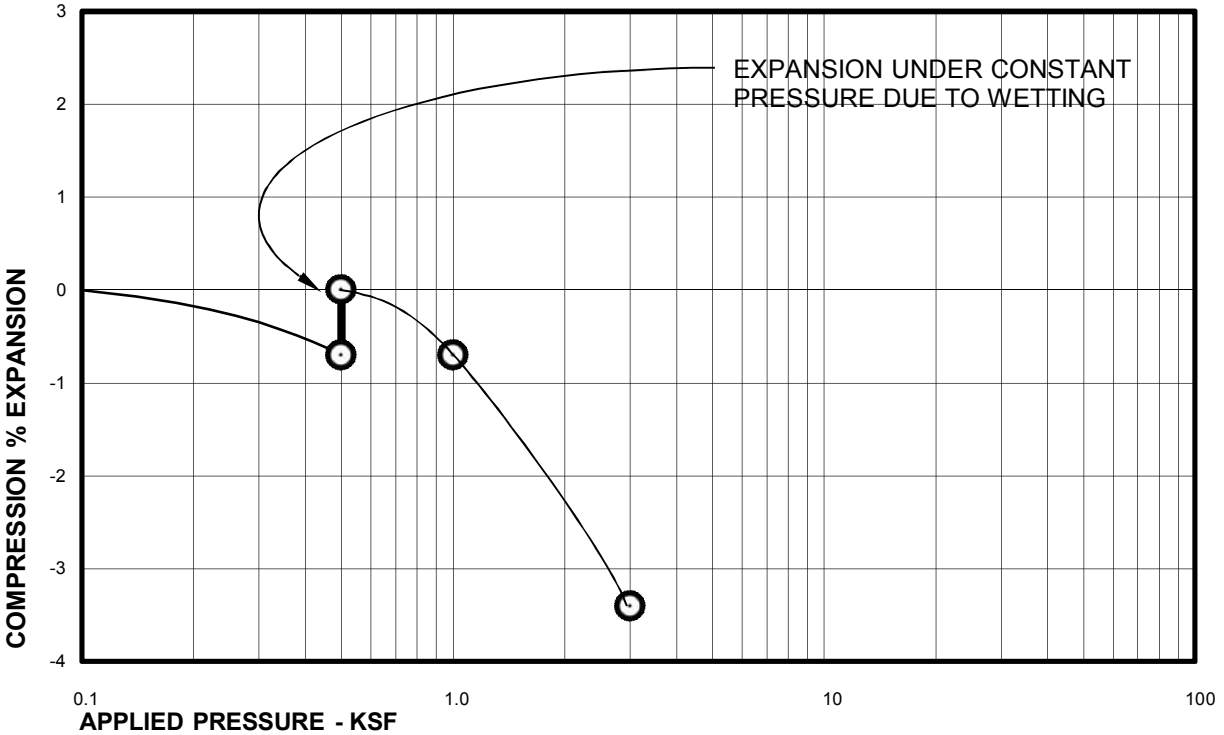
FIG. B-20

EVERGREEN DEVELOPMENT
NINE MILE CORNER APARTMENTS
CTL|T PROJECT NO. DN48,647-125-R2



Sample of INTERBEDDED CLAYSTONE/SANDSTONE
From TH-34 AT 19 FEET

DRY UNIT WEIGHT= 127 PCF
MOISTURE CONTENT= 8.5 %



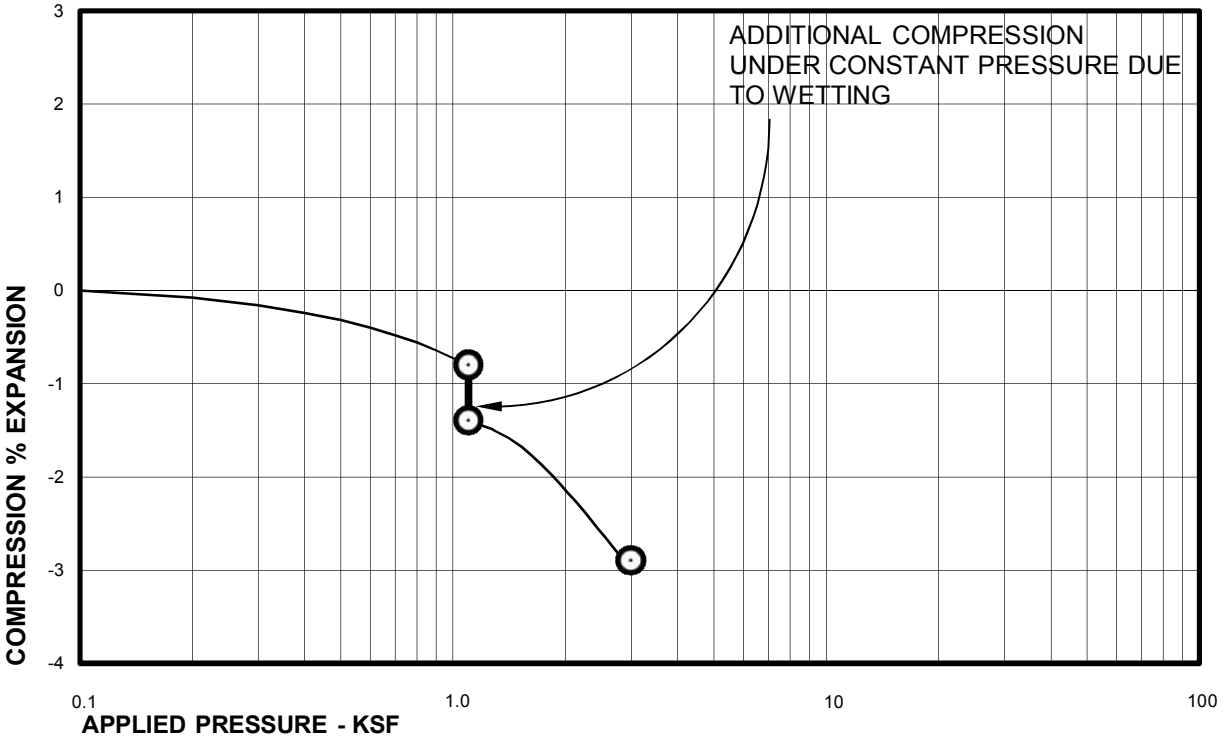
Sample of CLAY, SANDY (CL)
From TH-35 AT 4 FEET

DRY UNIT WEIGHT= 106 PCF
MOISTURE CONTENT= 7.0 %

Swell Consolidation Test Results

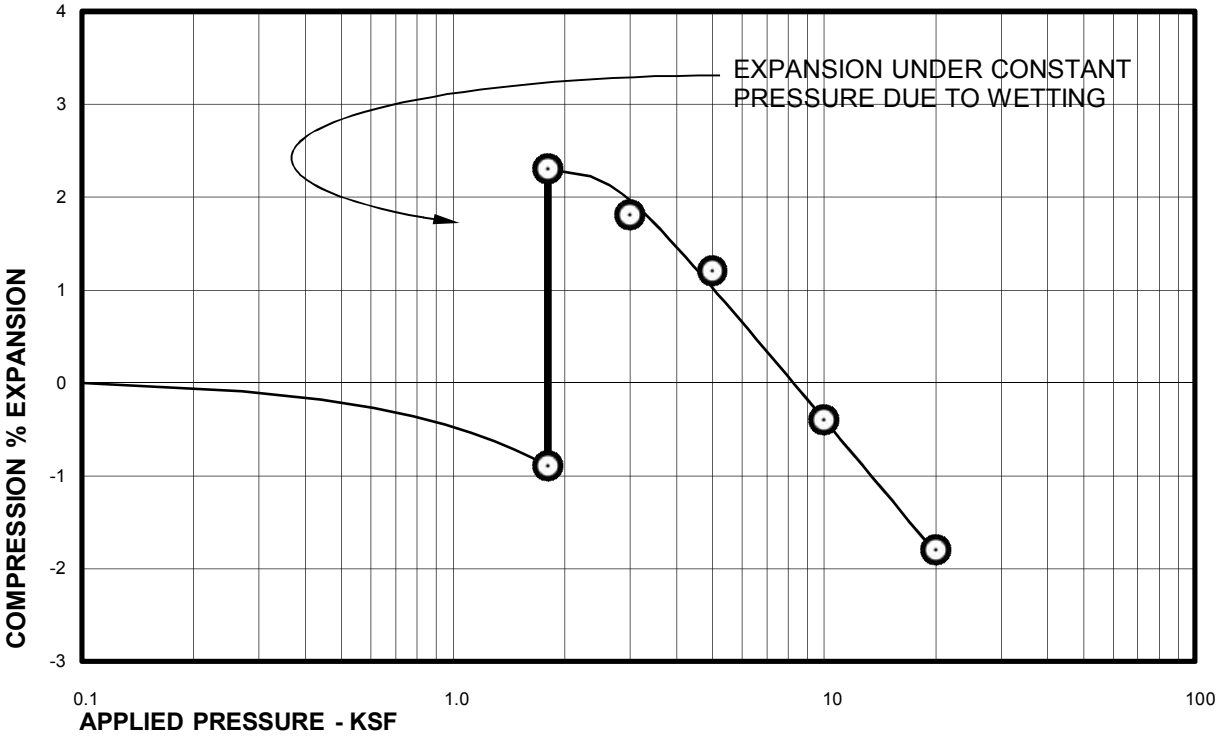
FIG. B-21

EVERGREEN DEVELOPMENT
NINE MILE CORNER APARTMENTS
CTL|T PROJECT NO. DN48,647-125-R2



Sample of CLAY, SANDY (CL) DRY UNIT WEIGHT= 115 PCF

From TH-35 AT 9 FEET MOISTURE CONTENT= 4.6 %



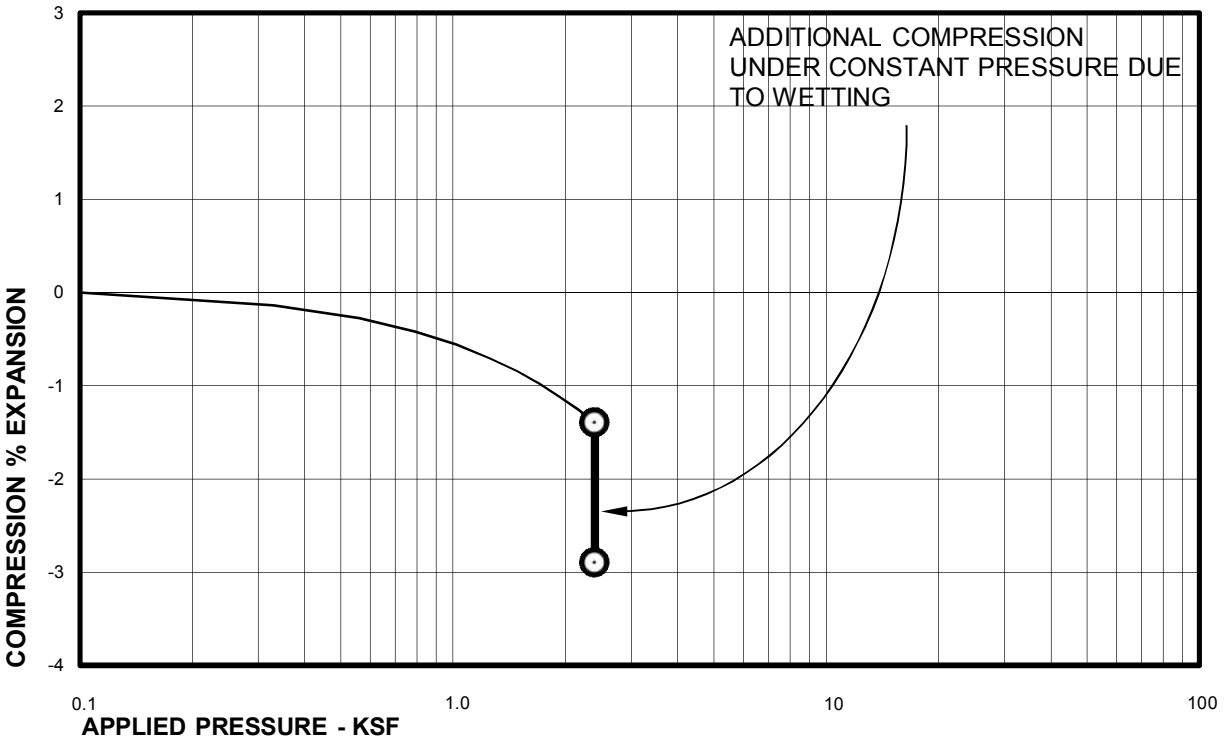
Sample of CLAY, SANDY (CL) DRY UNIT WEIGHT= 123 PCF

From TH-35 AT 14 FEET MOISTURE CONTENT= 10.6 %

Swell Consolidation Test Results

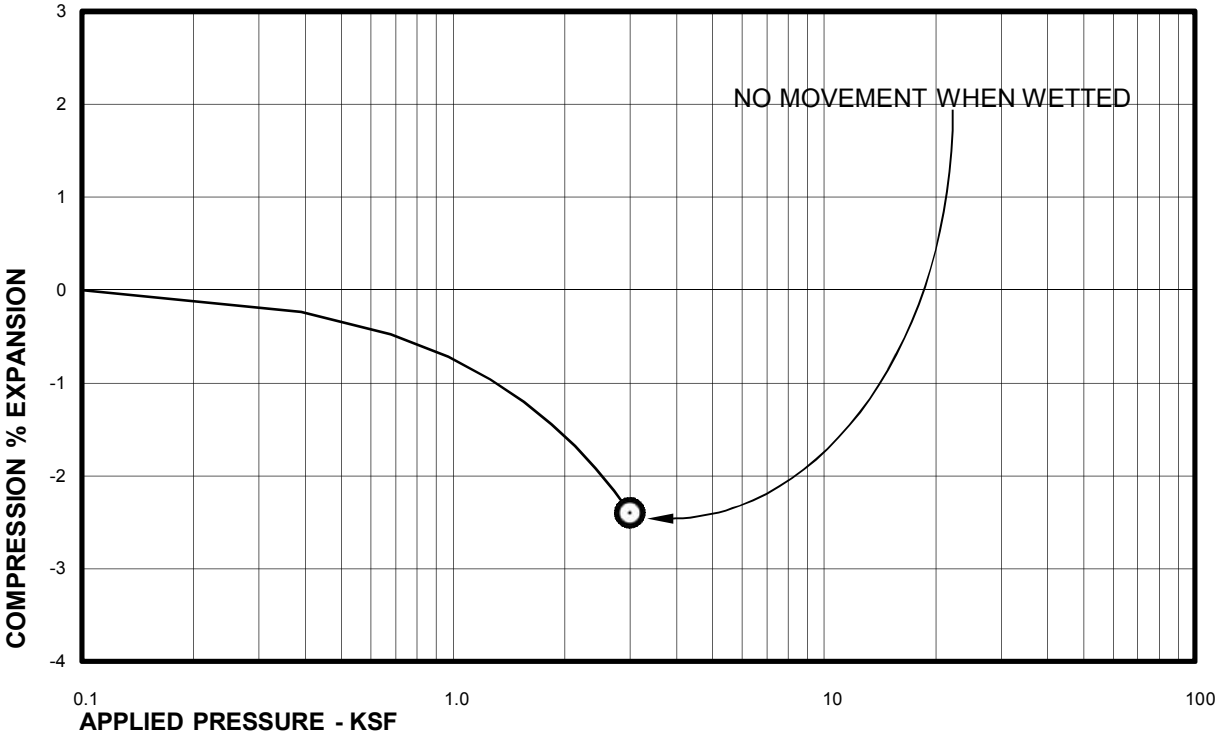
FIG. B-22

EVERGREEN DEVELOPMENT
NINE MILE CORNER APARTMENTS
CTL|T PROJECT NO. DN48,647-125-R2



Sample of INTERBEDDED CLAYSTONE/SANDSTONE
From TH-35 AT 19 FEET

DRY UNIT WEIGHT= 110 PCF
MOISTURE CONTENT= 9.1 %



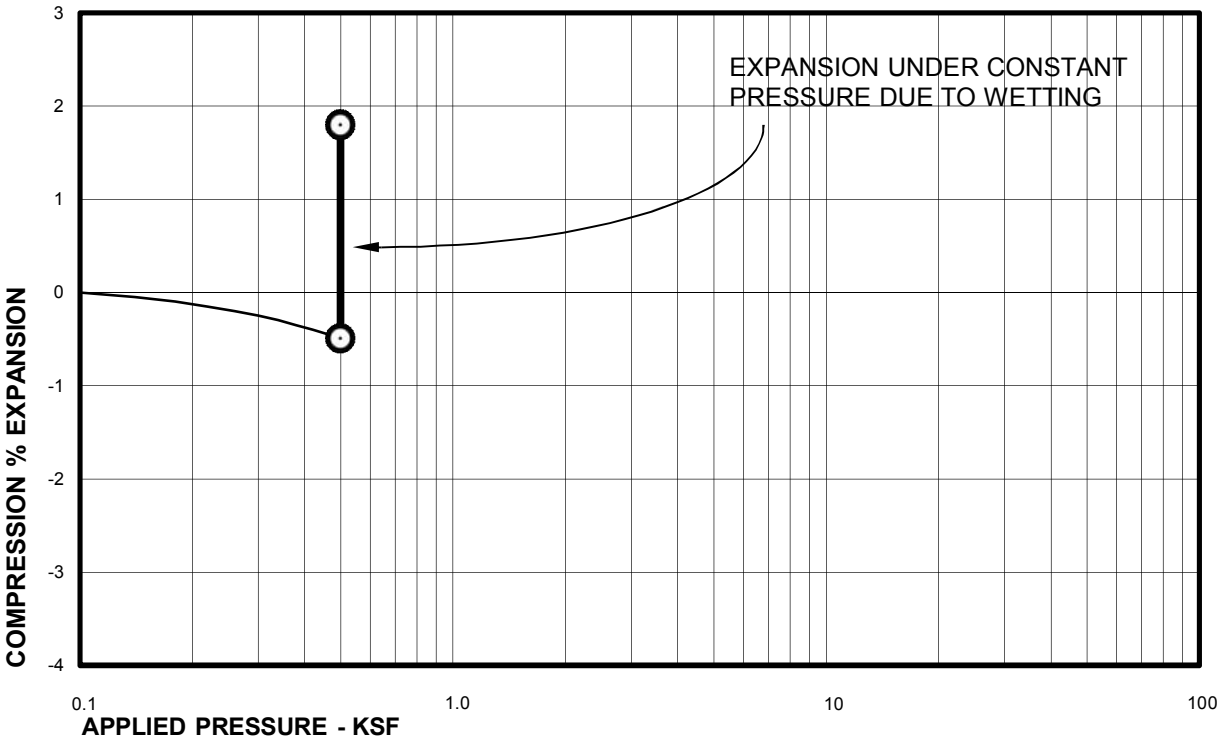
Sample of INTERBEDDED CLAYSTONE/SANDSTONE
From TH-35 AT 24 FEET

DRY UNIT WEIGHT= 123 PCF
MOISTURE CONTENT= 11.0 %

Swell Consolidation Test Results

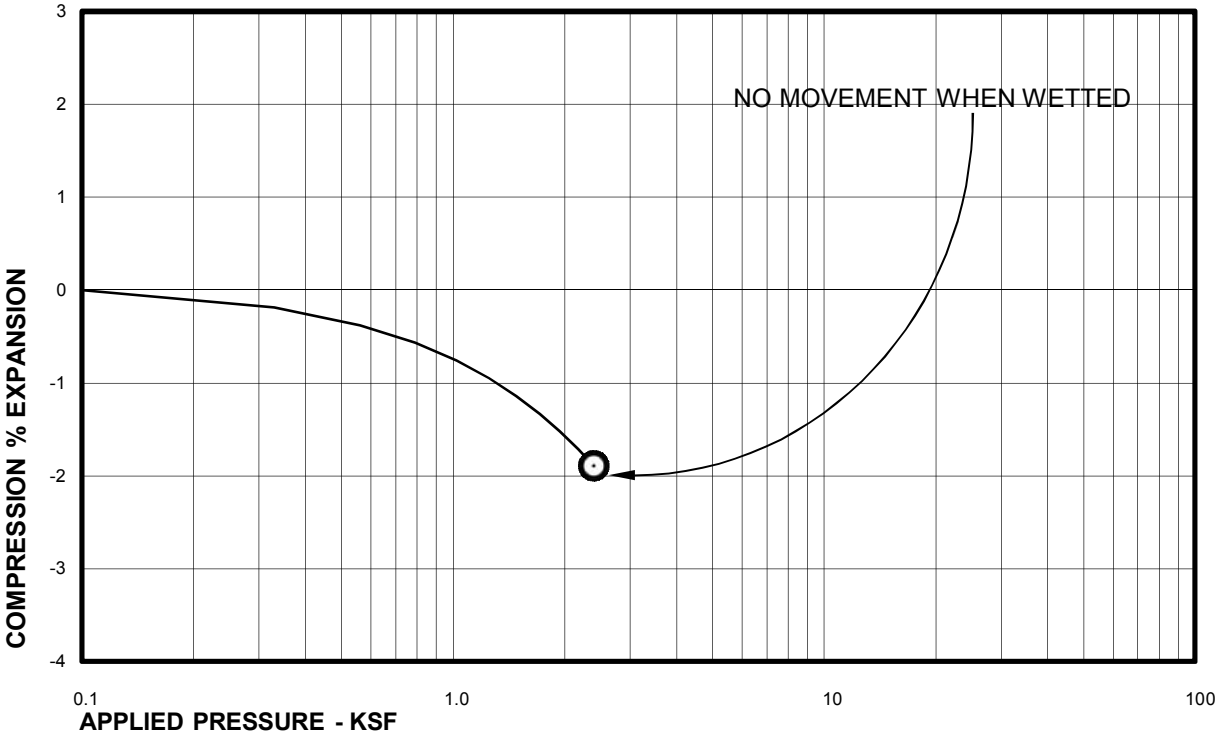
FIG. B-23

EVERGREEN DEVELOPMENT
NINE MILE CORNER APARTMENTS
CTL|T PROJECT NO. DN48,647-125-R2



Sample of CLAY, SANDY (CL)
From TH-36 AT 4 FEET

DRY UNIT WEIGHT= 104 PCF
MOISTURE CONTENT= 8.5 %



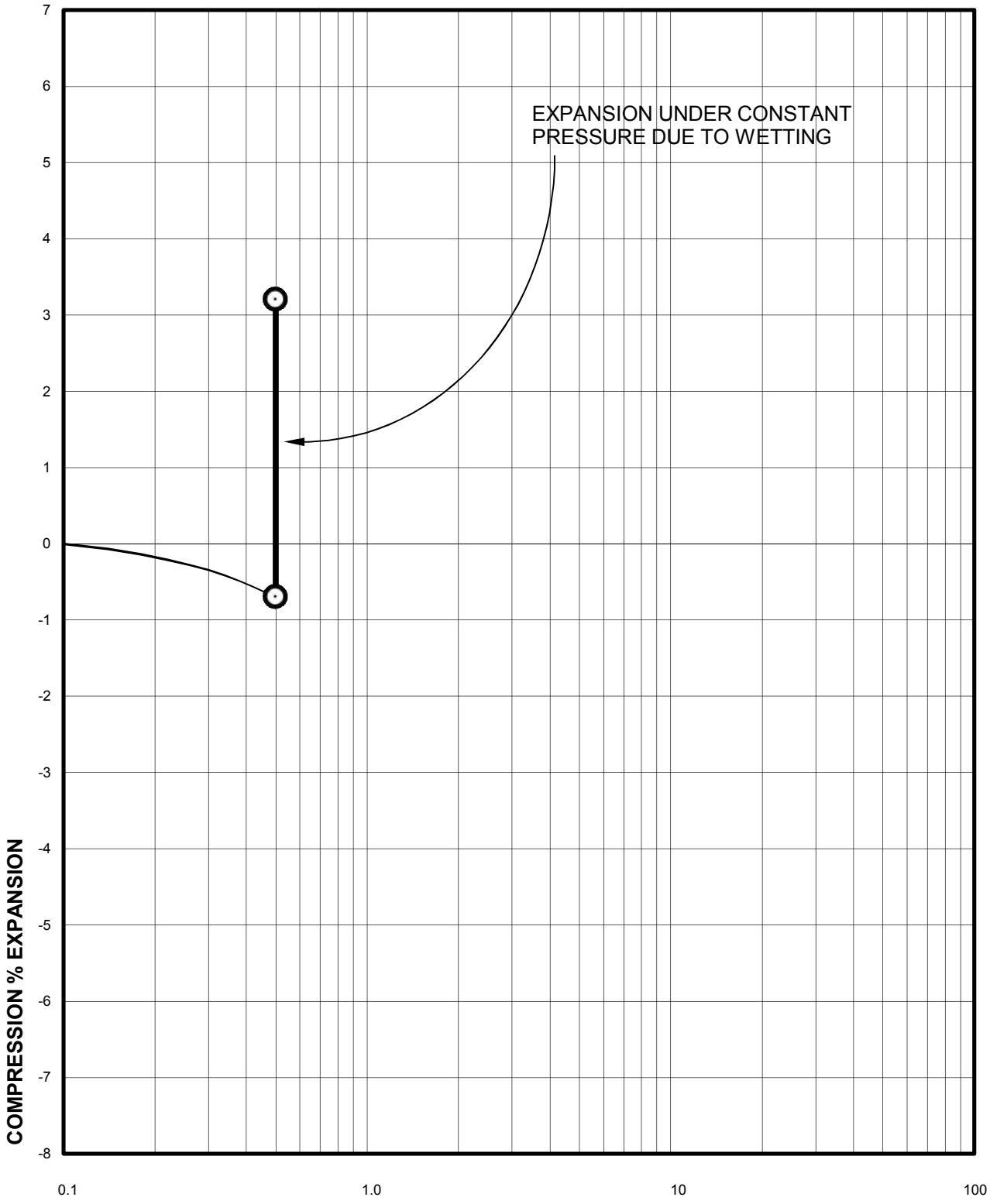
Sample of CLAY, SANDY (CL)
From TH-36 AT 19 FEET

DRY UNIT WEIGHT= 116 PCF
MOISTURE CONTENT= 15.1 %

Swell Consolidation Test Results

FIG. B-24

EVERGREEN DEVELOPMENT
NINE MILE CORNER APARTMENTS
CTL|T PROJECT NO. DN48,647-125-R2



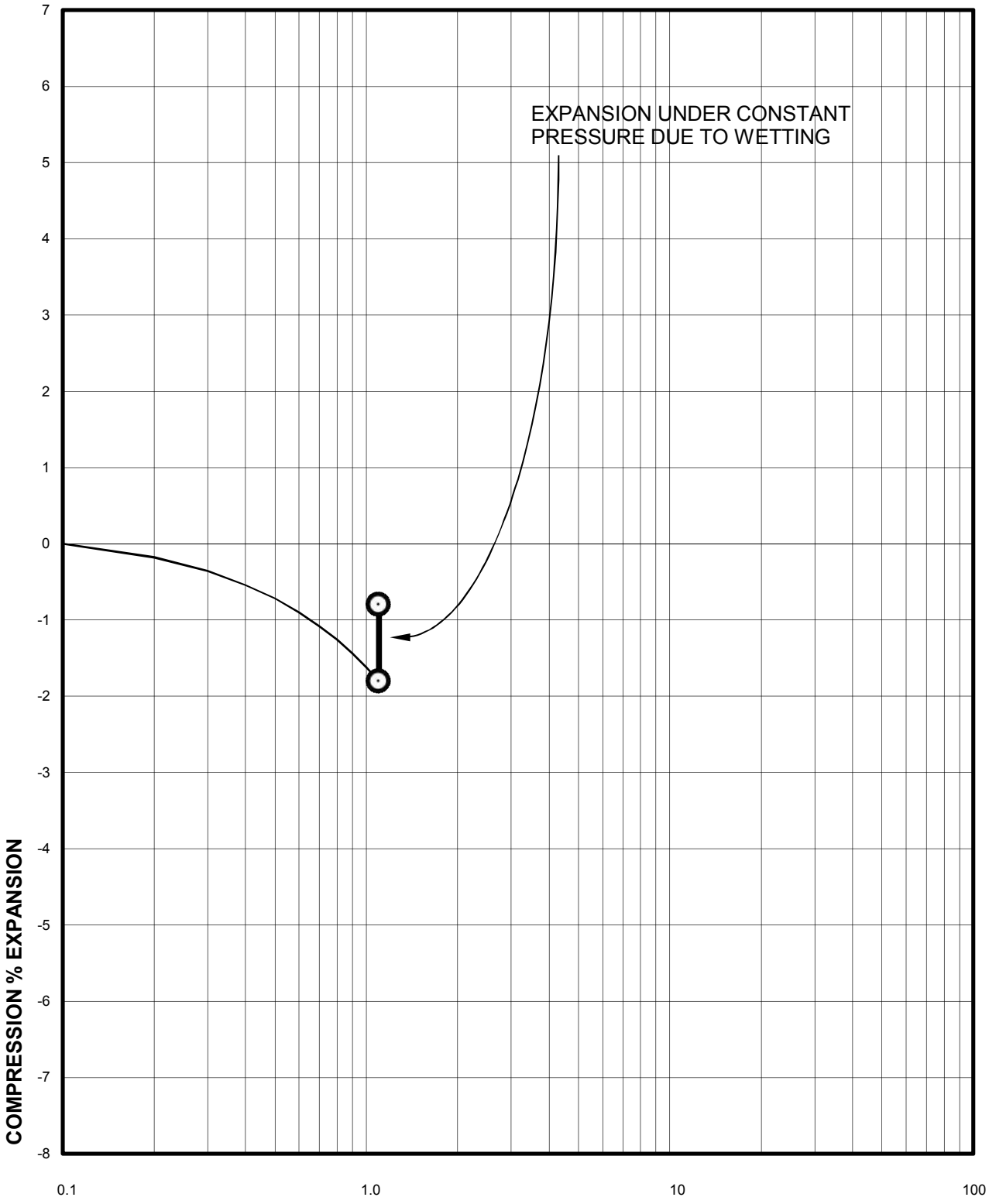
Sample of CLAY, SANDY (CL)
From TH-37 AT 4 FEET

DRY UNIT WEIGHT= 122 PCF
MOISTURE CONTENT= 7.7 %

Swell Consolidation Test Results

FIG. B-25

EVERGREEN DEVELOPMENT
NINE MILE CORNER APARTMENTS
CTL|T PROJECT NO. DN48,647-125-R2



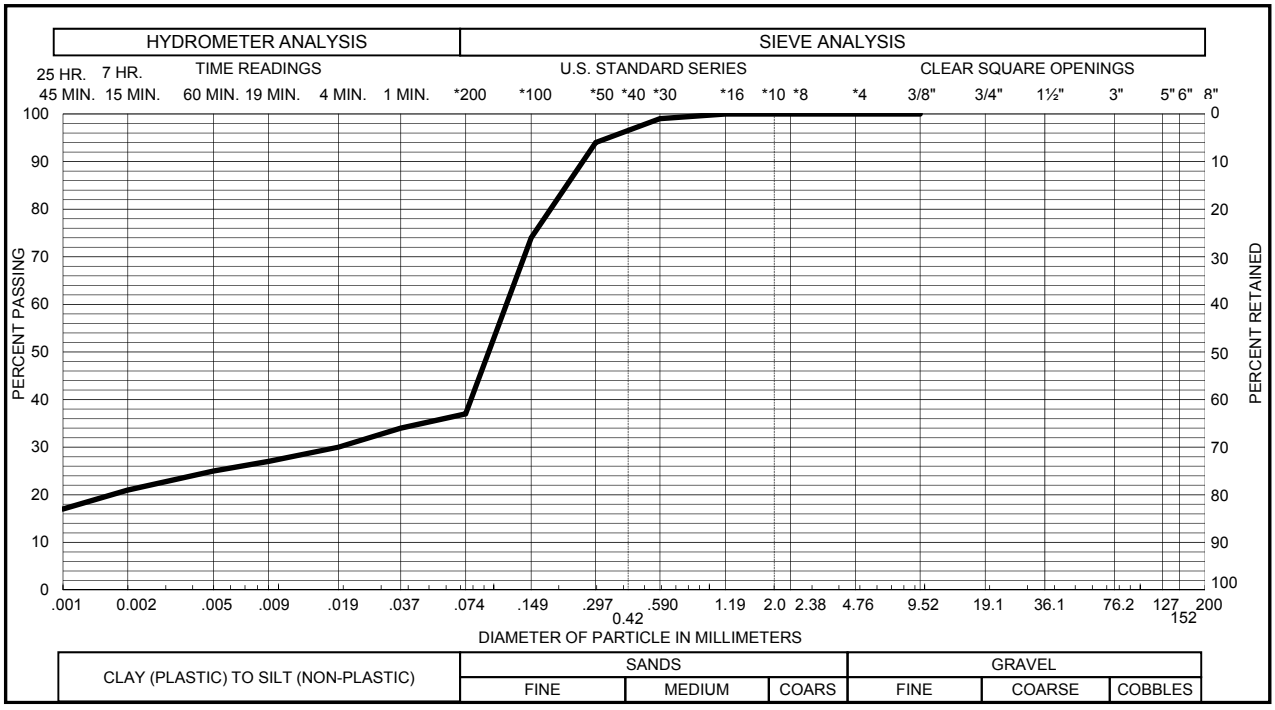
Sample of WEATHERED CLAYSTONE
From TH-37 AT 9 FEET

DRY UNIT WEIGHT= 115 PCF
MOISTURE CONTENT= 16.2 %

Swell Consolidation Test Results

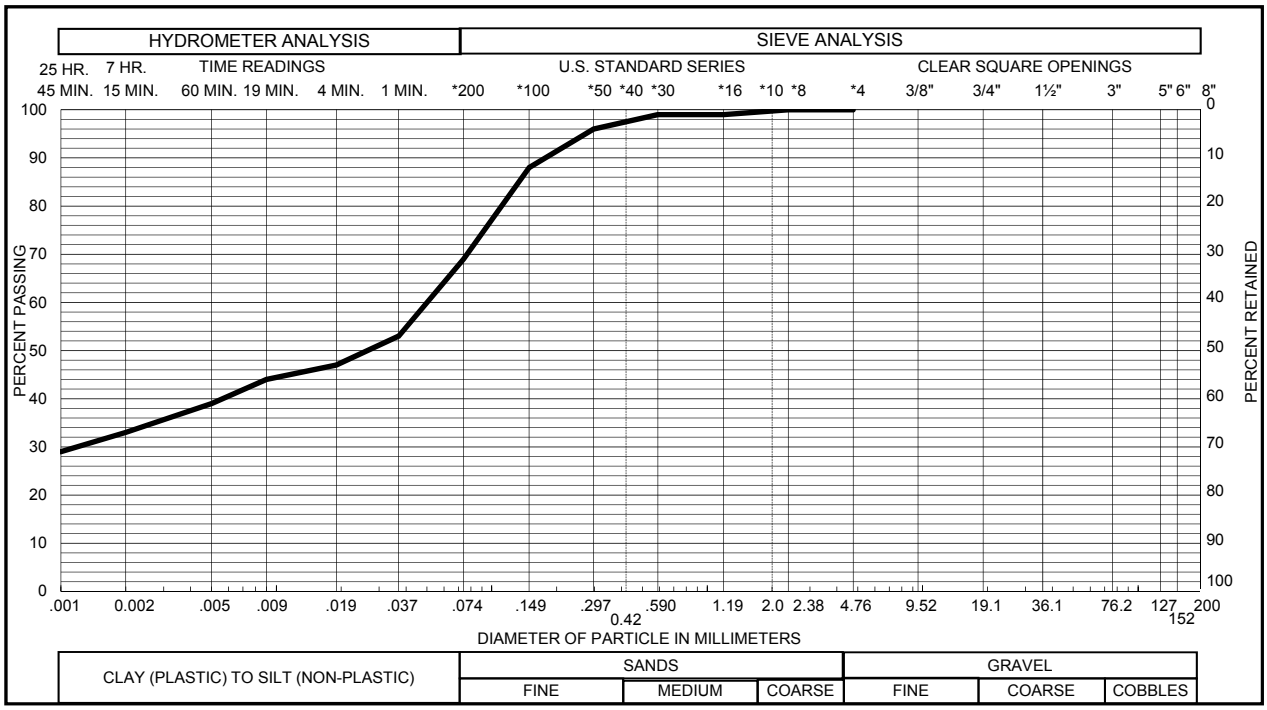
FIG. B-26

EVERGREEN DEVELOPMENT
NINE MILE CORNER APARTMENTS
CTL|T PROJECT NO. DN48,647-125-R2



Sample of CLAY, SANDY (CL)
From TH - 25 AT 9 FEET

GRAVEL 0 % SAND 63 %
SILT & CLAY 37 % LIQUID LIMIT
PLASTICITY INDEX

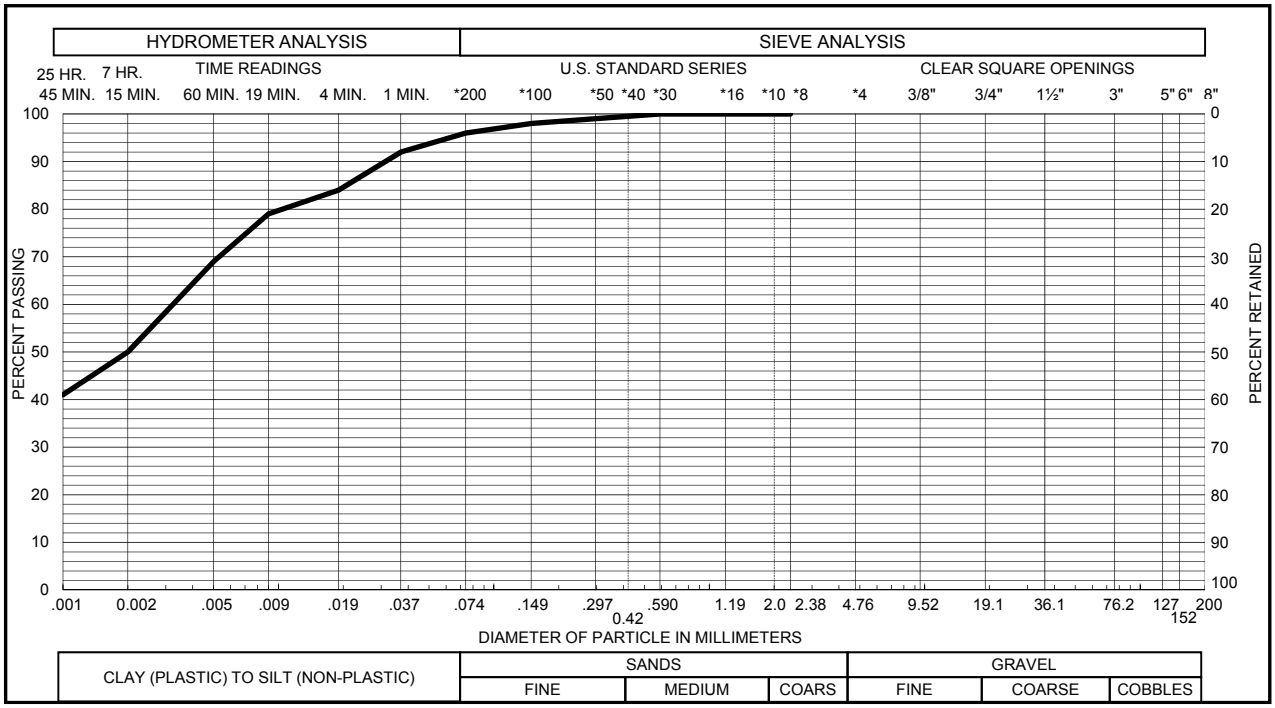


Sample of CLAY, SANDY (CL)
From TH - 29 AT 4 FEET

GRAVEL 0 % SAND 31 %
SILT & CLAY 69 % LIQUID LIMIT
PLASTICITY INDEX

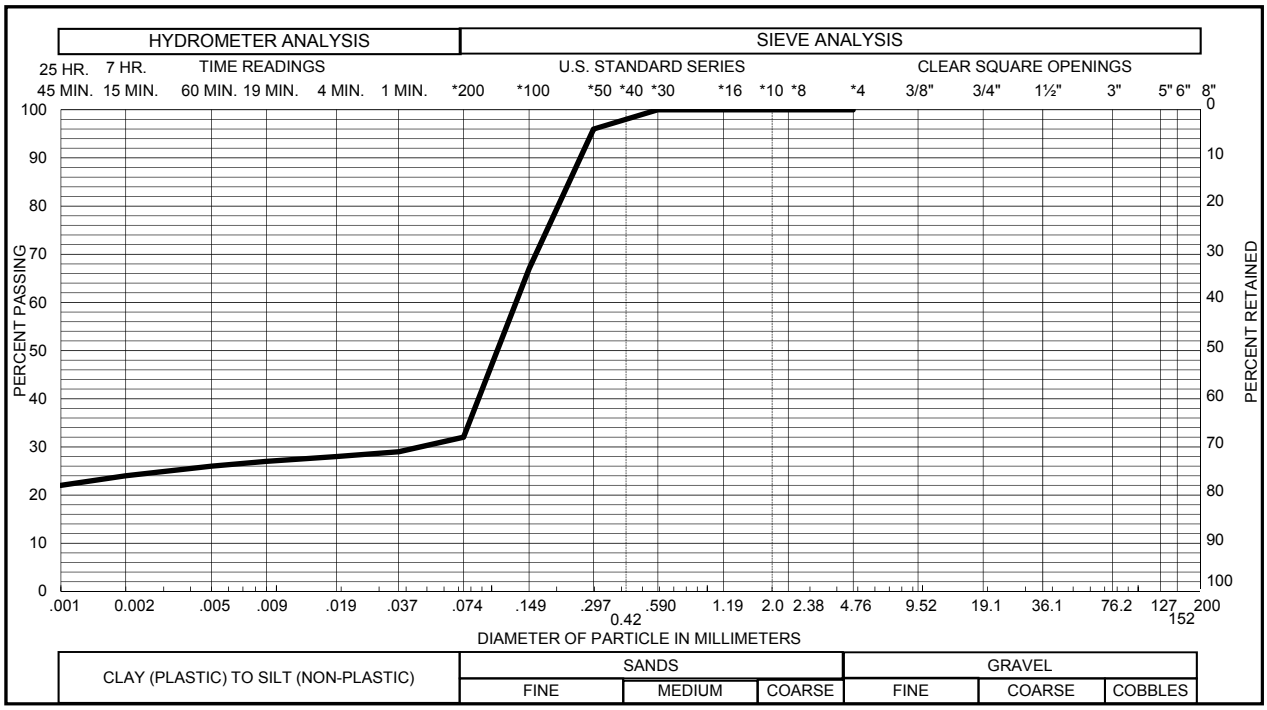
Gradation Test Results FIG. B-27

EVERGREEN DEVELOPMENT
NINE MILE CORNER APARTMENTS
CTL|T PROJECT NO. DN48,647-125-R2



Sample of CLAY, SANDY (CL)
From TH - 29 AT 14 FEET

GRAVEL 0 % SAND 4 %
SILT & CLAY 96 % LIQUID LIMIT
PLASTICITY INDEX

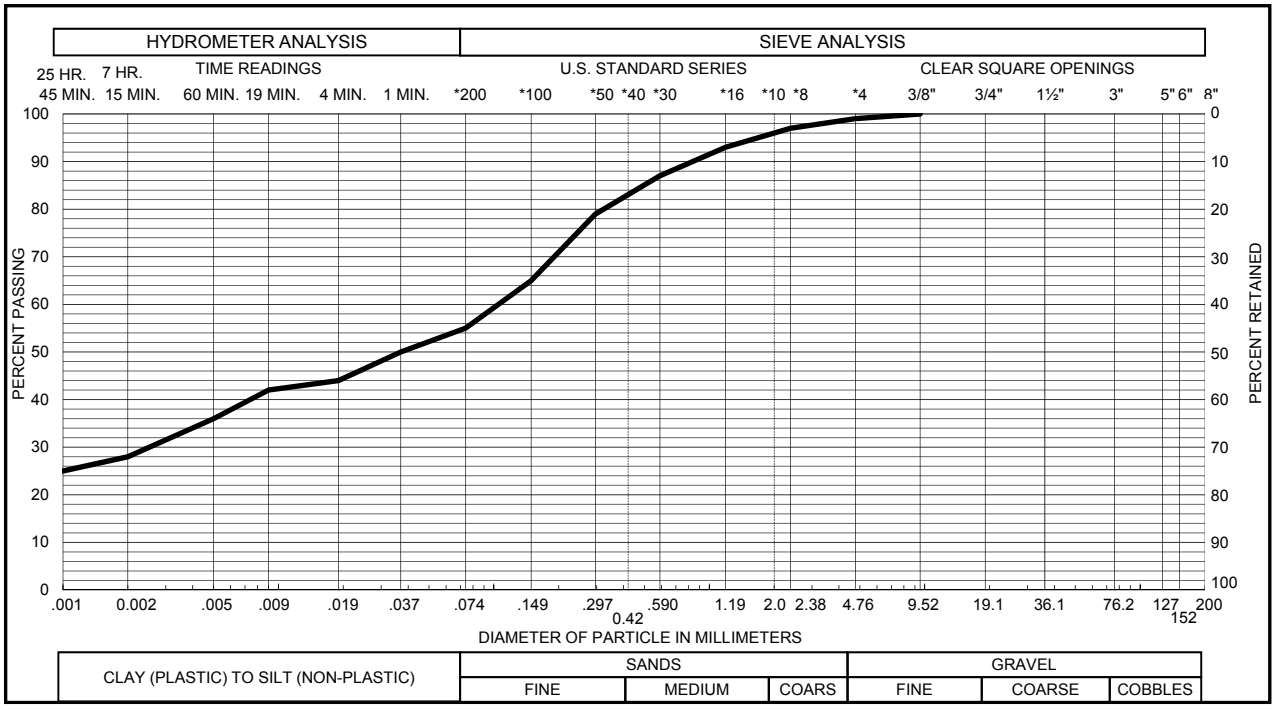


Sample of SAND, CLAYEY (SC)
From TH - 36 AT 14 FEET

GRAVEL 0 % SAND 68 %
SILT & CLAY 32 % LIQUID LIMIT
PLASTICITY INDEX

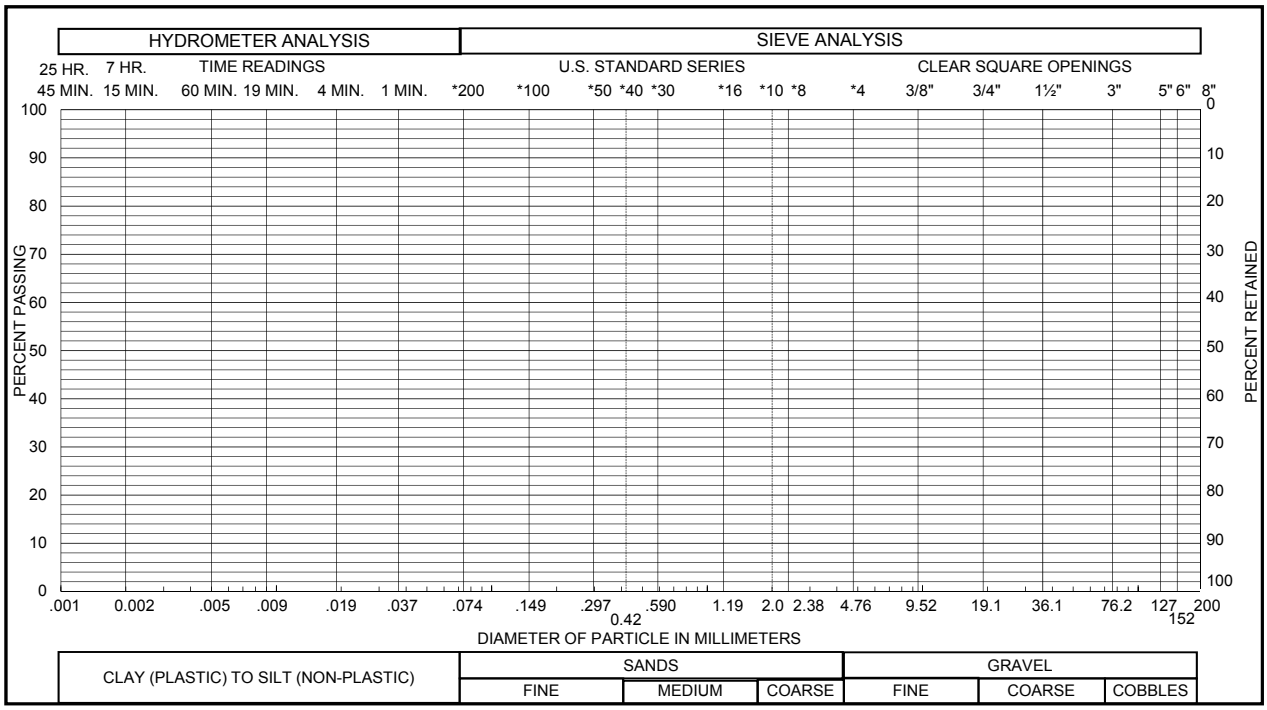
Gradation Test Results FIG. B-28

EVERGREEN DEVELOPMENT
NINE MILE CORNER APARTMENTS
CTL|T PROJECT NO. DN48,647-125-R2



Sample of CLAY, SANDY (CL)
From TH - 33 AT 9 FEET

GRAVEL 1 % SAND 44 %
SILT & CLAY 55 % LIQUID LIMIT
PLASTICITY INDEX



Sample of
From

GRAVEL % SAND %
SILT & CLAY % LIQUID LIMIT
PLASTICITY INDEX

Gradation Test Results FIG. B-29

EVERGREEN DEVELOPMENT
NINE MILE CORNER APARTMENTS
CTL|T PROJECT NO. DN48,647-125-R2

TABLE B - I

SUMMARY OF LABORATORY TEST RESULTS

BORING	DEPTH (ft)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	SWELL TEST DATA				SOIL SUCTION VALUE (pF)	ATTERBERG LIMITS		SOLUBLE SULFATE CONTENT (%)	PASSING NO. 200 SIEVE (%)	SOIL TYPE
				SWELL (%)	COMPRESSION (%)	APPLIED PRESSURE (psf)	SWELL PRESSURE (psf)		LIQUID LIMIT	PLASTICITY INDEX			
TH-12	9	8.6	117	3.0		500							CLAY, SANDY (CL)
TH-12	14	5.9	112									27	SAND, CLAYEY (SC)
TH-12	24	16.3	114	5.1		1,800							CLAYSTONE
TH-12	29	16.7	112	5.9		2,400							CLAYSTONE
TH-24	4	7.4	98		0.3	500							CLAY, SANDY (CL)
TH-24	14	9.7	129									74	CLAYSTONE/SANDSTONE
TH-24	19	25.3	100	2.4		2,400							CLAYSTONE
TH-25	4	9.4	106	2.0		500							CLAY, SANDY (CL)
TH-25	9	9.2	113						24	9		37	SAND, CLAYEY (SC)
TH-25	14	9.1	105		0.6	1,800							SAND, CLAYEY (SC)
TH-26	4	11.1	116	3.9		500	5,700	4.44					CLAY, SANDY (CL)
TH-26	9	12.7	121	0.6		1,100	3,000	3.29					CLAYSTONE/SANDSTONE
TH-26	14	12.0	124	0.0		1,800		3.34					CLAYSTONE/SANDSTONE
TH-26	19	10.4	116		0.3	2,400		3.43					CLAYSTONE/SANDSTONE
TH-26	24	11.5	116		0.4	3,000		2.99					CLAYSTONE/SANDSTONE
TH-27	4	6.6	114	3.9		500					0.19		CLAY, SANDY (CL)
TH-27	9	11.1	112		0.2	1,100							CLAY, SANDY (CL)
TH-27	19	20.5	108	0.8		2,400							WEATHERED CLAYSTONE
TH-28	4	17.1	114	0.6		500	1,300	3.85					CLAY, SANDY (CL)
TH-28	9	15.3	115		0.1	1,100		2.85					CLAY, SANDY (CL)
TH-28	14	15.9	115	0.0		1,800	2,100	3.17					CLAY, SANDY (CL)
TH-28	19	15.9	112	0.5		2,400	4,000	3.17					WEATHERED CLAYSTONE
TH-28	24	10.9	125	0.0		3,000		3.67					CLAYSTONE
TH-29	4	15.1	111						31	15		69	CLAY, SANDY (CL)
TH-29	9	15.8	107		0.2	1,100							CLAY, SANDY (CL)
TH-29	14	18.1	110						57	38		96	WEATHERED CLAYSTONE
TH-30	4	15.0	108	0.1		500							CLAY, SANDY (CL)
TH-30	9	17.8	110	0.6		1,100							CLAY, SANDY (CL)
TH-30	19	13.1	116									62	CLAYSTONE
TH-31	4	7.7	107	0.5		500					0.03		CLAY, SANDY (CL)
TH-31	14	13.3	115	2.0		1,800							CLAYSTONE
TH-32	4	9.6	101	3.6		500	1,800	4.59					CLAY, SANDY (CL)
TH-32	9	17.8	108	8.2		1,100	10,000	4.51					WEATHERED CLAYSTONE
TH-32	14	13.5	118	4.0		1,800	7,500	4.22					WEATHERED CLAYSTONE
TH-32	19	10.8	115		1.2	2,400		4.20					CLAYSTONE
TH-32	24	12.2	119		0.1	3,000		3.62					CLAYSTONE
TH-33	9	8.0							36	23		55	CLAY, SANDY (CL)
TH-33	14	11.0	104		0.2	1,800							CLAYSTONE
TH-34	4	7.2	102	2.5		500							CLAY, SANDY (CL)
TH-34	9	5.1	107		0.2	1,100							CLAY, SANDY (CL)
TH-34	19	8.5	127	3.4		2,400							CLAYSTONE/SANDSTONE
TH-35	4	7.0	106	0.7		500		4.86			0.1		CLAY, SANDY (CL)
TH-35	9	4.6	115		0.6	1,100		4.66					CLAY, SANDY (CL)
TH-35	14	10.6	123	3.2		1,800	15,000	4.48					CLAY, SANDY (CL)
TH-35	19	9.1	110		1.5	2,400		4.51					CLAYSTONE/SANDSTONE
TH-35	24	11.0	123	0.0		3,000		3.65					CLAYSTONE/SANDSTONE
TH-36	4	8.5	104	2.3		500							CLAY, SANDY (CL)
TH-36	14	7.5	118						25	8		32	SAND, CLAYEY (SC)
TH-36	19	15.1	116	0.0		2,400							CLAY, SANDY (CL)

TABLE B - I

SUMMARY OF LABORATORY TEST RESULTS

BORING	DEPTH (ft)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	SWELL TEST DATA				SOIL SUCTION VALUE (pF)	ATTERBERG LIMITS		SOLUBLE SULFATE CONTENT (%)	PASSING NO. 200 SIEVE (%)	SOIL TYPE
				SWELL (%)	COMPRESSION (%)	APPLIED PRESSURE (psf)	SWELL PRESSURE (psf)		LIQUID LIMIT	PLASTICITY INDEX			
TH-37	4	7.7	122	3.9		500							CLAY, SANDY (CL)
TH-37	9	16.2	115	1.0		1,100							CLAY, SANDY (CL)
TH-37	19	23.5	103									100	WEATHERED CLAYSTONE

DRAFT

APPENDIX C

FLEXIBLE AND RIGID PAVEMENT MATERIALS, CONSTRUCTION AND MAINTENANCE GUIDELINES

MATERIAL GUIDELINES FOR FLEXIBLE AND RIGID PAVEMENTS

Aggregate Base Course (ABC)

1. A Class 5 or 6 Colorado Department of Transportation (CDOT) specified aggregate base course should be used. A recycled concrete alternative which meets the Class 5 or 6 designation is also acceptable.

2. Aggregate base course should have a minimum Hveem stabilometer value of 84. Aggregate base course or recycled concrete material must be moisture stable. The change in R-value from 300 psi to 100 psi exudation pressure should be 12 points or less.

3. Aggregate base course or recycled concrete should be laid in thin lifts not to exceed 6 inches, moisture treated to within 2 percent of optimum moisture content, and compacted to at least 95 percent of maximum modified Proctor dry density (ASTM D 1557, AASHTO T 180). The material should be placed without segregation.

4. Placement and compaction of aggregate base course or recycled concrete should be observed and tested by a representative of our firm. Placement should not commence until the underlying subgrade is properly prepared and tested.

Hot-Mix Asphalt (HMA)

1. HMA should be composed of a mixture of aggregate, filler, hydrated lime and asphalt cement. Mixes shall be designed with 1 percent lime. Some mixes may require polymer modified asphalt cement, or make use of up to 20 percent reclaimed asphalt pavement (RAP). A project mix design is recommended and periodic checks on the project site should be made to verify compliance with specifications.

2. HMA should be relatively impermeable to moisture and should be designed with crushed aggregates that have a minimum of 80 percent of the aggregate retained on the No. 4 sieve with two mechanically fractured faces.

3. Gradations that approach the maximum density line (within 5 percent between the No. 4 and 50 sieves) should be avoided. A gradation with a nominal maximum size of 1 or 2 inches developed on the fine side of the maximum density line should be used.

4. Total void content, voids in the mineral aggregate (VMA) and voids filled should be considered in the selection of the optimum asphalt cement content. The optimum asphalt content should be selected at a total air void content of about 4 percent. The mixture should have a minimum VMA of 14 percent and between 65 percent and 80 percent of voids filled.

5. Asphalt cement should meet the requirements of the Superpave Performance Graded (PG) Binders. The minimum performing asphalt cement should be PG 64-22 for use along the Front Range. The use of PG 58-28 or PG 58-22 asphalt

cement has been known to cause tenderness in pavements in the Front Range area and should be avoided.

6. Hydrated lime should be added at the rate of 1 percent by dry weight of the aggregate and should be included in the amount passing the No. 200 sieve. Hydrated lime for aggregate pretreatment should conform to the requirements of ASTM C 207, Type N.

7. Paving should only be performed when subgrade temperatures are above 40˚F and air temperature is at least 40˚F and rising.

8. HMA should not be placed at a temperature lower than 245˚F for mixes containing PG 64-22 asphalt, and 290˚F for mixes containing polymer modified asphalt. The breakdown compaction should be completed before the mixture temperature drops 20˚F.

9. The maximum compacted lift should be 3 inches and joints should be staggered. No joints should be placed within wheel paths.

10. HMA should be compacted to between 92 and 96 percent of Maximum Theoretical Density. The surface shall be sealed with a finish roller before the mix cools to 185˚F.

11. Placement and compaction of HMA should be observed and tested by a representative of our firm. Placement should not commence until the subgrade is properly prepared, tested and proof-rolled.

Portland Cement Concrete (PCC)

1. Portland cement concrete should meet CDOT Class P concrete and have a minimum compressive strength of 4,200 psi at 28 days and a minimum modulus of rupture (flexural strength) of 650 psi. A job mix design is recommended and periodic checks on the job site should be made to verify compliance with specifications.

2. Portland cement should be Type II “low alkali” and should conform to ASTM C 150. Portland cement should conform to ASTM C 150.

3. Portland cement concrete should not be placed when the subgrade or air temperature is below 40ºF.

4. Free water should not be finished into the concrete surface. Atomizing nozzle pressure sprayers for applying finishing compounds are recommended whenever the concrete surface becomes difficult to finish.

5. Curing of the portland cement concrete should be accomplished by the use of a curing compound. The curing compound should be applied in accordance with manufacturer recommendations.

6. Curing procedures should be implemented, as necessary, to protect the pavement against moisture loss, rapid temperature change, freezing, and mechanical injury.

7. Construction joints, including longitudinal joints and transverse joints, should be formed during construction or sawed after the concrete has begun to set, but prior to uncontrolled cracking.

8. All joints should be properly sealed using a rod back-up and approved epoxy sealant.

9. Traffic should not be allowed on the pavement until it has properly cured and achieved at least 80 percent of the design strength, with saw joints already cut.

10. Placement of portland cement concrete should be observed and tested by a representative of our firm. Placement should not commence until the subgrade is properly prepared and tested.

FLEXIBLE PAVEMENT CONSTRUCTION GUIDELINES

Experience has shown that construction methods can significantly affect the life and serviceability of a pavement system. A site-specific mix design is recommended and periodic checks during the project should be made to verify compliance with specifications. We recommend the proposed pavement be constructed in the following manner:

1. The subgrade should be stripped of organic matter, scarified, moisture conditioned and compacted. Subgrade soils should be moisture conditioned to within 2 percent of optimum moisture content for sand and within 0 and 3 percent above optimum for clay, and compacted to at least 95 percent of maximum standard Proctor dry density (ASTM D 698, AASHTO T 99).

2. Utility trenches and all subsequently placed fill should be moisture conditioned, compacted, and tested prior to paving. As a minimum, fill should be compacted to 95 percent of maximum standard Proctor dry density.

3. After final subgrade elevation has been reached and the subgrade compacted, the resulting subgrade should be checked for uniformity and all soft or yielding materials should be replaced prior to paving. Concrete should not be placed on soft, spongy, frozen, or otherwise unsuitable subgrade.

4. If areas of soft or wet subgrade are encountered, the material should be sub-excavated and replaced with properly compacted structural backfill. Where extensively soft, yielding subgrade is encountered, we recommend the excavation be inspected by a representative of our office.

5. Aggregate base course should be laid in thin, loose lifts no more than 6 inches, moisture treated to within 2 percent of optimum moisture content, and compacted to at least 95 percent of modified Proctor maximum dry density (ASTM D 1557, AASHTO T 180).

6. Asphaltic concrete should be hot plant-mixed material compacted to between 92 and 96 percent of maximum Theoretical density. The temperature at laydown time should be at least 245°F. The surface shall be sealed with a finish roller prior to the mix cooling to 185°F.

7. The maximum compacted lift should be 3 inches and joints should be staggered. No joints should be within wheel paths.

8. Paving should only be performed when subgrade temperatures are above 40°F and air temperature is at least 40°F and rising.

9. Subgrade preparation and placement and compaction of all pavement material should be observed and tested. Compaction criteria should be met prior to the placement of the next paving lift. The additional requirements of CDOT should apply.

RIGID PAVEMENT CONSTRUCTION GUIDELINES

Rigid pavement sections are not as sensitive to subgrade support characteristics as flexible pavement. Due to the strength of the concrete, wheel loads from traffic are distributed over a large area and the resulting subgrade stresses are relatively low. The critical factors affecting the performance of a rigid pavement are the strength and quality of the concrete, and the uniformity of the subgrade. We recommend subgrade preparation and construction of the rigid pavement section be completed in accordance with the following recommendations:

1. The subgrade should be stripped of organic matter, scarified, moisture conditioned and compacted. Subgrade soils should be moisture conditioned to within 2 percent of optimum moisture content for sand and within 0 and 3 percent above optimum for clay, and compacted to at least 95 percent of maximum standard Proctor dry density (ASTM D 698, AASHTO T 99).

2. After final subgrade elevation has been reached and the subgrade compacted, the resulting subgrade should be checked for uniformity and all soft or yielding materials should be replaced prior to paving. Concrete should not be placed on soft, spongy, frozen, or otherwise unsuitable subgrade.

3. The subgrade should be kept moist prior to paving.

4. Curing procedures should protect the concrete against moisture loss, rapid temperature change, freezing, and mechanical injury for at least 3 days after placement. Traffic should not be allowed on the pavement for at least one week.

5. Curing of the portland cement concrete should be accomplished by use of a curing compound in accordance with manufacturer recommendations.

6. Construction joints, including longitudinal joints and transverse joints, should be formed during construction or should be sawed shortly after the concrete has begun to set, but prior to uncontrolled cracking. All joints should be sealed.

7. Construction control and inspection should be performed during the subgrade preparation and paving procedures. Concrete should be carefully monitored for quality control. The additional requirements of CDOT should apply.

The design sections are based upon 10-year and 20-year periods. Experience in the Denver area indicates virtually no maintenance or overlays are necessary for a 20-year design period. We believe some maintenance and sealing of concrete joints will help pavement performance by helping to keep surface moisture from wetting and softening or heaving subgrade. To avoid problems associated with scaling and to continue the strength gain, we recommend deicing salts not be used for the first year after placement.

MAINTENANCE GUIDELINES FOR FLEXIBLE PAVEMENTS

A primary cause for deterioration of pavements is oxidative aging resulting in brittle pavements. Tire loads from traffic are necessary to "work" or knead the asphalt concrete to keep it flexible and rejuvenated. Preventive maintenance treatments will typically preserve the original or existing pavement by providing a protective seal or rejuvenating the asphalt binder to extend pavement life.

Annual Preventive Maintenance

- Visual pavement evaluations should be performed each year.
- Reports documenting the progress of distress should be kept current to provide information on effective times to apply preventive maintenance treatments.
- Crack sealing should be performed annually as new cracks appear.

3 to 5-Year Preventive Maintenance

- The owner should budget for a preventive treatment (e.g. chip seal, fog seal, slurry seal) at approximate intervals of 3 to 5 years to reduce oxidative embrittlement problems.

5 to 10-Year Corrective Maintenance

- Corrective maintenance (e.g. full-depth patching, milling and overlay) may be necessary, as dictated by the pavement condition, to correct rutting, cracking and structurally failed areas.

MAINTENANCE GUIDELINES FOR RIGID PAVEMENTS

High traffic volumes create pavement rutting and smooth, polished surfaces. Preventive maintenance treatments will typically preserve the original or existing pavement by providing a protective seal and improving skid resistance through a new wearing course.

Annual Preventive Maintenance

- Visual pavement evaluations should be performed each spring or fall.
- Reports documenting the progress of distress should be kept current to provide information of effective times to apply preventive maintenance.
- Crack sealing should be performed annually as new cracks appear.

4 to 8 Year Preventive Maintenance

- The owner should budget for a preventive treatment at approximate intervals of 4 to 8 years to reduce joint deterioration.
- Typical preventive maintenance for rigid pavements includes patching, crack sealing and joint cleaning and sealing.
- Where joint sealants are missing or distressed, resealing is mandatory.

15 to 20 Year Corrective Maintenance

- Corrective maintenance for rigid pavements includes patching and slab replacement to correct subgrade failures, edge damage and material failure.
- Asphalt concrete overlays may be required at 15 to 20 year intervals to improve the structural capacity of the pavement.

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DRAFT

PRELIMINARY GEOTECHNICAL INVESTIGATION
NINE MILE CORNER – COMMERCIAL AREA
SOUTHEAST OF HIGHWAY 287 AND
ARAPAHOE ROAD
ERIE, COLORADO

Prepared For:

EVERGREEN DEVELOPMENT
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Project No. DN48,647-125

February 24, 2017

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SCOPE

This report presents the results of our Preliminary Geotechnical Investigation for the commercial area at Nine Mile Corner, southeast of Highway 287 and Arapahoe Road in Erie, Colorado (Fig. 1). We are concurrently performing a Geotechnical Investigation for apartments planned on the east side of the parcel. The purpose of our investigation was to evaluate the subsurface conditions to assist in planning of site development and commercial construction. The report includes descriptions of soil and bedrock strata and groundwater levels encountered in our exploratory borings, and discussions of site development and construction as influenced by geotechnical considerations. The scope was described in our Proposal (DN 16-0532R) dated December 6, 2016. Evaluation of the property for the possible presence of potentially hazardous materials (Environmental Site Assessment) was not included in our scope.

This report is based on subsurface conditions disclosed by exploratory drilling and sampling, results of field and laboratory tests, engineering analysis of field and laboratory data, and our experience. It contains descriptions of the soil and bedrock conditions and groundwater levels found in our exploratory borings, recommendations for site development, and preliminary discussion of potential foundations, floor systems, pavements, and surface drainage. The discussions of foundation and floor system alternatives are intended for planning purposes only. Additional, building-specific investigations will be necessary to design structures and improvements. A brief summary of our conclusions and recommendations follows, with more detailed discussion in the report.

SUMMARY OF FINDINGS AND CONCLUSIONS

1. The primary geotechnical concerns are expansive soil and bedrock, potentially shallow groundwater and deep fill. We believe these concerns can be mitigated with proper investigation, planning, engineering, design and construction. We believe there are no geotechnical constraints at this site that preclude development.

2. Strata found in our borings consisted of nil to 11.5 feet of fill over natural clay, sand, and/or interlayered clay/sand underlain in most borings by weathered to comparatively unweathered claystone and interbedded claystone/sandstone bedrock. Bedrock was not encountered in four borings. Testing indicates the fill is predominately low swelling and the natural clay is low to high swelling. The claystone is low to very high swelling, and we judge the sand is non-expansive.

3. Groundwater was encountered during drilling in fourteen borings at depths of about 3.5 to 28 feet below existing grades. When the holes were checked after drilling, water levels were measured in twenty-one borings at depths of 1.5 to 37.5 feet. Groundwater will likely impact sub-excavation, the retaining walls at the south site limits, and possibly utility installation. Temporary construction dewatering may be necessary. Groundwater may fluctuate seasonally and rise in response to precipitation and landscape irrigation.

4. Expansive soils and bedrock are present. We estimated potential heave of about 1.7 to 8.1 inches at the ground surface based on a depth of wetting of 20 feet below proposed grades. The majority of site borings had heave estimates of 2 inches or less. We anticipate shallow foundations can be used for the north anchor building and building pads along the west and northwest corners of the site. The southern portion of the north anchor pad should be sub-excavated to match existing grades on the northern portion. This will create a relatively uniform fill depth across the building pad and reduce the risk of differential movement. Existing fill should be removed below the northwest building pads.

   Highly expansive claystone and natural clay are present below the south anchor building and southwest building pad. Sub-excavation of the south anchor building and southwest building pad appears merited to potentially allow use of footing-type foundations and enhance performance of slab-on-grade floors.

5. We judge there is relatively low risk of excessive floor movements caused by expansive soils for the north anchor and building pads along the west and northwest corners of the site. Sub-excavation of the south anchor and southwest building pad should reduce potential floor movements.

6. Pavement subgrade soils are likely to be derived of clay and claystone, which are considered poor subgrade material. Imported materials will also support pavements. We anticipate a full depth asphalt section of 5 to 6 inches for parking lots and parking access drives, and 6 to 7 inches for fire/truck lanes and loading dock areas. In areas of highly expansive claystone and/or natural clay (south anchor and southwest building pad parking areas), sub-excavation to depths of 3 to 5 feet can be selected to enhance pavement performance. A design-level subgrade investigation should be done prior to paving.

7. Control of surface and subsurface drainage will be critical to the performance of foundations, slabs-on-grade and pavements. Overall surface drainage should be designed to provide rapid run-off of surface water away from structures and off pavements and flatwork. Water should not be allowed to pond near the crests of slopes, near structures or on pavements and flatwork.

SITE CONDITIONS

The commercial area is planned on the western side of the proposed Nine Mile Corner Development (Fig. 1 and Photo 1). The site is bordered by Arapahoe Road on the north, Highway 287 to the west, and existing single-family residences to the south and east. The ground surface is covered with grass, weeds, bushes and trees. The site generally slopes from south to north, with overall relief of about 50 feet. The northwest portion of the site was previously occupied by Prince Lake No. 1, which was used as a water storage reservoir. Based on Google Earth aerial photos, the reservoir appears to have been constructed in 2003 and remained in use until about 2015 when it was drained and partially filled. An existing ditch traverses the middle portion of the property from west-to-east.

PROPOSED CONSTRUCTION

Plans provided show construction will include two anchor buildings, oriented north-south across the center of the site, and six smaller building pads along the western edge of the parcel. Surface parking and access drives will occupy the area between the anchors and western building pads. Based on site topography and provided grading plans, up to about 21 feet of fill and 33 feet of cut will be necessary to reach final construction grades (Fig. 5). The majority of fill will be located north of the existing ditch, with the deepest fills occurring in the previous reservoir area. A stepped, mechanically stabilized earth retaining wall will be constructed along the south property line, with cuts of 10 to 33 feet occurring north of the wall. Two detention ponds are planned along the north side of the site and the existing ditch will be piped across the site.



Photo 1 – Google Earth© Aerial Site Photo, October 2015

GEOLOGIC HAZARDS

Colorado is a challenging location to practice geotechnical engineering. The climate is relatively dry and the near-surface soils are typically dry and comparatively stiff. These soils and related sedimentary bedrock formations react to changes in moisture conditions. Some of the soils swell as they increase in moisture and are referred to as expansive soils. Other soils can compress significantly upon wetting and are identified as compressible soils. Most of the land available for development east of the Front Range is underlain by expansive clay or claystone bedrock near the surface. The soils that exhibit compressible behavior are more likely west of the Continental Divide; however, both types of soils occur throughout the state.

Covering the ground with buildings, streets, pavements, sidewalks, etc., coupled with landscape irrigation and changing drainage patterns, leads to an increase in sub-surface moisture conditions. As a result, some soil movement due to heave or settlement is inevitable. Expansive soil and bedrock are present at this site, which constitutes a geologic hazard. Soft soils are also present which will compress under the proposed fill. There is risk that foundations and slab-on-grade floors will experience heave or settlement and damage. It is critical that precautions are taken to increase the chances that the foundations and slabs-on-grade will perform satisfactorily. Engineered design of grading, pavements, foundations, slabs-on-grade, and drainage can mitigate, but not eliminate, the effects of expansive soil and bedrock. Sub-excavation is a means to reduce potential heave and potentially allow wide use of shallow foundations and slab-on-grade floors. Shallow groundwater is also considered a geologic hazard and should be considered in design.

INVESTIGATION

We investigated subsurface conditions by drilling and sampling 22 exploratory borings in the commercial area at the approximate locations shown on Fig. 1. Prior to drilling, we contacted the Utility Notification Center of Colorado and local sewer and water districts to identify locations of buried utilities. Boring locations were staked and elevations provided by Galloway & Company Inc. prior to drilling. The borings were drilled to depths of 20 to 50 feet below existing grades using 4-inch diameter, continuous-flight solid-stem auger and truck-mounted drill rigs. Samples were obtained at 5 to 10-foot intervals using a 2.5-inch diameter (O.D.) modified California sampler driven by blows of an automatic 140-pound hammer falling 30 inches. Bulk samples were also obtained from auger cuttings. Our field representative was present to observe drilling operations, log the strata encountered and obtain samples. Upon completion of drilling, hand-slotted PVC pipe was inserted in some holes to allow delayed groundwater level measurements. Graphical logs of the borings are presented in Appendix A.

Samples were returned to our laboratory for examination and testing. Laboratory tests included moisture content, dry density, percent silt and clay-sized particles (passing No. 200 sieve), Atterberg limits, swell-consolidation, time consolidation, soil suction, standard Proctor, and water-soluble sulfate concentration. Swell-consolidation tests were performed by wetting samples under approximate anticipated overburden pressure (the pressure exerted by overlying soils). Load back analysis was performed on select samples to estimate swelling pressure Laboratory test results are presented in Appendix B and summarized in Table B-I.

SUBSURFACE CONDITIONS

Strata found in our borings consisted of nil to 11.5 feet of fill over natural clay, sand, and/or interlayered clay/sand underlain in most borings by weathered to comparatively unweathered claystone and interbedded claystone/sandstone bedrock. Bedrock was not encountered in four borings. Pertinent engineering characteristics of the soil and bedrock are described in the following paragraphs.

Fill

About 5 to 11.5 feet of clayey sand to sandy clay fill was encountered from the ground surface in nine borings. We understand the fill was placed during partial backfill of Prince Lake No. 1 in 2015. We were provided compaction test records from Midwest Testing. Review of these records indicate the fill was placed in a controlled manner, and compaction met project specifications at locations tested. The records provided indicate dewatering was necessary, some soft materials were removed, and some fill was placed to bridge soft areas before compaction was achieved. We obtained topographic data from Galloway for prior to 2015 and current conditions and used the data to estimate the depth of existing fill (Fig. 4). The datum for the two sets of data appears to be inconsistent, which results in estimates of cut or fill in areas where no grading has occurred. The data suggests a maximum of about 10 to 11 feet of fill was placed in the reservoir which is consistent with our borings TH-1, TH-21 and TH-22.

The fill was medium stiff to very stiff or loose to medium dense based on results of field penetration resistance tests. One fill sample compressed 0.3 percent and six swelled 0.1 to 3.5 percent when wetted. Three samples contained 48 to 78 percent silt and clay sized particles, with one showing moderate plasticity. A bulk sample of the fill had a standard Proctor maximum dry density of 113 pcf and optimum moisture content of 15.5 percent. A remolded sample of the same material compacted at 2 percent over optimum moisture content swelled 0.9 percent when wetted under a confining pressure of 1,000 psf.

Natural Clay and Sand

Natural clay, sand, and/or interlayered clay/sand was encountered below the fill or from the ground surface in seventeen borings. The clay was soft to very stiff and the sand very loose to medium dense. The softer clay and sand generally coincided with the presence of groundwater. One clay sample compressed 0.1 percent, two did not swell, and three swelled 0.9 to 4.8 percent when wetted. One bulk sample of clay obtained in the south portion of the site (TH-9) contained 88 percent silt and clay-sized particles and showed high plasticity. The same bulk sample had a standard Proctor maximum density of 106 pcf and optimum moisture content of 18.5 percent. A remolded sample of the clay compacted at 2 percent over optimum moisture content swelled 1.0 percent when wetted under a confining pressure of 1,000 psf. One sand sample contained 25 percent silt and clay sized particles. One interlayered clay/sand sample compressed 0.1 percent and two did not swell when wetted. Two interlayered clay/sand samples contained 23 and 29 percent silt and clay sized particles.

Bedrock

Weathered to comparatively unweathered claystone and interbedded claystone/sandstone bedrock was encountered below the fill and natural soils in eighteen borings at depths of about 3 to 24 feet. Claystone dominated the bedrock unit. The bedrock was weathered to very hard. Three claystone samples compressed 0.1 to 0.5

percent and forty swelled 0.1 to 8.7 percent when wetted. The average swell of the claystone was 3.5 percent. Four claystone samples contained 69 to 100 percent silt and clay sized particles, with two exhibiting high plasticity. Eighteen claystone samples had soil suction values of 3.68 to 4.65 pF. Laboratory testing indicates the majority of the claystone is moderate to highly expansive. Estimated bedrock surface elevations are shown on Fig. 2.

Groundwater

Groundwater was encountered during drilling in fourteen borings at depths of about 3.5 to 28 feet below existing grades. When the holes were checked after drilling on January 9, 2017, water levels were measured in twenty-one borings at depths of about 1.5 to 37.5 feet. Measured depths to groundwater and corresponding surface elevations are presented on Fig. 3. Groundwater will likely influence sub-excavation, the south retaining wall, and possibly utility installation. Groundwater control will likely be necessary during construction, and may be necessary after construction.

We understand the existing ditch will be piped across the site which may lower groundwater levels. Groundwater may fluctuate seasonally and rise in response to precipitation and landscape irrigation.

ESTIMATED POTENTIAL SETTLEMENT AND HEAVE

We estimate 1.7 to 8.1 inches of potential ground heave based on 20-foot depth of wetting below proposed grades. The majority of the site borings have heave estimates of 2 inches or less. We estimated up to about 4 inches of potential settlement in the previous reservoir area after grading. Additional settlement will occur as the fill is placed. We anticipate settlement will occur fairly rapidly after grading, likely within a few months or less. We recommend installing survey benchmarks to monitor the potential settlement after grading. Construction of the north anchor should be delayed until survey measurements confirm settlement has substantially ceased.

SITE DEVELOPMENT

The primary geotechnical concerns are expansive soil and bedrock, deep fill and potential shallow groundwater. These concerns can be mitigated with proper investigation, planning, engineering, design, and construction. We believe there are no geotechnical constraints at this site that could preclude development. The following sections discuss our opinions and recommendations for site development.

Excavation and Utility Installation

We believe the soils and bedrock penetrated by our exploratory borings can be excavated with typical heavy-duty equipment. We recommend the owner and the contractor become familiar with applicable local, state and federal safety regulations, including the current Occupational Safety and Health Administration (OSHA) Excavation and Trench Safety Standards. Based on our investigation and OSHA standards, we anticipate the clay and sand will classify as Type B and C soil, respectively, and the bedrock as Type B. Type B and C soils require maximum slope inclinations of 1:1 and 1½:1 (horizontal:vertical), respectively, for temporary excavations in dry conditions. Excavations will require flatter slopes below groundwater and where seepage is present. Excavation side slopes specified by OSHA are dependent upon soil types and groundwater or seepage conditions encountered. The contractor's "competent person" should identify the soils encountered in the excavations and refer to OSHA standards to determine appropriate slopes. Stockpiles of soils and equipment should not be placed within a horizontal distance equal to one-half the excavation depth, from the edge of the excavation. A professional engineer should design excavations deeper than 20 feet.

Site Grading

Substantial site grading will be required to achieve proposed construction grades. The on-site soils are generally suitable for reuse as new fill provided they are substantially free of debris, vegetation/organics and other deleterious materials. Significant

import fill will also be necessary. The ground surface in areas to be filled should be stripped of debris, vegetation/organics and other deleterious materials, scarified and moisture conditioned to the specifications outlined in the table below. To lower settlement after grading, we recommend a higher degree of compaction in deep fill.

RECOMMENDED FILL/BACKFILL COMPACTION CRITERIA

Soil Type	Depth of Fill* (feet)	Moisture Content From Optimum	Minimum Compaction (ASTM D698)
Clay and Claystone	0 to 18	0 to +3	>95 %
	>18	-1 to +2	100 %
Sand	0 to 18	-2 to +2	>95
	>18	-2 to +2	100 %

* Depth below proposed grade

The properties of fill will affect the performance of foundations, slabs-on-grade, utilities, pavements, flatwork and other improvements. Fill should be placed in thin loose lifts, moisture conditioned and compacted prior to placement of the next lift. The placement and compaction of fill should be observed and density tested by our representative during construction. Guideline grading specifications are presented in Appendix C.

Sub-Excavation

We have estimated potential ground heave of up to about 8.1 inches for an assumed depth of wetting of 20 feet. Settlement can also occur in areas where soft, compressible soils are present. Long and heavily-reinforced drilled piers and structurally supported floors are normally recommended for sites with significant potential heave. The south anchor building and southwest building pad (TH-13) are underlain at proposed grade by highly expansive claystone and/or natural clay, while building pads along the west and northwestern portion of the site will be underlain by fill and lower swelling materials. Sub-excavation of the south anchor building and southwest building pad appears merited.

Sub-excavation is a ground improvement method used to reduce the potential swell or compression and mitigate impacts of expansive/compressible soils. In order to use footing foundations and enhance floor performance for the south anchor building and southwest building pad, we anticipate sub-excavation to at least 10 feet below foundations and 14 feet below floors, whichever is deeper. Sub-excavation should extend at least 5 feet laterally outside foundations. The southern portion of the north anchor building pad should also be sub-excavated to nearly match existing grades on the northern portion. This will create a relatively uniform fill depth across the building pad and should reduce differential movement. Existing fill should be removed below the northwest building pads. Figure 6 shows the anticipated sub-excavation depths and elevations.

Sub-excavation has been used in the Denver area with satisfactory performance for the large majority of the sites where this ground modification method has been completed. We have seen isolated instances where settlement of sub-excavation fill has led to damage to buildings supported on footings. In most cases, the settlement was caused by wetting associated with poor surface drainage or seepage, and/or poorly compacted fill placed at the horizontal limits of excavation. Wetting of the fill may cause softening and settlement. If groundwater is encountered during sub-excavation an interceptor drain may be necessary. Interceptor drains should consist of Mirafi G200N drain board with two sided drainage capacity connected to 4-inch diameter perforated PVC pipe or approved equivalent. The drain board should extend up the excavation slope at least 3 feet above groundwater. A typical detail is provided on Fig. 7. Drains should slope to a gravity outfall or to a wet well where water can be removed with a pump.

The excavation contractor should be chosen carefully to assure they have experience with fill placement at over-optimum moisture and have the necessary compaction equipment. The contractor should provide a construction disc to break down fill materials and anticipate use of push-pull scraper operations and dozer assistance. The operation will be relatively slow. In order for the procedure to be performed properly, close

contractor control of fill placement to specifications is required. Sub-excavation fill should be moisture-conditioned between optimum and 3 percent above optimum moisture content with an average test moisture content each day of at least 1 percent above optimum. Fill should be moisture conditioned and compacted as recommended in Site Grading.

Special precautions should be taken for compaction of fill at corners, access ramps, and along the perimeters of the sub-excavation as large compaction equipment cannot easily reach these areas. Our representative should observe placement procedures and test compaction of the fill on a nearly full-time basis. The swell of the moisture-conditioned fill should be tested during and after the fill placement.

Sub-excavation and replacement with moisture conditioned fill will likely allow use of footing foundations and enhance performance of slab-on-grade floors. Sub-excavation can also enhance performance of concrete flatwork and pavements, potentially reducing maintenance costs. We recommend a surveyor document the actual limits of the treatment, and create "as-built" plans. These plans should be provided to the civil/surveyor so that they can verify that each building is over the treated area. The "treated area" stops at the toe of the deep sub-excavation slope. It would be prudent to show the horizontal limits and bottom elevation of treatment on plans. Guideline sub-excavation specifications are presented in Appendix D.

Slopes

We recommend permanent cut and fill slopes be designed with a maximum grade of 3:1 (horizontal to vertical). If site constraints (property boundaries and streets) do not permit construction with recommended slopes, we should be contacted. Surface drainage should not be allowed to sheet flow across slopes or pond near the crest of slopes. All cut and fill slopes should be re-vegetated as soon as possible after grading to reduce potential for erosion problems.

Stabilization and Dewatering

Based on current water levels, it is likely that sub-excavation, the south retaining wall, and (potentially) utility excavations will penetrate groundwater in various parts of the site, particularly at the south side. Soft, very moist soils may be encountered in excavations and should be removed or stabilized. Soft excavation bottoms can be stabilized by crowding crushed rock into the soils until firm. Acceptable rock materials include, but are not limited to, No. 2 and No. 57 rock. Crushed rock on a layer of geo-synthetic grid or woven fabric can also be used, which should reduce the amount of aggregate needed to stabilize the subgrade.

Temporary construction dewatering systems may be needed. We anticipate excavations can be dewatered using sumps, where the water is pumped down through the soils before being discharged. The Town of Erie and/or the Colorado Department of Public Health and Environment may require dewatering permits. Our experience indicates periodic environmental testing is usually required with these permits, with reporting. Permitting requirements may also influence the construction schedule. We recommend researching these requirements and permit processing times well before dewatering begins.

Pavements

Pavement subgrade soils are likely to be derived of clay and claystone, which are considered poor subgrade material. We anticipate parking lots and parking access drives will require a full depth asphalt section of at least 5 to 6 inches. For fire/truck lanes and loading dock areas, we anticipate a full depth asphalt section of 6 to 7 inches. Composite sections of asphalt and base course may also be suitable. In areas of highly expansive claystone and/or natural clay (south anchor and southwest building pad parking areas), sub-excavation to depths of 3 to 5 feet. A design-level subgrade investigation should be done prior to paving.

BUILDING CONSTRUCTION CONSIDERATIONS

The following discussions are preliminary and are not intended for design or construction. After grading is completed design-level investigations should be performed on a building-specific basis.

Foundations

Site soils include expansive soils and bedrock at depths likely to affect foundation performance. Drilled piers bottomed in bedrock are typically used where relatively high swelling soil and bedrock are encountered. We believe sub-excavation could allow use of footing foundations for the south anchor building and southwest building pad, where more expansive materials are present.

Building pads along the western and northwestern edges of the property will be underlain by fill and lower swelling materials. We anticipate shallow foundations (footings) will be suitable for those pads without sub-excavation. Footing-type foundations should also be suitable for the north anchor provided partial sub-excavation of the pad is performed and survey monitoring confirms settlement has dissipated.

Slab-On-Grade Construction

The use of conventional slab-on-grade floors should be limited to areas where potential movements are judged to be low to moderate, and where risk of distress is acceptable to the owner. We judge slab performance risk will be low or moderate for the majority of the site. The south anchor building and southwest building pad appear to be high risk unless sub-excavation is performed.

Sub-excavation may be considered to reduce the influence of expansive soil and bedrock on floors. Our experience suggests risk of poor slab performance can be reduced to low if the fill is moisture conditioned and compacted properly. The perfor-

mance of pavements, sidewalks, and other surface flatwork installed outside sub-excavated areas will likely be erratic at this site. Shallower sub-excavation of 3 feet can be considered in these areas to enhance performance.

The following precautions will be required to reduce the potential for damage due to movement of slabs-on-grade placed at this site:

1. Isolation of conventional slabs from foundation walls, columns or other slab penetrations;

2. Voiding of interior partition walls to allow slab movement without transferring movement to the structures;

3. Use of flexible water and gas connections to allow slab movement. A flexible duct above slab-supported furnaces (if any) will also be required; and

4. Proper surface grading to reduce water availability to sub-slab and foundation soils.

Structurally supported floors are recommended for areas of high risk. A structurally supported floor should also be used where the owner cannot tolerate potential movement. Slab-on-grade floors are appropriate for low risk conditions.

Concrete

Concrete in contact with soil can be subject to sulfate attack. We measured water-soluble sulfate concentrations of less than 0.01 to 0.19 percent in four samples from this study. For the highest level of sulfate concentration, ACI indicates concrete shall be made with ASTM C150 Type II cement, or an ASTM C595 or C1157 hydraulic cement meeting moderate sulfate-resistant hydraulic cement (MS) designation. In our experience, superficial damage may occur to the exposed faces of highly permeable concrete. To control this risk and to resist freeze-thaw deterioration, the water-to-cementitious material ratio should not exceed 0.5 for concrete in contact with soils that are likely to stay moist. Concrete should have a total air content of 6 percent ± 1.5 percent. Additional testing is recommended during building specific investigations.

Surface Drainage

The performance of foundations, floors, pavements and other improvements is affected by moisture changes within the soil and bedrock. This is largely influenced by surface drainage. When developing an overall drainage scheme, consideration should be given to drainage around each structure. The ground surface around the buildings should be sloped to provide positive drainage away from the foundation. We recommend a slope of at least 5 percent for the first 10 feet in landscaped areas surrounding each building. Roof downspouts and other water collection systems should discharge well beyond the limits of all backfill around structures. Roof drainage should not be directed below floors.

Proper control of surface runoff is also important to control the erosion of surface soils. Sheet flow should not be directed over unprotected slopes. Water should not be allowed to pond at the crest of slopes. Permanent slopes should be prepared to reduce erosion.

Attention should be paid to compaction of the soils behind curb and gutter adjacent to streets and in utility trenches during the construction and development. If surface drainage between preliminary development and construction phases is neglected, performance of the pavements, flatwork and foundations may be poor.

RETAINING WALLS

A stepped, mechanically stabilized earth retaining wall is planned along the southern edge of the property. Retaining walls should be designed to resist lateral earth pressures. The lateral earth pressure will depend on the height of the wall, retained soil, type of backfill, slope of backfill surface, surcharge loads and allowable horizontal movement at the top of the wall. Where multiple walls are closely spaced, the lower wall designs should consider surcharge from upper walls. Internal and global stability of the walls should be considered.

MSE retaining walls assume that some movement of the wall will occur to mobilize the shear strength of the soil. We assume retained soil and backfill above the reinforced zone will be on-site soils or similar soils. The on-site soil should not be used in the reinforced zone. We recommend the reinforced zone of the MSE Walls be constructed with imported sand and gravel meeting CDOT Class 5 or 6 Aggregate Road Base Specification (or better). Angular gravel meeting AASHTO No. 57 or 67 Specification may be used for the reinforced soil (if desired) and is recommended for the leveling pad and drainage material.

Most MSE block retaining wall design programs require input of soil parameters for foundation soil, leveling pad, reinforced soil and retained soil. We recommend the parameters presented below be used for the design of the wall.

MSE SOIL INPUT PARAMETERS

Material use	Material Description & Classification	Cohesion (psf)	Internal Friction Angle (degrees)	Unit Weight (pcf)
Foundation Soil	Sandy Clay/Claystone	200	23	130
Leveling Pad	Gravel (imported) AASHTO #57 or 67 Coarse Concrete Aggregate	0	37	140
Reinforced Soil (import recommended)	Sand, Gravelly, Silty, CDOT Class 6 Road Base (or better)	0	37	140
Retained Soil	Sandy Clay/Claystone	200	23	130

Free draining granular backfill should be used adjacent to the wall. We recommend a free-draining sand and gravel material with less than 5 percent fines (passing No. 200 sieve) be used as backfill for a zone within at least 1-foot behind the wall. Imported backfill should be tested and approved by our firm prior to importing. The upper 2 feet of wall backfill should be derived from the on-site clay. Fill should be placed and compacted to the criteria provided in Fill and Backfill. Special precautions should be taken to avoid over-stressing the wall during compaction. We recommend small, hand-operated compactors be used.

RECOMMENDED FUTURE INVESTIGATIONS

We recommend the following investigations and services:

1. Construction testing and observation during site development, sub-excavation, and pavement construction;
2. Survey monitoring in deep fill areas;
3. Subgrade investigation and pavement design after grading;
4. Design-level geotechnical investigations after grading; and
5. Construction observations during foundation construction.

LIMITATIONS

Our borings were widely spaced to provide a general picture of subsurface conditions for preliminary planning of development and construction. We believe this investigation was conducted in a manner consistent with that level of care and skill ordinarily used by geotechnical engineers practicing in this area at this time. No warranty, express or implied, is made. If we can be of further service in discussing the contents of this report or analysis of the influence of subsurface conditions on the project, please call.

CTL | THOMPSON, INC.

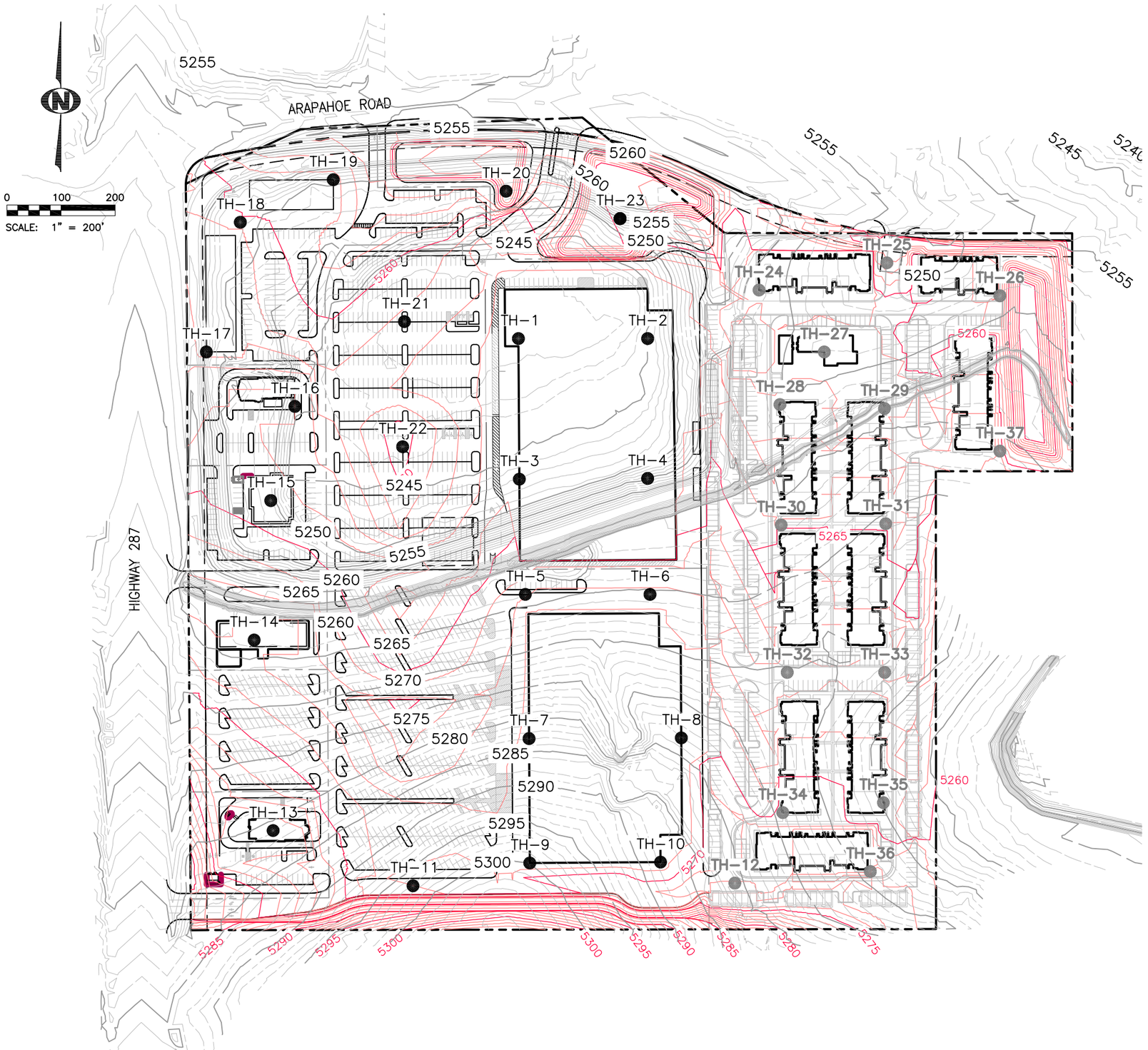
Chris Fitzsimmons, E.I.T.
Staff Engineer

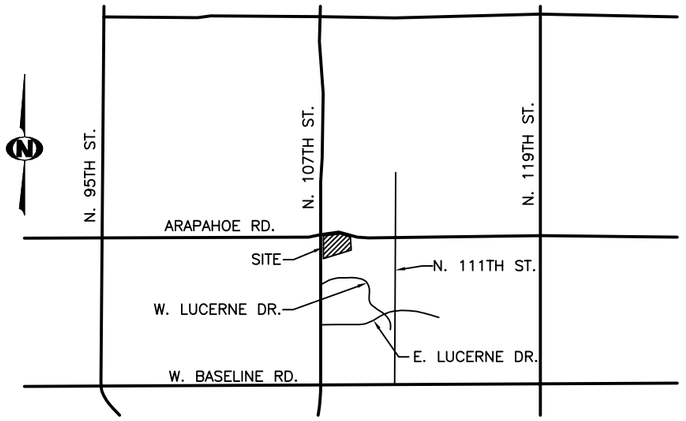
Reviewed by:

Ronald M. McOmber, P.E.
Chairman & CEO

CF:RMM/nn
(3 Draft Copies)

Via e-mail: rwolford@evgre.com
agrendahl@evgre.com





VICINITY MAP
NOT TO SCALE

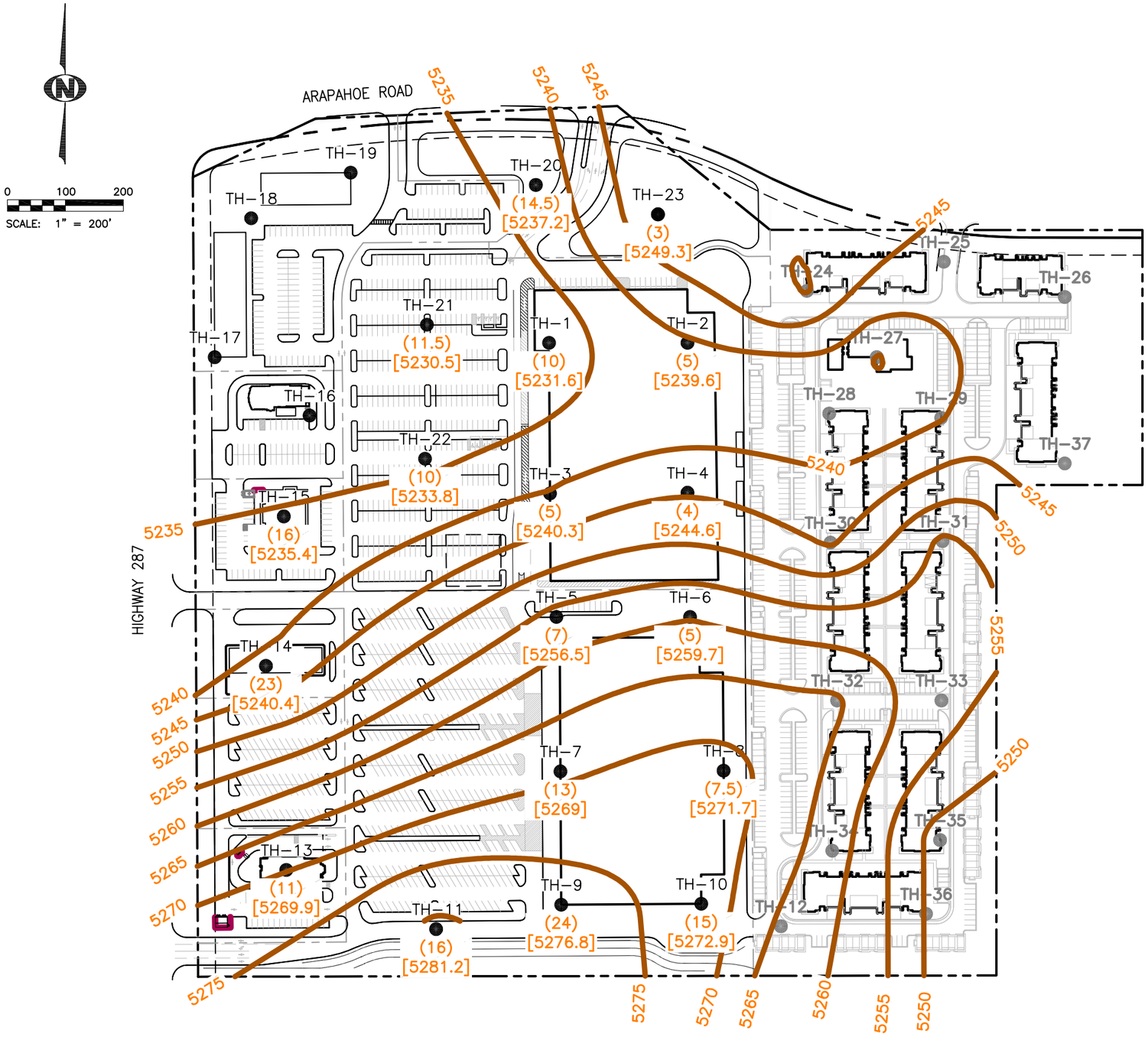
LEGEND:

TH–1 ●	APPROXIMATE LOCATION OF EXPLORATORY BORING
TH–12 ●	APPROXIMATE LOCATION OF EXPLORATORY BORING INCLUDED IN SEPARATE INVESTIGATION
5260 – – – –	INDICATES EXISTING GROUND SURFACE ELEVATION (FEET)
5300 ———	INDICATES PROPOSED GROUND SURFACE ELEVATION (FEET)

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL\T Project No. DN48,647-125-R1

Locations of Exploratory Borings

Fig. 1



LEGEND:

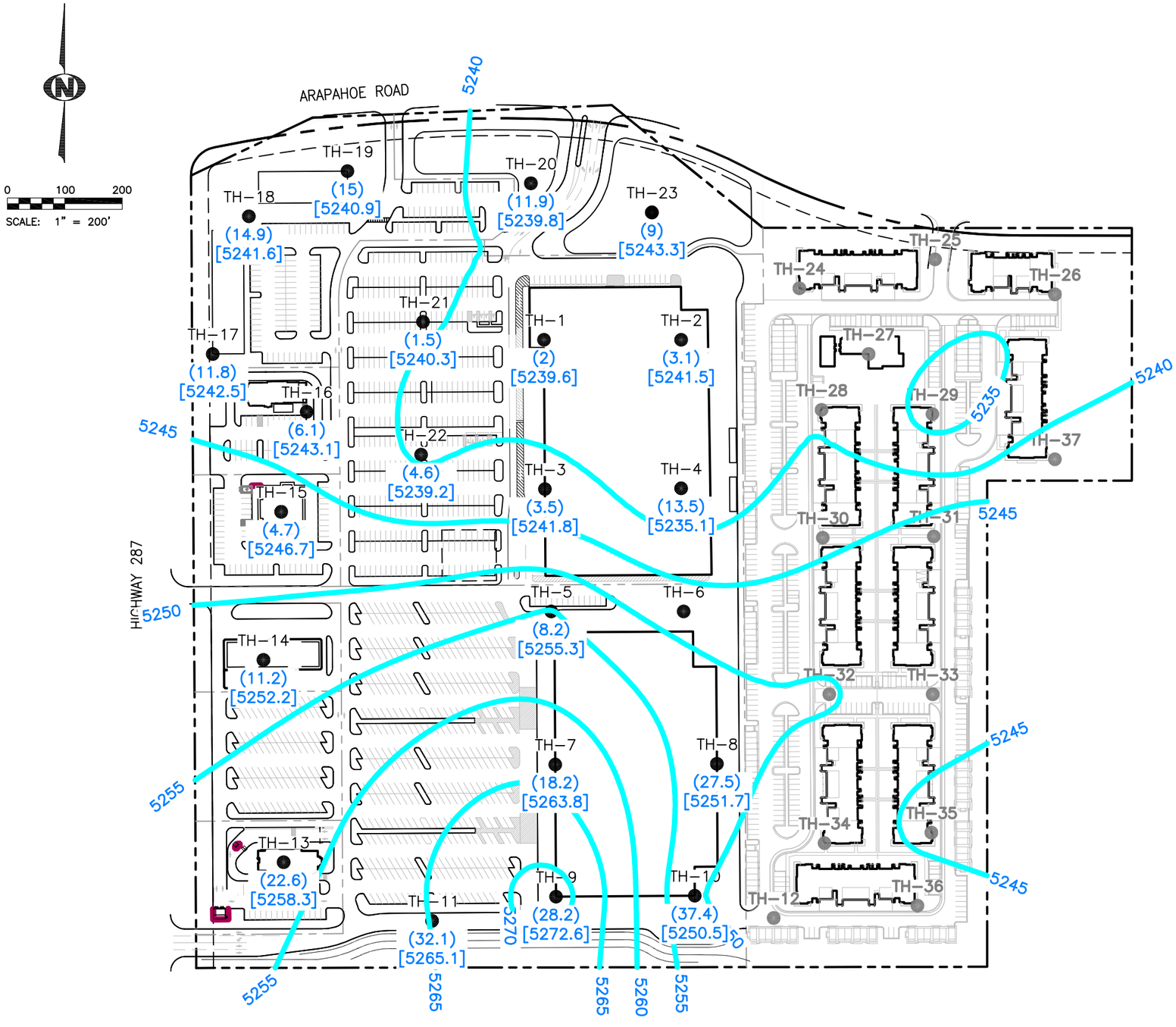
TH–1 ●	APPROXIMATE LOCATION OF EXPLORATORY BORING
TH–12 ●	APPROXIMATE LOCATION OF EXPLORATORY BORING INCLUDED IN SEPARATE INVESTIGATION
(11)	INDICATES DEPTH TO BEDROCK AT BORING LOCATION (FEET)
[5269.9]	INDICATES BEDROCK ELEVATION AT BORING LOCATION (FEET)
5250	INDICATES ESTIMATED BEDROCK SURFACE ELEVATION (FEET)

NOTE: THIS ESTIMATE WAS BASED UPON A SUBJECTIVE ANALYSIS OF DRILL HOLE DATA AND MAY NOT REFLECT LOCAL VARIATIONS.

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
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Estimated Bedrock Surface Elevations

Fig. 2



LEGEND:

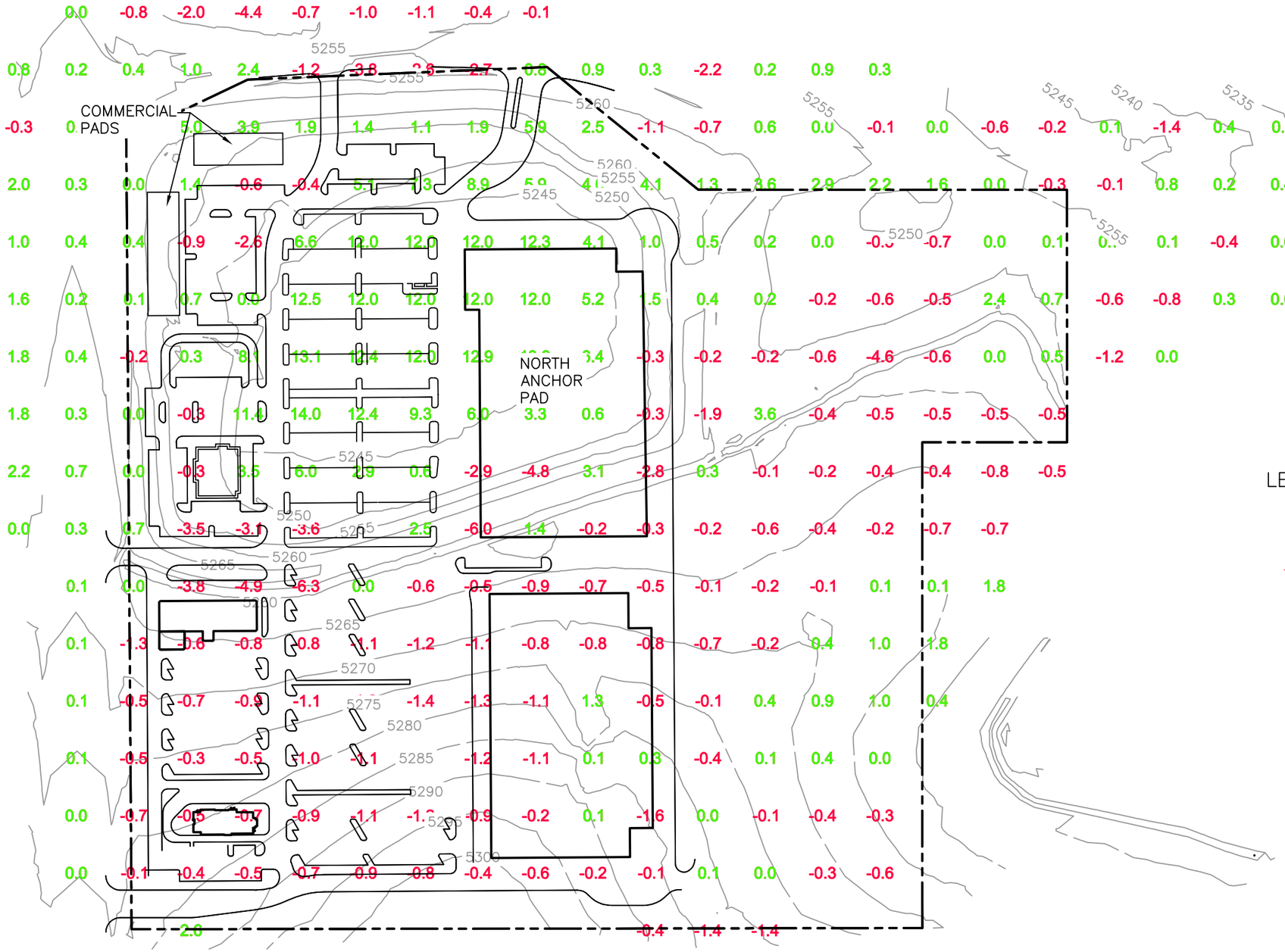
TH–1 ●	APPROXIMATE LOCATION OF EXPLORATORY BORING
TH–12 ●	APPROXIMATE LOCATION OF EXPLORATORY BORING INCLUDED IN SEPARATE INVESTIGATION
(22.6)	INDICATES MEASURED DEPTH TO GROUNDWATER AT BORING LOCATION (FEET)
[5258.3]	INDICATES GROUNDWATER ELEVATION AT BORING (FEET)
5245	INDICATES ESTIMATED GROUNDWATER SURFACE ELEVATION (FEET)

NOTE: THIS ESTIMATE WAS BASED UPON A SUBJECTIVE ANALYSIS OF DRILL HOLE DATA AND MAY NOT REFLECT LOCAL VARIATIONS AND SEASONAL FLUCTUATIONS.

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
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Estimated Groundwater Surface Elevations

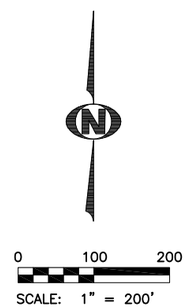
Fig. 3



LEGEND:

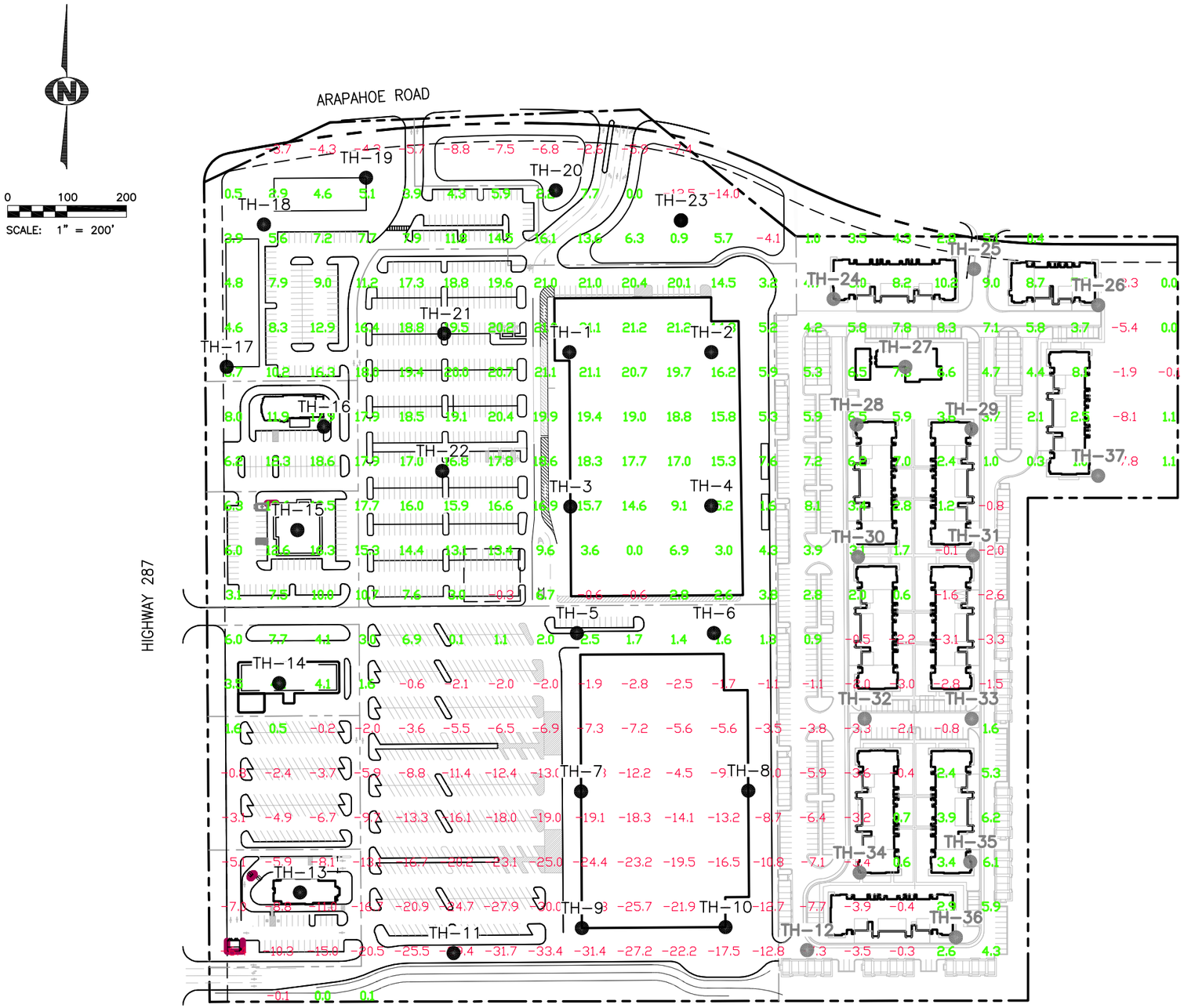
0.5 INDICATES FILL DEPTH (FEET)

−2.9 INDICATES CUT DEPTH (FEET)



EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
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Estimated Depth of Existing Fill Fig. 4



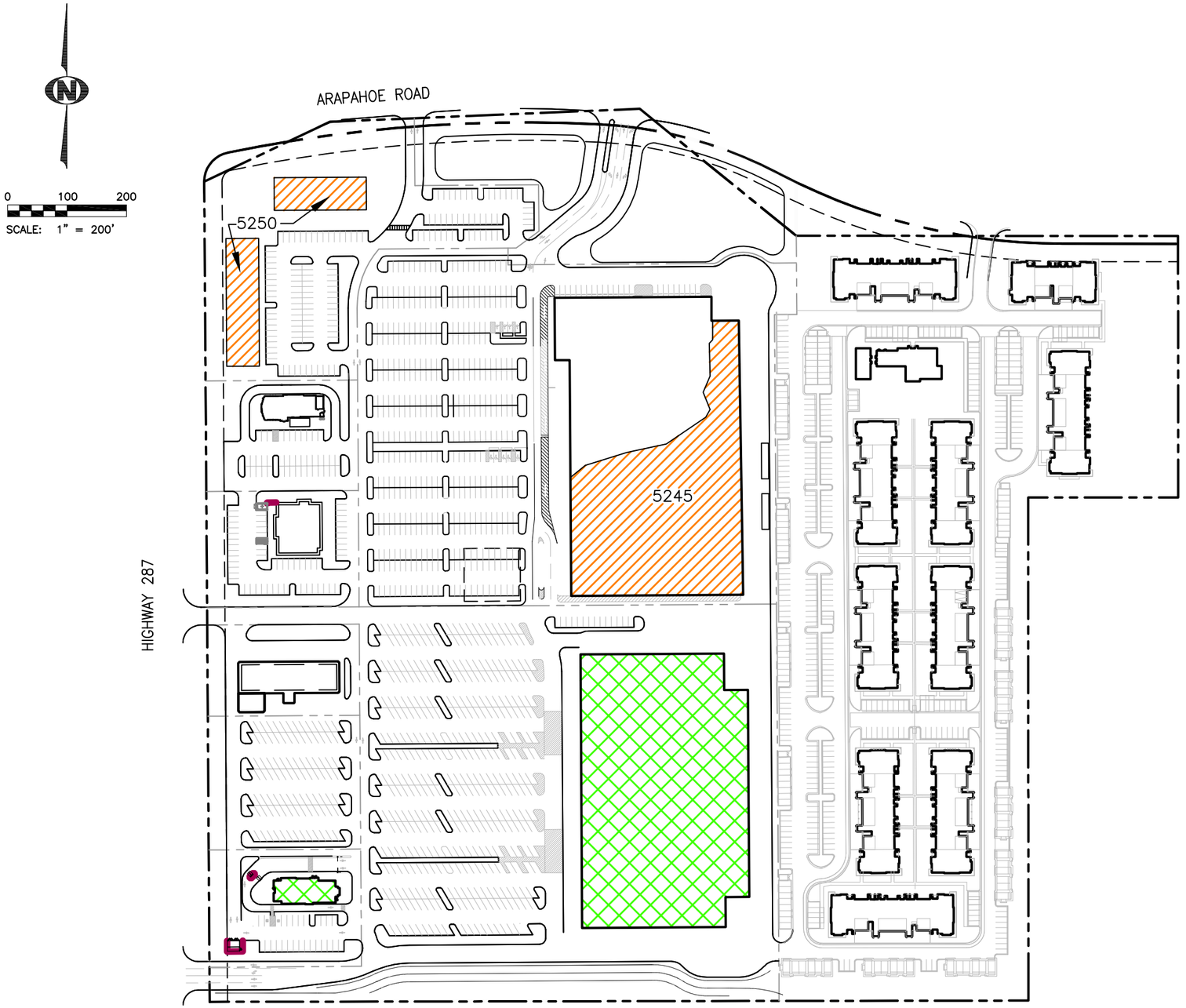
LEGEND:

TH–1 ●	APPROXIMATE LOCATION OF EXPLORATORY BORING
TH–12 ●	APPROXIMATE LOCATION OF EXPLORATORY BORING INCLUDED IN SEPARATE INVESTIGATION
21.1	INDICATES PROPOSED FILL (FEET)
–12.2	INDICATES PROPOSED CUT (FEET)

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
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Proposed Depth of Cut/Fill

Fig. 5



LEGEND:

5245 — SUB–EXCAVATE TO ELEVATION 5245

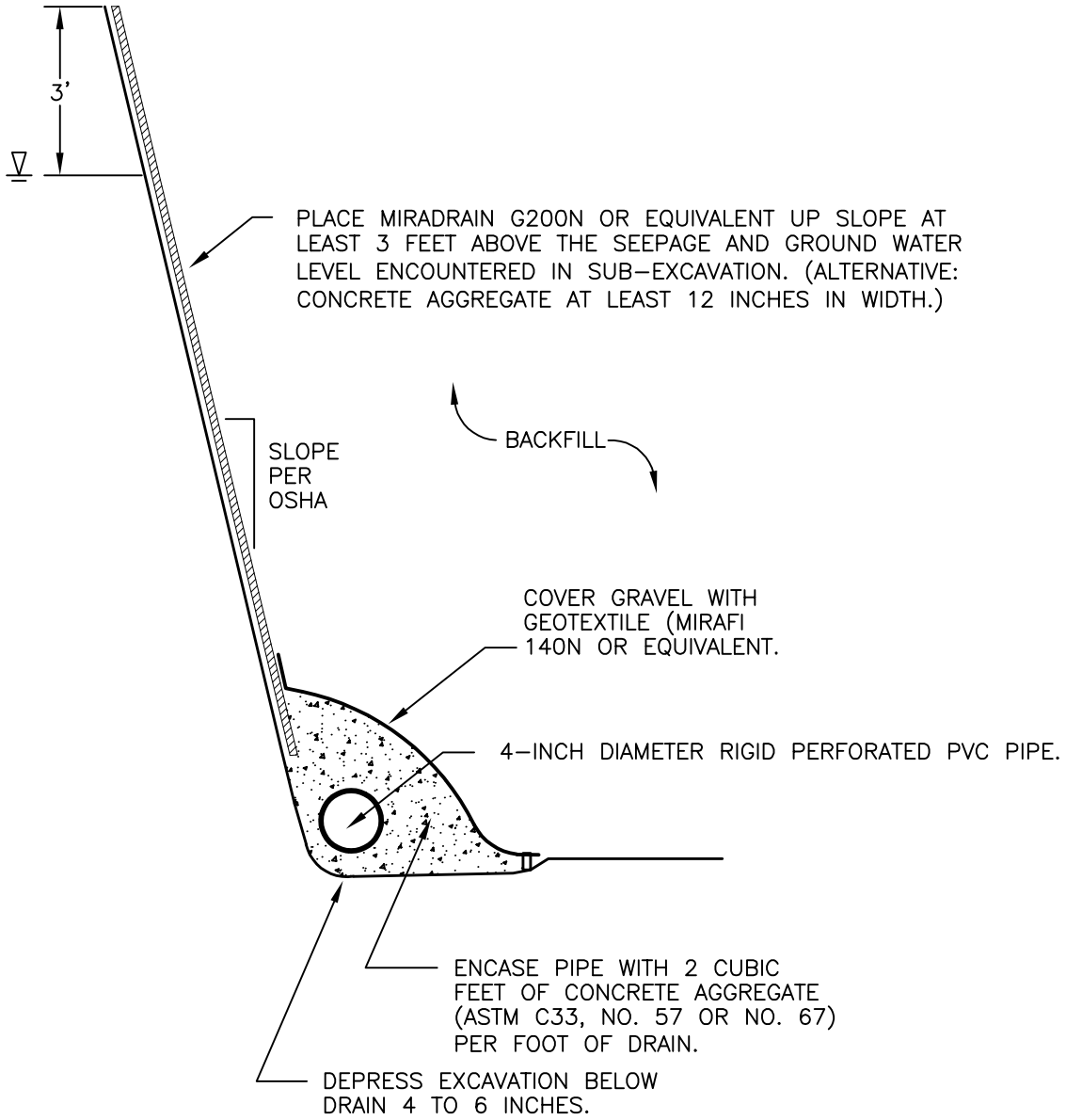
SUB–EXCAVATE TO 10 FEET BELOW FOOTING FOUNDATIONS AND 14 FEET BELOW FLOOR (WHICHEVER IS DEEPER)

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL\T Project No. DN48,647-125-R1

Anticipated Sub-Excavation Recommendations

Fig. 6

20-INTERCEPTOR_08



NOTE:
THE BOTTOM OF THE DRAIN SHOULD SLOPE TO A POSITIVE GRAVITY OUTLET WITH A MINIMUM SLOPE OF 0.5 PERCENT.

Sub-Excavation Interceptor Drain

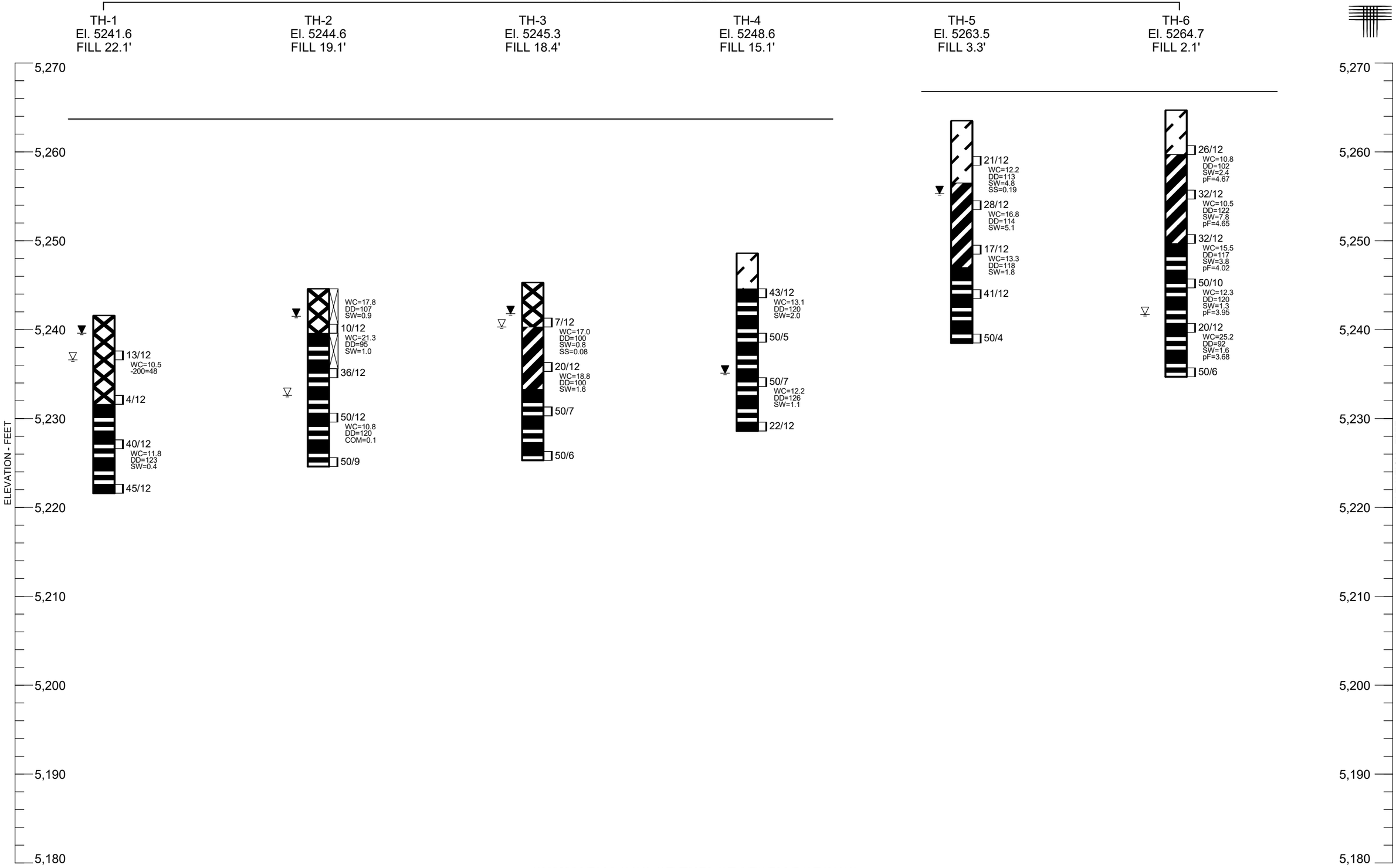
EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
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Fig. 7

APPENDIX A

SUMMARY LOGS OF EXPLORATORY BORINGS

NORTH ANCHOR BUILDING



EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERICAL AREA
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SUMMARY LOGS OF EXPLORATORY BORINGS

FIG. A- 1

SOUTH ANCHOR BUILDING

TH-5
El. 5263.5
FILL 3.3'

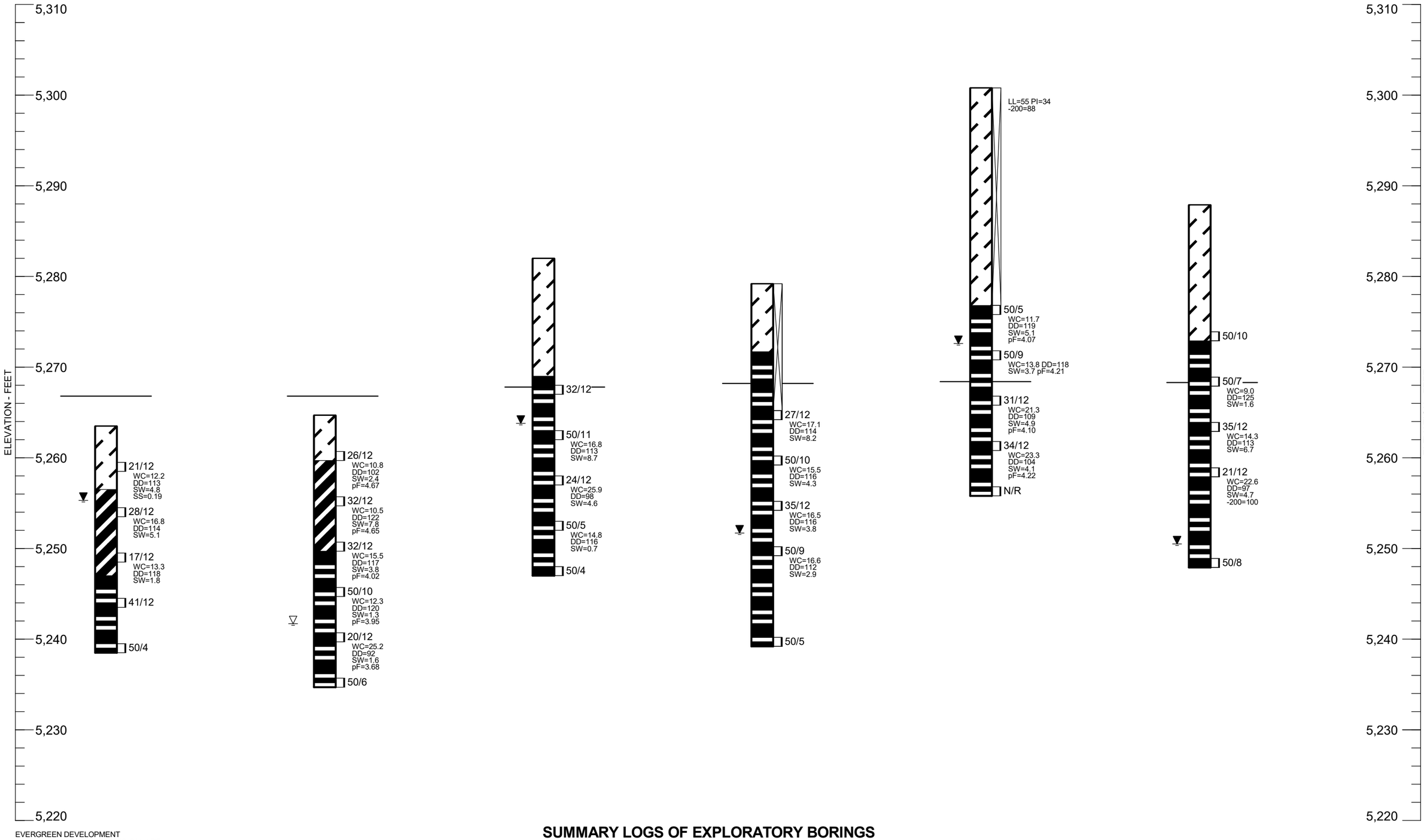
TH-6
El. 5264.7
FILL 2.1'

TH-7
El. 5282.0
CUT 14.2'

TH-8
El. 5279.2
CUT 11.0'

TH-9
El. 5300.8
CUT 32.4'

TH-10
El. 5287.9
CUT 19.6'

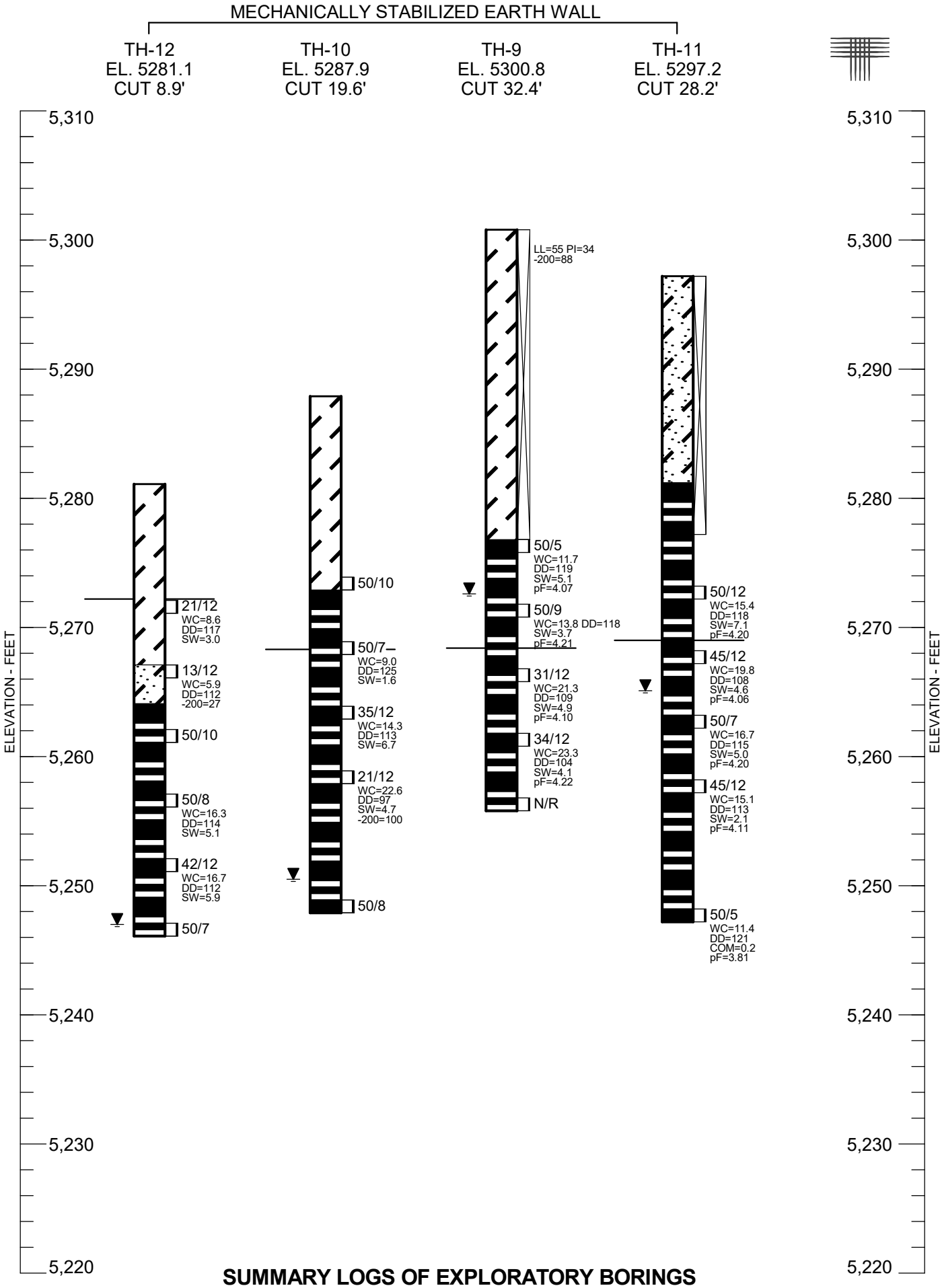


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EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERICAL AREA
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SUMMARY LOGS OF EXPLORATORY BORINGS

FIG. A- 2

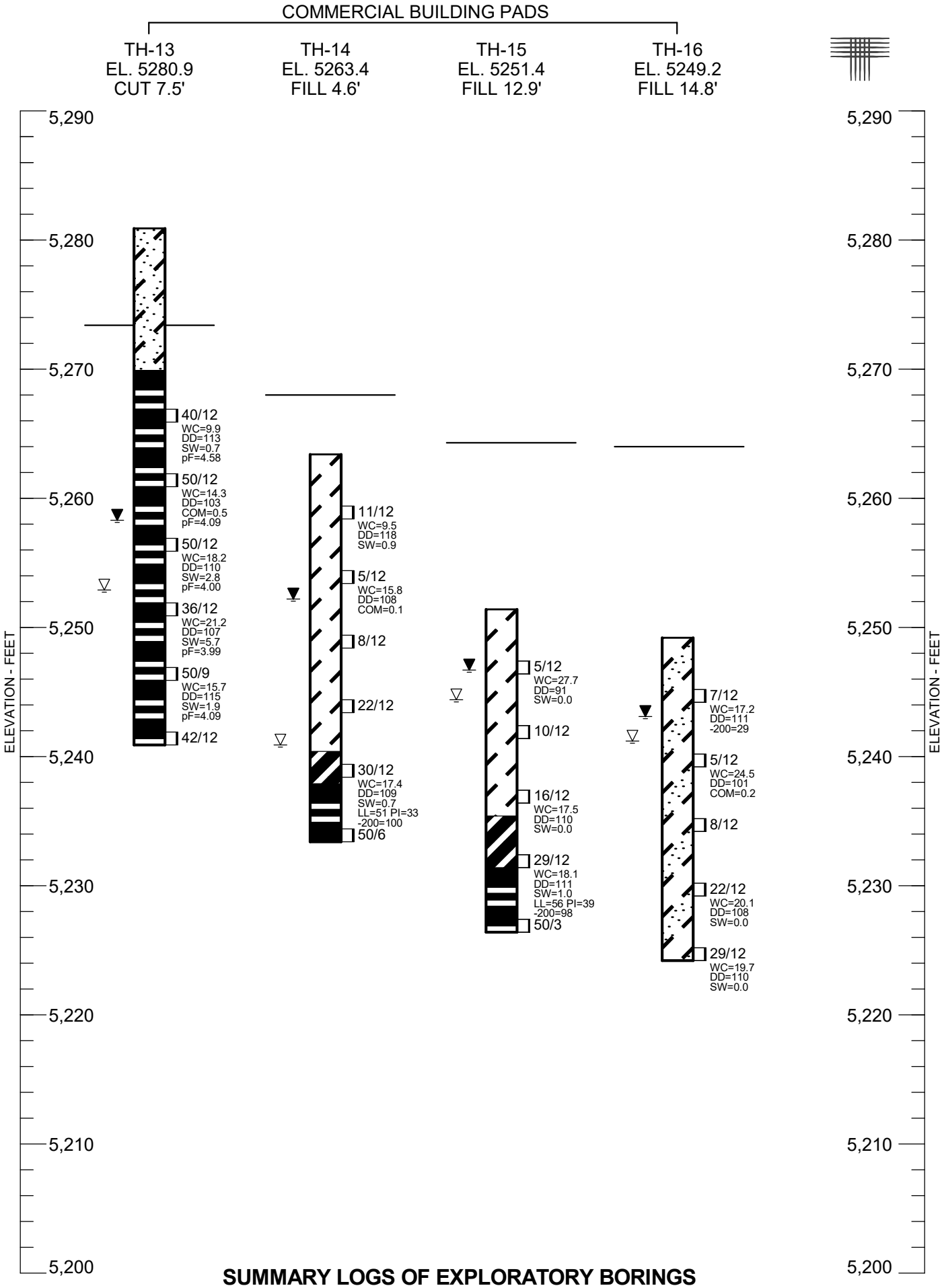


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SUMMARY LOGS OF EXPLORATORY BORINGS

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERICAL AREA
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FIG. A- 3

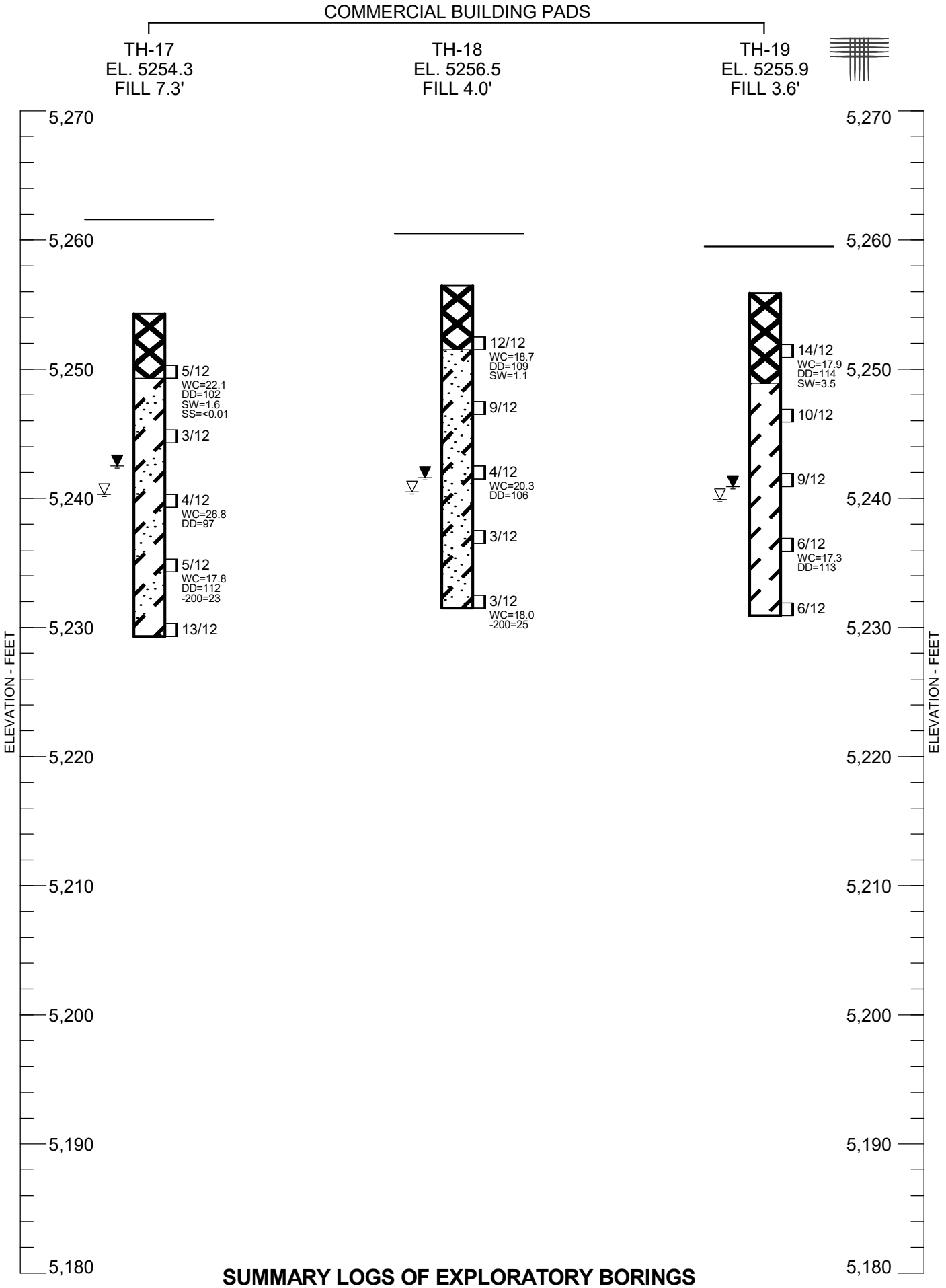


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SUMMARY LOGS OF EXPLORATORY BORINGS

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERICAL AREA
CTL|T PROJECT NO. DN48,647-125-R1

FIG. A- 4

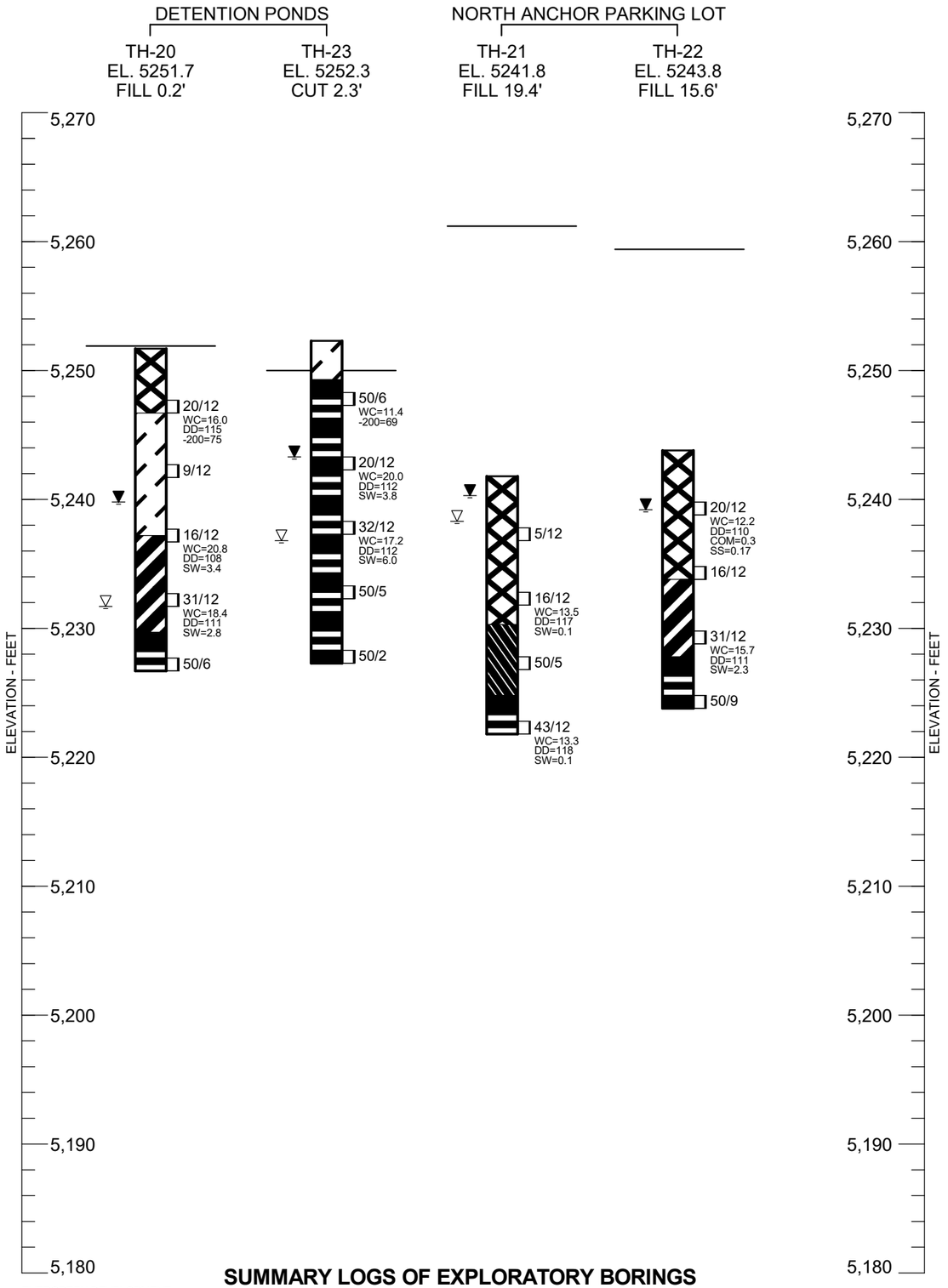


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SUMMARY LOGS OF EXPLORATORY BORINGS

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERICAL AREA
CTL|T PROJECT NO. DN48,647-125-R1

FIG. A- 5



SUMMARY LOGS OF EXPLORATORY BORINGS

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERICAL AREA
CTL|T PROJECT NO. DN48,647-125-R1

LEGEND:

FILL, CLAY, SANDY OR SAND, CLAYEY, GRAVELLY, MEDIUM STIFF TO VERY STIFF OR LOOSE TO MEDIUM DENSE, SLIGHTLY MOIST TO VERY MOIST, BROWN, GRAY, RUST, TAN.

CLAY, SANDY, MEDIUM STIFF TO VERY STIFF, DRY TO MOIST, BROWN, GRAY, TAN (CL).

SAND, CLAYEY, GRAVELLY, DRY, BROWN.

INTERLAYERED CLAY/SAND, SOFT TO VERY STIFF OR VERY LOOSE TO MEDIUM DENSE, SLIGHTLY MOIST TO WET, BROWN, LIGHT BROWN, RUST, TAN, WHITE (SM, SC, CL).

WEATHERED CLAYSTONE, DRY TO MOIST, BROWN, LIGHT BROWN, GRAY, TAN, RUST.

BEDROCK, INTERBEDDED CLAYSTONE/SANDSTONE, VERY HARD, MOIST, TAN.

BEDROCK, CLAYSTONE, OCCASIONAL LIGNITE SEAMS, MEDIUM HARD TO VERY HARD, DRY TO SLIGHTLY MOIST, BROWN, GRAY, LIGHT GRAY, TAN, RUST.

DRIVE SAMPLE. THE SYMBOL 12/12 INDICATES 12 BLOWS OF AN AUTOMATIC 140-POUND HAMMER FALLING 30 INCHES WERE REQUIRED TO DRIVE A 2.5-INCH O.D. SAMPLER 12 INCHES.

BULK SAMPLE COLLECTED FROM AUGER CUTTINGS.

WATER LEVEL MEASURED AT TIME OF DRILLING.

WATER LEVEL MEASURED AFTER DRILLING ON JANUARY 9, 2017.

INDICATES PROPOSED GRADE.

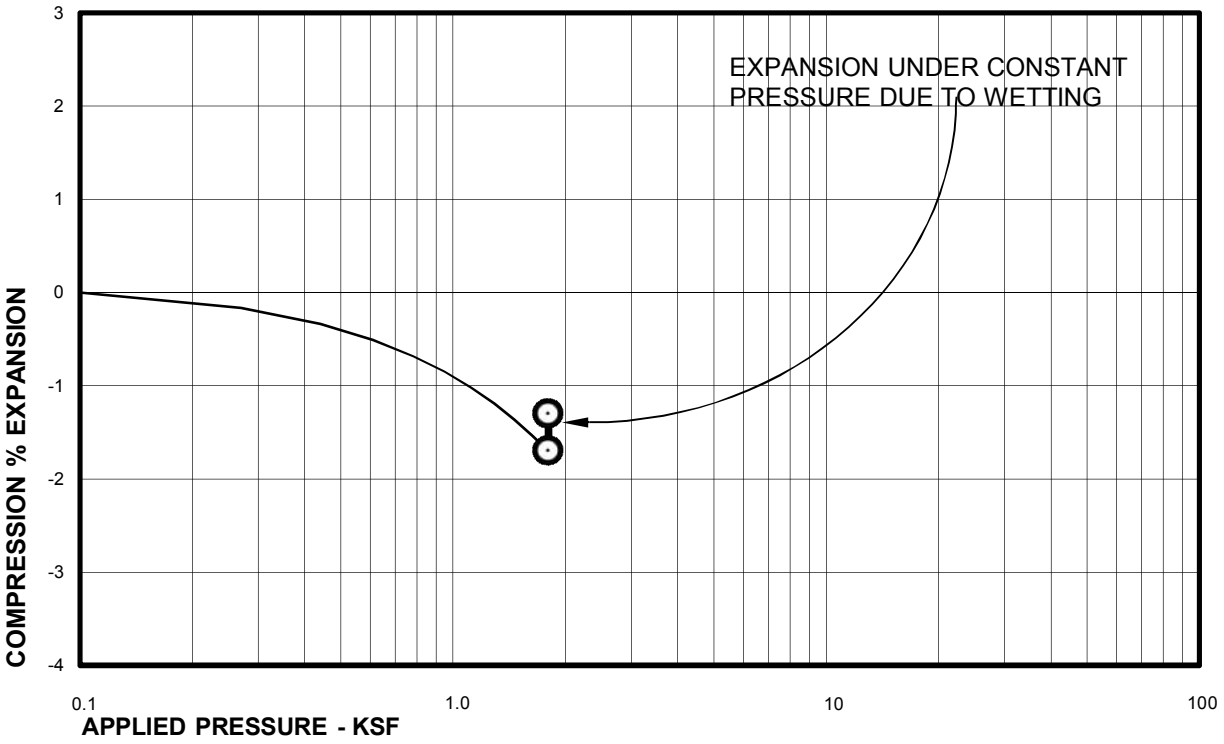
NOTES:

1. THE BORINGS WERE DRILLED ON DECEMBER 30, 2016 THROUGH JANUARY 4, 2017 USING 4-INCH DIAMETER, CONTINUOUS-FLIGHT SOLID-STEM AUGER AND A TRUCK-MOUNTED CME-45 OR CME-55 DRILL RIG.
2. BORING LOCATIONS AND ELEVATIONS WERE SURVEDY BY GALLOWAY & COMPANY, INC.
3. WC - INDICATES MOISTURE CONTENT (%).
   DD - INDICATES DRY DENSITY (PCF).
   SW - INDICATES SWELL WHEN WETTED UNDER APPLIED PRESSURE (%).
   COM- INDICATES COMPRESSION WHEN WETTED UNDER APPLIED PRESSURE (%).
   LL - INDICATES LIQUID LIMIT.
   PI - INDICATES PLASTICITY INDEX.
   -200 - INDICATES PASSING NO. 200 SIEVE (%).
   SS - INDICATES WATER-SOLUBLE SULFATE CONTENT (%).
   pF - INDICATES SOIL SUCTION VALUE (pF).
4. THESE LOGS ARE SUBJECT TO THE EXPLANATIONS, LIMITATIONS AND CONCLUSIONS CONTAINED IN THIS REPORT.

FIG. A- 6

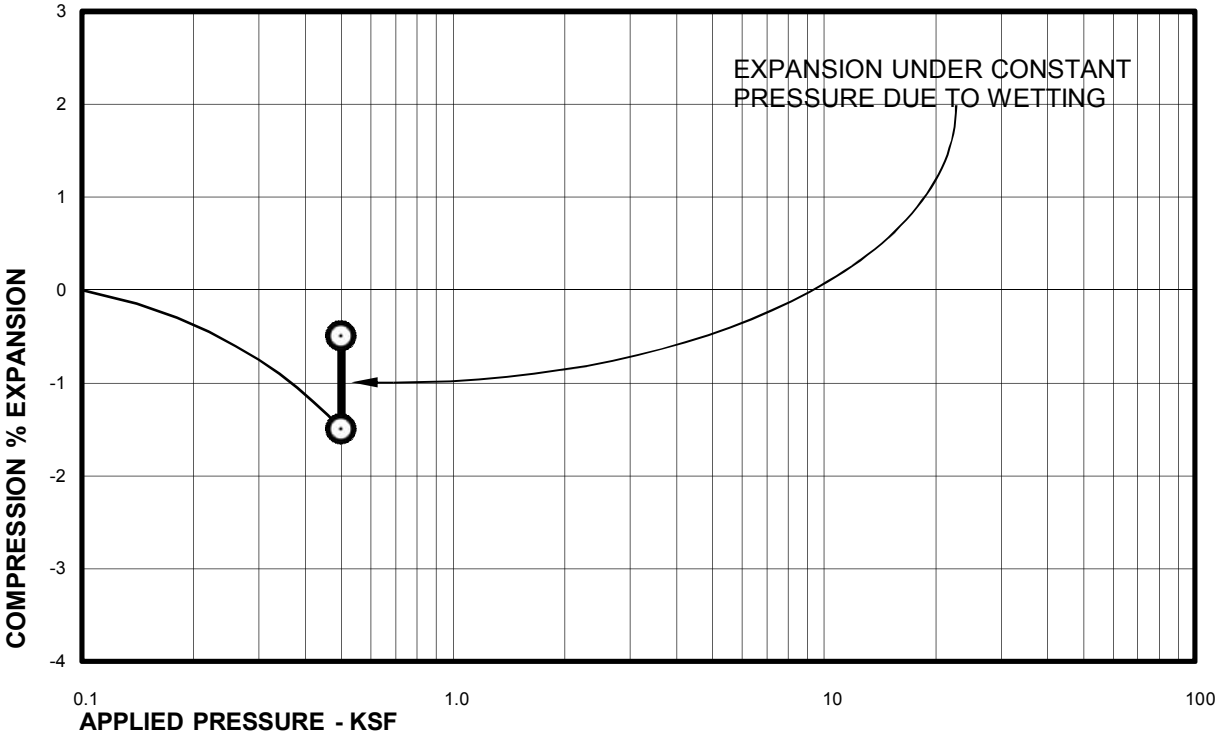
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APPENDIX B
LABORATORY TEST RESULTS



Sample of CLAYSTONE
From TH-1 AT 14 FEET

DRY UNIT WEIGHT= 123 PCF
MOISTURE CONTENT= 11.8 %



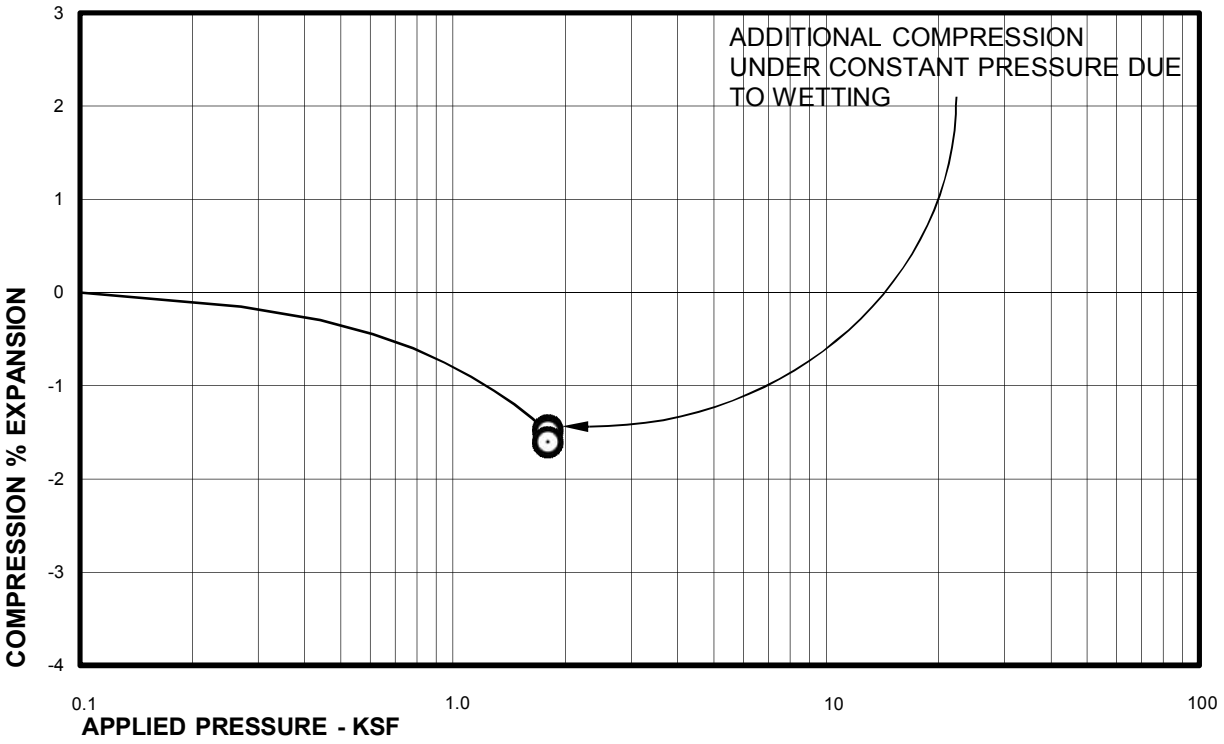
Sample of FILL, CLAY, SANDY
From TH-2 AT 4 FEET

DRY UNIT WEIGHT= 95 PCF
MOISTURE CONTENT= 21.3 %

Swell Consolidation Test Results

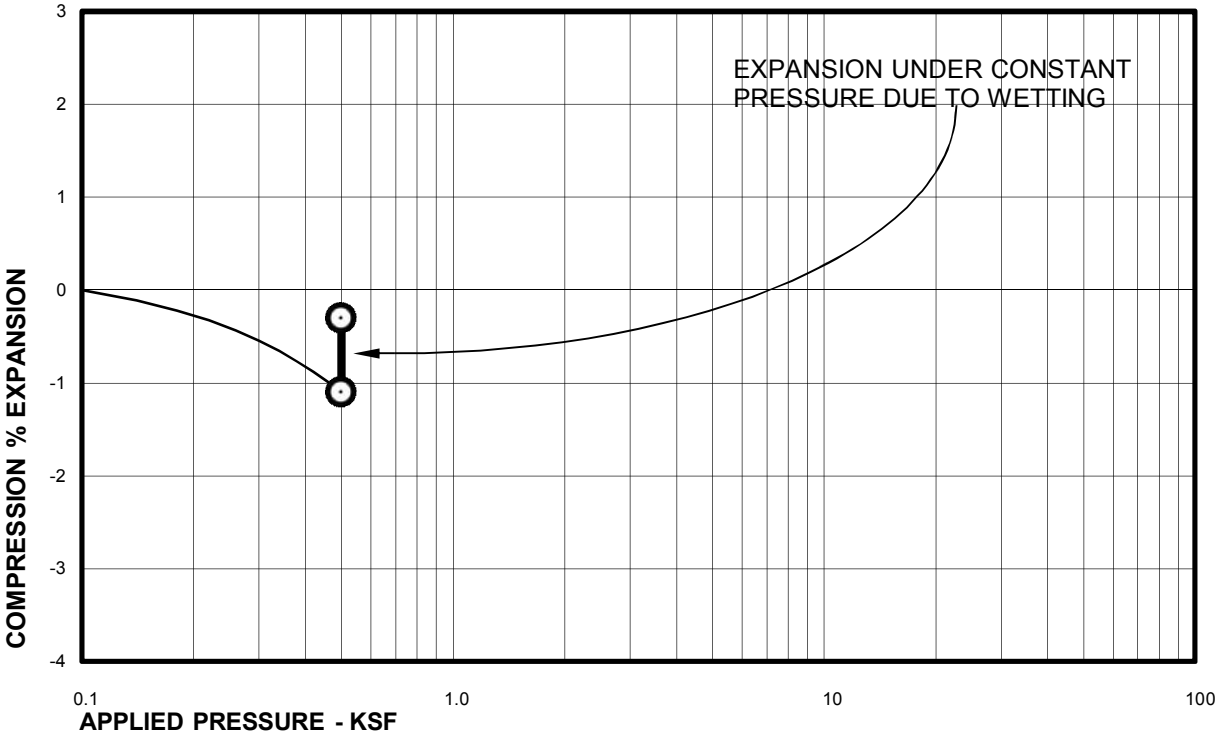
FIG. B-1

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



Sample of CLAYSTONE
From TH-2 AT 14 FEET

DRY UNIT WEIGHT= 120 PCF
MOISTURE CONTENT= 10.8 %



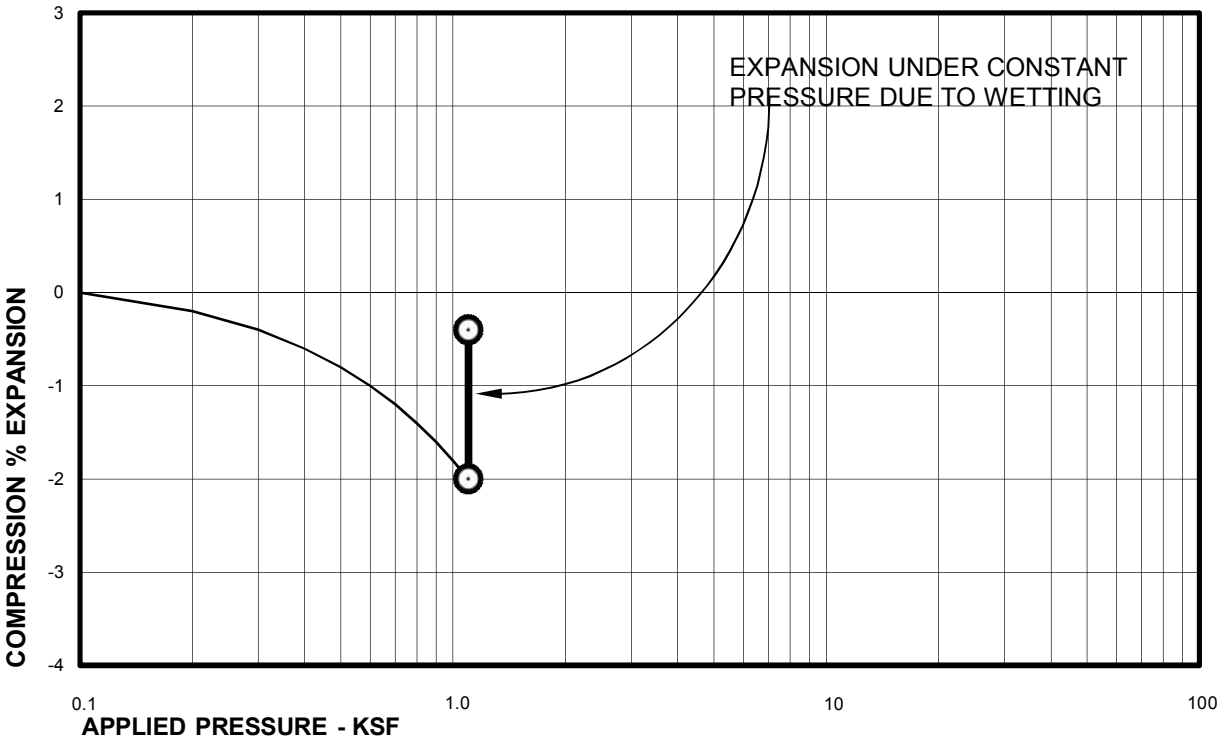
Sample of FILL, CLAY, SANDY
From TH-3 AT 4 FEET

DRY UNIT WEIGHT= 100 PCF
MOISTURE CONTENT= 17.0 %

Swell Consolidation Test Results

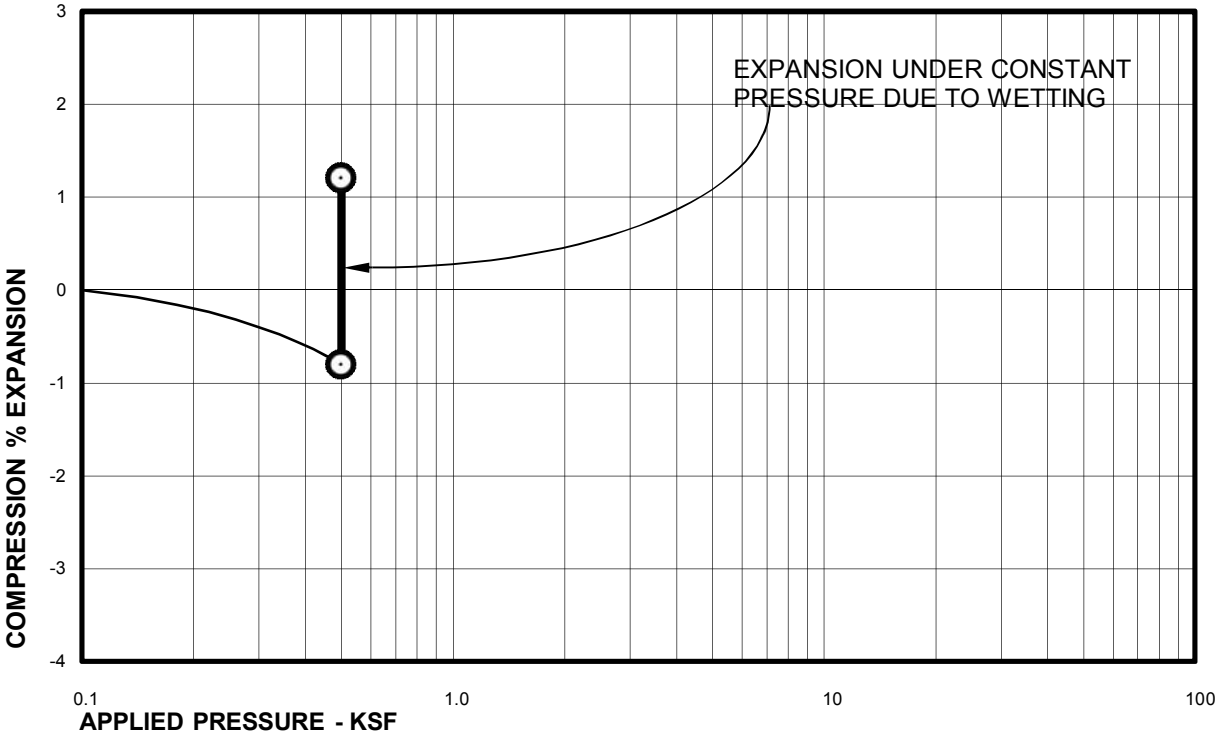
FIG. B-2

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



Sample of CLAYSTONE
From TH-3 AT 9 FEET

DRY UNIT WEIGHT= 100 PCF
MOISTURE CONTENT= 18.8 %



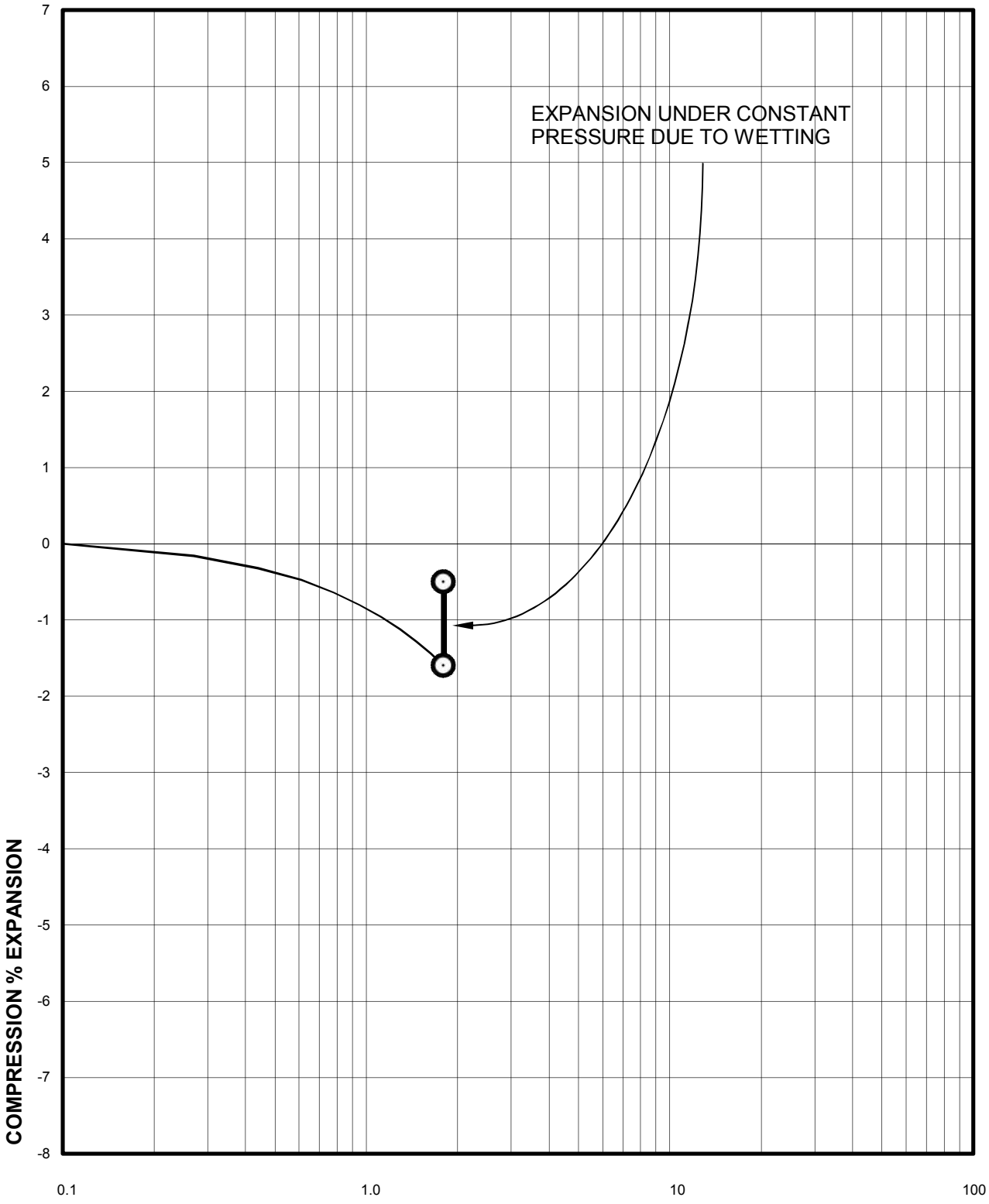
Sample of CLAYSTONE
From TH-4 AT 4 FEET

DRY UNIT WEIGHT= 120 PCF
MOISTURE CONTENT= 13.1 %

Swell Consolidation Test Results

FIG. B-3

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



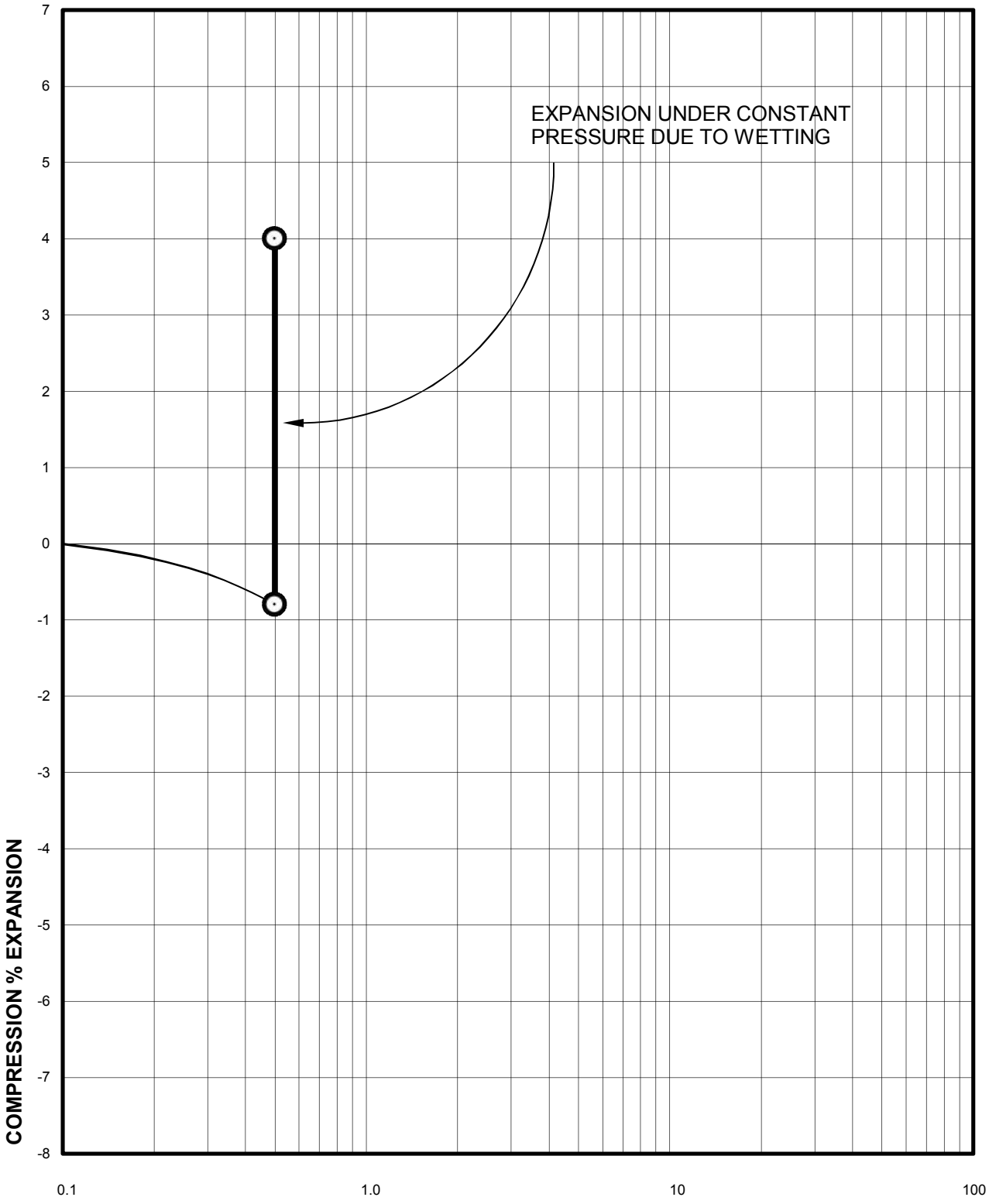
Sample of CLAYSTONE
From TH-4 AT 14 FEET

DRY UNIT WEIGHT= 126 PCF
MOISTURE CONTENT= 12.2 %

Swell Consolidation Test Results

FIG. B-4

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



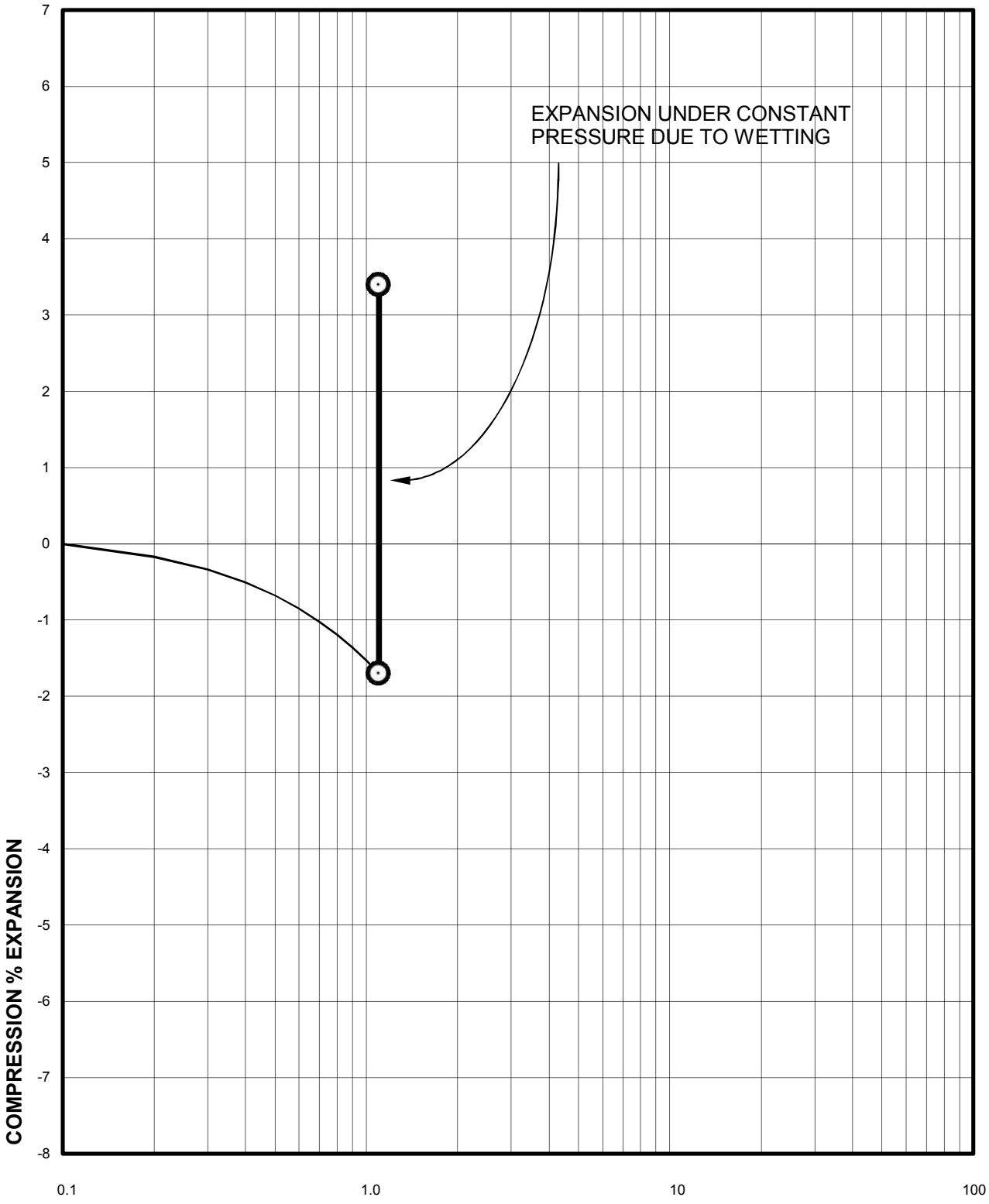
Sample of CLAY, SANDY (CL)
From TH-5 AT 4 FEET

DRY UNIT WEIGHT= 113 PCF
MOISTURE CONTENT= 12.2 %

Swell Consolidation Test Results

FIG. B-5

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



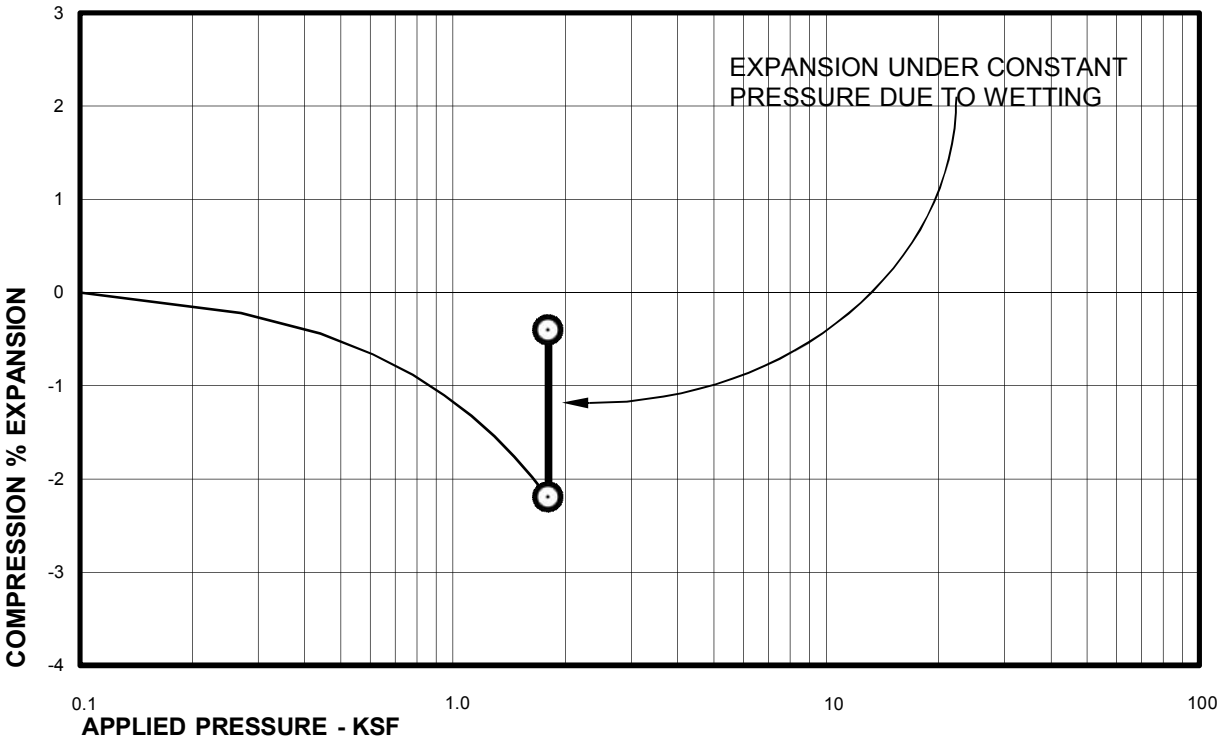
Sample of WEATHERED CLAYSTONE
From TH-5 AT 9 FEET

DRY UNIT WEIGHT= 114 PCF
MOISTURE CONTENT= 16.8 %

Swell Consolidation Test Results

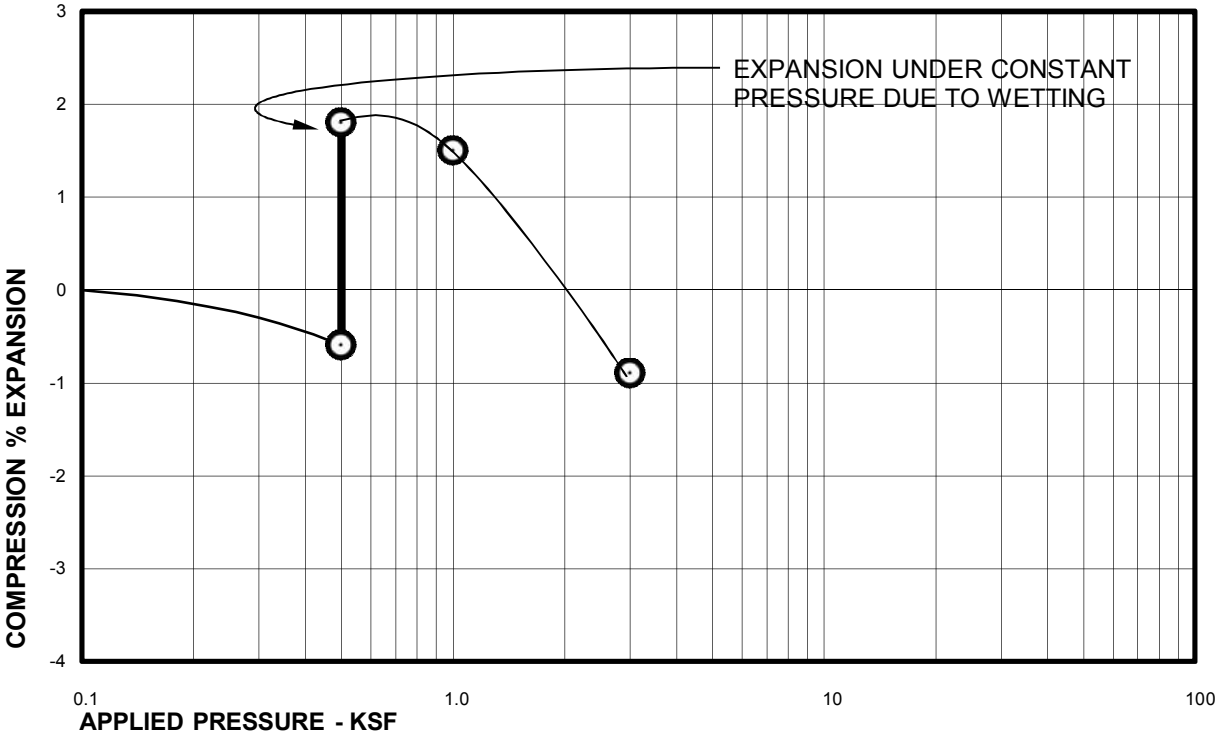
FIG. B-6

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



Sample of WEATHERED CLAYSTONE
From TH-5 AT 14 FEET

DRY UNIT WEIGHT= 118 PCF
MOISTURE CONTENT= 13.3 %



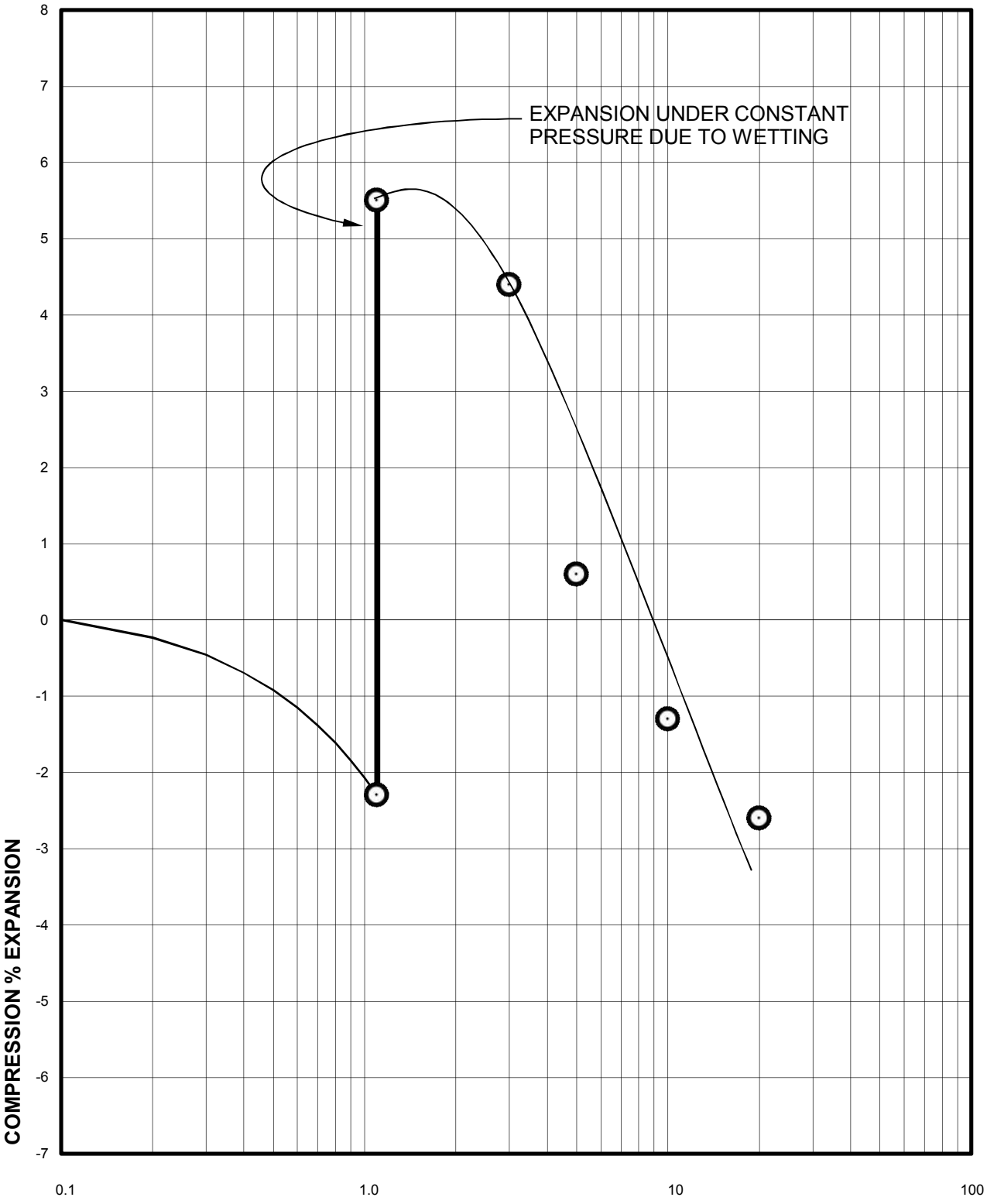
Sample of CLAY, SANDY (CL)
From TH-6 AT 4 FEET

DRY UNIT WEIGHT= 102 PCF
MOISTURE CONTENT= 10.8 %

Swell Consolidation Test Results

FIG. B-7

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



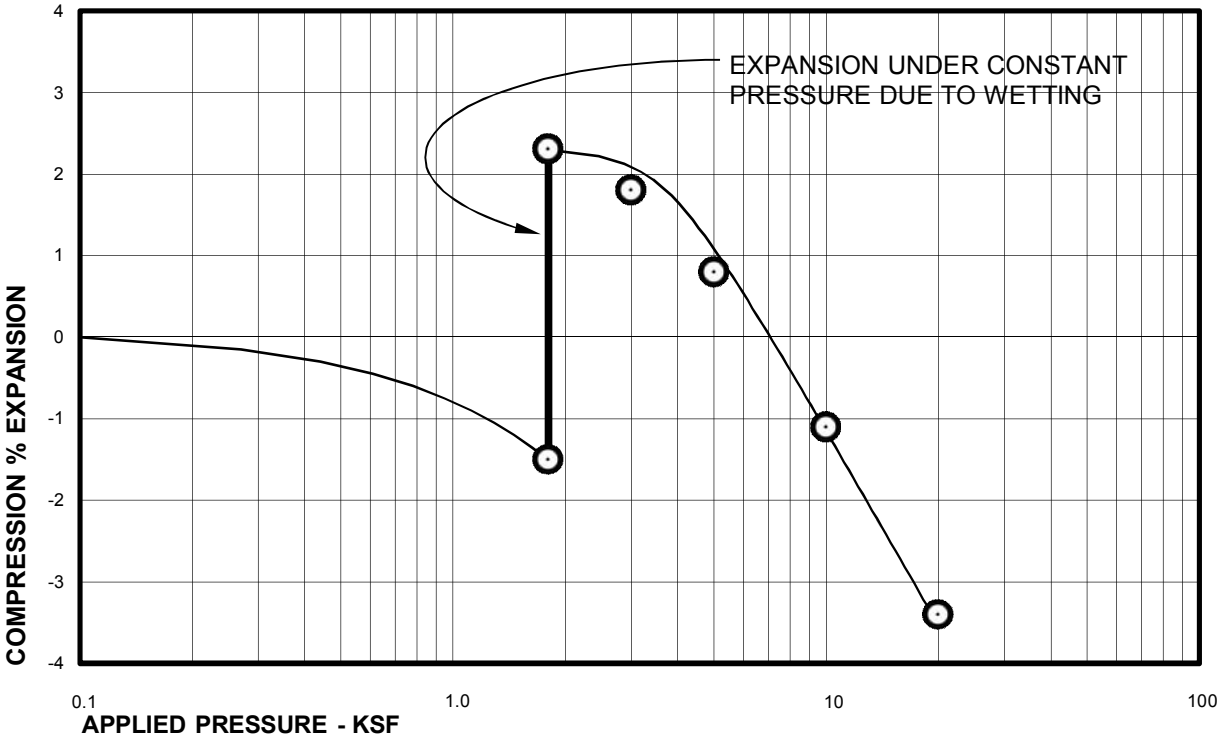
Sample of WEATHERED CLAYSTONE
From TH-6 AT 9 FEET

DRY UNIT WEIGHT= 122 PCF
MOISTURE CONTENT= 10.5 %

Swell Consolidation Test Results

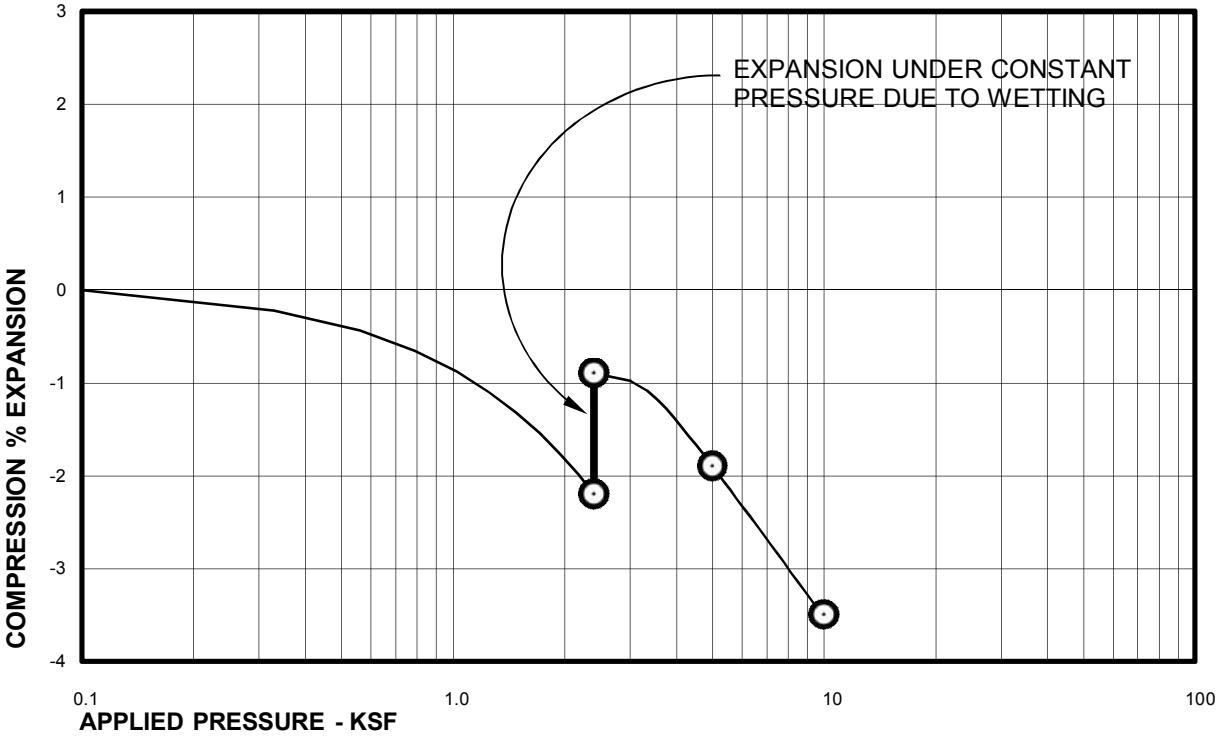
FIG. B-8

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



Sample of WEATHERED CLAYSTONE
From TH-6 AT 14 FEET

DRY UNIT WEIGHT= 117 PCF
MOISTURE CONTENT= 15.5 %



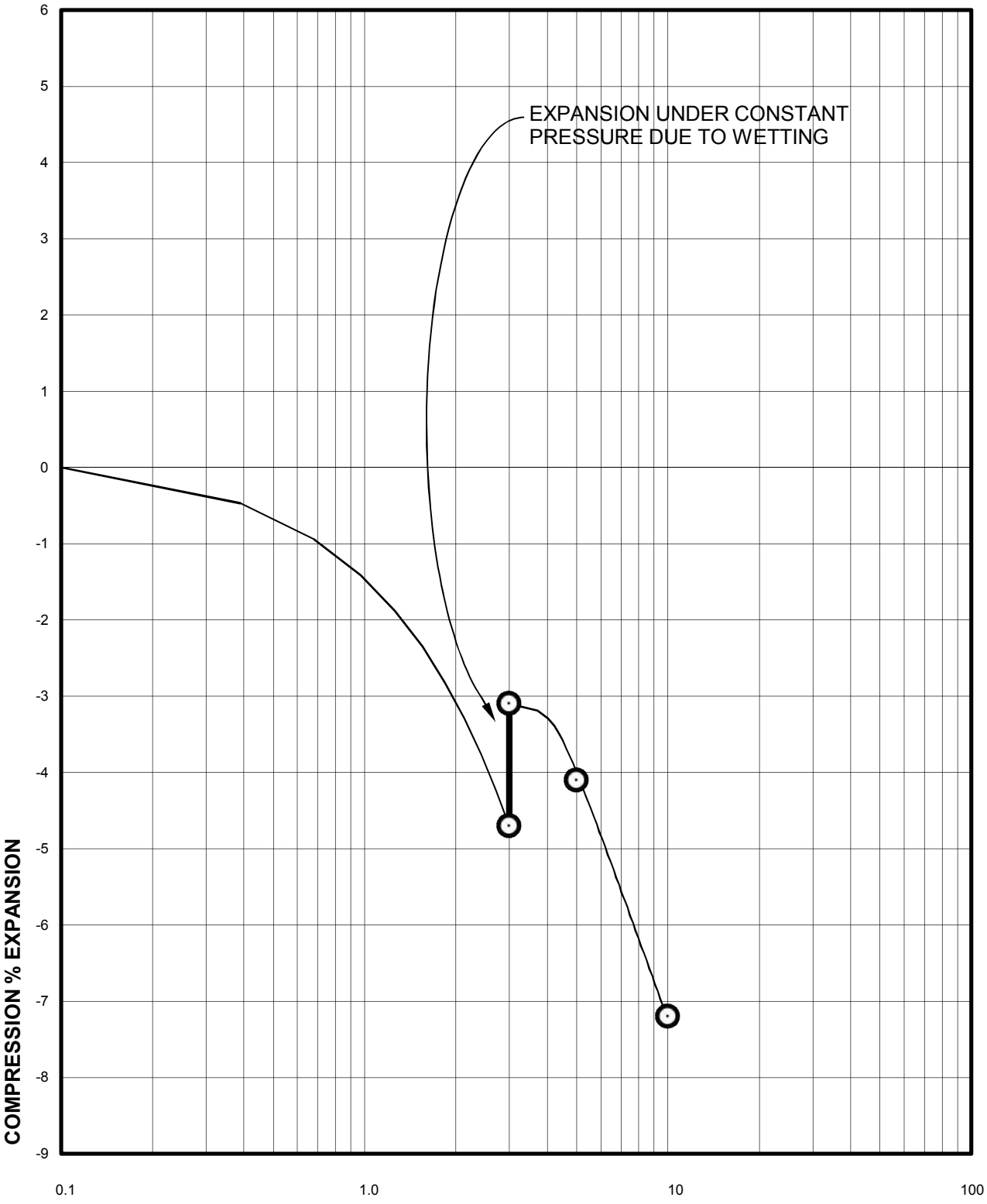
Sample of CLAYSTONE
From TH-6 AT 19 FEET

DRY UNIT WEIGHT= 120 PCF
MOISTURE CONTENT= 12.3 %

Swell Consolidation Test Results

FIG. B-9

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



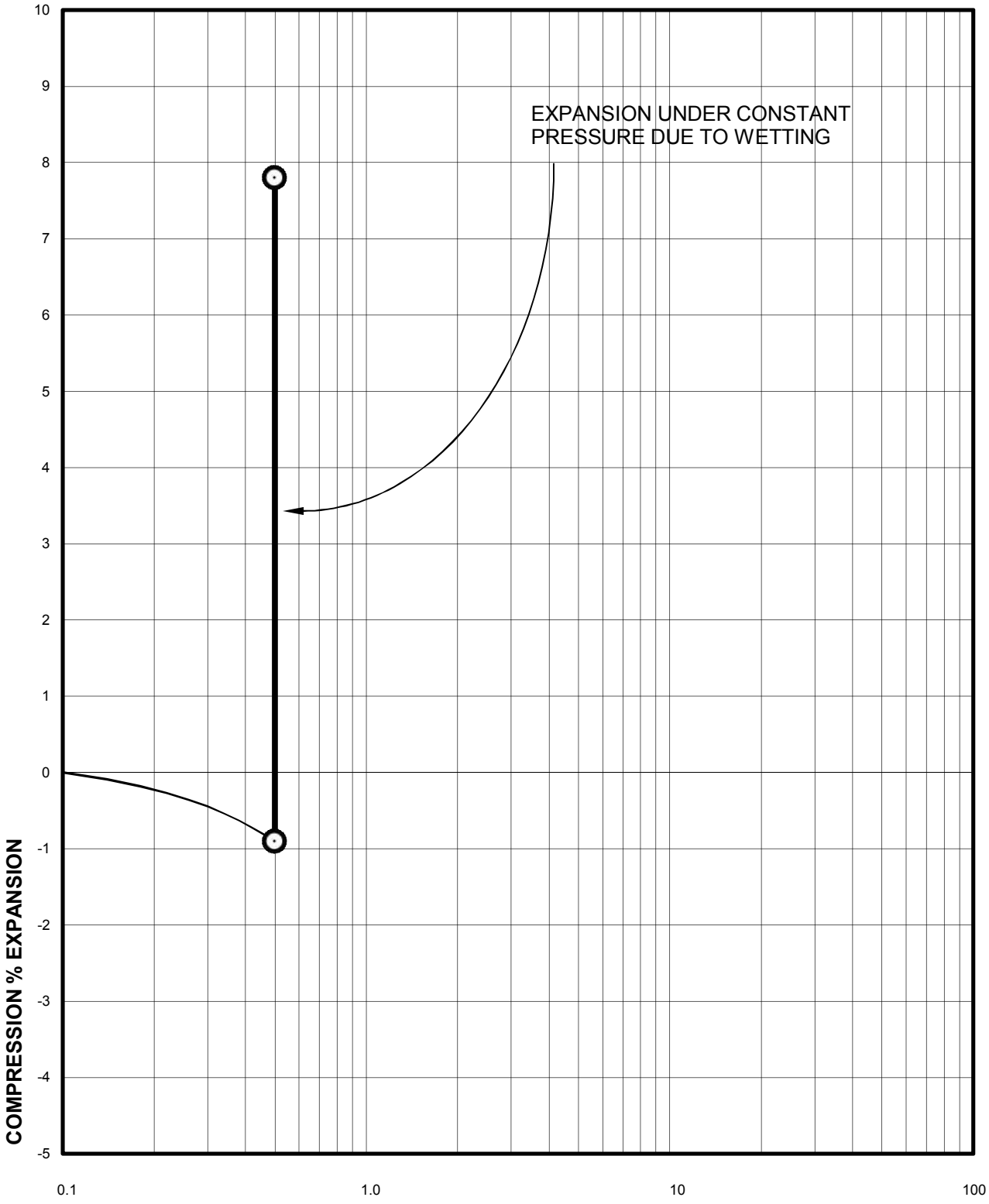
Sample of CLAYSTONE
From TH-6 AT 24 FEET

DRY UNIT WEIGHT= 92 PCF
MOISTURE CONTENT= 25.2 %

Swell Consolidation Test Results

FIG. B-10

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



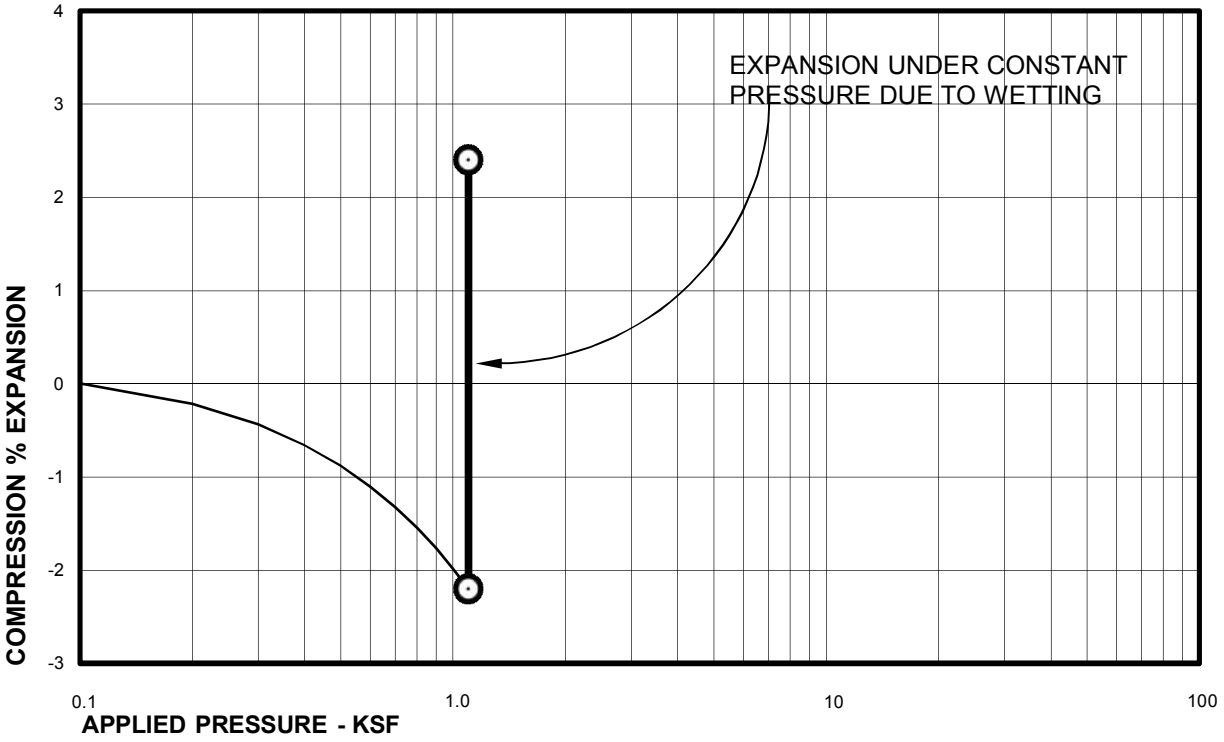
Sample of CLAYSTONE
From TH-7 AT 19 FEET

DRY UNIT WEIGHT= 113 PCF
MOISTURE CONTENT= 16.8 %

Swell Consolidation Test Results

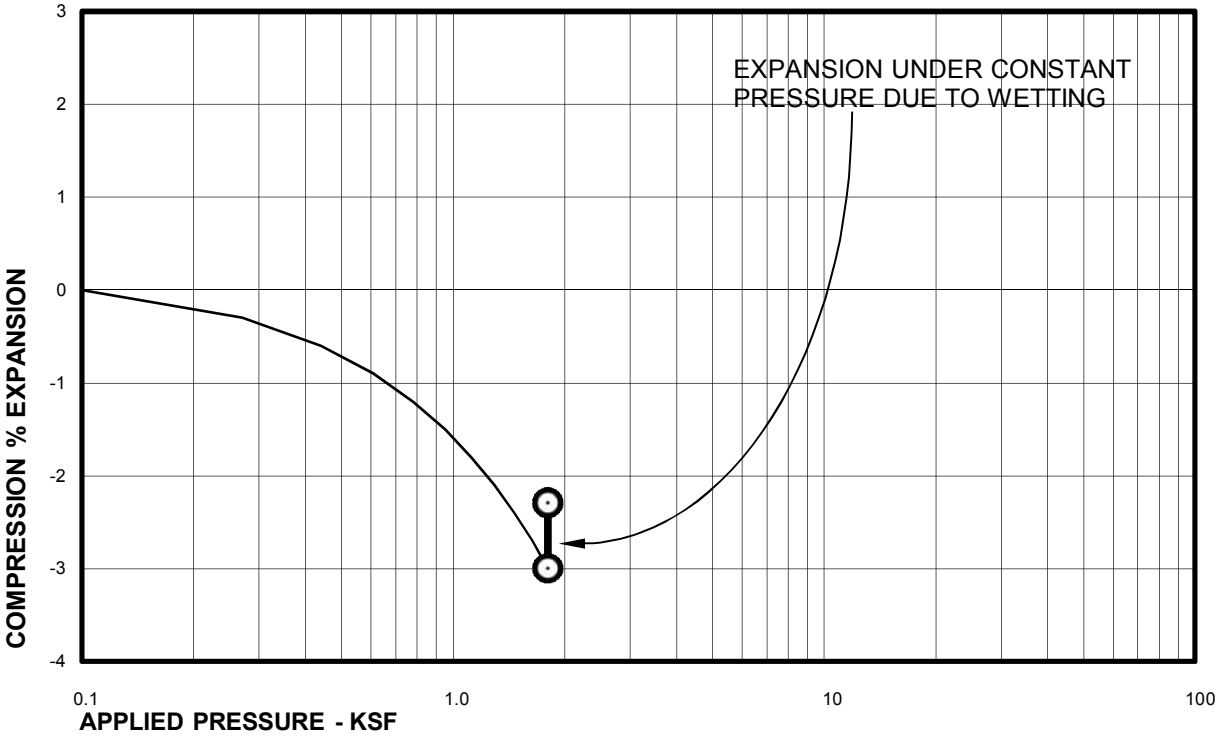
FIG. B-11

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



Sample of CLAYSTONE
From TH-7 AT 24 FEET

DRY UNIT WEIGHT= 98 PCF
MOISTURE CONTENT= 25.9 %



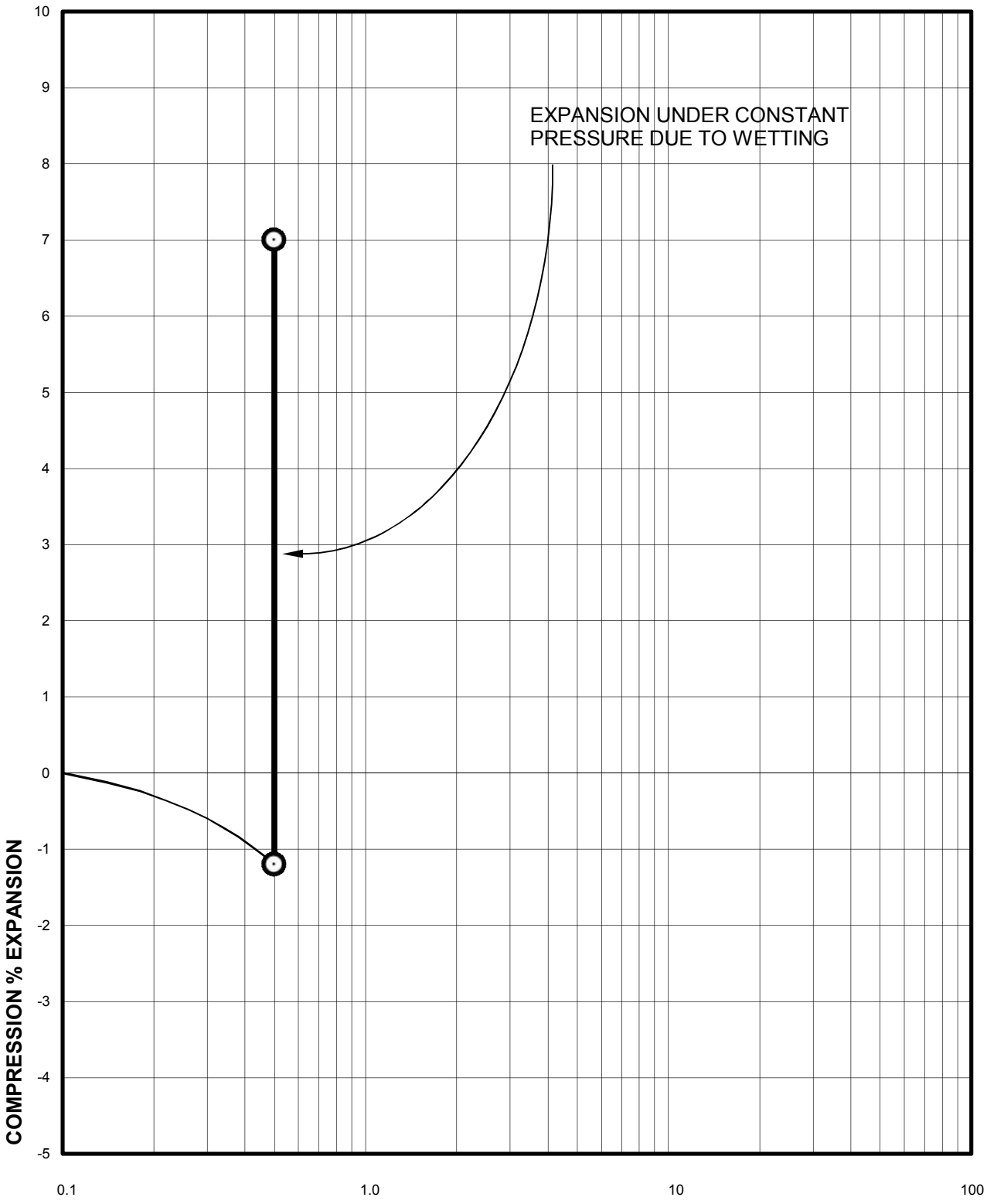
Sample of CLAYSTONE
From TH-7 AT 29 FEET

DRY UNIT WEIGHT= 116 PCF
MOISTURE CONTENT= 14.8 %

Swell Consolidation Test Results

FIG. B-12

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



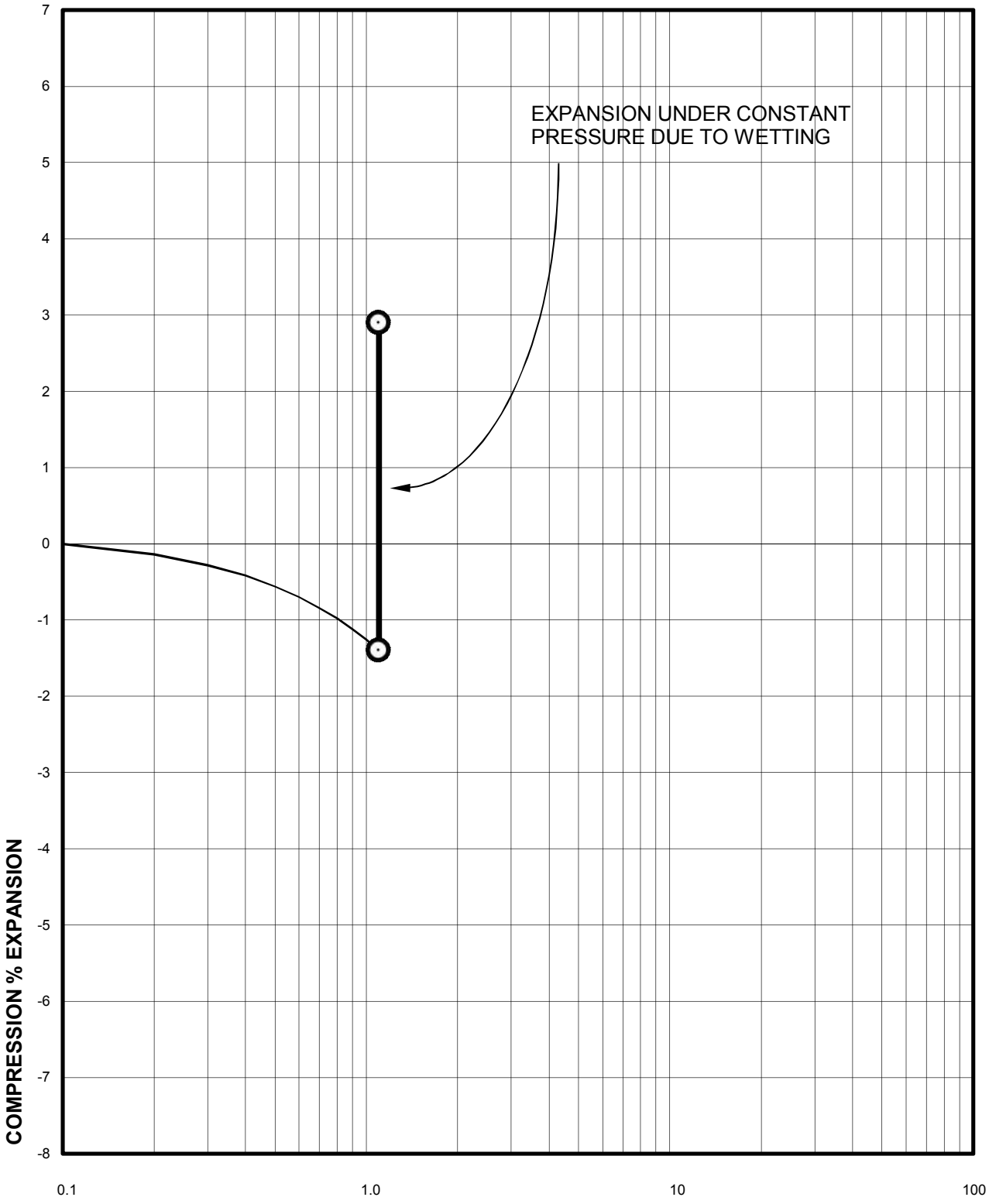
Sample of CLAYSTONE
From TH-8 AT 14 FEET

DRY UNIT WEIGHT= 114 PCF
MOISTURE CONTENT= 17.1 %

Swell Consolidation Test Results

FIG. B-13

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



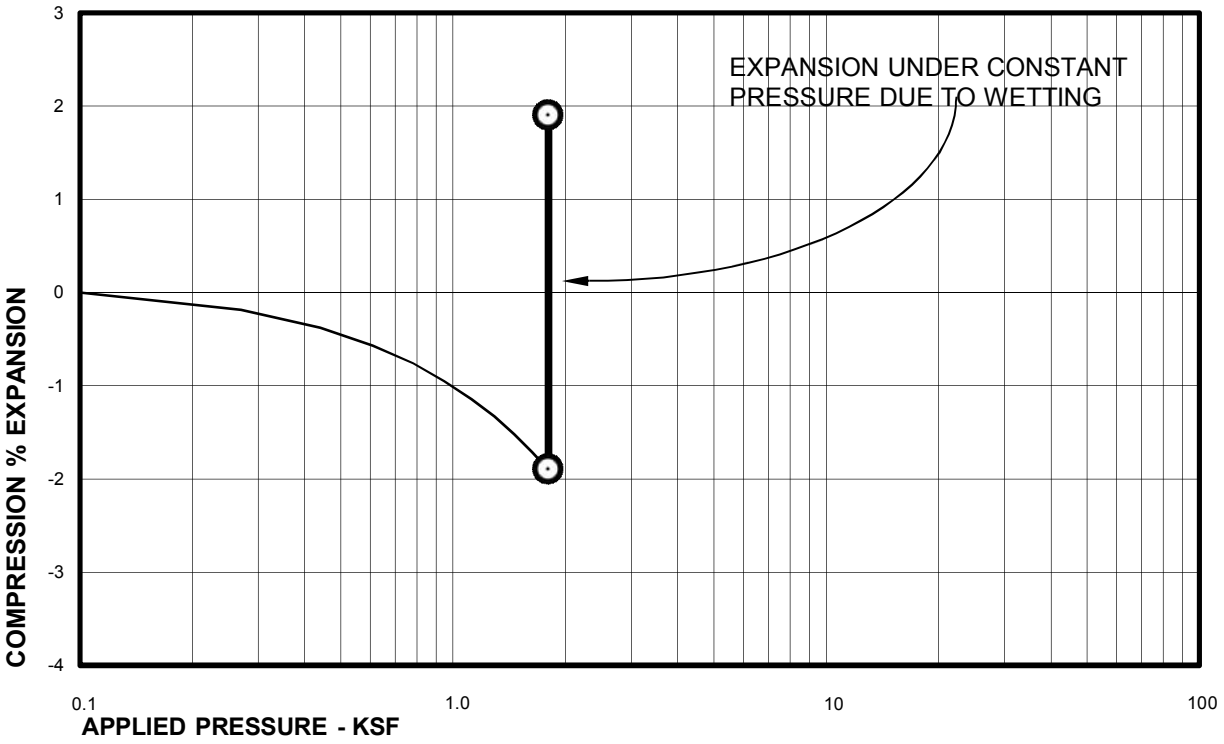
Sample of CLAYSTONE
From TH-8 AT 19 FEET

DRY UNIT WEIGHT= 116 PCF
MOISTURE CONTENT= 15.5 %

Swell Consolidation Test Results

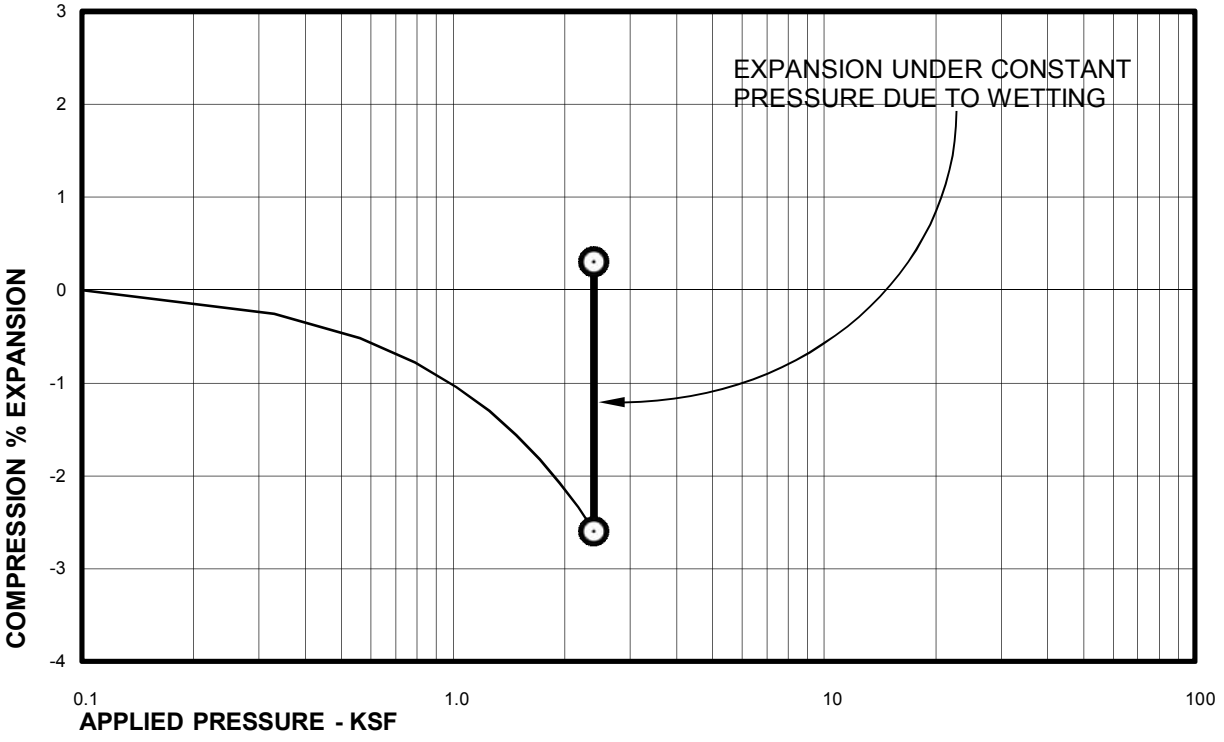
FIG. B-14

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



Sample of CLAYSTONE
From TH-8 AT 24 FEET

DRY UNIT WEIGHT= 116 PCF
MOISTURE CONTENT= 16.5 %



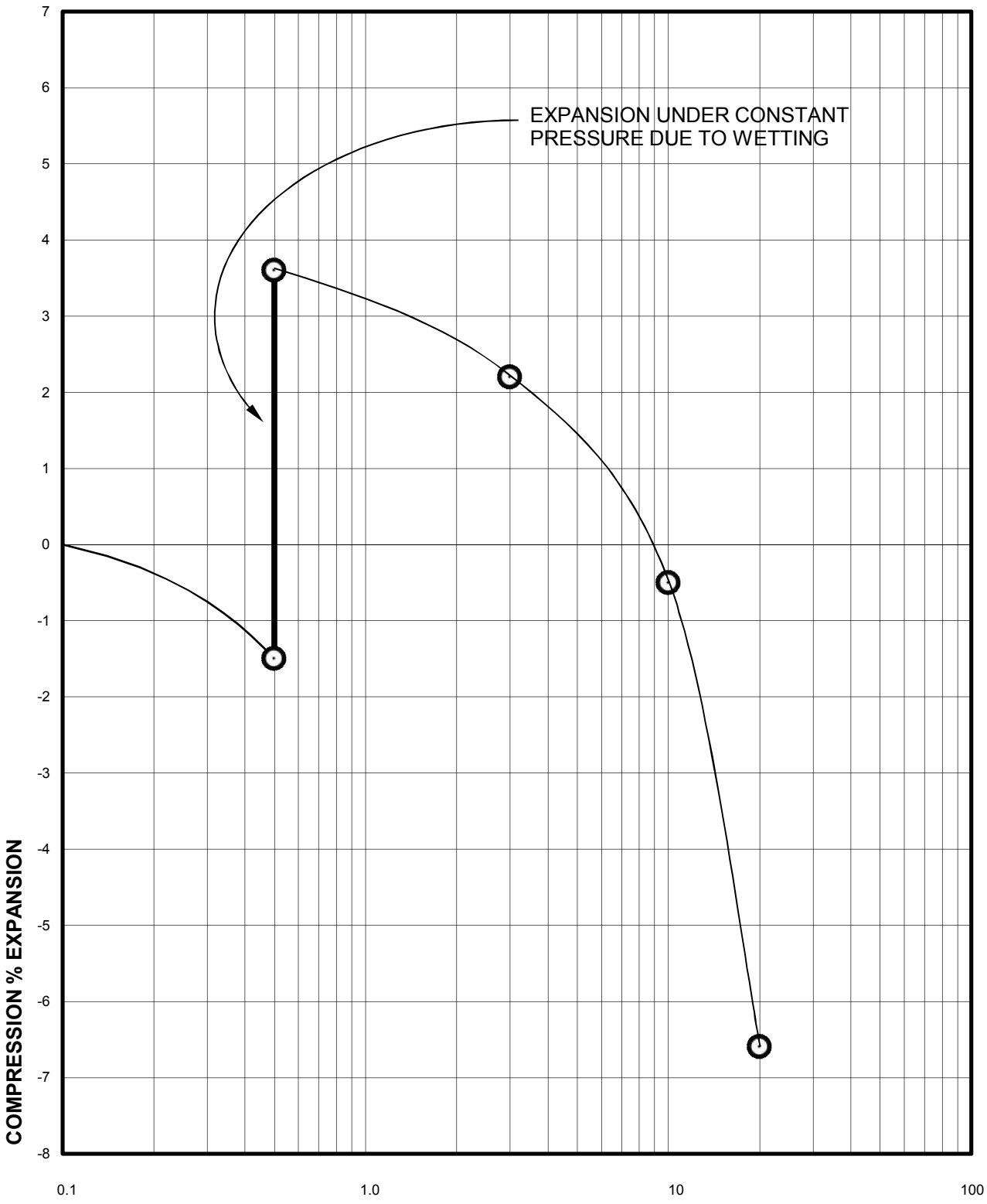
Sample of CLAYSTONE
From TH-8 AT 29 FEET

DRY UNIT WEIGHT= 112 PCF
MOISTURE CONTENT= 16.6 %

Swell Consolidation Test Results

FIG. B-15

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



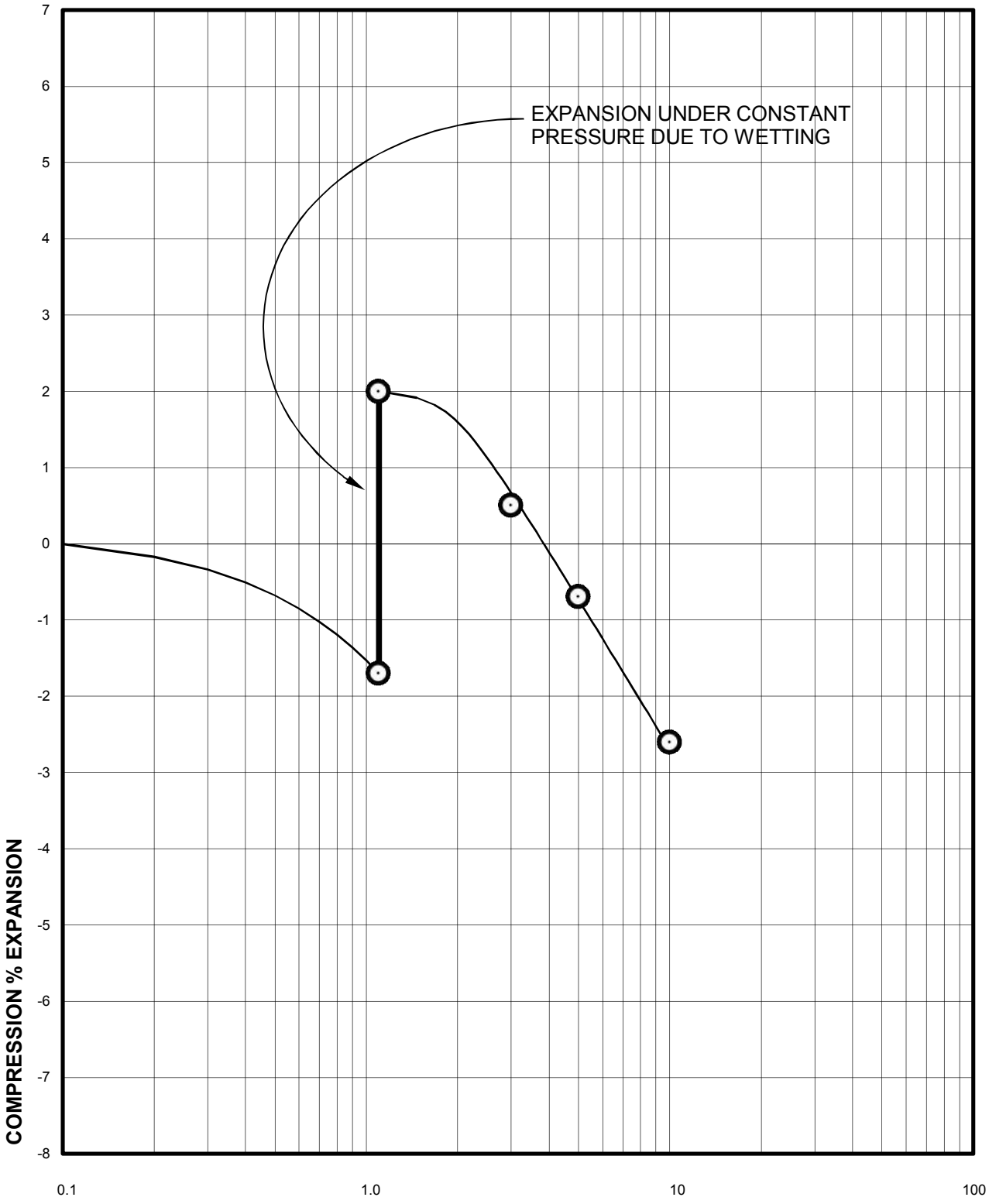
Sample of CLAYSTONE
From TH-9 AT 24 FEET

DRY UNIT WEIGHT= 119 PCF
MOISTURE CONTENT= 11.7 %

Swell Consolidation Test Results

FIG. B-16

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



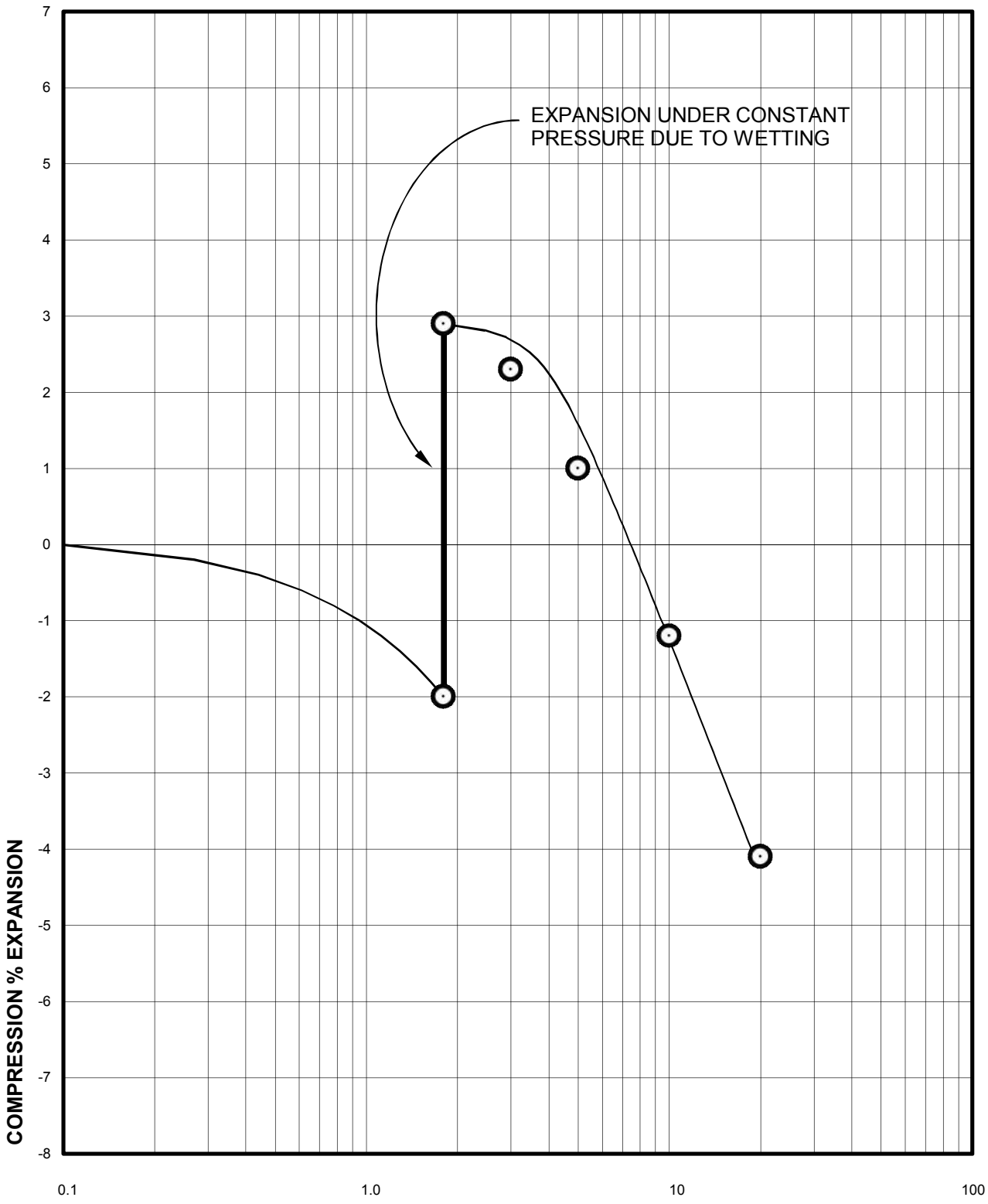
Sample of CLAYSTONE
From TH-9 AT 29 FEET

DRY UNIT WEIGHT= 118 PCF
MOISTURE CONTENT= 13.8 %

Swell Consolidation Test Results

FIG. B-17

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



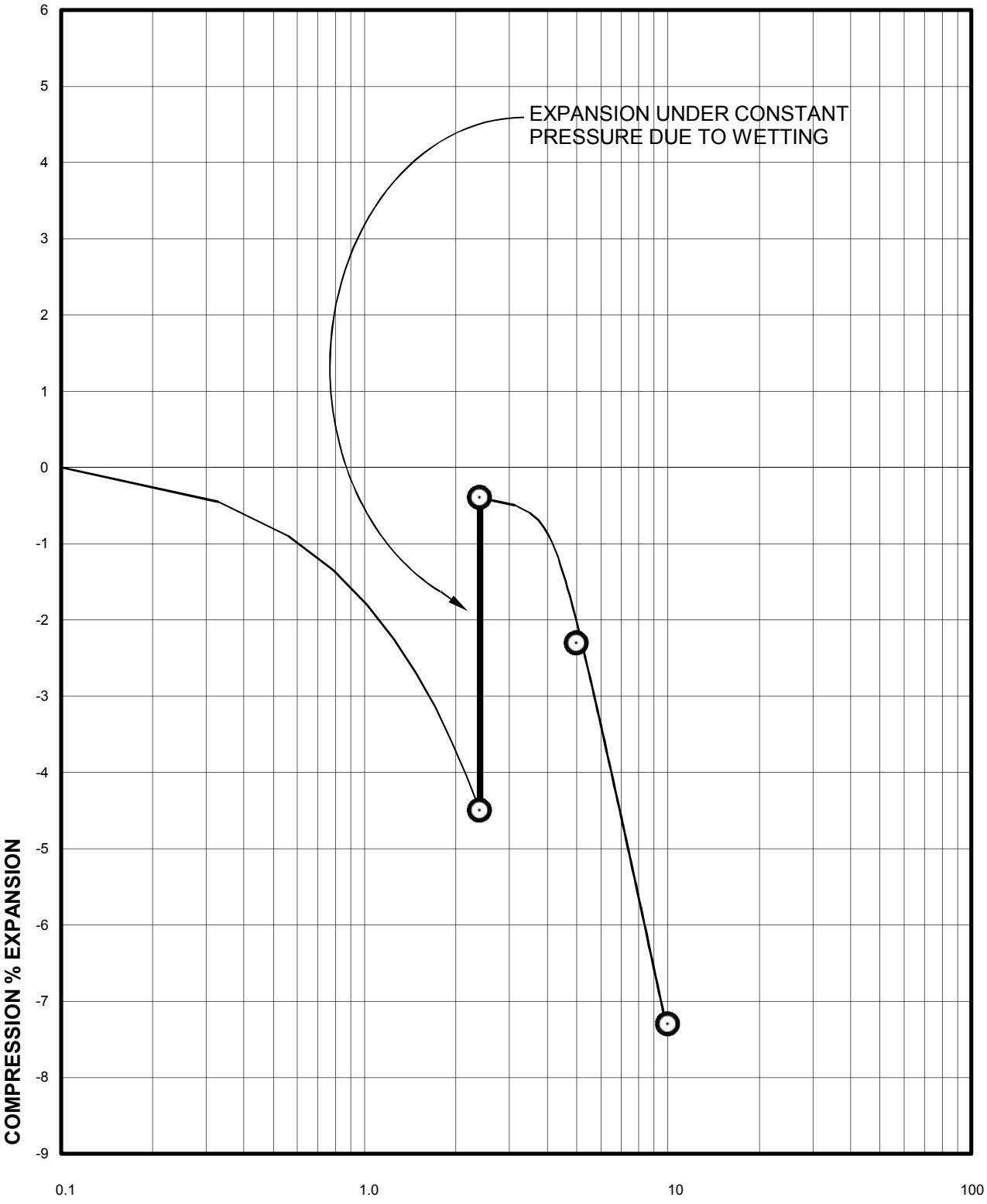
Sample of CLAYSTONE
From TH-9 AT 34 FEET

DRY UNIT WEIGHT= 109 PCF
MOISTURE CONTENT= 21.3 %

Swell Consolidation Test Results

FIG. B-18

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



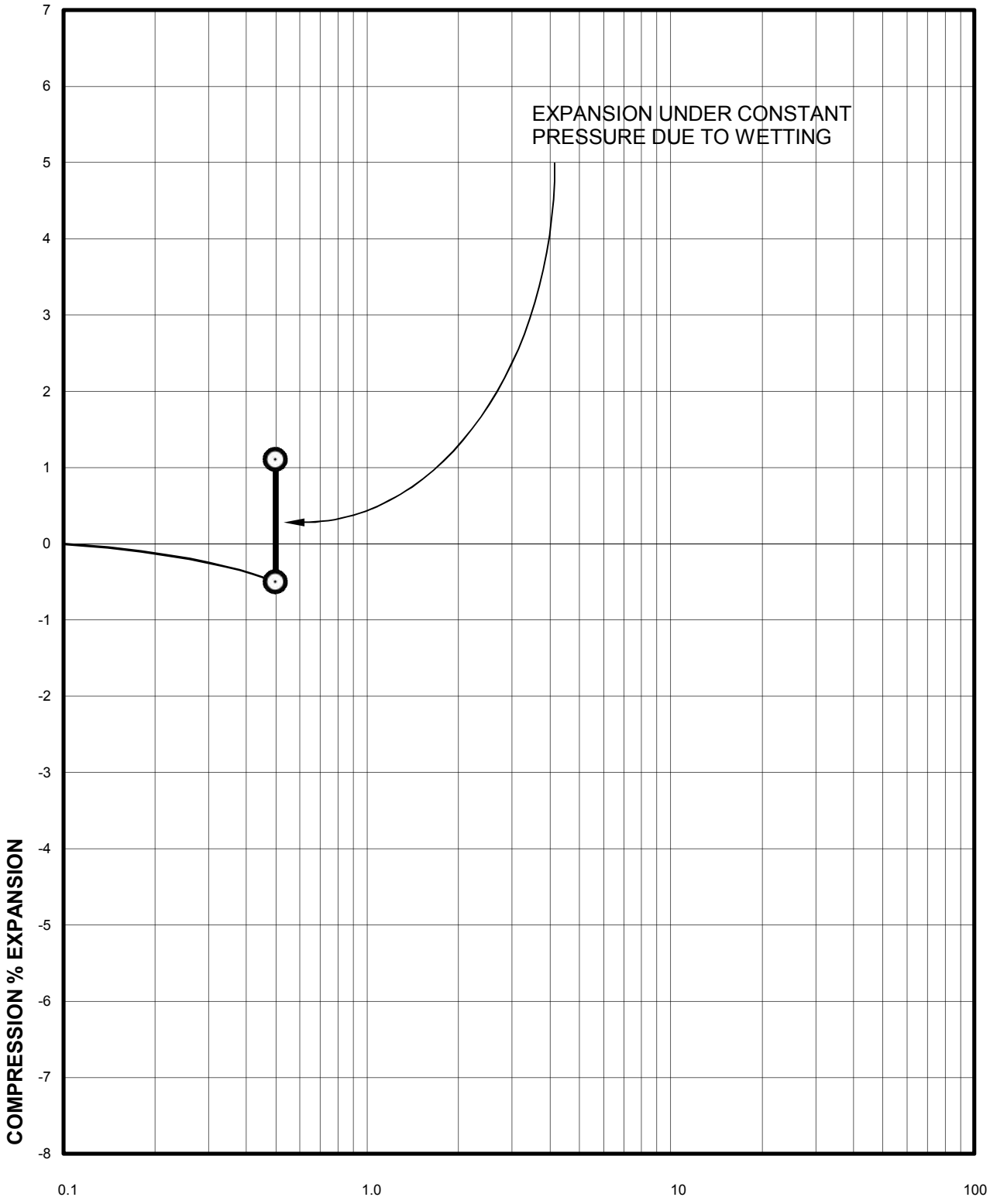
Sample of CLAYSTONE
From TH-9 AT 39 FEET

DRY UNIT WEIGHT= 104 PCF
MOISTURE CONTENT= 23.3 %

Swell Consolidation Test Results

FIG. B-19

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



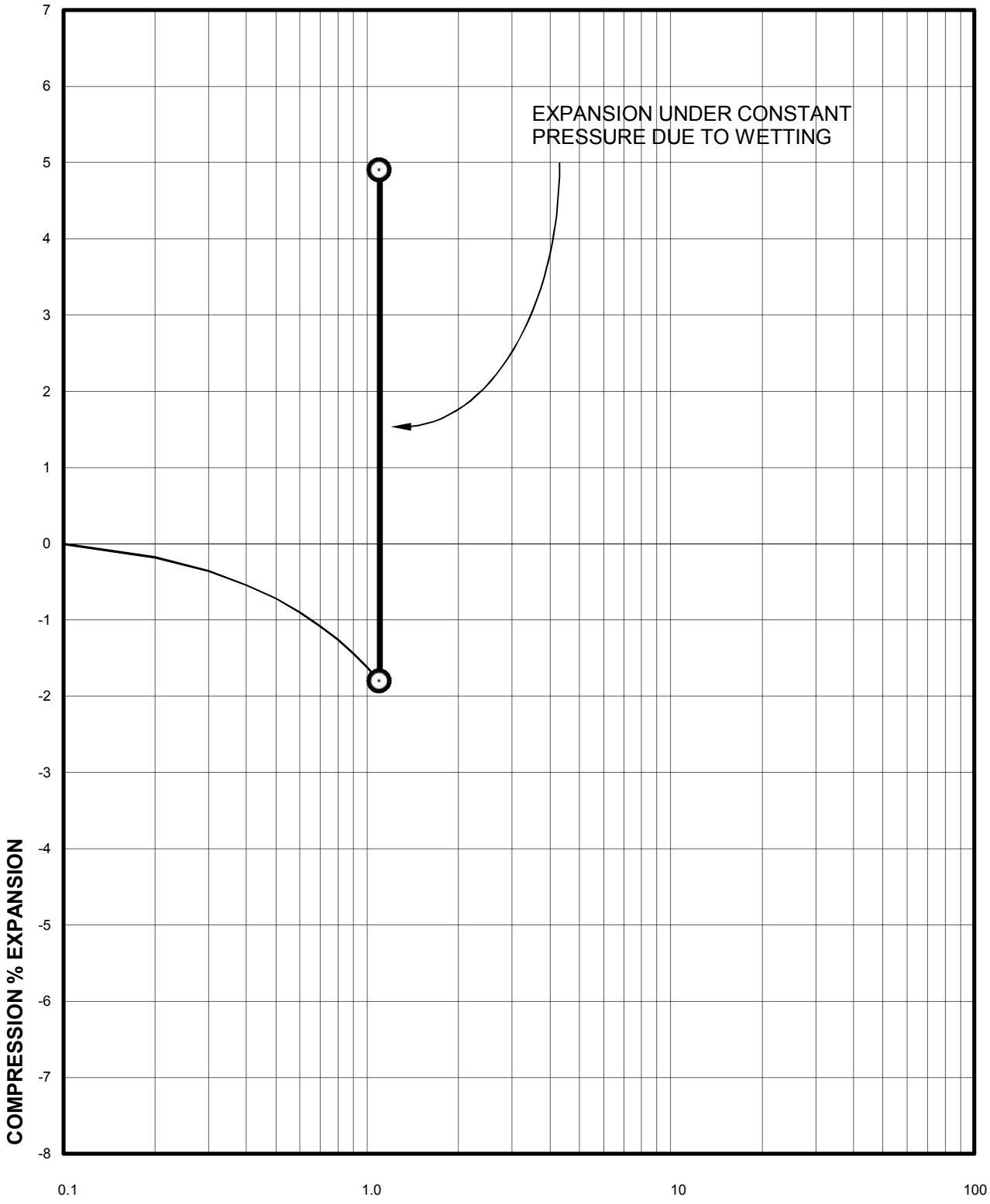
Sample of SANDSTONE
From TH-10 AT 19 FEET

DRY UNIT WEIGHT= 125 PCF
MOISTURE CONTENT= 9.0 %

Swell Consolidation Test Results

FIG. B-20

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



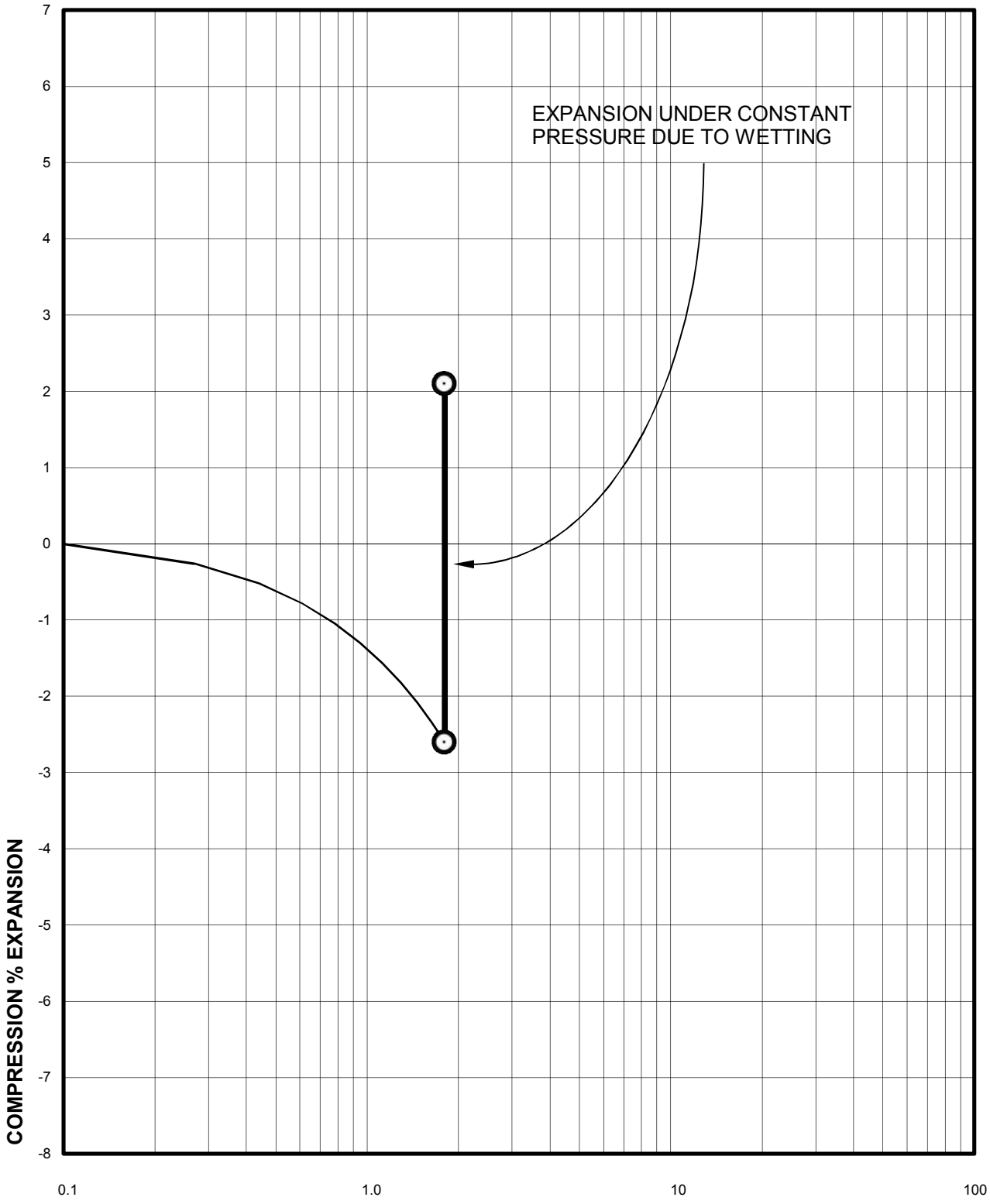
Sample of CLAYSTONE
From TH-10 AT 24 FEET

DRY UNIT WEIGHT= 113 PCF
MOISTURE CONTENT= 14.3 %

Swell Consolidation Test Results

FIG. B-21

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



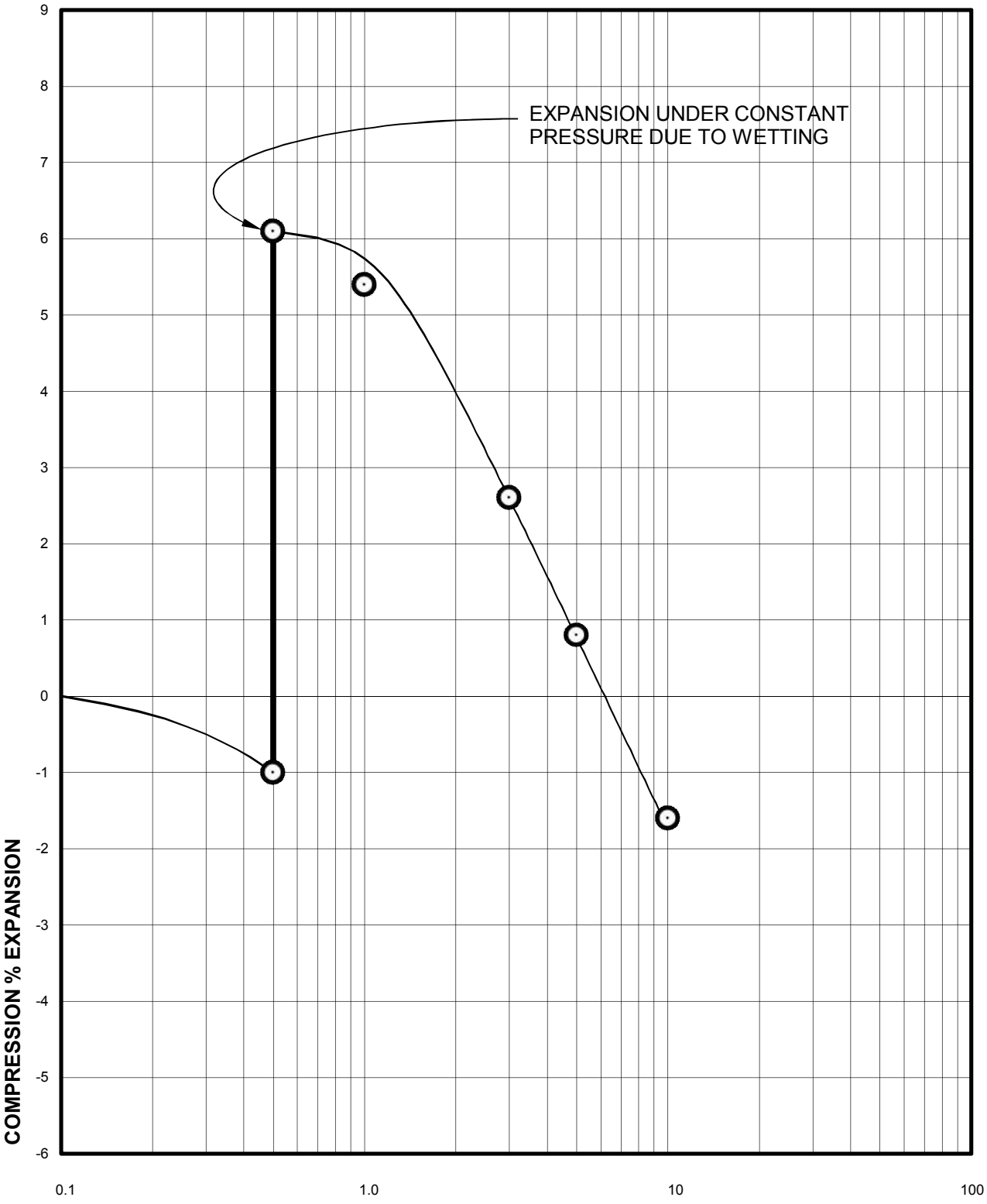
Sample of CLAYSTONE
From TH-10 AT 29 FEET

DRY UNIT WEIGHT= 97 PCF
MOISTURE CONTENT= 22.6 %

Swell Consolidation Test Results

FIG. B-22

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



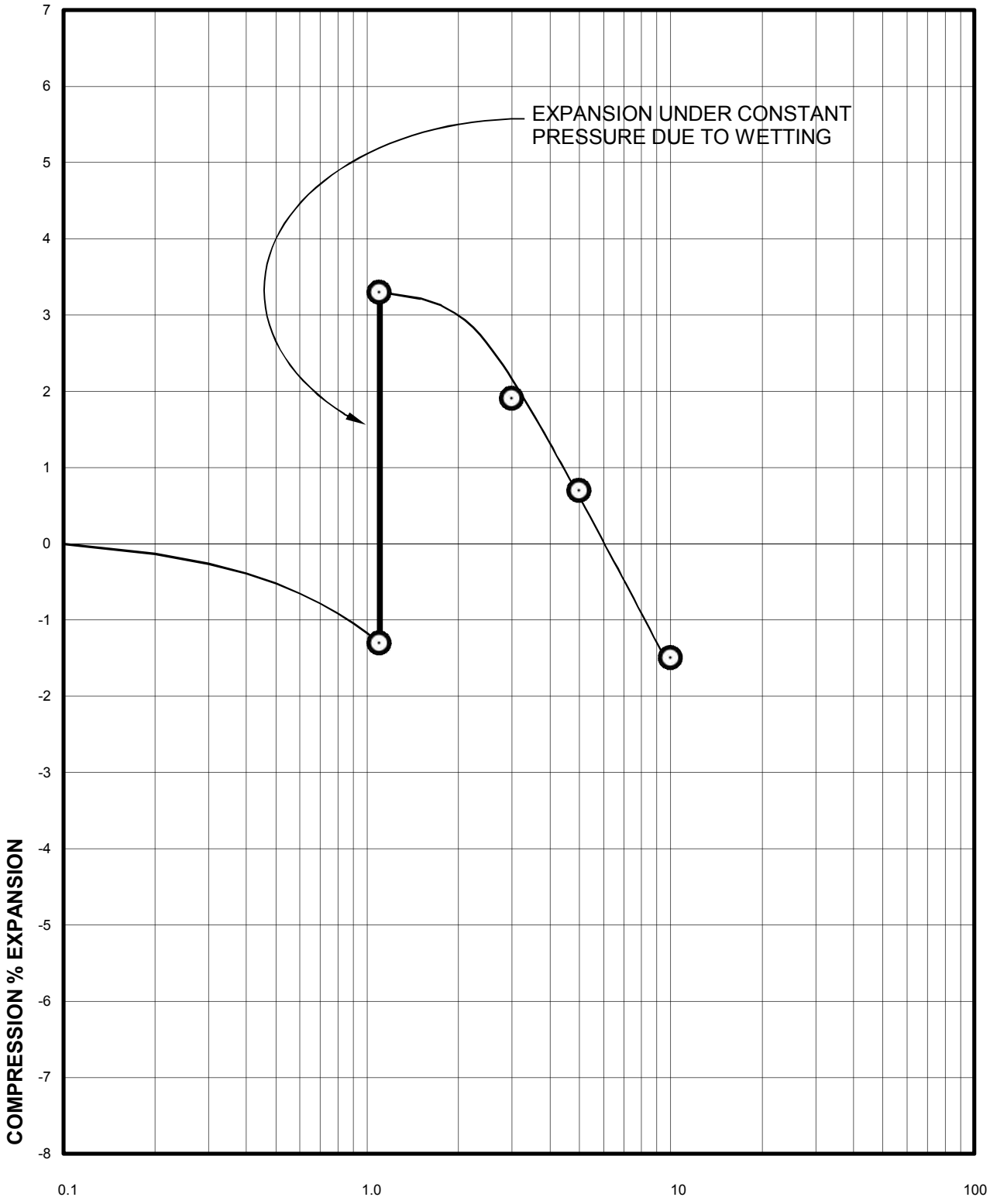
Sample of CLAYSTONE
From TH-11 AT 24 FEET

DRY UNIT WEIGHT= 118 PCF
MOISTURE CONTENT= 15.4 %

Swell Consolidation Test Results

FIG. B-23

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



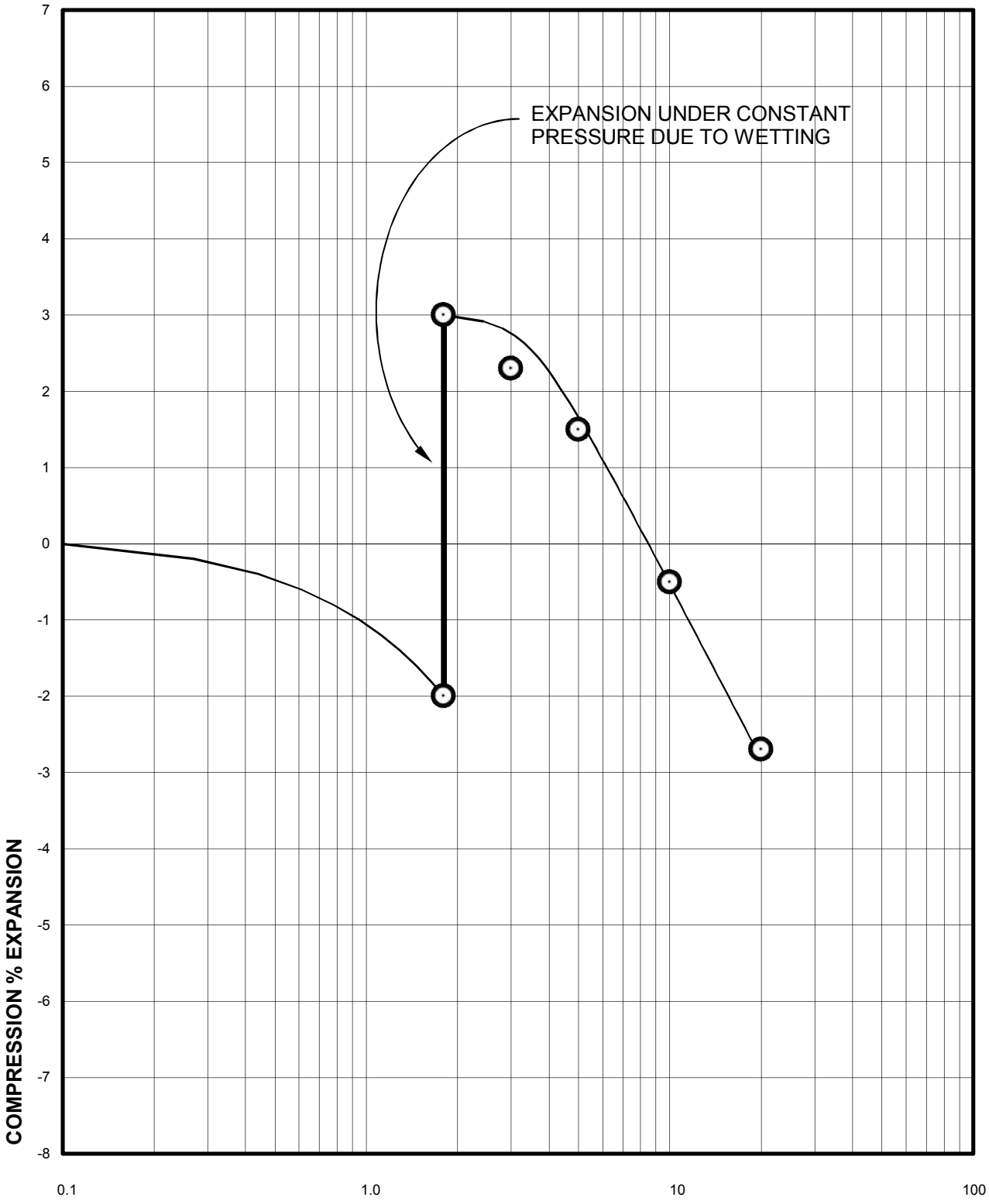
Sample of CLAYSTONE
From TH-11 AT 29 FEET

DRY UNIT WEIGHT= 108 PCF
MOISTURE CONTENT= 19.8 %

Swell Consolidation Test Results

FIG. B-24

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



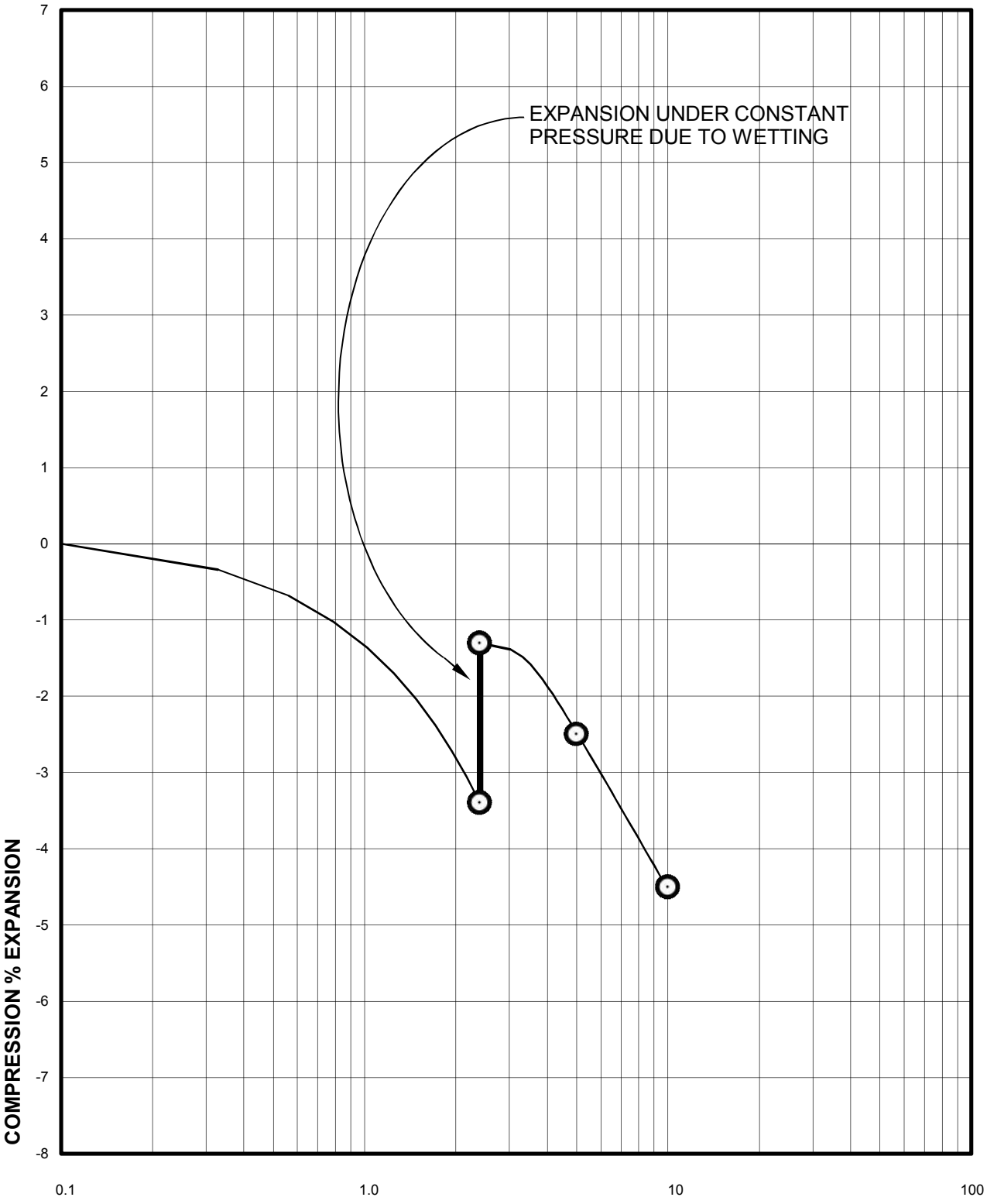
Sample of CLAYSTONE
From TH-11 AT 34 FEET

DRY UNIT WEIGHT= 115 PCF
MOISTURE CONTENT= 16.7 %

Swell Consolidation Test Results

FIG. B-25

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



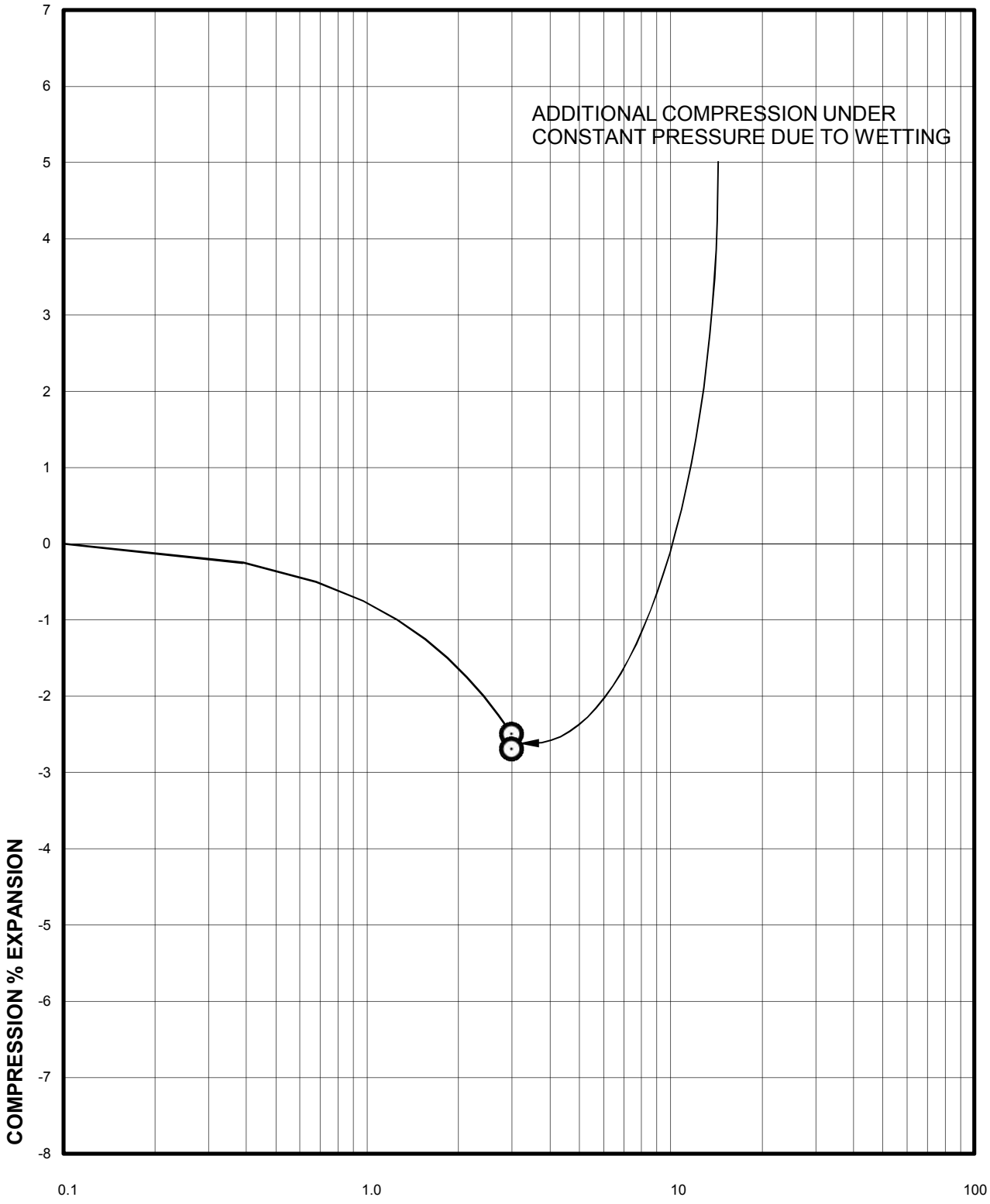
Sample of CLAYSTONE
From TH-11 AT 39 FEET

DRY UNIT WEIGHT= 113 PCF
MOISTURE CONTENT= 15.1 %

Swell Consolidation Test Results

FIG. B-26

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



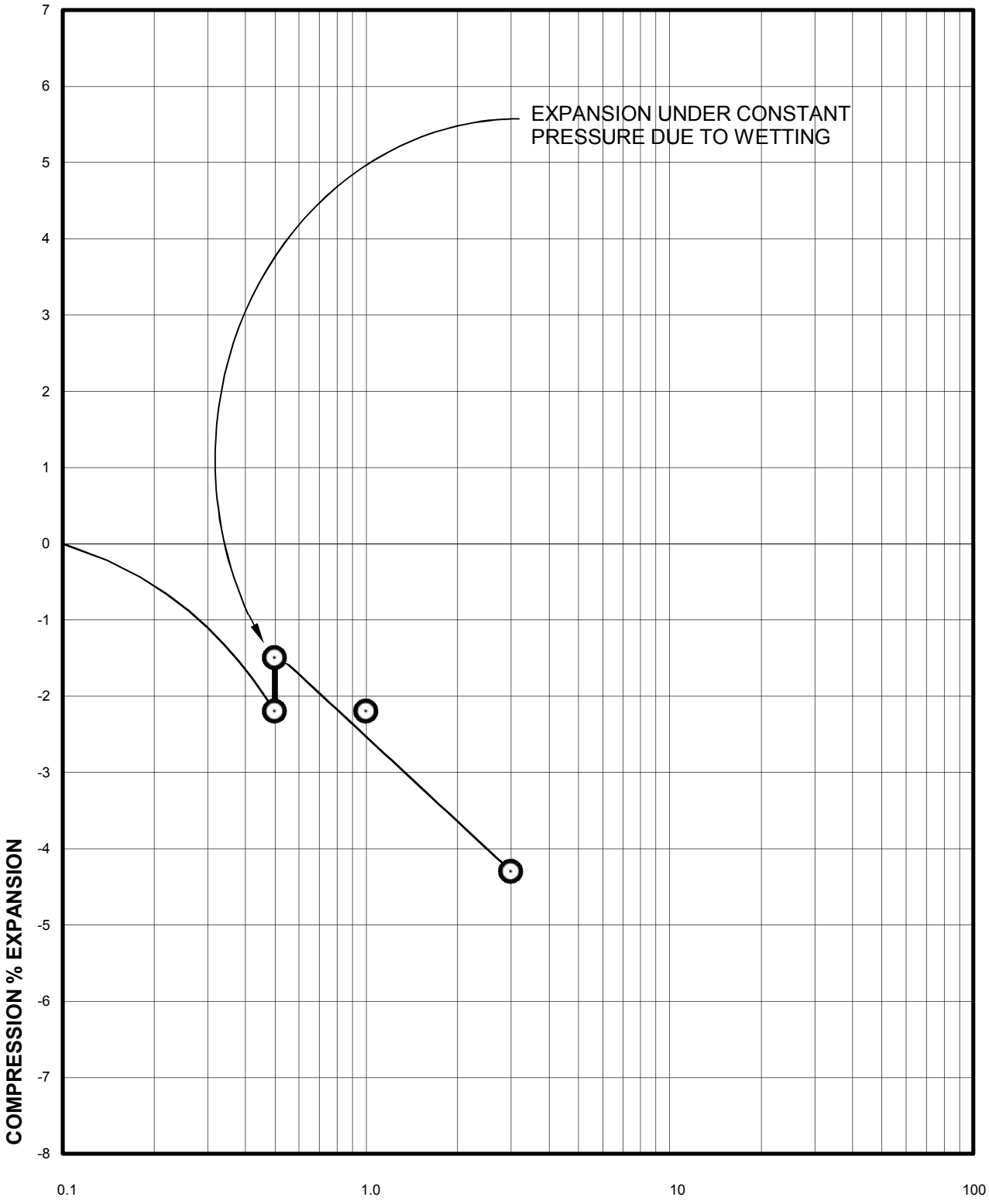
Sample of CLAYSTONE
From TH-11 AT 49 FEET

DRY UNIT WEIGHT= 121 PCF
MOISTURE CONTENT= 11.4 %

Swell Consolidation Test Results

FIG. B-27

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



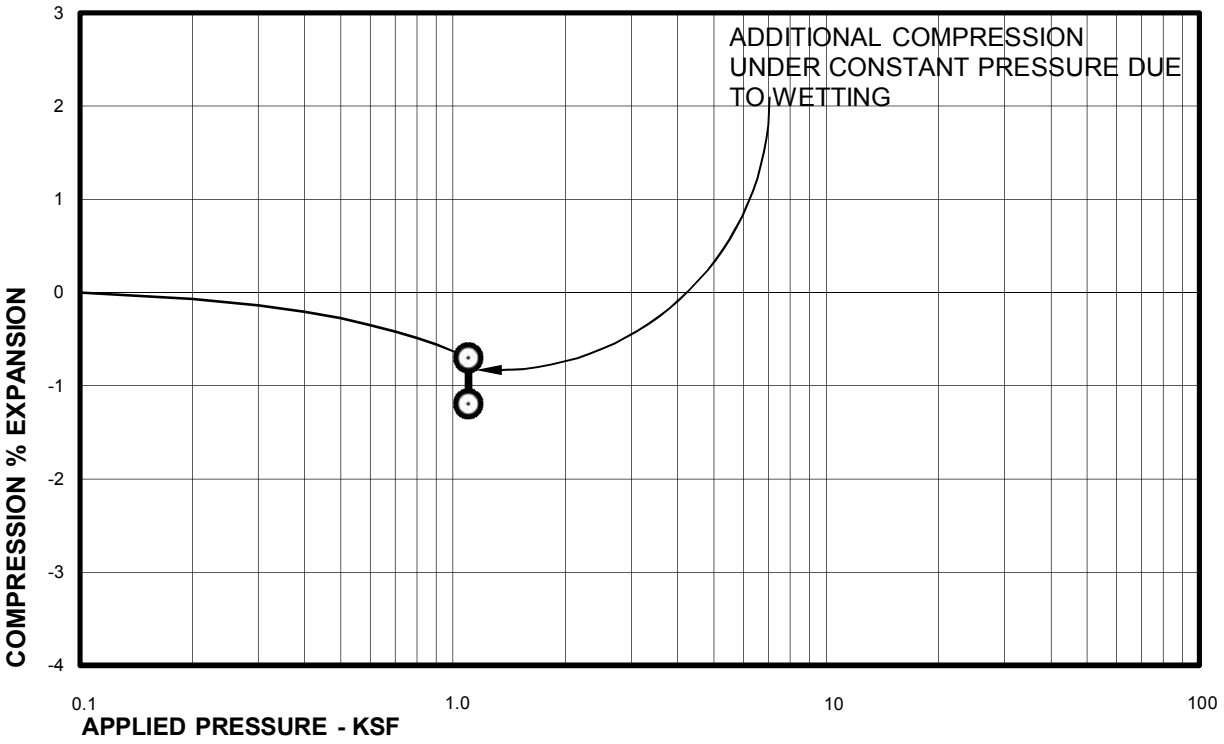
Sample of CLAYSTONE
From TH-13 AT 14 FEET

DRY UNIT WEIGHT= 113 PCF
MOISTURE CONTENT= 9.9 %

Swell Consolidation Test Results

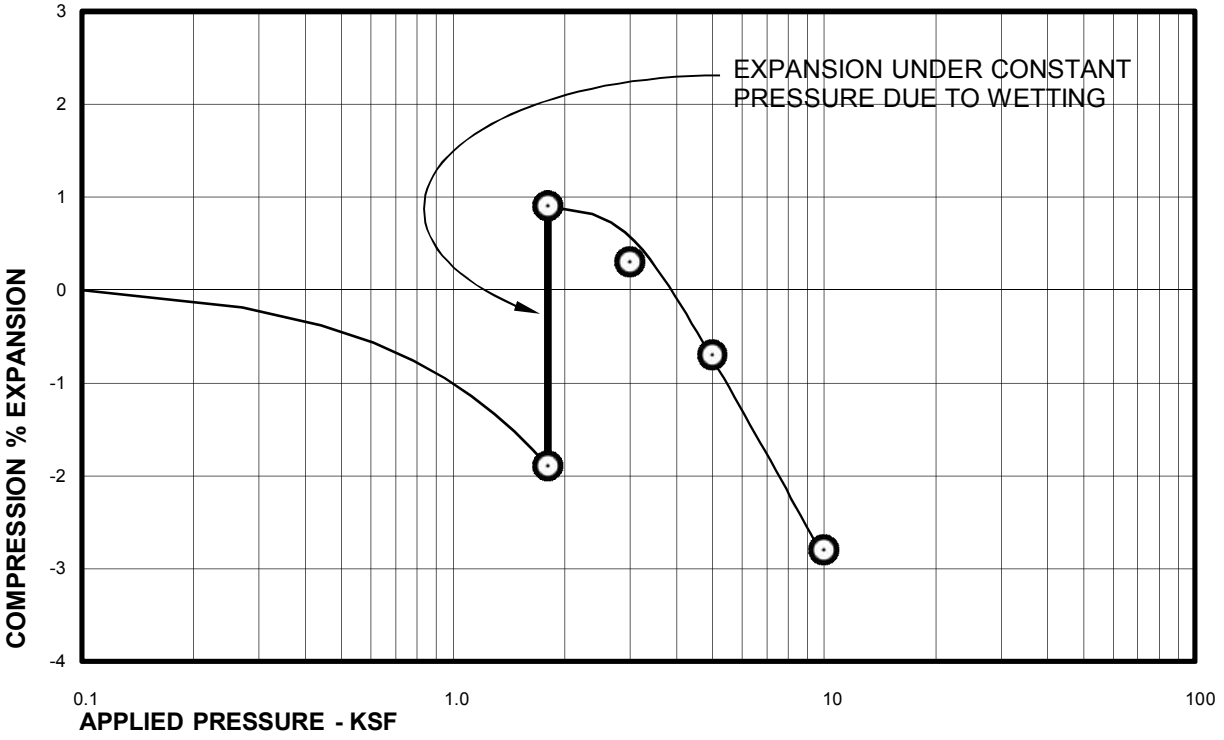
FIG. B-28

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



Sample of CLAYSTONE
From TH-13 AT 19 FEET

DRY UNIT WEIGHT= 103 PCF
MOISTURE CONTENT= 14.3 %



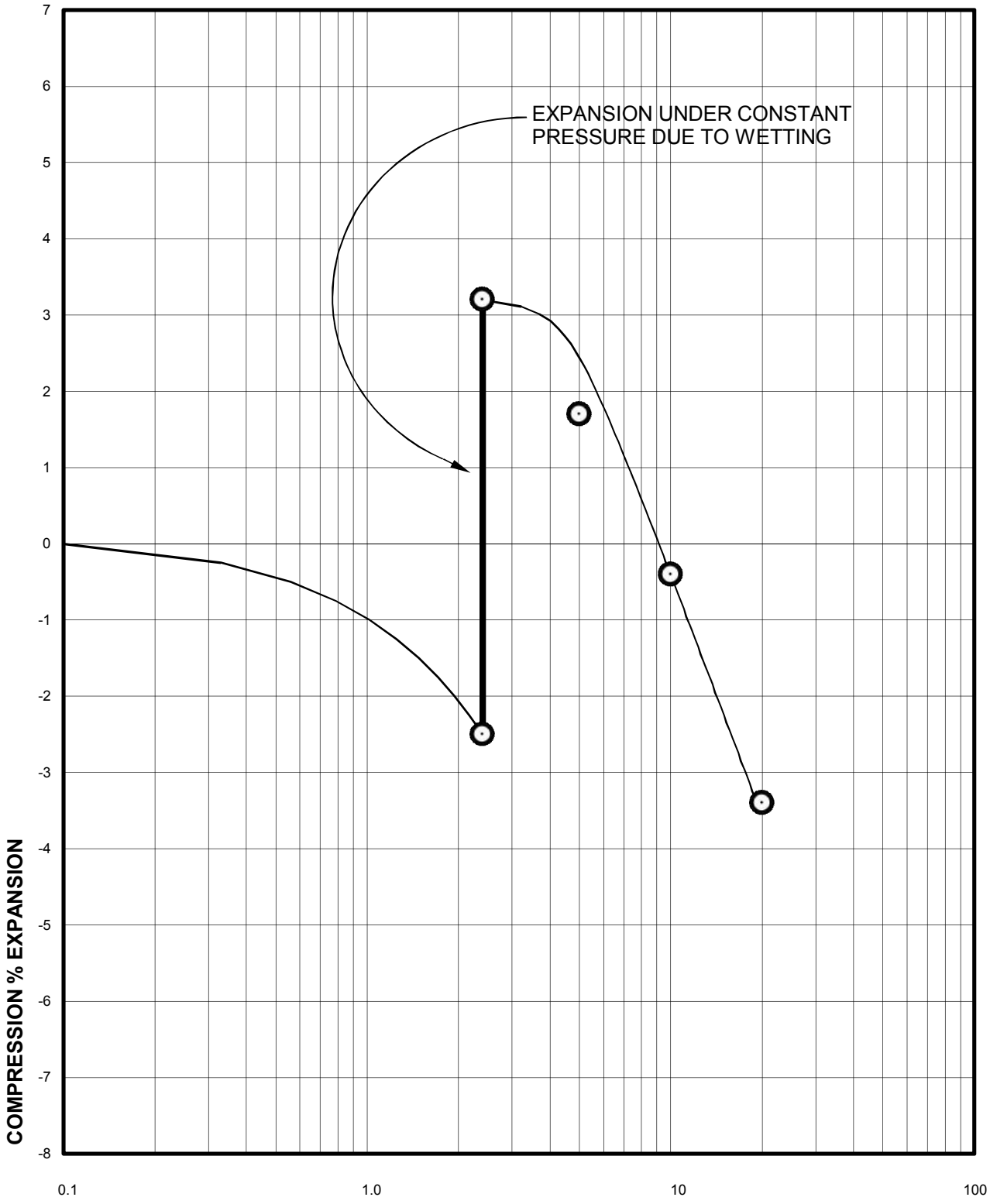
Sample of CLAYSTONE
From TH-13 AT 24 FEET

DRY UNIT WEIGHT= 110 PCF
MOISTURE CONTENT= 18.2 %

Swell Consolidation Test Results

FIG. B-29

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



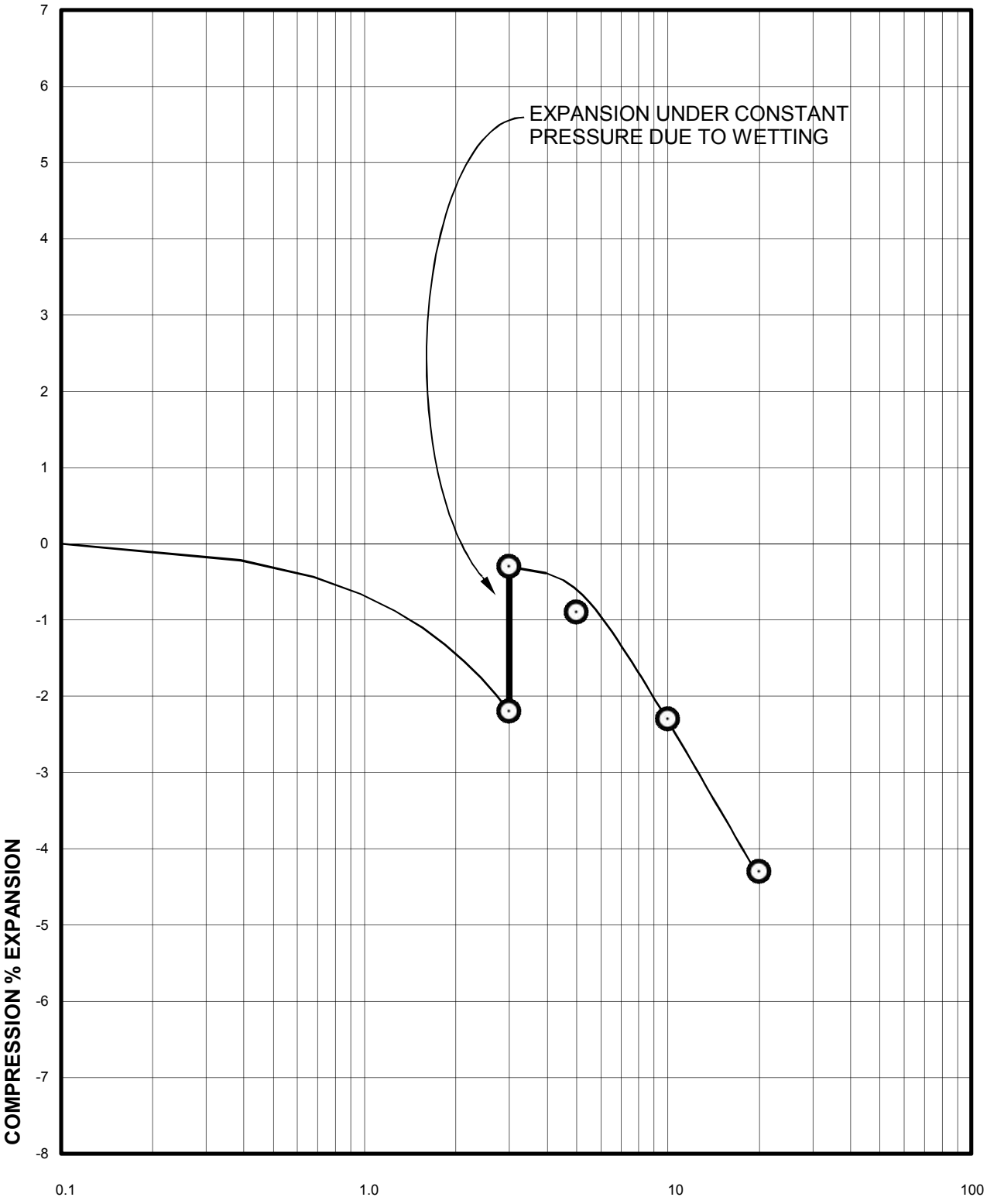
Sample of CLAYSTONE
From TH-13 AT 29 FEET

DRY UNIT WEIGHT= 107 PCF
MOISTURE CONTENT= 21.2 %

Swell Consolidation Test Results

FIG. B-30

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



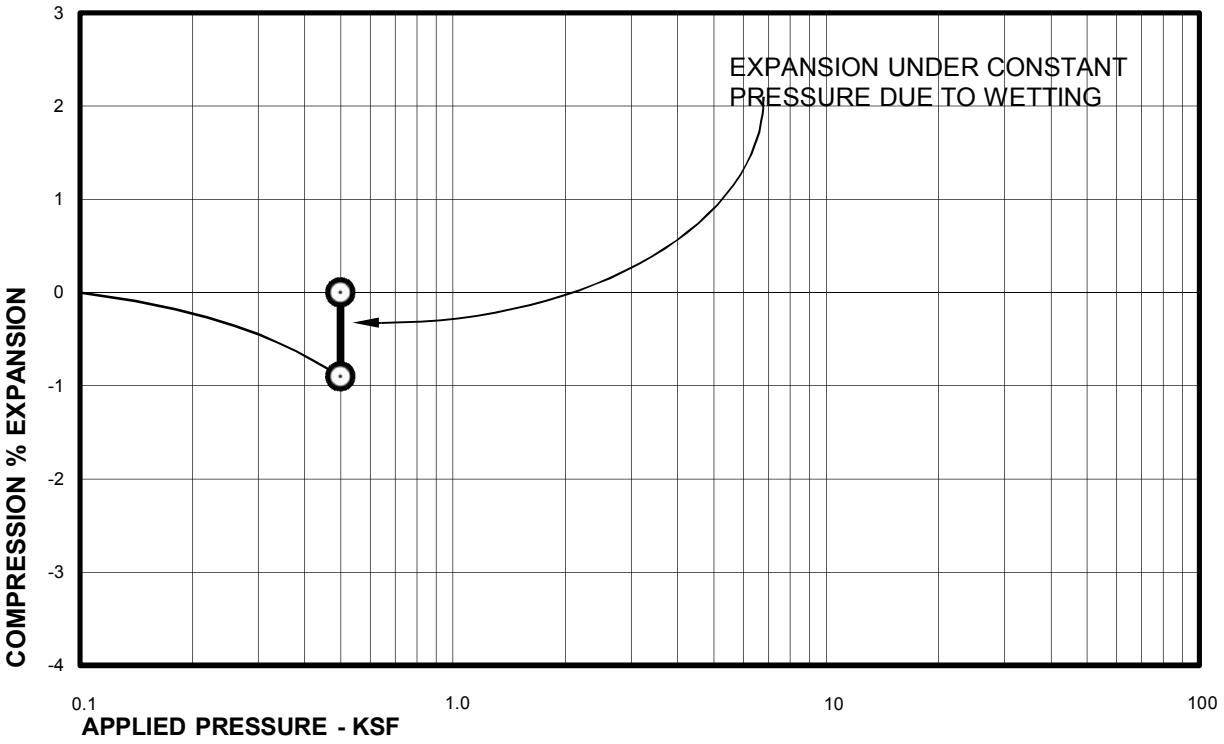
Sample of CLAYSTONE
From TH-13 AT 34 FEET

DRY UNIT WEIGHT= 115 PCF
MOISTURE CONTENT= 15.7 %

Swell Consolidation Test Results

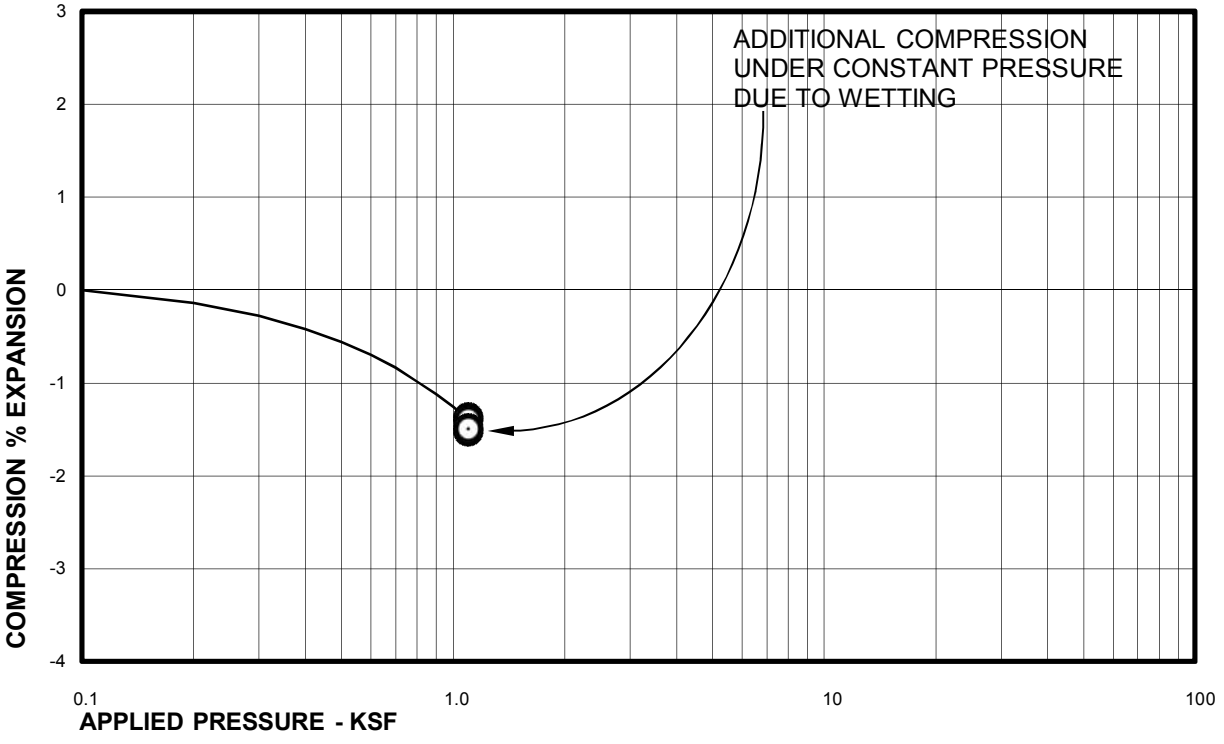
FIG. B-31

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



Sample of CLAY, SANDY (CL) DRY UNIT WEIGHT= 118 PCF

From TH-14 AT 4 FEET MOISTURE CONTENT= 9.5 %



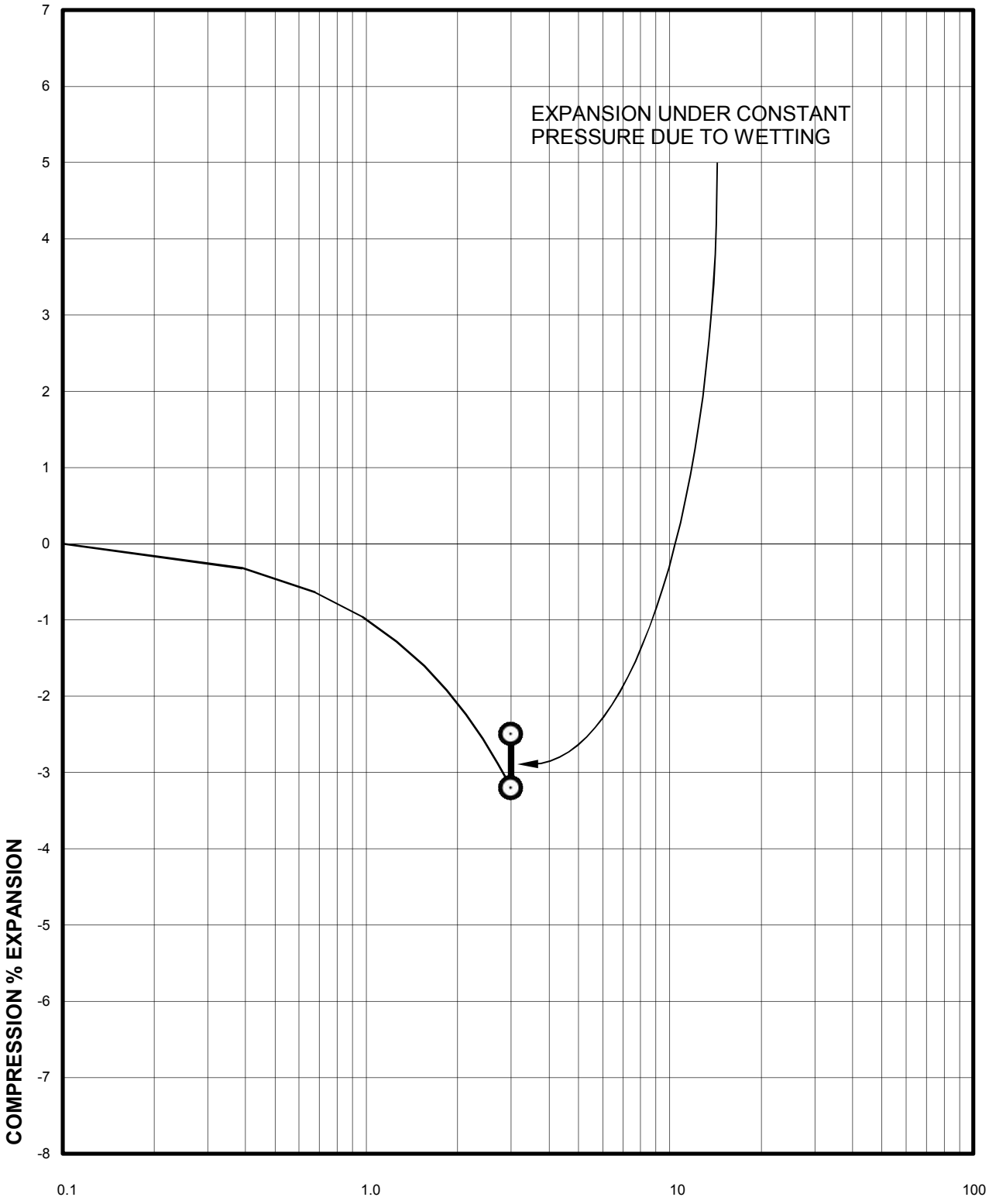
Sample of CLAY, SANDY (CL) DRY UNIT WEIGHT= 108 PCF

From TH-14 AT 9 FEET MOISTURE CONTENT= 15.8 %

Swell Consolidation Test Results

FIG. B-32

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



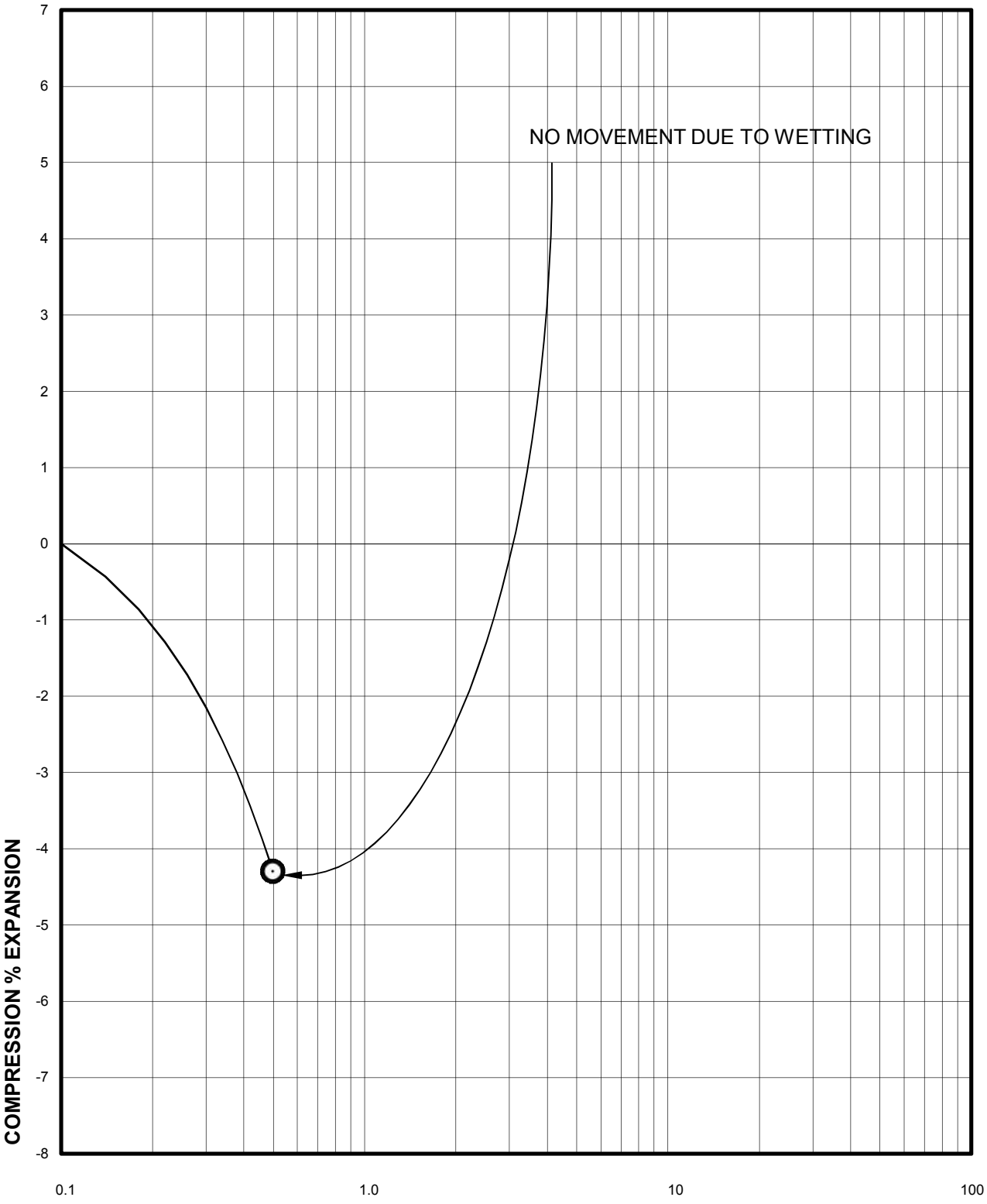
Sample of WEATHERED CLAYSTONE
From TH-14 AT 24 FEET

DRY UNIT WEIGHT= 109 PCF
MOISTURE CONTENT= 17.4 %

Swell Consolidation Test Results

FIG. B-33

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



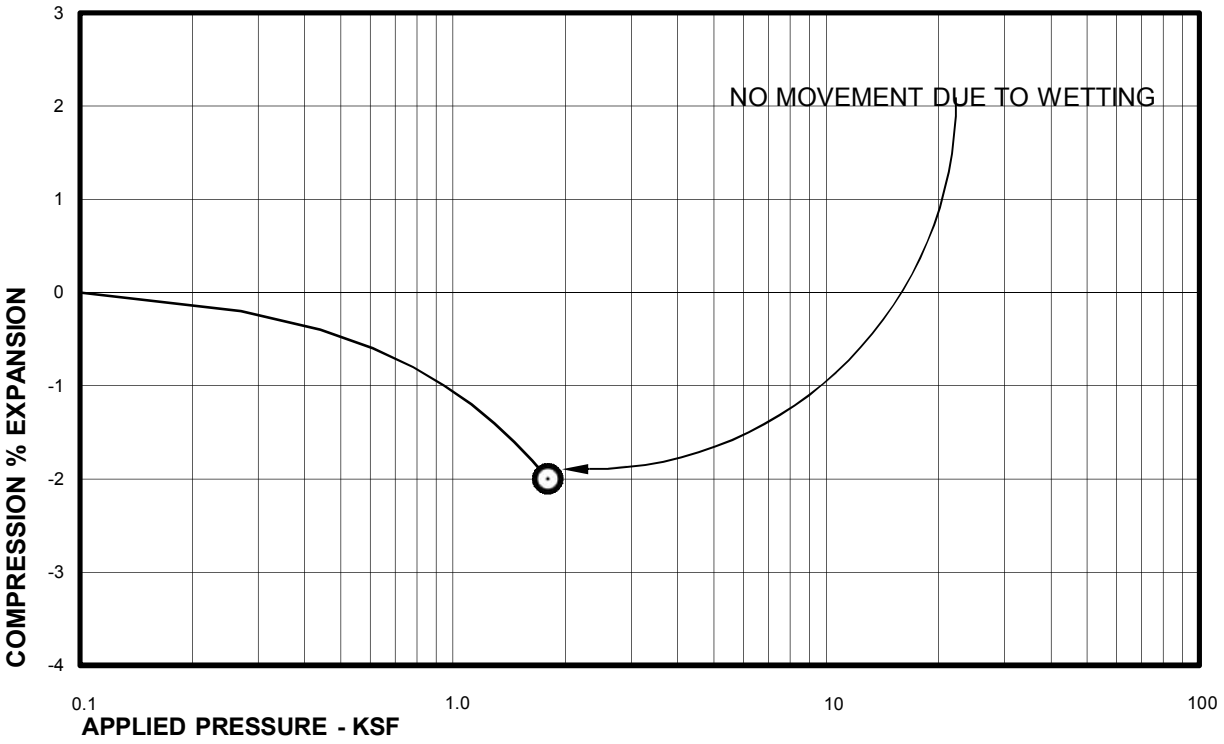
Sample of CLAY, SANDY (CL)
From TH-15 AT 4 FEET

DRY UNIT WEIGHT= 91 PCF
MOISTURE CONTENT= 27.7 %

Swell Consolidation Test Results

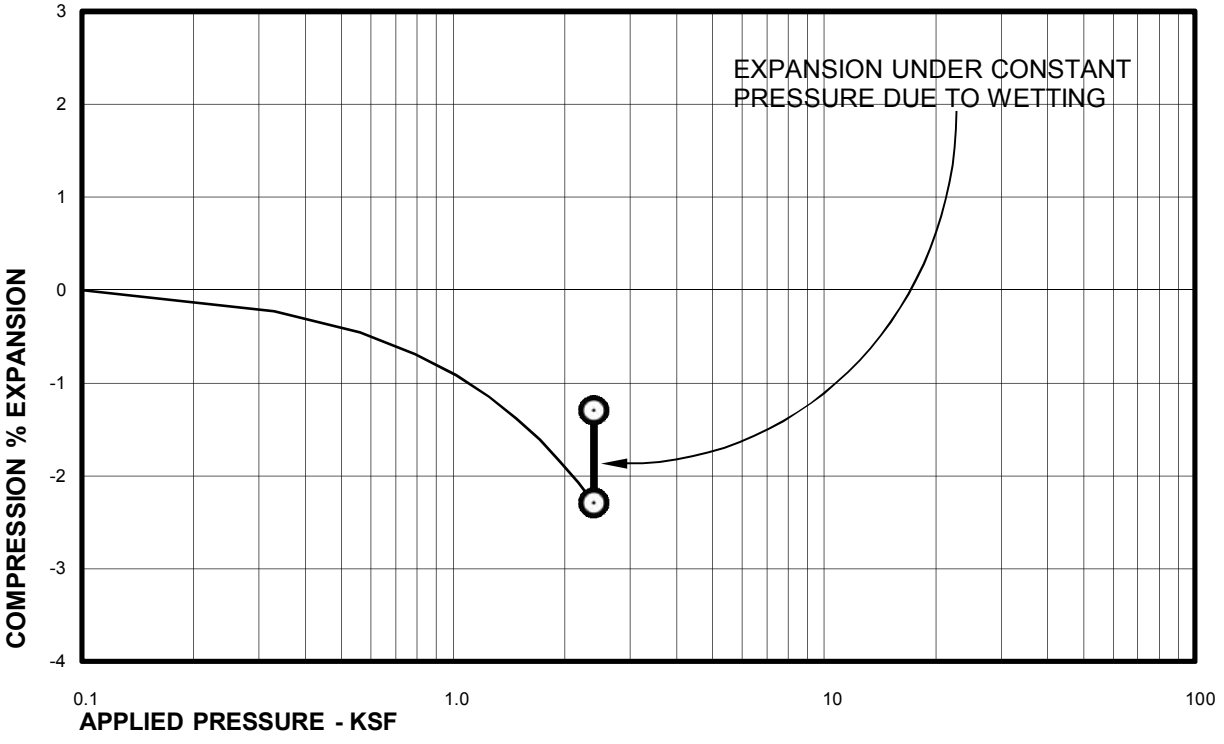
FIG. B-34

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



Sample of CLAY, SANDY (CL)
From TH-15 AT 14 FEET

DRY UNIT WEIGHT= 110 PCF
MOISTURE CONTENT= 17.5 %



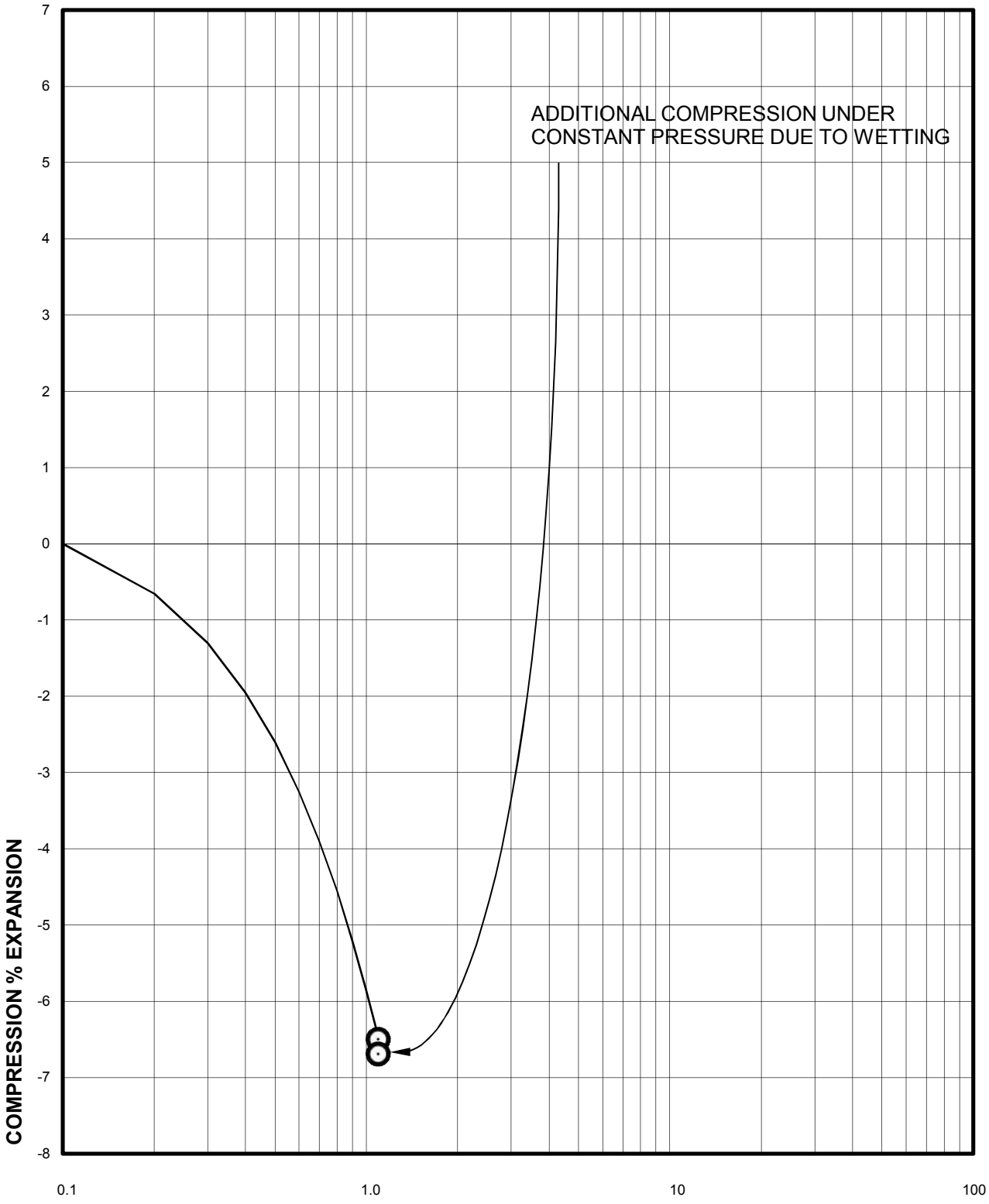
Sample of WEATHERED CLAYSTONE
From TH-15 AT 19 FEET

DRY UNIT WEIGHT= 111 PCF
MOISTURE CONTENT= 18.1 %

Swell Consolidation Test Results

FIG. B-35

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



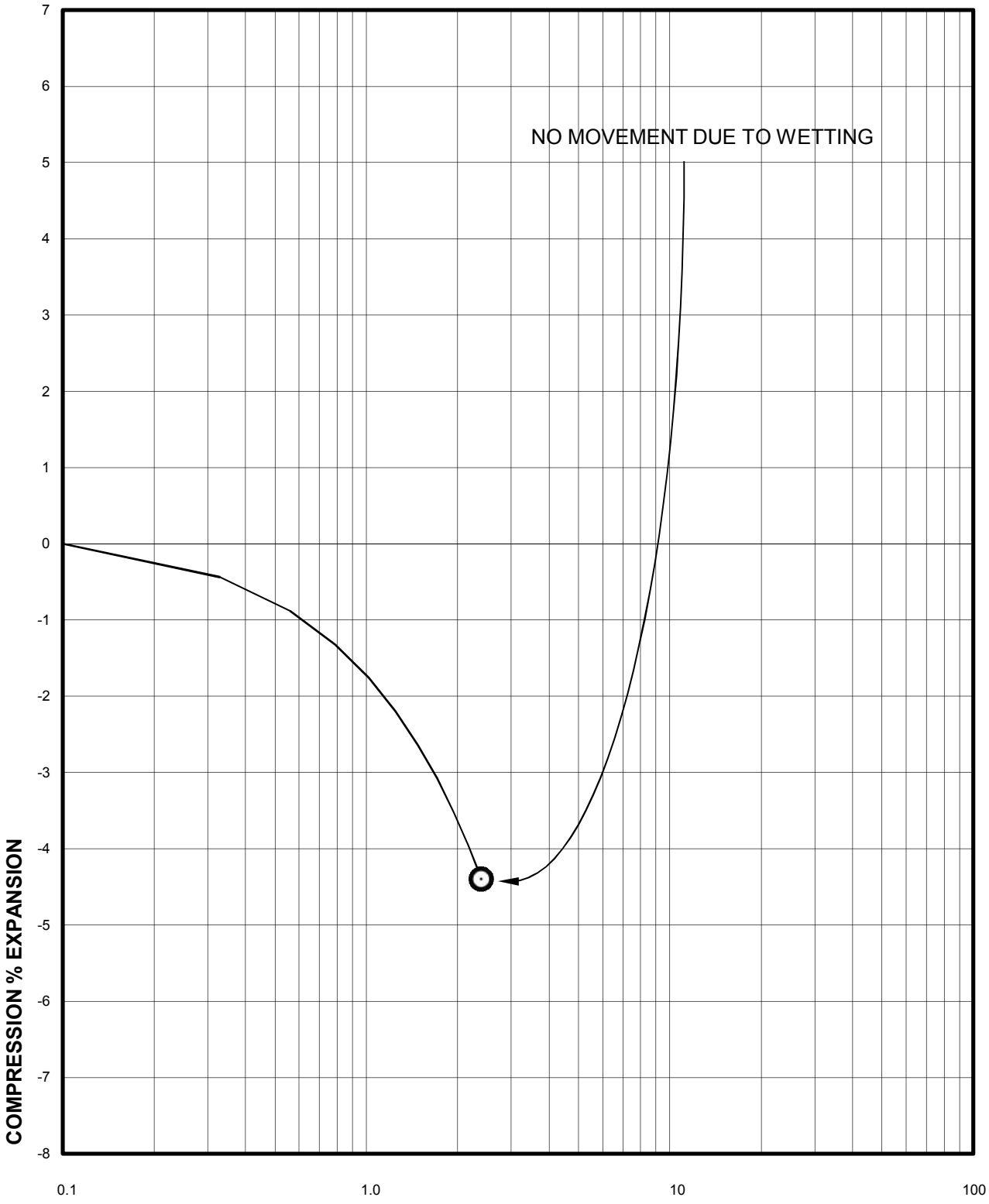
Sample of INTERLAYERED CLAY/SAND
From TH-16 AT 9 FEET

DRY UNIT WEIGHT= 101 PCF
MOISTURE CONTENT= 24.5 %

Swell Consolidation Test Results

FIG. B-36

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



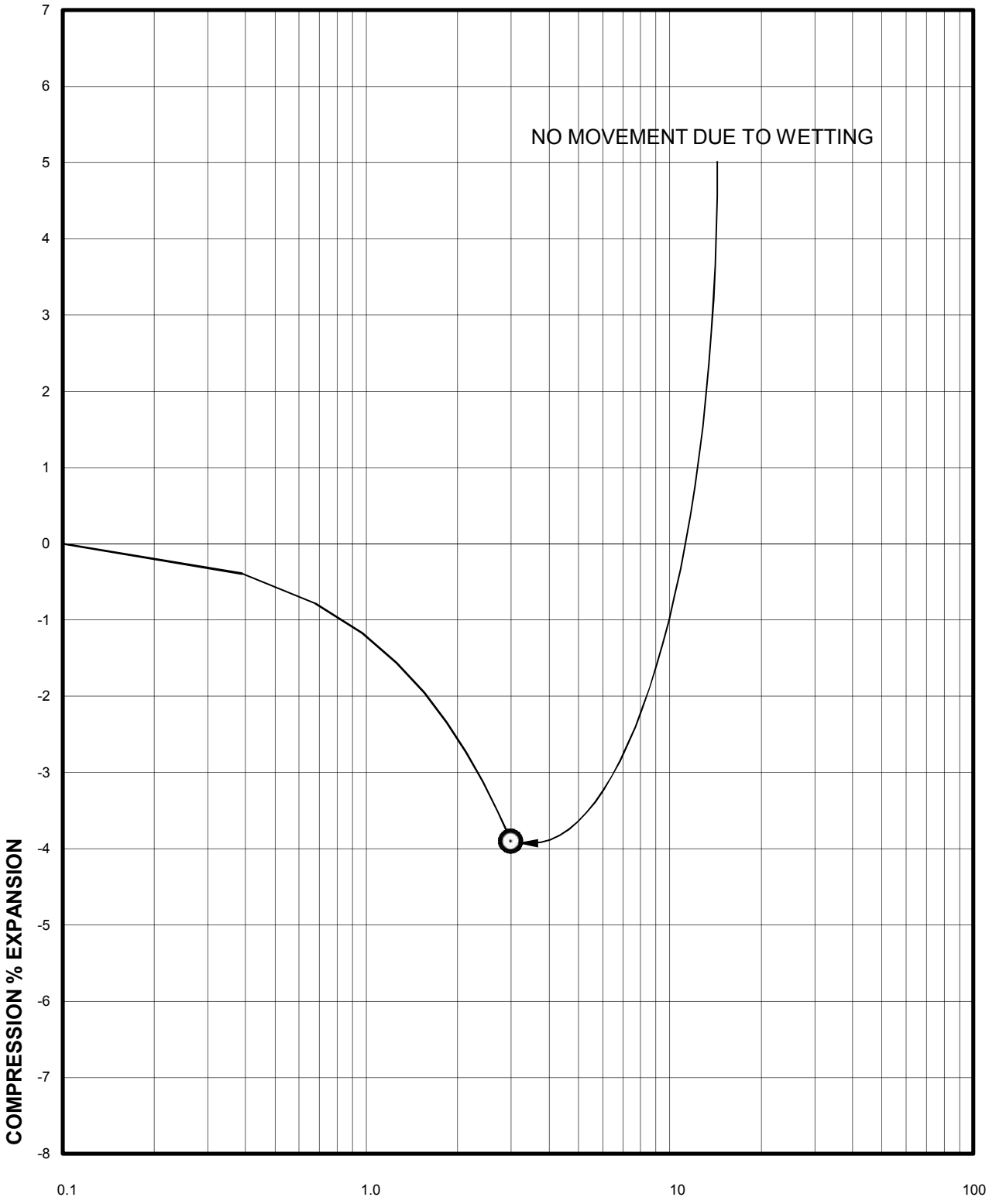
Sample of INTERLAYERED CLAY/SAND
From TH-16 AT 19 FEET

DRY UNIT WEIGHT= 108 PCF
MOISTURE CONTENT= 20.1 %

Swell Consolidation Test Results

FIG. B-37

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



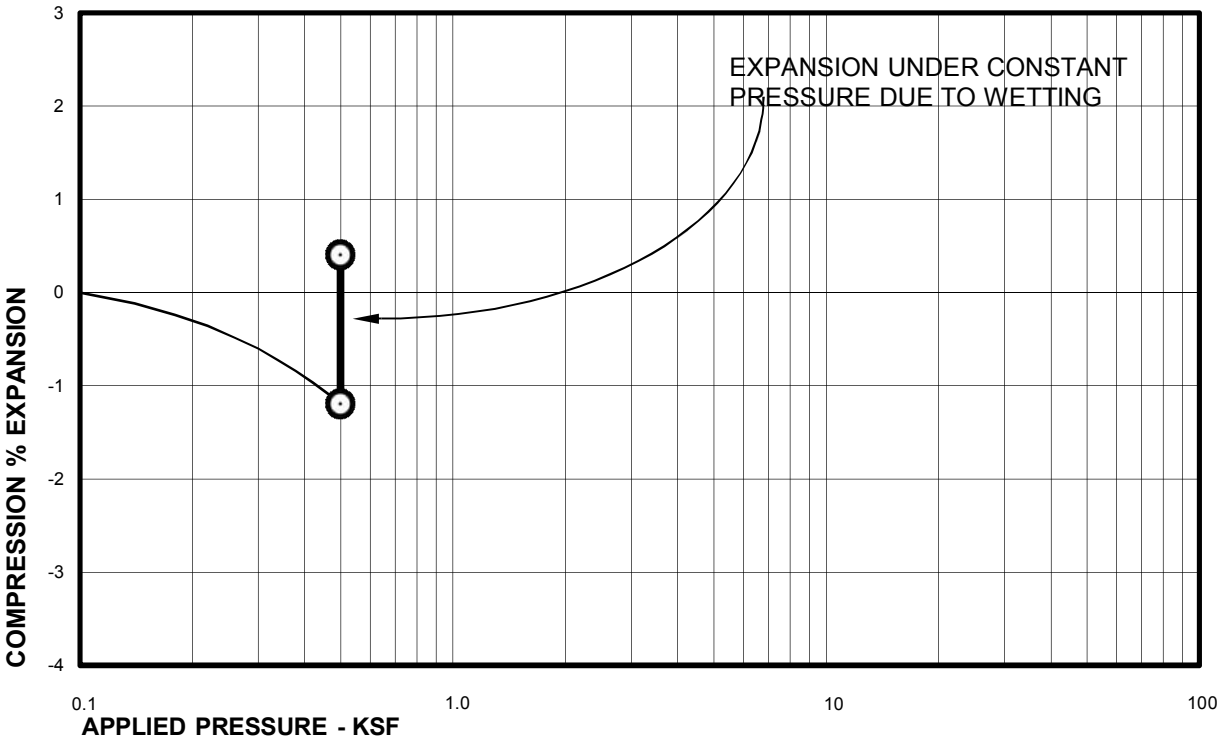
Sample of INTERLAYERED CLAY/SAND
From TH-16 AT 24 FEET

DRY UNIT WEIGHT= 110 PCF
MOISTURE CONTENT= 19.7 %

Swell Consolidation Test Results

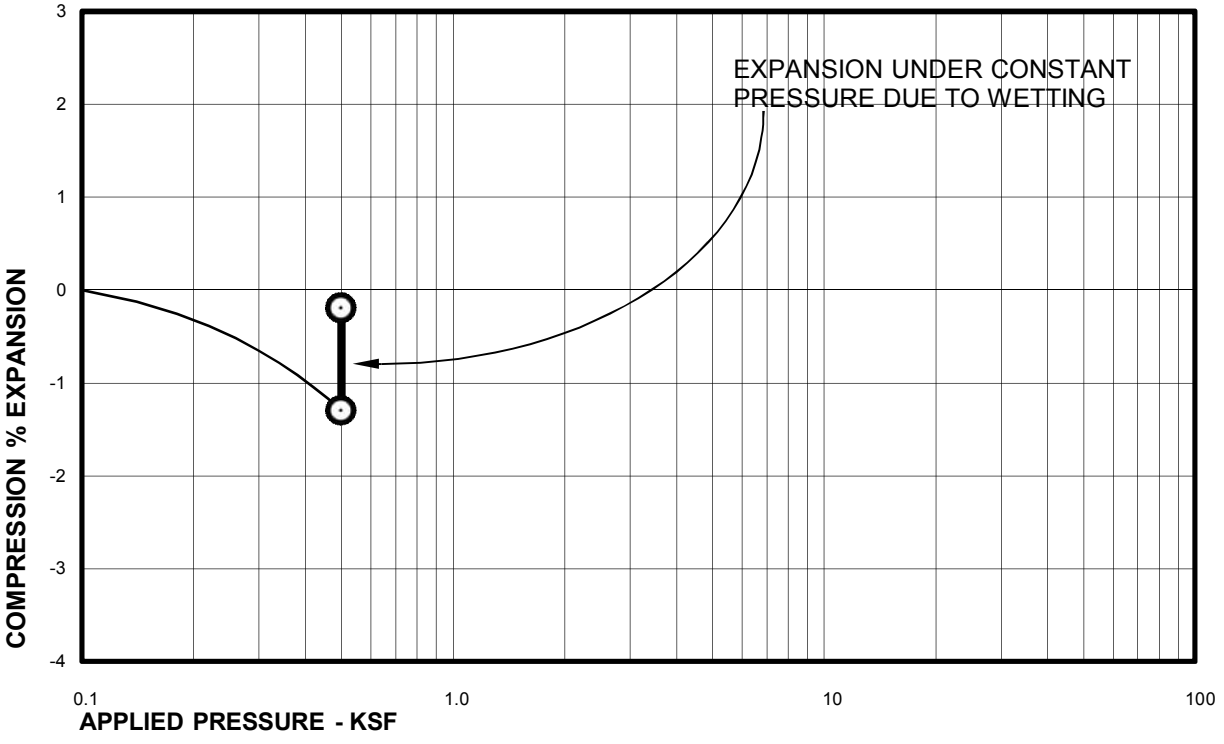
FIG. B-38

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



Sample of FILL, CLAY, SANDY
From TH-17 AT 4 FEET

DRY UNIT WEIGHT= 102 PCF
MOISTURE CONTENT= 22.1 %



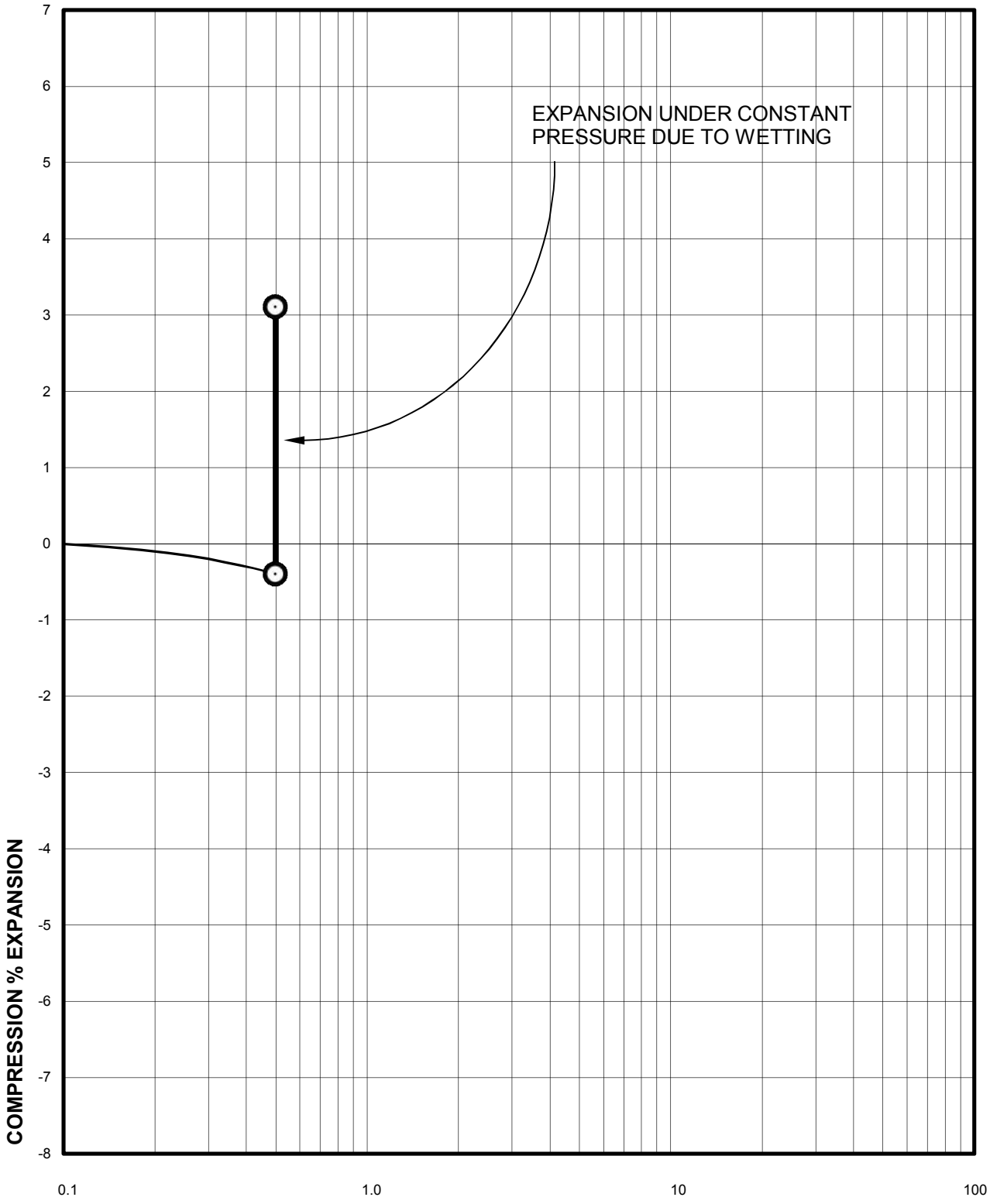
Sample of FILL, CLAY, SANDY
From TH-18 AT 4 FEET

DRY UNIT WEIGHT= 109 PCF
MOISTURE CONTENT= 18.7 %

Swell Consolidation Test Results

FIG. B-39

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



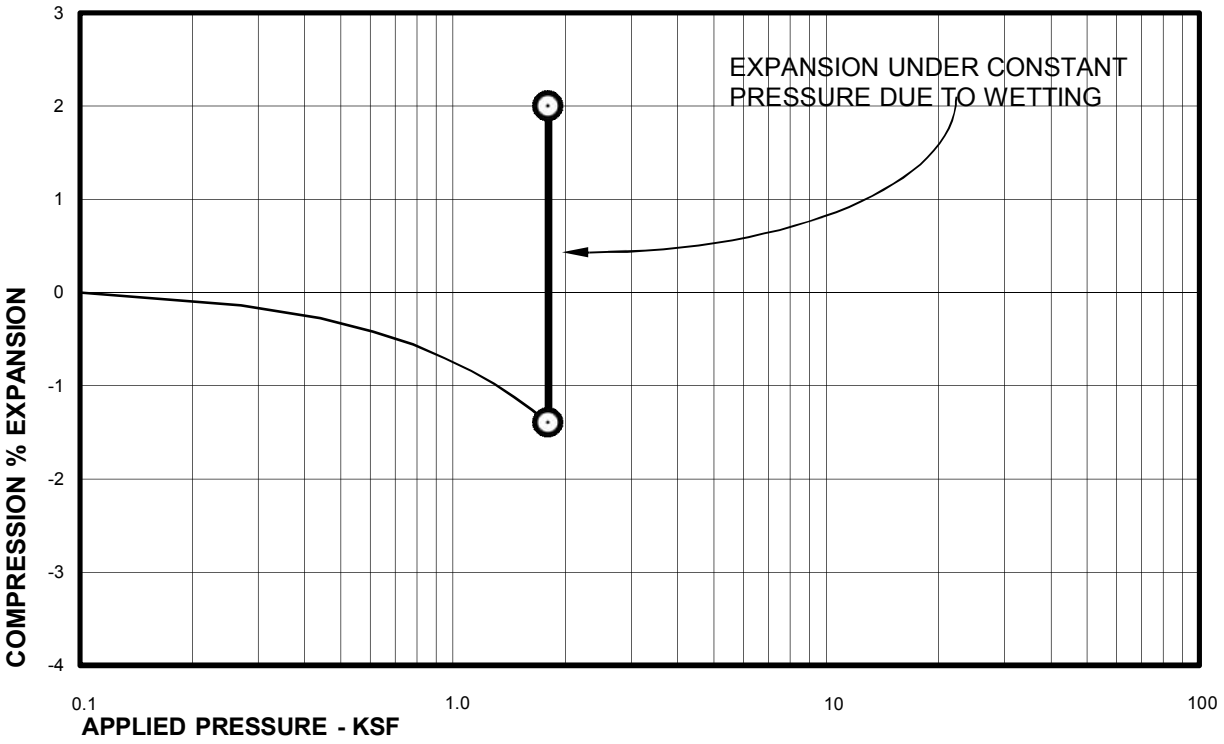
Sample of FILL, CLAY, SANDY
From TH-19 AT 4 FEET

DRY UNIT WEIGHT= 114 PCF
MOISTURE CONTENT= 17.9 %

Swell Consolidation Test Results

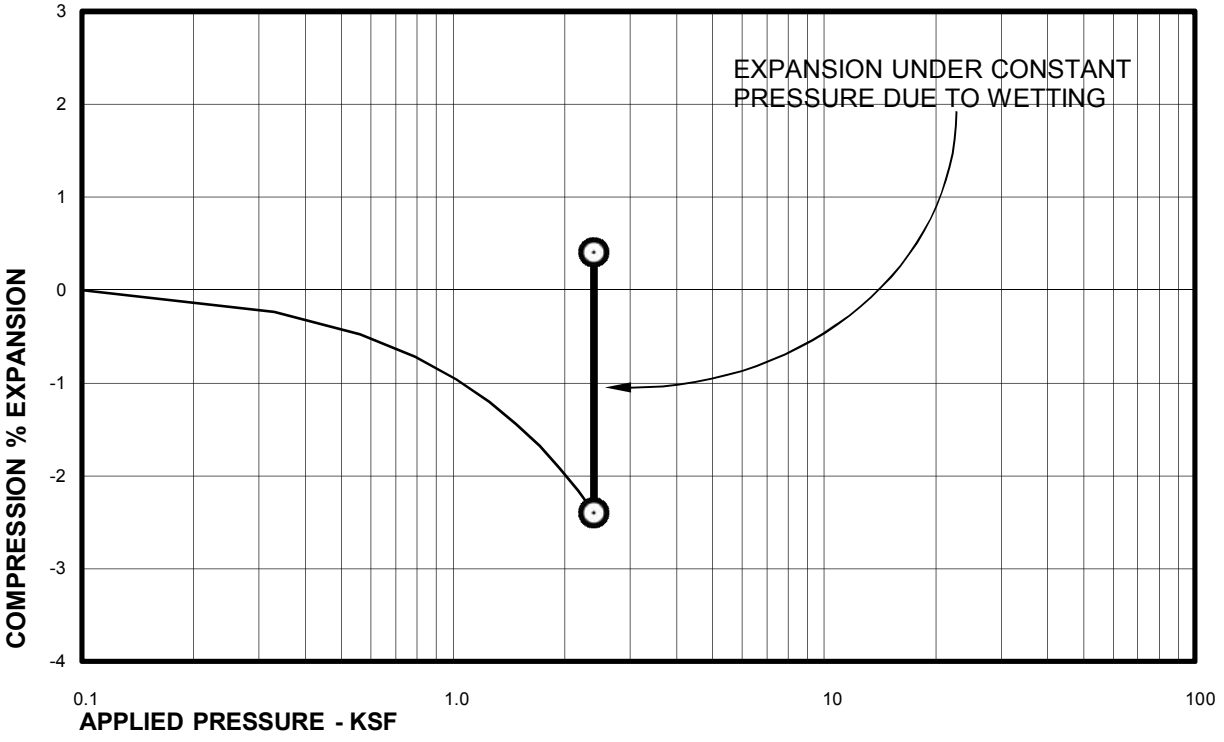
FIG. B-40

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



Sample of WEATHERED CLAYSTONE
From TH-20 AT 14 FEET

DRY UNIT WEIGHT= 108 PCF
MOISTURE CONTENT= 20.8 %



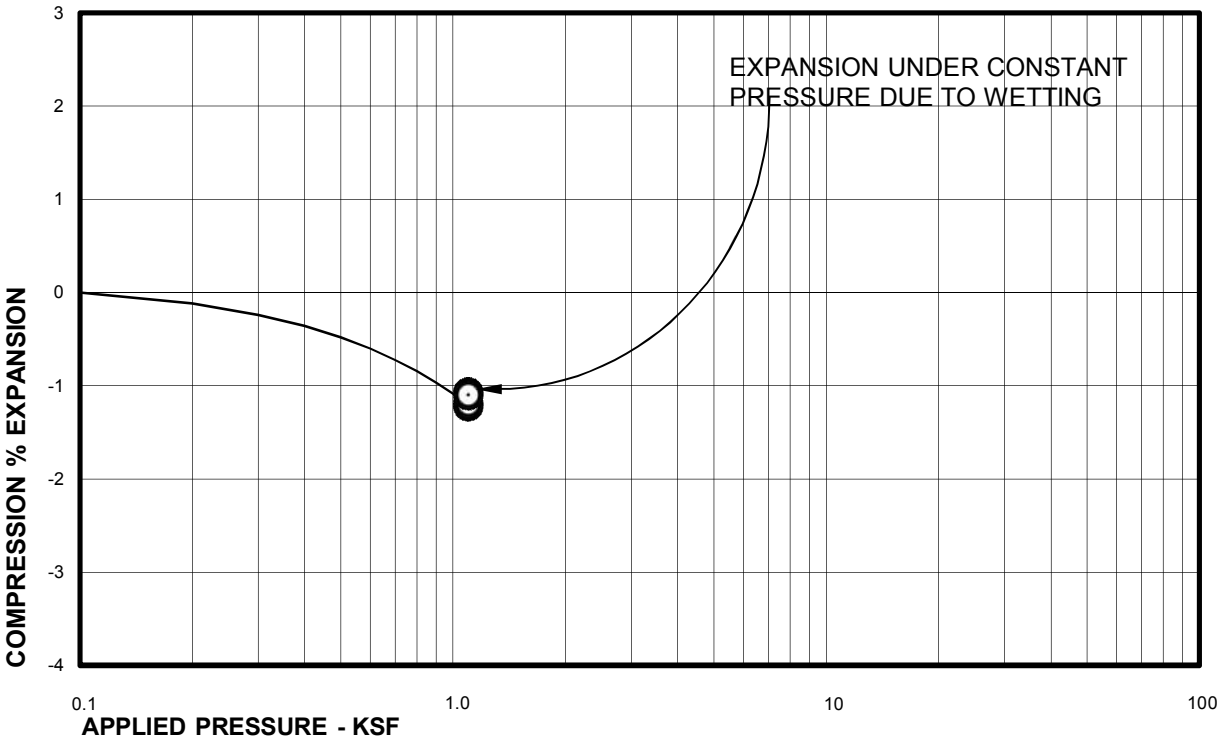
Sample of WEATHERED CLAYSTONE
From TH-20 AT 19 FEET

DRY UNIT WEIGHT= 111 PCF
MOISTURE CONTENT= 18.4 %

Swell Consolidation Test Results

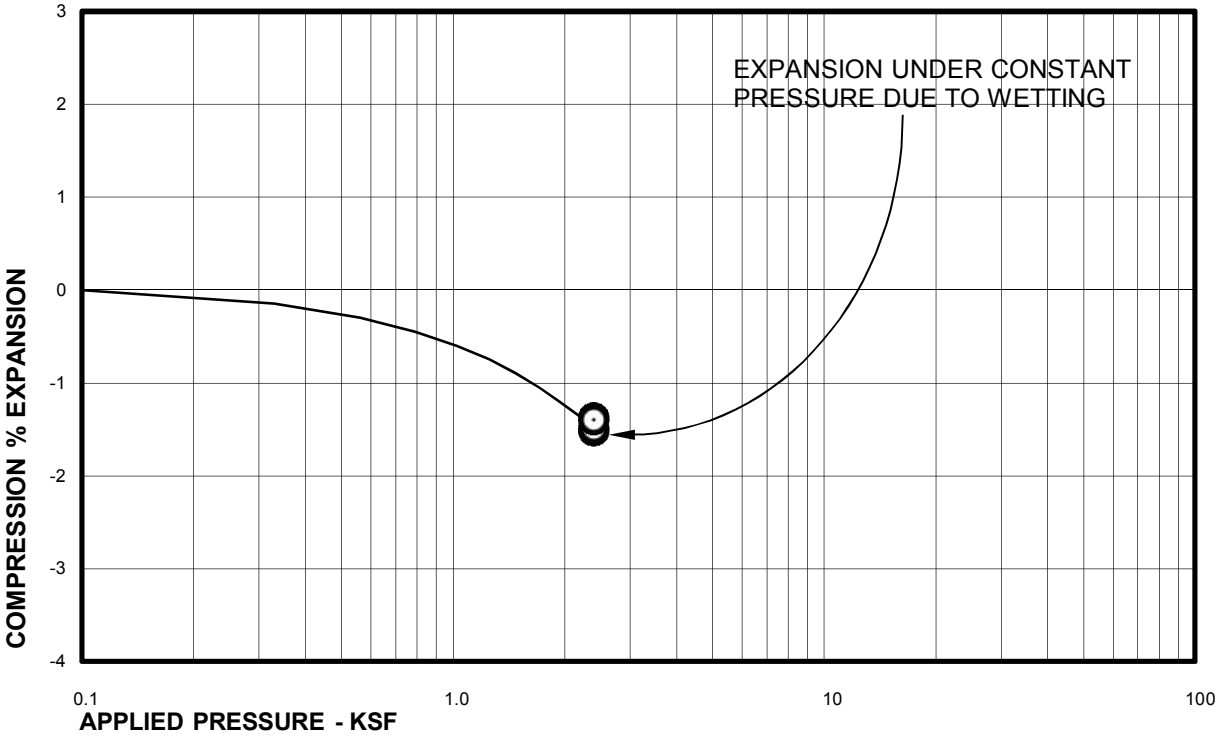
FIG. B-41

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



Sample of FILL, CLAY, SANDY
From TH-21 AT 9 FEET

DRY UNIT WEIGHT= 117 PCF
MOISTURE CONTENT= 13.5 %



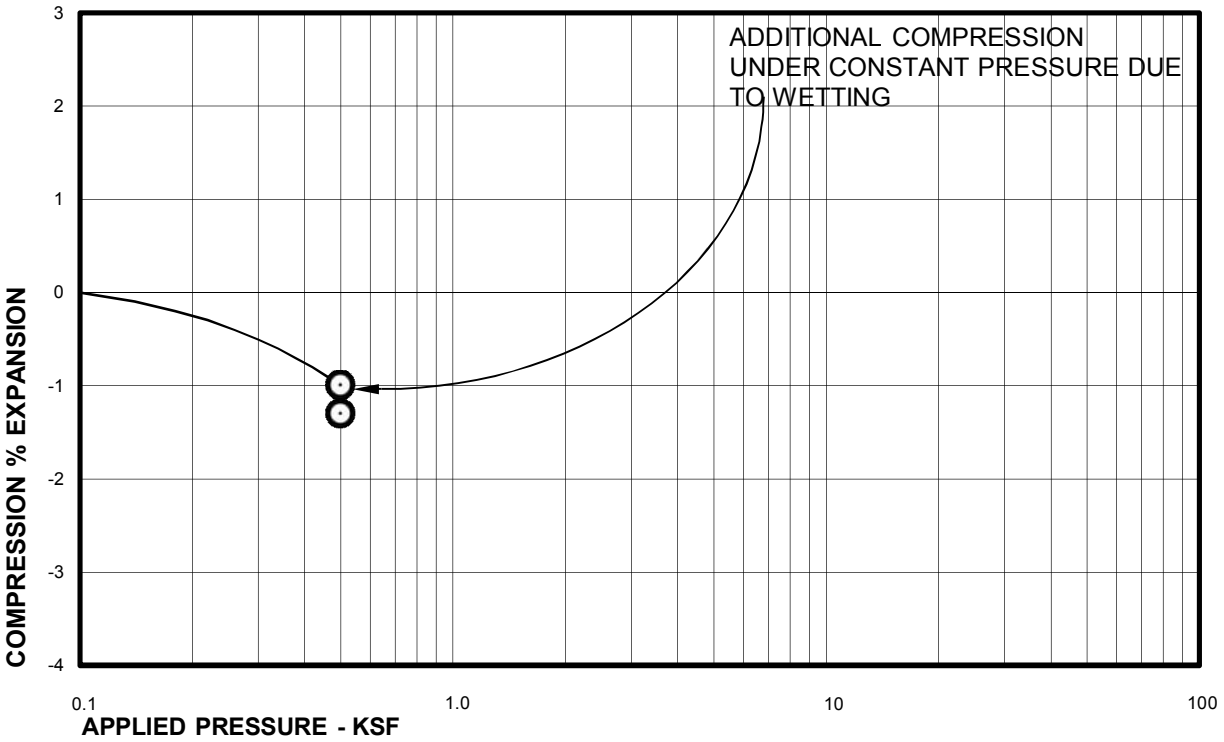
Sample of CLAYSTONE
From TH-21 AT 19 FEET

DRY UNIT WEIGHT= 118 PCF
MOISTURE CONTENT= 13.3 %

Swell Consolidation Test Results

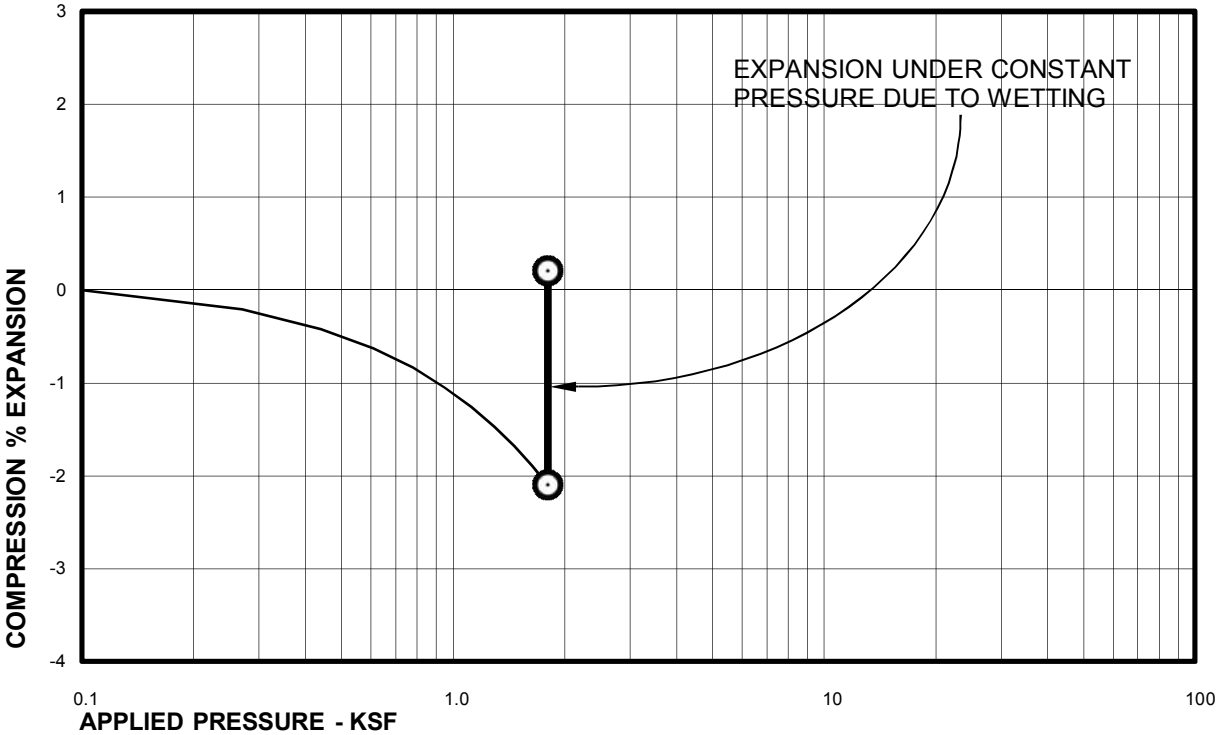
FIG. B-42

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



Sample of FILL, CLAY, SANDY
From TH-22 AT 4 FEET

DRY UNIT WEIGHT= 110 PCF
MOISTURE CONTENT= 12.2 %



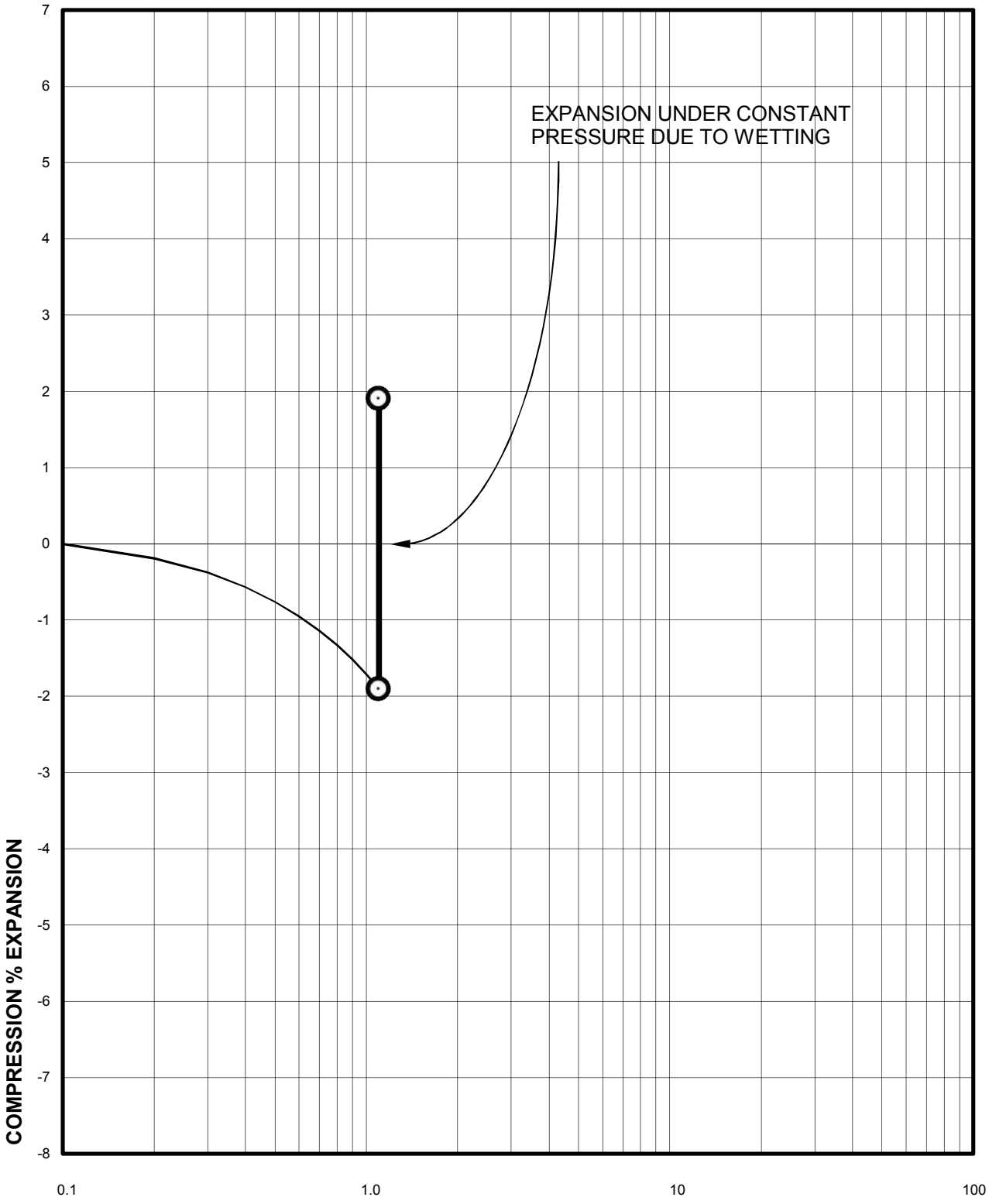
Sample of WEATHERED CLAYSTONE
From TH-22 AT 14 FEET

DRY UNIT WEIGHT= 111 PCF
MOISTURE CONTENT= 15.7 %

Swell Consolidation Test Results

FIG. B-43

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



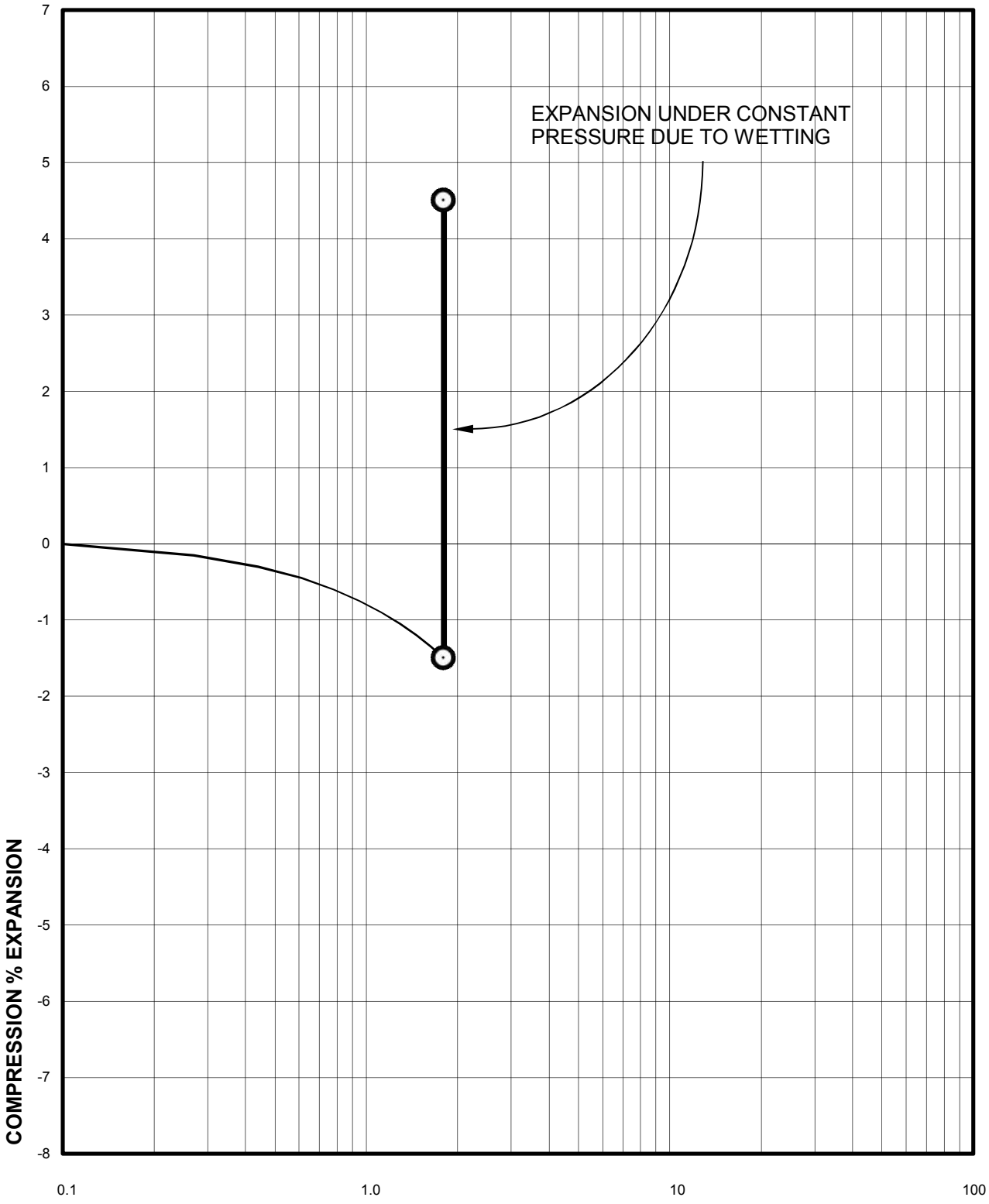
Sample of CLAYSTONE
From TH-23 AT 9 FEET

DRY UNIT WEIGHT= 112 PCF
MOISTURE CONTENT= 20.0 %

Swell Consolidation Test Results

FIG. B-44

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



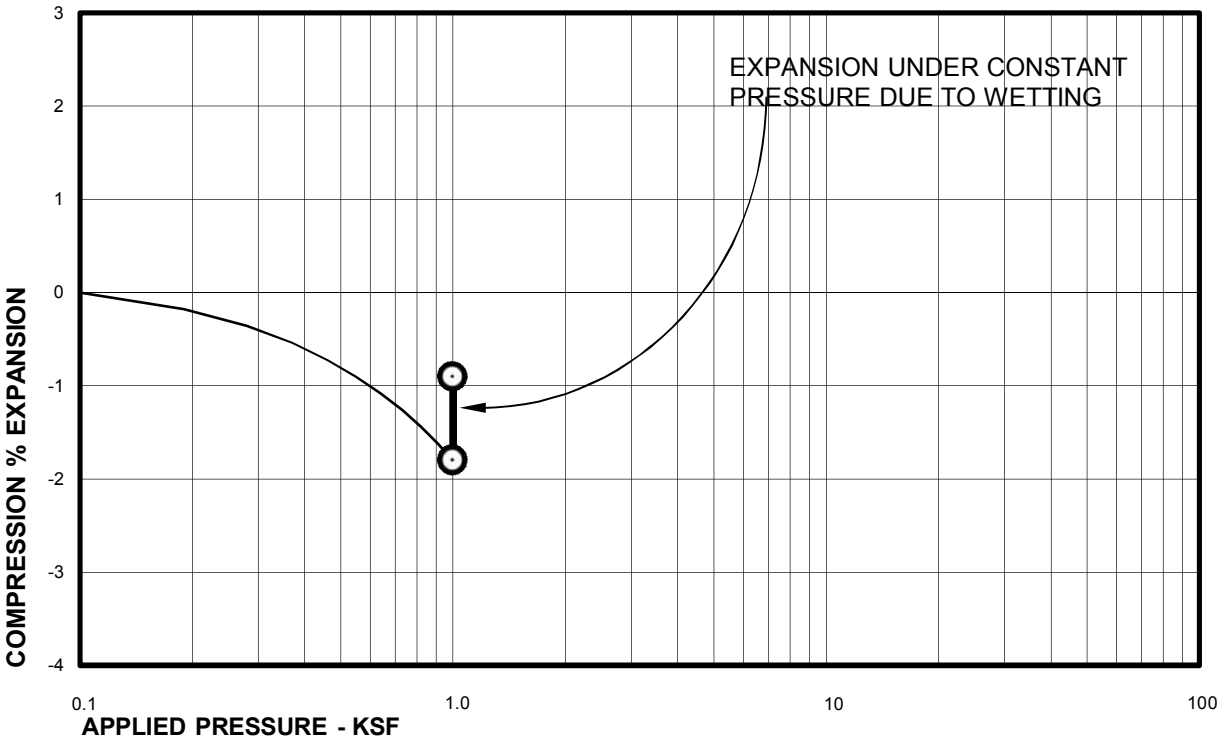
Sample of CLAYSTONE
From TH-23 AT 14 FEET

DRY UNIT WEIGHT= 112 PCF
MOISTURE CONTENT= 17.2 %

Swell Consolidation Test Results

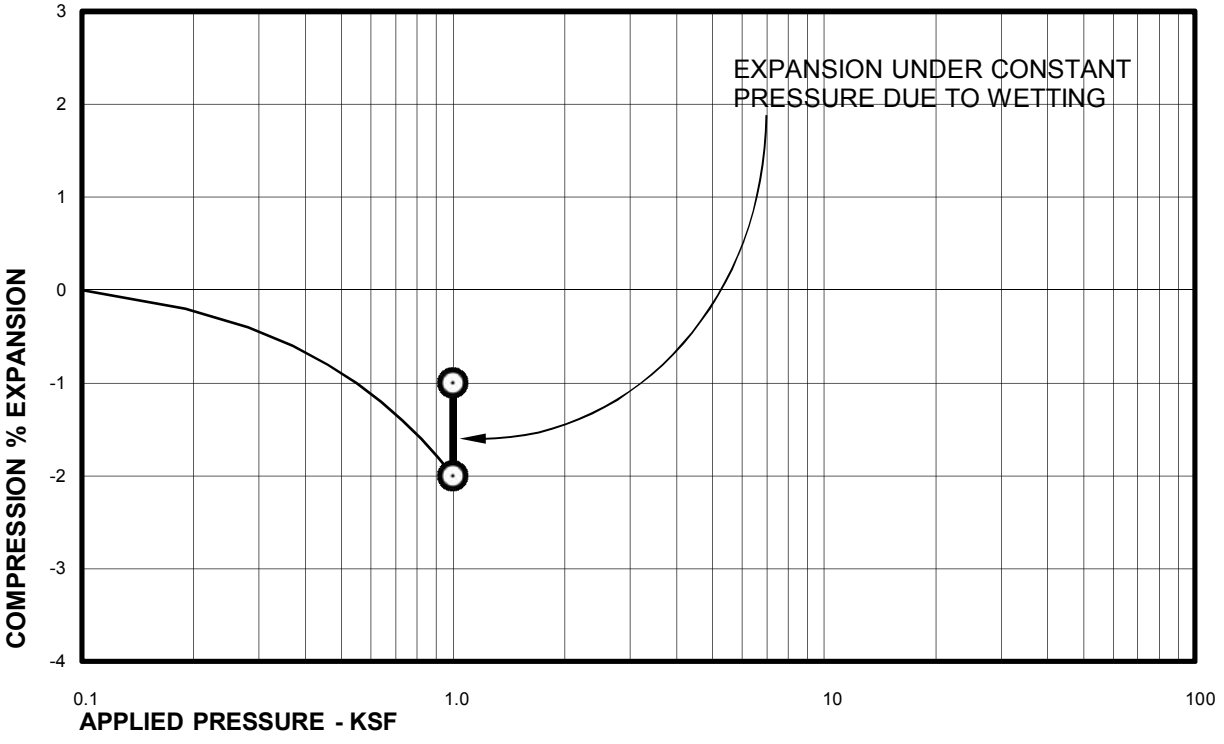
FIG. B-45

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1



Sample of REMOLDED CLAY
From TH-2 AT 0-10 FEET

DRY UNIT WEIGHT= 107 PCF
MOISTURE CONTENT= 17.8 %



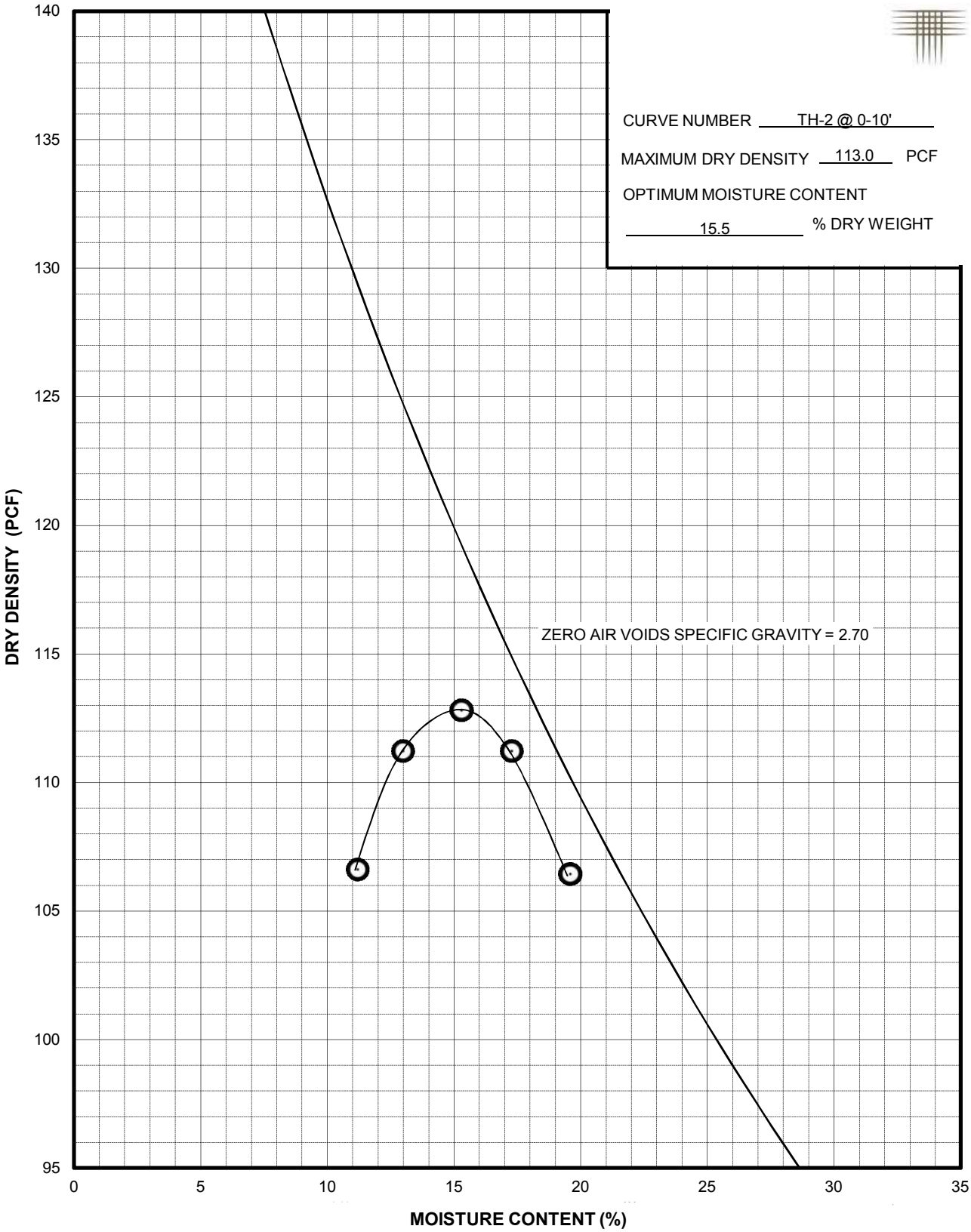
Sample of REMOLDED CLAY
From TH-9 AT 0-24 FEET

DRY UNIT WEIGHT= 100 PCF
MOISTURE CONTENT= 21.1 %

Swell Consolidation Test Results

FIG. B-46

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1

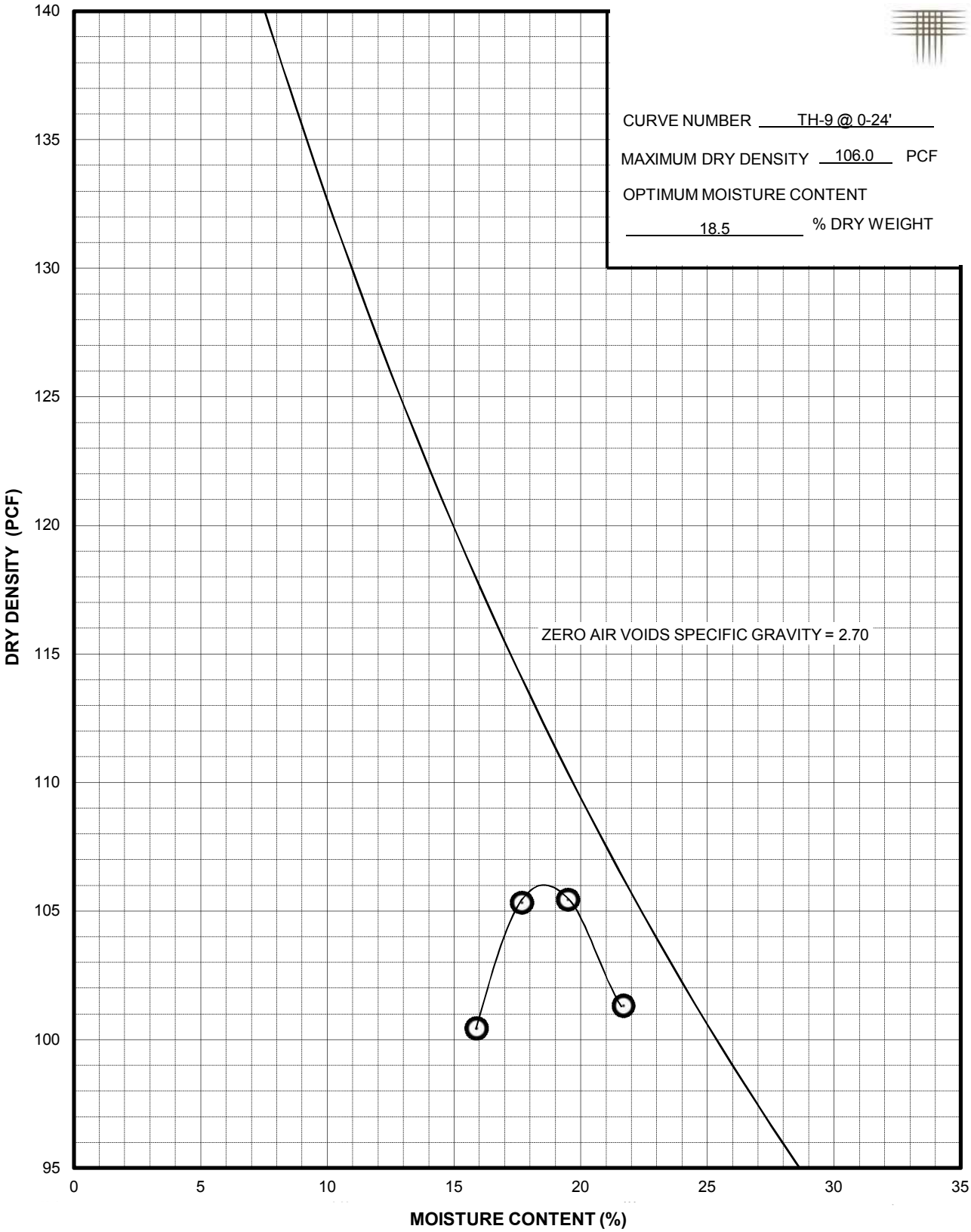


SAMPLE DESCRIPTION	CLAY, SANDY, BROWN		LIQUID LIMIT	40 %
			PLASTICITY INDEX	23 %
LOCATION	TH-2 @ 0-10'		GRAVEL	- %
			SAND	- %
COMPACTION TEST PROCEDURE	ASTM D698-00		SILT AND CLAY	78 %

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1

Laboratory Compaction Test Results

FIG. B-47

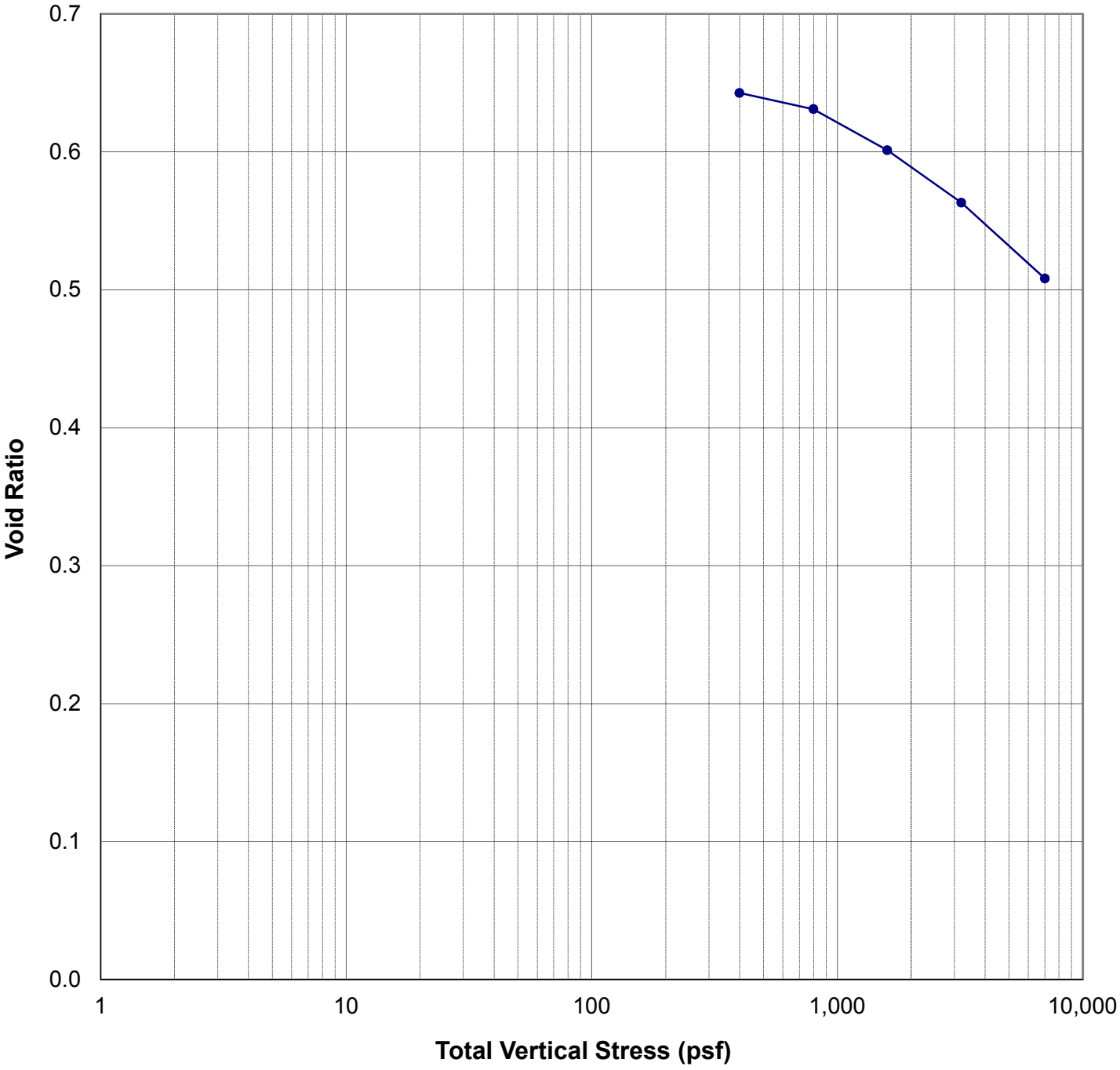


SAMPLE DESCRIPTION	CLAY, SANDY, BROWN		LIQUID LIMIT	50 %
			PLASTICITY INDEX	34 %
LOCATION	TH-9 @ 0-24'		GRAVEL	- %
			SAND	- %
COMPACTION TEST PROCEDURE	ASTM D698-00		SILT AND CLAY	88 %

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL | T PROJECT NO. DN48,647-125-R1

Laboratory Compaction Test Results

FIG. B-48



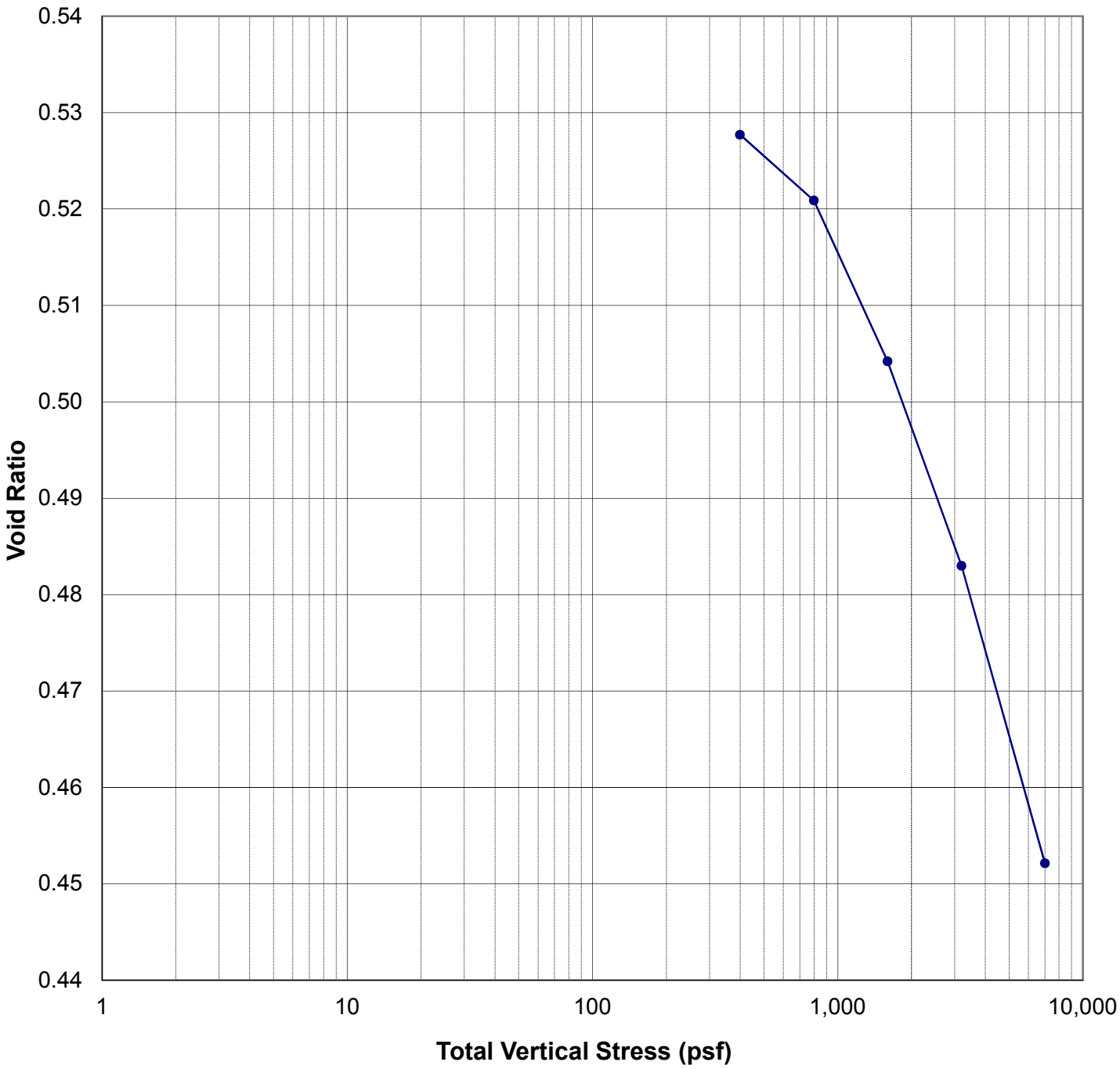
SAMPLE DESCRIPTION: Clay, Sandy, Soft, V. Moist, Brown
LOCATION: TH-17 @ 14'
MOISTURE CONTENT: 26.8 % (Before Test)
21.7 % (After Test)
DRY DENSITY: 97.3 pcf (Before Test)
TEST PROCEDURE: ASTM D2435

LIQUID LIMIT: ____ %
PLASTICITY INDEX: ____ %
GRAVEL: ____ %
SAND: ____ %
SILT AND CLAY: ____ %

One Dimensional Consolidation Test Results

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL|T PROJECT NO. DN48,647-125-R1

FIG. B-49

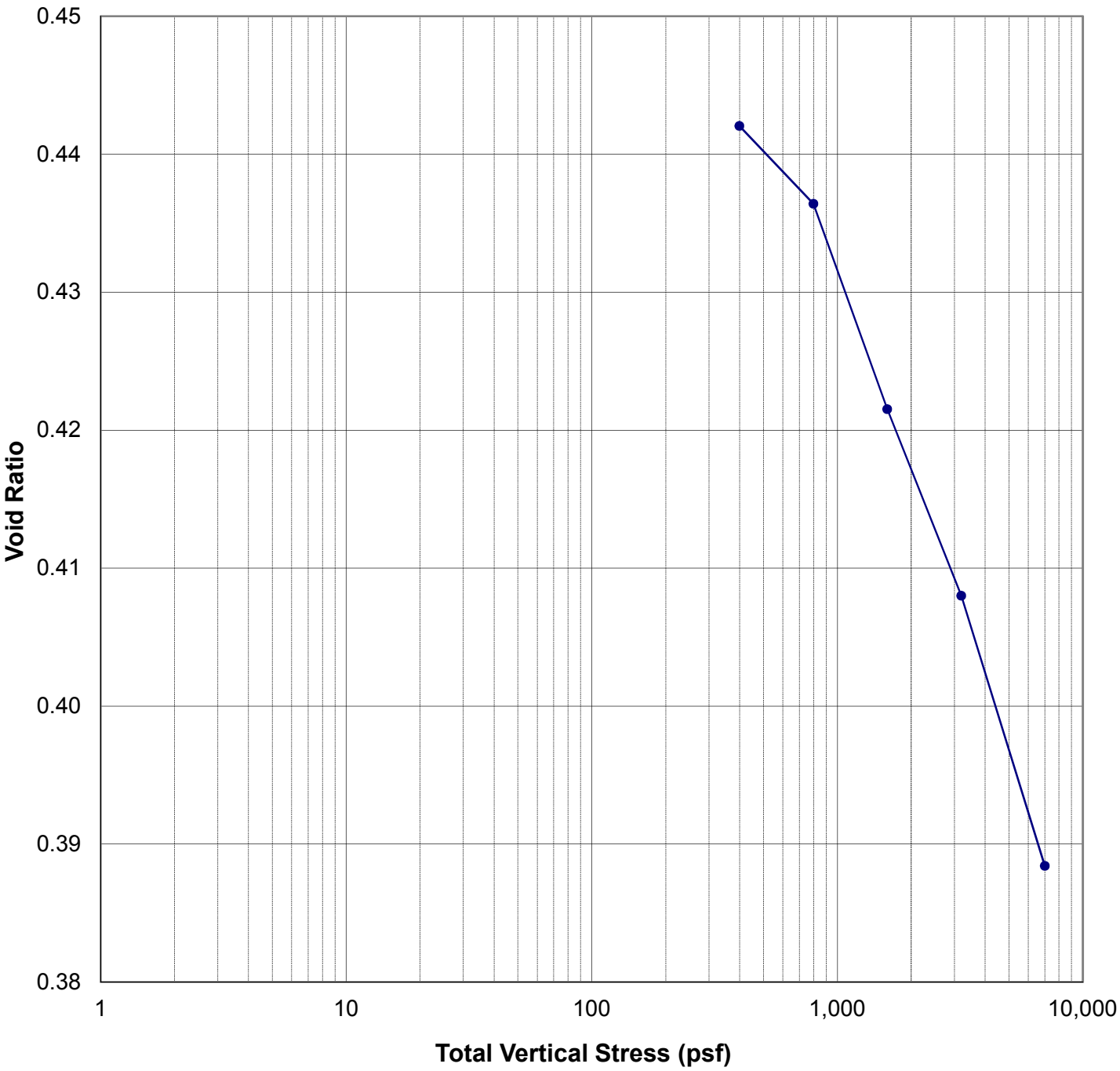


SAMPLE DESCRIPTION:	Clay, Sandy, Soft, V. Moist, Brown	LIQUID LIMIT:	%
LOCATION:	TH-18 @ 14'	PLASTICITY INDEX:	%
MOISTURE CONTENT:	20.3 % (Before Test)	GRAVEL:	%
	18.2 % (After Test)	SAND:	%
DRY DENSITY:	106.0 pcf (Before Test)	SILT AND CLAY:	%
TEST PROCEDURE:	ASTM D2435		

One Dimensional Consolidation Test Results

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL|T PROJECT NO. DN48,647-125-R1

FIG. B-50



SAMPLE DESCRIPTION: Clay, Sandy, M. Stiff, Moist, Brown
LOCATION: TH-19 @ 19'
MOISTURE CONTENT: 17.3 % (Before Test)
15.9 % (After Test)
DRY DENSITY: 113.1 pcf (Before Test)
TEST PROCEDURE: ASTM D2435

LIQUID LIMIT: _____ %
PLASTICITY INDEX: _____ %
GRAVEL: _____ %
SAND: _____ %
SILT AND CLAY: _____ %

One Dimensional Consolidation Test Results

EVERGREEN DEVELOPMENT
NINE MILE CORNER - COMMERCIAL AREA
CTL|T PROJECT NO. DN48,647-125-R1

FIG. B-51

TABLE B - I

SUMMARY OF LABORATORY TEST RESULTS

BORING	LOT	DEPTH (ft)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	SWELL TEST DATA				SOIL SUCTION VALUE (pF)	ATTERBERG LIMITS		SOLUBLE SULFATE CONTENT (%)	PASSING NO. 200 SIEVE (%)	SOIL TYPE
					SWELL (%)	COMPRESSION (%)	APPLIED PRESSURE (psf)	SWELL PRESSURE (psf)		LIQUID LIMIT	PLASTICITY INDEX			
TH-1	1	4	10.5										48	FILL, SAND, CLAYEY
TH-1	1	14	11.8	123	0.4		1,800							CLAYSTONE
TH-2	2	0-10								40	23		78	FILL, CLAY, SANDY
TH-2	2	4	21.3	95	1.0		500							FILL, CLAY, SANDY
TH-2	2	14	10.8	120		0.1	1,800							CLAYSTONE
TH-3	3	4	17.0	100	0.8		500					0.08		FILL, CLAY, SANDY
TH-3	3	9	18.8	100	1.6		1,100							CLAYSTONE
TH-4	4	4	13.1	120	2.0		500							CLAYSTONE
TH-4	4	14	12.2	126	1.1		1,800							CLAYSTONE
TH-5	5	4	12.2	113	4.8		500					0.19		CLAY, SANDY (CL)
TH-5	5	9	16.8	114	5.1		1,100							WEATHERED CLAYSTONE
TH-5	5	14	13.3	118	1.8		1,800							WEATHERED CLAYSTONE
TH-6	6	4	10.8	102	2.4		500	2,700	4.67					CLAY, SANDY (CL)
TH-6	6	9	10.5	122	7.8		1,100	17,000	4.65					WEATHERED CLAYSTONE
TH-6	6	14	15.5	117	3.8		1,800	12,000	4.02					WEATHERED CLAYSTONE
TH-6	6	19	12.3	120	1.3		2,400	5,800	3.95					CLAYSTONE
TH-6	6	24	25.2	92	1.6		3,000	5,800	3.68					CLAYSTONE
TH-7	7	19	16.8	113	8.7		500							CLAYSTONE
TH-7	7	24	25.9	98	4.6		1,100							CLAYSTONE
TH-7	7	29	14.8	116	0.7		1,800							CLAYSTONE
TH-8	8	14	17.1	114	8.2		500							CLAYSTONE
TH-8	8	19	15.5	116	4.3		1,100							CLAYSTONE
TH-8	8	24	16.5	116	3.8		1,800							CLAYSTONE
TH-8	8	29	16.6	112	2.9		2,400							CLAYSTONE
TH-9	9	0-24								50	34		88	CLAY, SANDY (CL)
TH-9	9	24	11.7	119	5.1		500	13,000	4.07					CLAYSTONE
TH-9	9	29	13.8	118	3.7		1,100	7,000	4.21					CLAYSTONE
TH-9	9	34	21.3	109	4.9		1,800	13,000	4.10					CLAYSTONE
TH-9	9	39	23.3	104	4.1		2,400	7,000	4.22					CLAYSTONE
TH-10	10	19	9.0	125	1.6		500							CLAYSTONE
TH-10	10	24	14.3	113	6.7		1,100							CLAYSTONE
TH-10	10	29	22.6	97	4.7		1,800						100	CLAYSTONE
TH-11	11	24	15.4	118	7.1		500	8,000	4.20					CLAYSTONE
TH-11	11	29	19.8	108	4.6		1,100	9,000	4.06					CLAYSTONE
TH-11	11	34	16.7	115	5.0		1,800	16,000	4.20					CLAYSTONE
TH-11	11	39	15.1	113	2.1		2,400	6,800	4.11					CLAYSTONE
TH-11	11	49	11.4	121		0.2	3,000		3.81					CLAYSTONE
TH-13	13	14	9.9	113	0.7		500	800	4.58					CLAYSTONE
TH-13	13	19	14.3	103		0.5	1,100		4.09					CLAYSTONE
TH-13	13	24	18.2	110	2.8		1,800	7,300	4.00					CLAYSTONE
TH-13	13	29	21.2	107	5.7		2,400	17,000	3.99					CLAYSTONE
TH-13	13	34	15.7	115	1.9		3,000	9,500	4.09					CLAYSTONE
TH-14	14	4	9.5	118	0.9		500							CLAY, SANDY (CL)
TH-14	14	9	15.8	108		0.1	1,100							CLAY, SANDY (CL)
TH-14	14	24	17.4	109	0.7		3,000			51	33		100	WEATHERED CLAYSTONE
TH-15	15	4	27.7	91	0.0		500							CLAY, SANDY (CL)
TH-15	15	14	17.5	110	0.0		1,800							CLAY, SANDY (CL)
TH-15	15	19	18.1	111	1.0		2,400			56	39		98	WEATHERED CLAYSTONE
TH-16	16	4	17.2	111									29	INTERLAYERED CLAY/SAND
TH-16	16	9	24.5	101		0.2	1,100							INTERLAYERED CLAY/SAND

TABLE B - I

SUMMARY OF LABORATORY TEST RESULTS

BORING	LOT	DEPTH (ft)	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	SWELL TEST DATA				SOIL SUCTION VALUE (pF)	ATTERBERG LIMITS		SOLUBLE SULFATE CONTENT (%)	PASSING NO. 200 SIEVE (%)	SOIL TYPE
					SWELL (%)	COMPRESSION (%)	APPLIED PRESSURE (psf)	SWELL PRESSURE (psf)		LIQUID LIMIT	PLASTICITY INDEX			
TH-16	16	19	20.1	108	0.0		2,400							INTERLAYERED CLAY/SAND
TH-16	16	24	19.7	110	0.0		3,000							INTERLAYERED CLAY/SAND
TH-17	17	4	22.1	102	1.6		500					<0.01		FILL, CLAY, SANDY
TH-17	17	14	26.8	97										INTERLAYERED CLAY/SAND
TH-17	17	19	17.8	112									23	INTERLAYERED CLAY/SAND
TH-18	18	4	18.7	109	1.1		500							FILL, CLAY, SANDY
TH-18	18	14	20.3	106										SAND, CLAYEY (SC)
TH-18	18	24	18.0										25	SAND, CLAYEY (SC)
TH-19	19	4	17.9	114	3.5		500							FILL, CLAY, SANDY
TH-19	19	19	17.3	113										CLAY, SANDY (CL)
TH-20	20	4	16.0	115									75	FILL, CLAY, SANDY
TH-20	20	14	20.8	108	3.4		1,800							WEATHERED CLAYSTONE
TH-20	20	19	18.4	111	2.8		2,400							WEATHERED CLAYSTONE
TH-21	21	9	13.5	117	0.1		1,100							FILL, CLAY, SANDY
TH-21	21	19	13.3	118	0.1		2,400							CLAYSTONE
TH-22	22	4	12.2	110		0.3	500					0.17		FILL, CLAY, SANDY
TH-22	22	14	15.7	111	2.3		1,800							WEATHERED CLAYSTONE
TH-23	23	4	11.4										69	CLAYSTONE
TH-23	23	9	20.0	112	3.8		1,100							CLAYSTONE
TH-23	23	14	17.2	112	6.0		1,800							CLAYSTONE
TH-2	2	0-10	17.8	107	0.9		1,000							REMOLDED CLAY
TH-9	9	0-24	21.1	100	1.0		1,000							REMOLDED CLAY

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APPENDIX C

GUIDELINE SITE GRADING SPECIFICATIONS

Nine Mile Corner – Commercial Area
Erie, Colorado

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GUIDELINE SITE GRADING SPECIFICATIONS

Nine Mile Corner – Commercial Area
Erie, Colorado

1. DESCRIPTION

This item shall consist of the excavation, transportation, placement and compaction of materials from locations indicated on the plans, or staked by the Engineer, as necessary to achieve preliminary street and overlot elevations. These specifications shall also apply to compaction of excess cut materials that may be placed outside of the development boundaries.

2. GENERAL

The Soils Representative shall be the Owner's representative. The Soils Representative shall approve fill materials, method of placement, moisture contents and percent compaction, and shall give written approval of the completed fill.

3. CLEARING JOB SITE

The Contractor shall remove all vegetation and debris before excavation or fill placement is begun. The Contractor shall dispose of the cleared material to provide the Owner with a clean, neat appearing job site. Cleared material shall not be placed in areas to receive fill or where the material will support structures of any kind.

4. AREA TO BE FILLED

All topsoil and vegetable matter shall be removed from the ground surface upon which fill is to be placed. The surface shall then be plowed or scarified until the surface is free from ruts, hummocks or other uneven features, which would prevent uniform compaction.

After the foundation for the fill has been cleared and scarified, it shall be disked or bladed until it is free from large clods, brought to the proper moisture content as outlined in Table C1 below.

Table C1 – Moisture and Compaction Specifications

Soil Type	Depth of Fill* (feet)	Moisture Content From Optimum	Minimum Compaction (ASTM D698)
Clay and Claystone	0 to 18	0 to +3	>95 %
	>18	-1 to +2	100 %
Sand	0 to 18	-2 to +2	>95
	>18	-2 to +2	100 %

* Depth below proposed grade

5. FILL MATERIALS

Fill soils shall be free from organics, debris or other deleterious substances, and shall not contain rocks or lumps having a diameter greater than six (6) inches. Claystone bedrock should be broken down to three (3) inches or smaller in size. Fill materials shall be obtained from cut areas shown on the plans or staked in the field by the Engineer.

On-site materials classifying as CL, CH, SC, SM, SW, SP, GP, GC and GM are acceptable. Concrete, asphalt, organic matter and other deleterious materials or debris shall not be used as fill.

6. MOISTURE CONTENT

Fill material classifying as CH and CL shall be moisture conditioned as outlined in Table C1. Granular soils classifying as SC, SM, SW, SP, GP, GC and GM shall be moisture conditioned as outlined in Table C1. Sufficient laboratory compaction tests shall be made to determine the optimum moisture content for the various soils encountered in borrow areas.

The Contractor may be required to add moisture to the excavation materials in the borrow area if, in the opinion of the Soils Representative, it is not possible to obtain uniform moisture content by adding water on the fill surface. The Contractor may be required to rake or disc the fill soils to provide uniform moisture content through the soils.

The application of water to embankment materials shall be made with any type of watering equipment approved by the Soils Representative, which will give the desired results. Water jets from the spreader shall not be directed at the embankment with such force that fill materials are washed out.

Should too much water be added to any part of the fill, such that the material is too wet to permit the desired compaction from being obtained, rolling and all work on that section of the fill shall be delayed until the material has been allowed to dry to the required moisture content. The Contractor will be permitted to rework wet material in an approved manner to hasten its drying.

7. COMPACTION OF FILL AREAS

Selected fill material shall be placed and mixed in evenly spread layers. After each fill layer has been placed, it shall be uniformly compacted to not less than the specified percentage of maximum density. Fill shall be compacted according to the specifications outlined Table C1. At the option of the Soils Representative, soils classifying as SW, GP, GC, or GM may be compacted to 95 percent of maximum density as determined in accordance with ASTM D 1557 or 70 percent relative density for cohesionless sand soils. Fill materials shall be placed such that

the thickness of loose materials does not exceed 10 inches and the compacted lift thickness does not exceed 6 inches.

Compaction as specified above, shall be obtained by the use of sheepsfoot rollers, multiple-wheel pneumatic-tired rollers, or other equipment for soils classifying as CL, CH, or SC. Granular fill shall be compacted using vibratory equipment or other approved equipment. Compaction shall be accomplished while the fill material is at the specified moisture content. Compaction of each layer shall be continuous over the entire area. Compaction equipment shall make sufficient trips to ensure that the required density is obtained.

8. COMPACTION OF SLOPES

Fill slopes shall be compacted by means of sheepsfoot rollers or other suitable equipment. Compaction operations shall be continued until slopes are stable, but not too dense for planting, and there is not appreciable amount of loose soils on the slopes. Compaction of slopes may be done progressively in increments of three to five feet (3' to 5') in height or after the fill is brought to its total height. Permanent fill slopes shall not exceed 3:1 (horizontal to vertical).

9. PLACEMENT OF FILL ON NATURAL SLOPES

Where natural slopes are steeper than 20 percent in grade and the placement of fill is required, benches shall be cut at the rate of one bench for each 5 feet in height (minimum of two benches). Benches shall be at least 10 feet in width. Larger bench widths may be required by the Engineer. Fill shall be placed on completed benches as outlined within this specification.

10. DENSITY TESTS

Field density tests shall be made by the Soils Representative at locations and depths of his choosing. Where sheepsfoot rollers are used, the soil may be disturbed to a depth of several inches. Density tests shall be taken in compacted material below the disturbed surface. When density tests indicate that the density or moisture content of any layer of fill or portion thereof is not within specification, the particular layer or portion shall be reworked until the required density or moisture content has been achieved.

11. SEASONAL LIMITS

No fill material shall be placed, spread or rolled while it is frozen, thawing, or during unfavorable weather conditions. When work is interrupted by heavy precipitation, fill operations shall not be resumed until the Soils Representative indicates that the moisture content and density of previously placed materials are as specified.

12. NOTICE REGARDING START OF GRADING

The Contractor shall submit notification to the Soils Representative and Owner advising them of the start of grading operations at least three (3) days in advance of the starting date. Notification shall also be submitted at least 3 days in advance of any resumption dates when grading operations have been stopped for any reason other than adverse weather conditions.

13. REPORTING OF FIELD DENSITY TESTS

Density tests made by the Soils Representative, as specified under "Density Tests" above, shall be submitted progressively to the Owner. Dry density, moisture content, and percentage compaction shall be reported for each test taken.

14. DECLARATION REGARDING COMPLETED FILL

The Soils Engineer shall provide a written declaration stating that the site was filled with acceptable materials, and was placed in general accordance with the specifications.

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APPENDIX D

GUIDELINE SITE GRADING SPECIFICATIONS
(SUB-EXCAVATION)

Nine Mile Corner – Commercial Area
Erie, Colorado

Note: This guideline is intended for use with sub-excavation. For general site grading, the guidelines in Appendix C should be followed.

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GUIDELINE SITE GRADING SPECIFICATIONS
(SUB-EXCAVATION)

Nine Mile Corner – Commercial Area
Erie, Colorado

1. DESCRIPTION

This item shall consist of the excavation, transportation, placement and compaction of materials from locations indicated on the plans, or staked by the Engineer, as necessary to achieve preliminary street and overlot elevations. These specifications shall also apply to compaction of materials that may be placed outside of the development boundaries.

2. GENERAL

The Soils Engineer shall be the Owner's representative. The Soils Engineer shall observe fill materials, method of placement, moisture content and percent compaction, and shall provide written opinions of the completed fill.

3. CLEARING JOB SITE

The Contractor shall remove all vegetation and debris before excavation or fill placement is begun. The Contractor shall dispose of the cleared material to provide the Owner with a clean, neat appearing job site. Cleared material shall not be placed in areas to receive fill where the material will support structures of any kind.

4. SCARIFYING AREA TO BE FILLED

All topsoil and vegetable matter shall be removed from the ground surface where fill is to be placed. The surface shall then be plowed or scarified until the surface is free from ruts, hummocks or other uneven features that would prevent uniform compaction.

5. COMPACTING AREA TO BE FILLED

After the foundation for the fill has been cleared and scarified, it shall be disked or bladed until it is free from large clods, brought to the proper moisture content, (0 to 3 percent above optimum) and compacted to not less than 95 percent of maximum density as determined in accordance with ASTM D 698.

6. FILL MATERIALS

Fill soils shall be free from vegetable matter or other deleterious substances, and shall not contain clay and claystone having a diameter greater than three (3)

inches. Fill materials shall be obtained from cut areas shown on the plans or staked in the field by the Engineer.

On-site materials classifying as CL, CH, SC, SM, SP, GP, GC and GM are acceptable. Concrete, asphalt, and other deleterious materials or debris shall not be used as fill.

7. MOISTURE CONTENT

Fill materials shall be moisture-conditioned to within limits of optimum moisture content specified in “Moisture Content and Density Criteria”. Sufficient laboratory compaction tests shall be made to determine the optimum moisture content for the various soils encountered in borrow areas or imported to the site.

The Contractor may be required to add moisture to the excavation materials in the borrow area if, in the opinion of the Soils Engineer, it is not possible to obtain uniform moisture content by adding water on the fill surface. The Contractor will be required to rake or disc the fill to provide uniform moisture content throughout the fill.

The application of water to embankment materials shall be made with any type of watering equipment that will give the desire results. Water jets from the spreader shall not be directed at the embankment with such force that fill materials are washed out.

Should too much water be added to any part of the fill, such that the material is too wet to permit the desired compaction from being obtained, rolling and all work on that section of the fill shall be delayed until the material has been allowed to dry to the required moisture content. The Contractor will be permitted to rework wet material in an approved manner to hasten its drying.

8. COMPACTION OF FILL MATERIALS

Selected fill material shall be placed and mixed in evenly spread layers. After each fill layer has been placed, it shall be uniformly compacted to not less than the specified percentage of maximum density given in “Moisture Content and Density Criteria”. Fill materials shall be placed such that the thickness of loose material does not exceed 8 inches and the compacted lift thickness does not exceed 6 inches.

Compaction, as specified above, shall be obtained by the use of suitable equipment. Compaction shall be accomplished while the fill material is at the specified moisture content. Compaction of each layer shall be continuous over the entire area. Compaction equipment shall make sufficient trips to ensure that the required density is obtained.

9. MOISTURE CONTENT AND DENSITY CRITERIA

Fill material shall be substantially compacted to at least 95 percent of standard Proctor maximum dry density (ASTM D 698, AASHTO T 99) dry density at 0 to 3 percent above optimum moisture content. Additional criteria for acceptance are presented in DENSITY TESTS.

10. DENSITY TESTS

Field density tests shall be made by the Soils Engineer at locations and depths of his choosing. Where sheepsfoot rollers are used, the soil may be disturbed to a depth of several inches. Density tests shall be taken in compacted material below the disturbed surface. When density tests indicate the density or moisture content of any layer of fill or portion thereof not within specifications, the particular layer or portion shall be reworked until the required density or moisture content has been achieved.

Allowable ranges of moisture content and density given in MOISTURE CONTENT AND DENSITY CRITERIA are based on design considerations. The moisture shall be controlled by the Contractor so that moisture content of the compacted earth fill, as determined by tests performed by the Soils Engineer, shall be within the limits given. The Soils Engineer will inform the Contractor when the placement moisture is less than or exceeds the limits specified and the Contractor shall immediately make adjustments in procedures as necessary to maintain placement moisture content within the specified limits, to satisfy the following requirements.

A. Moisture

1. The average moisture content of material tested each day shall not be less than 1 percent over optimum moisture content.

2. Material represented by samples tested having moisture lower than optimum will be rejected. Such rejected materials shall be reworked until moisture equal to or greater than 1 percent above optimum is achieved.

B. Density

1. The average dry density of material tested each day shall not be less than 95 percent of standard Proctor maximum dry density (ASTM D 698).

2. No more than 10 percent of the material represented by the samples tested shall be at dry densities less than 95 percent of standard Proctor maximum dry density (ASTM D 698).

3. Material represented by samples tested having dry density less than 95 percent of standard Proctor maximum dry density (ASTM D 698) will be rejected. Such rejected materials shall be reworked until a dry density equal to or greater than 95 percent of standard Proctor maximum dry density (ASTM D 698) is obtained.

11. OBSERVATION AND TESTING OF FILL

Observation by the Soils Engineer shall be sufficient during the placement of fill and compaction operations so that they can declare the fill was placed in general conformance with specifications. All observations necessary to test the placement of fill and observe compaction operations will be at the expense of the Owner.

12. SEASONAL LIMITS

No fill material shall be placed, spread or rolled while it is frozen, thawing, or during unfavorable weather conditions. When work is interrupted by heavy precipitation, fill operations shall not be resumed until the Soils Engineer indicates the moisture content and density of previously placed materials are as specified.

13. REPORTING OF FIELD DENSITY TESTS

Density tests made by the Soils Engineer, as specified under “Density Tests” above, shall be submitted progressively to the Owner. Dry density, moisture content and percentage compaction shall be reported for each test taken.

SALEM engineering group, inc.

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May 25, 2016 **Project No. 7-416-0419**

Mr. Russell Perkins
Evergreen Devco, Inc.
2390 East Camelback Road, Suite 410
Phoenix, AZ 85016

Subject: **AAI PHASE I ENVIRONMENTAL SITE ASSESSMENT**
Proposed Nine Mile Corner Development
SEC Highway 287 & Arapahoe Road
Erie, Colorado

Dear Mr. Perkins:

At your request and authorization, SALEM Engineering Group, Inc. (SALEM) has conducted this Phase I Environmental Site Assessment (ESA) of the Proposed Nine Mile Corner Development located on the southeast corner of Highway 287 and Arapahoe Road in Erie, Colorado (subject property). During the course of this assessment, SALEM identified the following evidence of a Recognized Environmental Condition (REC) in connection with the subject property as defined by ASTM E1527-13:

- SALEM's review of State of Colorado Oil & Gas Conservation Commission (COGCC) records indicates that one plugged abandoned oil well is located near the central eastern property boundary. A mud pit associated with the drilling of the oil well may be buried within a 25- to 50-foot radius of the well head, and is anticipated to exist at an approximate depth of three to five feet below ground surface (bgs) and cover an area of approximately 300 square feet. Drilling mud is dense slurry circulated through the well bore to lubricate and cool the drill bit, circulate cuttings and other debris to the surface for extraction, and to counter the build-up of hydrostatic pressures encountered in geologic formations. Drilling mud may be water or oil based. Water-based muds are generally considered non-hazardous and are the most common type of mud. Oil-based mud is generally considered "hazardous." It is not known if a drilling mud pit is buried proximate to the abandoned oil well located on the subject property or what type of drilling mud was used to drill the on-site oil well. No surface indication of a drilling mud pit was observed during SALEM's reconnaissance of the subject property and adjacent properties. Based upon the proposed use of the subject property for residential development, the presence of a buried drilling mud pit and an abandoned oil well have the potential to present an adverse impact to human health and the environment at the subject property. Therefore, SALEM recommends locating the oil well, as well as its potential associated mud pit on the subject property, for the purpose of collecting soil samples within the former mud pit to determine the characteristics of the drilling mud. Additionally, SALEM recommends that the on-site inactive oil well be re-abandoned in accordance with all current applicable COGCC requirements.

Additionally, the following Site Development Issues were identified:

- Two single-family dwellings occupy the northeast and southern portions of the subject property. According to the Town of Erie Public Works Department (TEPWD) records, a septic system and a domestic water well are likely associated with each of the single-family dwellings. The presence

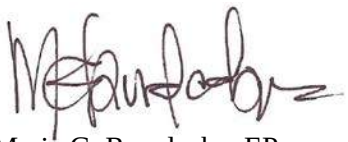
of septic systems and water wells are not anticipated to adversely environmentally impact the subject property due to their presumed use for domestic purposes only. If the septic systems and water wells are encountered during the redevelopment of the subject property and are not to be used in any planned redevelopment, they should be properly abandoned/closed or destroyed in accordance with state and local guidelines.

- During SALEM's site reconnaissance, an approximately 900 foot by 700 foot surface water body identified as Prince Lake was observed to occupy the northwest portion of the subject property. Prince Lake is observed to be approximately 10-15 feet below the graded surface elevation of the adjoining properties. Minimal standing water was observed in the lake. Additionally, a 5-10 foot wide ridge transects the subject property (between Prince Lake and the southern residential dwelling property) in an east to west direction from Highway 287 towards the adjoining property to the east. Based upon the proposed use of the subject property for residential and commercial development, it is understood that fill material will be imported to bring the depressions to grade. SALEM recommends the prospective fill material source documentation be obtained to include laboratory analytical data to ensure the fill material does not contain elevated concentrations of hazardous substances and petroleum products.

We appreciate the opportunity to assist you with this project. If you have any questions, or if we may be of further assistance, please do not hesitate to contact our office at (303) 848-3945.

Respectfully submitted,

SALEM Engineering Group, Inc.



Maria G. Ruvalcaba, EP
Senior Environmental Project Manager

GEOTECHNICAL • ENVIRONMENTAL • GEOLOGY • MATERIALS TESTING & INSPECTION • FORENSIC • LABORATORY

SALEM
engineering group, inc.

PHASE I ENVIRONMENTAL SITE ASSESSMENT

PROPOSED NINE MILE CORNER DEVELOPMENT
SEC HIGHWAY 287 & ARAPAHOE ROAD
ERIE, COLORADO

SALEM PROJECT NO. 7-416-0419
MAY 25, 2016

PREPARED FOR:

MR. RUSSELL PERKINS
EVERGREEN DEVCO, INC.
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May 25, 2016 **Project No. 7-416-0419**

AAI PHASE I ENVIRONMENTAL SITE ASSESSMENT

PROPOSED NINE MILE CORNER DEVELOPMENT
SEC HIGHWAY 287 & ARAPAHOE ROAD
ERIE, COLORADO

1.0 EXECUTIVE SUMMARY

SALEM Engineering Group, Inc. (SALEM) has conducted a Phase I Environmental Site Assessment (ESA) of the Proposed Nine Mile Corner Development site located on the southeast corner of Highway 287 and Arapahoe Road in Erie, Colorado (subject property). The subject property comprises an approximate 45-acre irregular-shaped parcel which is primarily vacant land with the exception of two single-family dwellings and associated out buildings, as well as a small surface water body identified as Prince Lake. SALEM conducted this Phase I ESA of the subject property in conformance with the American Society for Testing and Materials (ASTM) E1527-13 *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process.* The U.S. Environmental Protection Agency (USEPA) has determined that the ASTM E1527-13 Standard is consistent with the requirements for conducting an "All Appropriate Inquiry" under 40 C.F.R. Part 312. Thus, this Phase I ESA constitutes All Appropriate Inquiry (AAI) designed to identify Recognized Environmental Conditions (RECs) in connection with the previous ownership and uses of the subject property as defined by ASTM E1527-13 and 40 C.F.R. Part 312.

ASTM E1527-13 Section 1.1.1 *Recognized Environmental Conditions* – The term *recognized environmental conditions* is defined as "the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: (1) due to any release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment." The term as further defined by ASTM "is not intended to include de minimis conditions that generally do not present a threat to human health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies." Conditions determined to be *de minimis* are not *recognized environmental conditions*.

During the course of this assessment, SALEM identified the following evidence of a Recognized Environmental Condition (REC) in connection with the subject property as defined by ASTM E1527-13:

- SALEM's review of State of Colorado Oil & Gas Conservation Commission (COGCC) records indicates that one plugged abandoned oil well is located near the central eastern property boundary. A mud pit associated with the drilling of the oil well may be buried within a 25- to 50-foot radius of the well head, and is anticipated to exist at an approximate depth of three to five feet below ground surface (bgs) and cover an area of approximately 300 square feet. Drilling mud is dense slurry circulated through the well bore to lubricate and cool the drill bit, circulate cuttings and other debris to the surface for extraction, and to counter the build-up of hydrostatic pressures encountered in geologic formations. Drilling mud may be water or oil based. Water-based muds are generally considered non-hazardous and are the most common type of mud. Oil-based mud is generally considered "hazardous." It is not known if a drilling mud pit is buried proximate to the abandoned oil well located on the subject property or what type of drilling mud was used to drill the on-site oil well. No surface indication of a drilling mud pit was observed during SALEM's reconnaissance

of the subject property and adjacent properties. Based upon the proposed use of the subject property for residential development, the presence of a buried drilling mud pit and an abandoned oil well have the potential to present an adverse impact to human health and the environment at the subject property. Therefore, SALEM recommends locating the oil well, as well as its potential associated mud pit on the subject property, for the purpose of collecting soil samples within the former mud pit to determine the characteristics of the drilling mud. Additionally, SALEM recommends that the on-site inactive oil well be re-abandoned in accordance with all current applicable COGCC requirements.

Additionally, the following Site Development Issues were identified:

- Two single-family dwellings occupy the northeast and southern portions of the subject property. According to the Town of Erie Public Works Department (TEPWD) records, a septic system and a domestic water well are likely associated with each of the single-family dwellings. The presence of septic systems and water wells are not anticipated to adversely environmentally impact the subject property due to their presumed use for domestic purposes only. If the septic systems and water wells are encountered during the redevelopment of the subject property and are not to be used in any planned redevelopment, they should be properly abandoned/closed or destroyed in accordance with state and local guidelines.

- During SALEM's site reconnaissance, an approximately 900 foot by 700 foot surface water body identified as Prince Lake was observed to occupy the northwest portion of the subject property. Prince Lake is observed to be approximately 10-15 feet below the graded surface elevation of the adjoining properties. Minimal standing water was observed in the lake. Additionally, a 5-10 foot wide ridge transects the subject property (between Prince Lake and the southern residential dwelling property) in an east to west direction from Highway 287 towards the adjoining property to the east. Based upon the proposed use of the subject property for residential and commercial development, it is understood that fill material will be imported to bring the depressions to grade. SALEM recommends the prospective fill material source documentation be obtained to include laboratory analytical data to ensure the fill material does not contain elevated concentrations of hazardous substances and petroleum products.

2.0 PURPOSE AND SCOPE OF ASSESSMENT

2.1 Purpose

According to ASTM E1527-13, the purpose of this practice is to define good commercial and customary practice in the United States of America for conducting an *environmental site assessment* of a parcel of *commercial real estate* with respect to the range of contaminants within the scope of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) (42 U.S.C. §9601) and *petroleum products.* As such, this practice is intended to permit a *user* to satisfy one of the requirements to qualify for the *innocent landowner, contiguous property owner,* or *bona fide prospective purchaser* limitation on CERCLA liability (hereinafter, the *"landowner liability protections,"* or *"LLPs"*): that is, the practice that constitutes *"all appropriate inquiry* into the previous ownership and uses of the *property* consistent with good commercial or customary practice" as defined at 42 U.S.C. §9601(35) (B).

The Phase I ESA was conducted to identify 'Recognized Environmental Conditions' (RECs), 'Controlled Recognized Environmental Conditions' (CRECs) and 'Historical RECs' (HRECs) as defined by the American Society for Testing and Materials (ASTM) *Designation E1527-13 Standard Practice for*

Environmental Site Assessments: Phase I Environmental Site Assessment Process. Section 1.1.1 of the ASTM *Designation E1527-13* defines an REC as "the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: (1) due to any release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment." The term as further defined by ASTM "is not intended to include de minimis conditions that generally do not present a threat to human health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies." Section 3.2.18 defines a CREC as a "recognized environmental condition resulting from a past release of hazardous substances or petroleum products that has been addressed to the satisfaction of the applicable regulatory authority (for example, as evidenced by the issuance of a no further action letter or equivalent, or meeting risk-based criteria established by regulatory authority), with hazardous substances or petroleum products allowed to remain in place subject to the implementation of required controls (for example, property use restrictions, activity and use limitations, institutional controls, or engineering controls)." Section 3.2.42 defines HREC as a "past release of any hazardous substances or petroleum products that has occurred in connection with the property and has been addressed to the satisfaction of the applicable regulatory authority or meeting unrestricted use criteria established by a regulatory authority, without subjecting the property to any required controls (for example, property use restrictions, activity and land use limitations, institutional controls, or engineering controls)."

2.2 Scope of Work

The objective of the SALEM Phase I ESA scope of work is to provide an evaluation of RECs at the subject property and potential off-site sources. The scope of work for this Phase I ESA conforms to ASTM E1527-13 and 40 C.F.R. Part 312. SALEM was provided written authorization to conduct the Phase I ESA by Mr. Russell Perkins with Evergreen Devco, Inc. on April 12, 2016. In fulfillment of the SALEM scope of work outlined in SALEM's Proposal No. P7-416-0597. In fulfillment of the SALEM scope of work for this Phase I ESA, SALEM was retained to perform the following tasks:

- Acquire readily available information regarding land-use history and property development by reviewing historical aerial photographs, pertinent building permit records, historic city directories, as well as reviewing recent and historic topographic land-use maps of the subject property and surrounding area.

- Reviewing readily available local, state and federal regulatory agency databases listed in ASTM E1527-13 and compiled by Environmental Data Resources, Inc. (EDR), including but not limited to CERCLA and NPL lists for sites within one mile of the subject property. State databases were reviewed for sites within one mile of the subject property.

- Performing a reconnaissance of the subject property and surrounding areas (up to one-half mile beyond site boundary), which included photograph documentation of subject property conditions, and identification of potential recognized environmental conditions.

- Interviews with persons knowledgeable of the previous and current ownership and uses of the subject property.

- Identifying aboveground storage tanks and/or indications of underground storage tanks on-site.

- In addition to ASTM E1527-13, SALEM recognizes ASTM *Standard Guide for Vapor Encroachment Screening (VES) on Property Involved in Real Estate Transactions* (ASTM E2600-15) as an industry-accepted guideline to determine if a Vapor Encroachment Condition (VEC)

exists at the target property. A VES consists of reviewing the Phase I ESA data combined with the application of professional judgment. SALEM evaluates the regulatory agency databases to determine if there are known or suspect contaminated sites within a minimum search distance of the target property. In addition, SALEM attempted to determine whether soil and/or groundwater have been impacted within the critical distances outlined in ASTM E2600-15.

- Preparing this report of SALEM's findings and recommendations if warranted.

3.0 SITE DESCRIPTION

The subject property comprises an approximate 45-acre irregular-shaped parcel located on the southeast corner of Highway 287 and Arapahoe Road in Erie, Colorado. At the time of SALEM's April 20, 2016 site reconnaissance, the subject property was primarily vacant land with the exception of two single-family dwellings and associated out buildings, as well as a small surface water body identified as Prince Lake. The subject property is located in Section 34, Township 1 North, Range 69 West, Sixth Principal Meridian, City and County of Denver, United States Geological Survey (U.S.G.S.) 7.5 Minute Topographic Map, Erie, Colorado Quadrangle dated 2013.

4.0 PHYSIOGRAPHY AND HYDROGEOLOGIC CONDITIONS

The subject property is located on the Colorado Piedmont section of the Great Plains physiographic province approximately 10 miles east of the foothills of the Rocky Mountains. Based on the Geologic Map of the, Boulder-Fort Collins-Greeley Area, Colorado by Roger B. Colton, the majority of the subject property is mapped as being underlain by Loess Pleistocene sediments--mantles pre-Broadway alluvium units (Qel). A well-developed soil profile of post louviers age formed in the upper part. Additionally parts of the southern portion of the subject property are mapped as Verdos Alluvium (Qv), a reddish brown sand and course gravel of Yarmouth and Kansan age.

The Southern Wasatch fault is the nearest active fault to the subject property, and is located approximately 95.4 miles from the project site. It appears that a maximum probable event along these fault zones could produce a peak horizontal ground acceleration of approximately 0.153g (2% probability of being exceeded in 50 years). With respect to this hazard, the site is comparable to others in this general area within similar geologic settings. No evidence of surface faulting was observed on the subject property during our site reconnaissance. Soils on site are classified as Site Class D in accordance with Chapter 16 of the International Building Code (IBC). The proposed structures are determined to be in Seismic Design Category B.

During SALEM's Geotechnical Engineering Investigation of the subject property conducted in March 2016, groundwater at the subject property was first encountered in the test borings at a depth of approximately 7 to 13.5 feet bgs. It should be recognized that water table elevations may fluctuate with time, being dependent upon seasonal precipitation, irrigation, land use, localized pumping, and climatic conditions as well as other factors. Therefore, water level observations at the time of the field investigation may vary from those encountered during the construction phase of the project. The evaluation of such factors is beyond the scope of this report. Based upon SALEM's topographic map interpretation, the estimated groundwater flow direction is anticipated to follow the topography at the subject property towards the north-northeast.

5.0 SITE RECONNAISSANCE

A site reconnaissance, which included a visual observation of the subject property and properties within the subject area, was conducted by SALEM's environmental assessor on April 20, 2016. The objective of the site reconnaissance is to identify RECs, including the storage and handling of hazardous substances and petroleum products on or in the vicinity of the subject property which have the potential to environmentally impact on-site soils, surface water and groundwater.

5.1 Observations

Table I summarizes the visual observations made during our site reconnaissance. A discussion of the physical observations follows Table I. Refer to the Site Map (Figure 1) and color photographs following the text for the locations of the features discussed in this section of the report.

TABLE I
Summary of Observations during Site Reconnaissance

FEATURE	OBSERVED	NOT OBSERVED
Structures (existing)	X	
Evidence of past uses		X
Hazardous substances and/or petroleum products (including containers)		X
Aboveground storage tanks (ASTs)		X
Underground storage tanks (USTs) or evidence of USTs		X
Strong, pungent, or noxious odors		X
Pools of liquid likely to be hazardous materials or petroleum products		X
Drums		X
Unidentified substance containers		X
Pad-mounted/Pole-mounted transformers/capacitors/other PCB-containing equipment		X
Subsurface hydraulic equipment		X
Heating/ventilation/air conditioning (HVAC)	X	
Stains or corrosion on floors, walls, or ceilings		X
Floor drains and sumps		X
Pits, ponds, or lagoons	X	
Stained soil and/or pavement		X
Stressed vegetation		X
Waste or wastewater discharges to surface or surface waters on subject property (including stormwater)		X
Wells (irrigation, domestic, dry, injection, abandoned, monitoring wells)	X	
Septic Systems	X	

The subject property located on the southeast corner of Highway 287 and Arapahoe Road in Erie, Colorado comprises an approximate 45-acre irregular-shaped parcel which at the time of the site reconnaissance was primarily vacant land with the exception of two single-family dwellings and associated out buildings, as well as a small surface water body identified as Prince Lake.

The single-family dwelling and its associated garage and shed structures at 10960 Arapahoe Road (also identified as Boulder County APN 146534100004) are located on the northeast corner of the subject property and occupy approximately 6.01 acres. The two-story single family dwelling with sub-grade basement and single-story garage structure are of wood-frame and brick construction with a shingle-roofing system. The two associated shed structures are of wood frame and wood siding construction with a shingle-roofing system and were constructed prior to 1937. A domestic water well and septic system are associated with the single-family dwelling. The remainder of the site appears to be vacant land covered with native grasses.

The single-family dwelling and its associated garage and barn structures at 504 West Lucerne Drive (also identified as Boulder County APN 14653400006) are located on the southern half of the subject property

and occupy approximately 22.20 acres. The multi-level single-family dwelling is of wood-frame construction with a partial sub-grade level basement and an asphalt shingle-roofing system. The two associated barn structures are also of wood frame and wood siding construction with metal siding and a shingle and metal-roofing system. The single-family dwelling and associated barn structures were constructed between 1993 and 1999. A domestic water well and septic system are associated with the single-family dwelling. The remainder of the site appears to be vacant land covered with sparse vegetation and native grasses.

The northwest portion of the subject property (identified as Boulder County APN 146534100005) comprises approximately 17.13 acres and is occupied by a large depression (approximately 900 feet by 700 feet), identified as Prince Lake. Prince Lake is observed to be approximately 10-15 feet in elevation lower than the adjoining properties. Minimal standing water was observed in the lake. An approximate 5-10 foot wide ridge transects the subject property (between Prince Lake and the southern single-family dwelling) in an east to west direction from Highway 287 towards the adjoining property to the east.

5.2 Adjacent Streets and Property Usage

Table II summarizes the adjacent streets and properties uses observed during the SALEM's site reconnaissance.

TABLE II
Adjacent Streets and Property Use

DIRECTION	ADJACENT STREET	ADJACENT PROPERTY USE
North	Arapahoe Road	Safeway Market & Commercial Development including; Heritage Cleaners (3335 Arapahoe Road); Circle K Store (290 Hwy. 287); Shell Gasoline Station (3334 Arapahoe Road); and Residential Development
East	None	Single-Family Dwellings
South	None	Residential Development
West	Highway 287/North 107th Street	Vacant Land

Based on the observed uses of the properties located immediately adjacent to the subject property, it is unlikely that significant quantities of hazardous substances or petroleum products are stored or handled at the adjacent properties with the exception of the adjoining Shell gasoline station at 3334 Arapahoe Road, located adjoining the subject property to the north across Arapahoe Road, which stores large quantities of gasoline. The adjoining Shell gasoline station was not identified on any government databases of known and reported unauthorized releases of hazardous substances or petroleum products to the subsurface. Based upon the absence of reported unauthorized releases, the Shell gasoline station is deemed to presently have a low potential to environmentally impact the subject property and therefore, does not present an REC to the subject property.

Additionally, Heritage Cleaners at 3335 Arapahoe Road (formerly at 3333 Arapahoe Road), also located adjoining the subject property to the north across Arapahoe Road, was identified on the EDR Historical Cleaners database as being occupied by a dry cleaner from 2004-2012. According to the manager of the dry cleaning business, the store is a "drop-off" only center and no on-site dry cleaning is conducted on-site. Based on the absence of hazardous materials utilized at the dry cleaning facility and the absence of any reported unauthorized releases at the Heritage Cleaners, the adjoining dry cleaning business does not present an REC to the subject property.

5.3 Potable Water Source

Two single-family dwellings and associated out buildings occupy the northeast and southern portions of the subject property. A domestic water well was observed to be located near the single-family dwelling at 10960 Arapahoe Road, located near the northeast corner of the subject property. A domestic water well is also likely associated with the single-family dwelling at 504 West Lucerne Drive, located on the southern

portion of the subject property. If the on-site water wells are not to be used in any planned redevelopment of the subject property, they should be properly destroyed in accordance with state and local guidelines. Water sampling was not conducted to verify water quality.

5.4 Sewage Disposal System

On April 20, 2016, the TEPWD was contacted regarding sewer service for the subject property addresses of 10960 Arapahoe Road and 504 West Lucerne Drive. According to TEPWD records, sewer service has not been provided to the subject property. The presence of septic systems is not anticipated to adversely environmentally impact the subject property due to their presumed use for domestic purposes only. If the septic systems are encountered during the redevelopment of the subject property and are not to be used in any planned redevelopment, they should be properly abandoned/closed or destroyed in accordance with state and local guidelines.

5.5 Heating and Cooling Source

Two single-family dwellings and associated out buildings occupy the northeast and southern portions of the subject property. Based on records provided by Xcel Gas & Energy, natural gas and electricity have been supplied to both single-family dwellings (10960 Arapahoe Road and 504 West Lucerne Avenue) since at least 1993. No documentation of fuel oil use was identified during review of reasonably ascertainable records and no visual evidence of fuel oil use was identified during the site reconnaissance. Due to the construction date (prior to 1937) of the single-family dwelling located at 10960 Arapahoe Road, it's possible that a fuel oil AST or UST was historically utilized at the subject property. No documentation of fuel oil use was identified during review of reasonably ascertainable records and no visual evidence of fuel oil use was identified during the site reconnaissance.

6.0 USER-PROVIDED INFORMATION

A review of the user-provided Title report and a Phase I ESA User Questionnaire was conducted in order to help identify pertinent information regarding potential environmental impacts associated with the subject property.

6.1 Commitment for Title Insurance

On May 20, 2016, a Commitment for Title Insurance by Land Title Guarantee Company, dated October 19, 2015 was provided to SALEM by Mr. Russell Perkins with Evergreen Devco, Inc. The Commitment for Title Insurance was reviewed to identify evidence of RECs, including potential deed restrictions, environmental liens or activity and use limitations (AULs) which may have occurred on or exist in connection with the subject property as indicated by the Commitment for Title Insurance. SALEM's review of the Commitment for Title Insurance indicated no evidence of RECs, including, no deed restrictions, environmental liens or AULs for the subject property. Refer to Appendix A for a copy of the Commitment for Title Insurance.

6.2 Phase I Environmental Site Assessment User Questionnaire

On May 25, 2016, a completed Phase I ESA User Questionnaire was received from Mr. Russell Perkins with Evergreen Devco, Inc. Please refer to Appendix B for a copy of the completed Phase I ESA User Questionnaire.

In order to quality for one of the *Landowner Liability Protections (LLPs)* offered by the Small Business Liability Relief and Brownfields Revitalization Act of 2001 (the "*Brownfields Amendments"*), the *user* must provide the following information (if available) to the *environmental professional*. Failure to provide

this information could result in a determination that *"all appropriate inquiry"* is not complete. The user is asked to provide information or knowledge of the following:

- Environmental cleanup liens that are filed or recorded against the site.
- Activity and land use limitations that are in place on the site or that have been filed or recorded in a registry.
- Specialized knowledge or experience of the person seeking to quality for the LLPs.
- Relationship of the purchase price to the fair market value of the *property* if it were not contaminated.
- Commonly known or *reasonably ascertainable* information about the *property*.
- The degree of obviousness of the presence or likely presence of contamination at the *property*, and the ability to detect the contamination by appropriate investigation.

According to Mr. Perkins, to the best of his knowledge as the user of this Phase I ESA, no environmental cleanup liens and no activity or land use limitations have been filed or recorded against the subject property. Mr. Perkins indicated that he did not have knowledge of the past or current spills or chemical releases or environmental cleanups at the subject property. Additionally, Mr. Perkins indicated that the purchase price of the subject property reasonably reflects fair market value.

7.0 SITE USAGE SURVEY

In order to assess the subject property's history, SALEM conducted a review of a Phase I ESA Owner Questionnaire, historical aerial photographs, building department records, city directories, planning department records and SFIMs.

7.1 Phase I Environmental Site Assessment Owner Interview

On May 25, 2016, a Phase I ESA Owner Interview was conducted with Ms. Paula Mehle with the Town of Erie Renewal Authority (TERA), the current owner of the two residential parcels. The Phase I ESA Owner Interview is designed to provide pertinent information regarding potential environmental and historical impacts associated with the subject property. Ms. Mehle reported that she had been familiar with the two residential parcels since the TERA acquired the property approximately three years ago. Ms. Mehle stated that the subject property was acquired with the current site developments (two residential dwellings and associated structures on vacant land). Ms. Mehle stated that both residential dwellings were likely on a septic system and had a domestic water well associated with the, and that both properties are currently unoccupied.

According to Ms. Mehle, to the best of her knowledge, no on-site treatment or discharge of waste; dry wells, sumps, or disposal ponds; no use, storage or disposal of hazardous materials; no existing or former ASTs; no hazardous material spills; no buried materials; no domestic or irrigation wells; no oil wells, or any additional items of environmental concern were associated with the subject property.

7.2 Historical Aerial Photograph Review

Historical aerial photographs of the subject property and vicinity, dated 1937, 1941, 1949, 1955, 1963, 1966, 1971, 1978, 1983, 1988, 1993, 1999, 2002, 2005, 2006, 2009, 2011 and 2015 were reviewed to evaluate changes in land-use for the subject property. The historical aerial photographs were supplied by EDR. Refer to Appendix C for a copy of the EDR-provided aerial photographs. A summary of the aerial photographs is provided below:

- **1937 Aerial Photograph**
  The northern half of the subject property is primarily occupied by a lake (Prince Lake Number [No.] 1). Vacant land, and a rectangular-shaped single-family dwelling and what appears to be a garage, similar in shape and location of the single-family dwelling and associated garage observed during SALEM's site reconnaissance, is observed to be located on the northeast portion of the subject property. A row of trees and what appears to be a creek or river transects the subject property in an east to west direction. What appears to be agricultural land is observed to occupy the southern half of the subject property. A single-lane road (present day Arapahoe Road) adjoins the subject property to the north, beyond which is vacant land and what appears to be a residential property. Vacant and agricultural land adjoins the subject property to the east and south. A two-lane paved road (present day Highway 287) adjoins the subject property to the west, beyond which is vacant land and a portion of Prince Lake No. 1.

- **1941 Aerial Photograph**
  The subject property appears as it did in the 1937 aerial photograph with the exception of what appears to be two barn structures observed on the southern portion of the subject property. All adjoining properties appear as they did in the 1937 aerial photograph.

- **1949 Aerial Photograph**
  The subject property and all adjoining properties appear as they did in the 1941 aerial photograph.

- **1955 Aerial Photograph**
  The subject property and all adjoining properties appear as they did in the 1949 aerial photograph with the exception of Prince Lake No. 1, which appears to be approximately half the size observed in the 1949 aerial photograph. Additionally, a rectangular-shaped structure similar in size and location of the shed structure observed during SALEM's site reconnaissance is observed on the northeast corner of the subject property.

- **1963 Aerial Photograph**
  The subject property and all adjoining properties appear as they did in the 1955 aerial photograph with the exception of Prince Lake No. 1, which appears to be dry and graded (no trees are observed lining the lake, or along the creek/river transecting the subject property). The adjoining properties in all directions appear as they did in the 1955 aerial photographs.

- **1966 Aerial Photograph**
  The subject property and all adjoining properties appear as they did in the 1963 aerial photograph.

- **1971 Aerial Photograph**
  The subject property and all adjoining properties appear as they did in the 1966 aerial photograph, with the exception of Prince Lake No. 1 which appears to be full of water. The southern half of the subject property appears to be vacant graded land.

- **1978 Aerial Photograph**
  The subject property and all adjoining properties appear as they did in the 1971 aerial photograph.

- **1983 Aerial Photograph**
  The subject property and all adjoining properties appear as they did in the 1978 aerial photograph with the exception of the adjoining property to the south, which is developed with single-family residential tract homes.

- **1988 Aerial Photograph**
  The subject property and all adjoining properties appear as they did in the 1983 aerial photograph, with the exception of the development of what appears to be small structure and single-lane unpaved road heading off-site in an east direction. The location of this structure is similar to the location of the historical oil well installed on the subject property in 1985.

- **1993 Aerial Photograph**
  The subject property and all adjoining properties appear as they did in the 1988 aerial photograph including the oil well previously observed. Additionally, what appears to be small rectangular-shaped figure (possibly a mud pit associated with the oil well) is observed slightly northeast of the oil well's location.

- **1999 Aerial Photograph**
  The northern half of the subject property appears as it did in the 1993 aerial photograph with the exception of Prince Lake No. 1, which appears to be dry. The southern half appears as it did in the 1993 aerial photograph with the exception of the development of a structure similar in size and location as the single-family dwelling observed during SALEM's site reconnaissance. A single-lane paved road from the residence heading south is observed. Additionally, the oil well previously observed along the subject property's eastern boundary is no longer apparent. The adjoining property to the north appears to be undergoing development into a commercial shopping center and its associated parking and residential tract homes, similar in configuration as the commercial development and residential development observed during SALEM's sire reconnaissance. Vacant land and what appears to be a residence adjoin the subject property to the east. The adjoining properties to the south and west appear as they did in the 1993 aerial photograph.

- **2002 Aerial Photograph**
  The subject property and all adjoining properties appear as they did in the 1999 aerial photograph.

- **2005 Aerial Photograph**
  The subject property appears as it did in the 2002 aerial photograph with the exception of what appears to be rectangular-shaped foundation located northeast of the southern residential dwelling. Additionally, a square-shaped structure and a circular-corral similar to the barn structure and corral observed during SLEM"s site reconnaissance is located near the southern residential dwelling. All adjoining properties appear as they did in the 2002 aerial photograph.

- **2006 Aerial Photograph**
  The subject property and all adjoining properties appear as they did in the 2005 aerial photograph.

- **2009 Aerial Photograph**
  The subject property and all adjoining properties appear as they did in the 2006 aerial photograph.

- **2011 Aerial Photograph**
  The subject property and all adjoining properties appear as they did in the 2009 aerial photograph.

- **2015 Aerial Photograph**
  The subject property and all adjoining properties appear as they did in the 2011 aerial photograph.

7.3 Building Department Records Review

On April 20, 2016, a records request was made to the Town of Erie Building Department (TEBD) for the subject property addresses of 10960 Arapahoe Road and 504 West Lucerne Drive. According to Ms. Julie Conde with the TEBD, no building permit information was on file for the subject property addresses. According to Ms. Conde, limited information is available for the subject property since the subject property was annexed into the City within the past 3 years.

7.4 City Directories

On April 15, 2016, SALEM contracted with EDR to provide a City Directory Abstract dated 1962 through 2013 for the subject property addresses of 10960 Arapahoe Road and 504 West Lucerne Drive, as well as the subject property vicinity. The subject property addresses were not listed in the EDR-provided City Directory Abstract. No listings for activities or businesses anticipated being associated with the handling, storage or disposal of hazardous materials or petroleum products was noted in the EDR-provided City Directory Abstract. Please refer to Appendix D for a copy of the EDR-provided City Directory Abstract.

7.5 Sanborn Fire Insurance Maps

SALEM reviews SFIMs to evaluate prior land use at the subject property and adjacent properties. SFIMs typically exist for cities with populations of 2,000 or more, the coverage dependent on the location of the property. On April 12, 2016, SALEM contracted with EDR to provide a Fire Insurance Map Abstract indicating the availability of historic SFIMs for the subject property and adjacent properties as far back as 1867. EDR's search of collections at the Library of Congress, University Publications of America, and various public and local sources revealed no coverage for the subject property and adjacent properties. Refer to Appendix E for a copy of the EDR SFIM No Coverage Certification.

7.6 Agricultural Chemicals

Review of historical aerial photographs dating from 1937 reveals that the subject property has not been utilized for agricultural purposes since at least 1971. Based upon the length of time since the subject property was last used for agricultural purposes, it is not anticipated that elevated concentrations of environmentally persistent pesticides would be found in the near-surface soils of the subject property. SALEM's sampling and analysis of surface soils from properties with similar histories has typically yielded non-detectable concentrations of environmentally persistent pesticides. Therefore, the former agricultural use of the subject property does not present an REC to the subject property.

7.7 Phase I Environmental Site Assessment Interview - Previous Owner

A Phase I ESA interview with the previous owner of the subject property was not reasonably ascertainable because contact information for the previous owner was not provided.

7.8 Previous Environmental Reports

SALEM was not provided with additional environmental reports for the subject property.

8.0 REGULATORY AGENCY RECORDS REVIEW

SALEM conducted a review of regulatory agency records for the purpose of determining if hazardous substances and petroleum products have been stored or handled on the subject property and area properties of environmental concern. The most current records available were reviewed.

Colorado Oil & Gas Conservation Commission

SALEM's review of COGCC records indicates that one plugged abandoned oil well (identified as Well Name Prince Lake #1-34, API # 05-013-06205) was located near the central eastern subject property

boundary. According to the Well Information Report obtained from the COGCC website, the oil well was installed in June 1985 and operated on-site until it was plugged and abandoned on May 7, 1996. A mud pit was likely associated with the drilling of the oil well and may be buried within a 25- to 50-foot radius of the well head. Mud pits are anticipated to exist at an approximate depth of three to five feet below bgs and cover an area of approximately 300 square feet. Drilling mud is dense slurry circulated through the well bore to lubricate and cool the drill bit, circulate cuttings and other debris to the surface for extraction, and to counter the build-up of hydrostatic pressures encountered in geologic formations. Drilling mud may be water or oil based. Water-based muds are generally considered non-hazardous and are the most common type of mud. Oil-based mud is generally considered "hazardous." It is not known if a drilling mud pit is buried proximate to the abandoned oil well located on the subject property or what type of drilling mud was used to drill the on-site oil well. No surface indication of a drilling mud pit was observed during SALEM's reconnaissance of the subject property and adjacent properties. Based upon the proposed use of the subject property for residential development, the presence of a buried drilling mud pit and an abandoned oil well have the potential to present an adverse impact to human health and the environment at the subject property. Therefore, SALEM recommends locating the oil well, as well as its potential associated mud pit on the subject property, for the purpose of collecting soil samples within the former mud pits to determine the characteristics of the drilling mud. Additionally, SALEM recommends that on-site inactive oil well be re-abandoned in accordance with all current applicable COGCC requirements. Copies of pertinent COGCC records are included in Appendix F.

Colorado Department of Labor & Employment – Division of Oil and Public Safety
On May 20, 2016, the Colorado Department of Labor & Employment – Division of Oil and Public Safety (CDLE-DOPS) was contacted regarding records of USTs, historical hazardous/flammable permits, hazardous materials handling, and releases of hazardous materials for the of subject property addresses of 10960 Arapahoe Road and 504 West Lucerne Drive. According to a representative of the CDLE-DOPS, no records of historical hazardous/flammable permits, hazardous materials handling, registered USTs or unauthorized releases of hazardous materials were on file for the subject property.

Boulder County Environment Health Department
On April 20, 2016, the Boulder County Environment Health Department (BCEHD) was contacted regarding records of USTs, historical hazardous/flammable permits, hazardous materials handling, and releases of hazardous materials for the of subject property addresses of 10960 Arapahoe Road and 504 West Lucerne Drive. According to a representative of the BCEHD, no records of historical hazardous/flammable permits, hazardous materials handling, registered USTs or unauthorized releases of hazardous materials were on file for the subject property.

Local Area Tribal Records
According to the EDR Radius Map Report, no tribal records are listed for the subject property or the adjacent properties.

8.1 Standard Environmental Record Sources
EDR performed a search of the most current Federal, State and local regulatory agency databases for the subject property and surrounding area. The various search distances as required by ASTM E1527-13 extended up to one mile from the subject property. Several agencies have published documents that list businesses or properties which have handled hazardous materials or hazardous waste, or may have had a documented release of hazardous materials or petroleum products. The databases consulted in the course of this assessment were compiled by EDR on April 12, 2016 and represent reasonably ascertainable current listings. SALEM did not verify the locations and distances of every site listed by EDR. SALEM verified locations and distances of the sites SALEM deemed as having a potential to environmentally impact the

subject property. The actual location of the off-site properties identified may differ from the EDR listing. Table III summarizes the listed properties located within the specified ASTM Search Radii. The EDR Radius Map report is included in Appendix G.

TABLE III
EDR Radius Map Summary

DATABASE	TYPE OF RECORDS	SUBJECT PROPERTY	<⅛ MILE	⅛ - ¼ MILE	¼ - ½ MILE	½ - 1 MILE
STANDARD ENVIRONMENTAL RECORDS						
Federal NPL Site List						
NPL	National Priorities List	0	0	0	0	0
Proposed NPL	Proposed National Priorities List	0	0	0	0	0
NPL LIENS	Federal Superfund Liens	---	---	---	---	---
Federal Delisted NPL Site List						
Delisted NPL	National Priority List Deletions	0	0	0	0	0
Federal CERCLIS List						
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information	0	0	0	0	---
Federal Facility	Federal Facility	0	0	0	0	0
Federal CERCLIS NFRAP Site List						
CERC-NFRAP	CERCLIS – No Further Remedial Action Planned	0	0	0	0	---
Federal RCRA CORRACTS Facilities List						
CORRACTS	Corrective Action Report	0	0	0	0	0
Federal RCRA non-CORRACTS TSD Facilities List						
RCRA-TSDF	Transporters, Storage, and Disposal	0	0	0	0	---
Federal RCRA Generators List						
RCRA – LQG	RCRA – Large Quantity Generators	0	0	0	---	---
RCRA – SQG	RCRA – Small Quantity Generators	0	0	0	---	---
RCRA – CESQG	Conditionally Exempt SQG	0	1	0	---	---
Federal Institutional Controls/Engineering Controls Registries						
LUCIS	LUCIS database	0	0	0	0	---
US ENG CONTROLS	Engineering Controls Sites List	0	0	0	0	---
US INST CONTROL	Sites with Institutional Controls	0	0	0	0	---
Federal ERNS List						
ERNS	Emergency Response Notification System	0	---	---	---	---
State and Tribal Landfill and/or Solid Waste Disposal Site List						
SWF/LF	Solid Waste Information System	0	0	0	0	---
State and Tribal Leaking Storage Tank Lists						
LUST	Leaking Underground Storage Tanks	0	0	0	0	---
LUST TRUST	Colorado's Petroleum Storage Tank Fund	0	0	0	0	---
LAST	Leaking Aboveground Storage Tanks	0	0	0	0	---
INDIAN LUST	LUST on Indian Land	0	0	0	0	---
State and Tribal Registered Storage Tank Lists						
UST	Active UST Facilities	0	1	0	---	---
AST	Aboveground Storage Tank Facilities	0	1	0	0	0
INDIAN UST	USTS on Indian Land	0	0	0	0	0
State and Tribal Voluntary Cleanup Sites						
INDIAN VCP	Voluntary Cleanup on Indian Land	0	0	0	0	---
VCP	Voluntary Cleanup Program Properties	0	0	0	0	---
ADDITIONAL ENVIRONMENTAL RECORDS						
Local Brownfield Lists						
US BROWNFIELDS	Brownfield Sites	0	0	0	0	---
Local Lists of Landfill/Solid Waste Disposal Sites						
ODI	Open Dump Inventory	0	0	0	0	---
DEBRIS REGION 9	Illegal Dump Site Locations	0	0	0	0	---

TABLE III (cont'd)
EDR Radius Map Summary

DATABASE	TYPE OF RECORDS	SUBJECT PROPERTY	<⅛ MILE	⅛ - ¼ MILE	¼ - ½ MILE	½ - 1 MILE
WMUDS/SWAT	Waste Management Unit Database	0	0	0	0	---
SWRCY	Recycler Database	0	0	0	0	---
HAULERS	Registered Waste Tire Haulers Lists	0	---	---	---	---
INDIAN ODI	Report on Open Dumps on Indian Land	0	0	0	0	---
Local Lists of Hazardous Waste/Contaminated Sites						
US CDL	Clandestine Drug Labs	0	---	---	---	---
SCH	School Property Evaluation Program	0	0	0	---	---
Toxic Pits	Toxic Pits Cleanup Act Sites	0	0	0	0	0
CDL	Clandestine Drug Labs	0	---	---	---	---
Local Land Records						
LIENS 2	CERCLA Lien Information	0	---	---	---	---
Records of Emergency Release Reports						
HMIRS	Hazardous Materials Information System	0	---	---	---	---
CO ERNS	Colorado ERNS	0	---	---	---	---
SPILLS 90	Spill Sites	0	---	---	---	---
Other Ascertainable Records						
RCRA Non-Gen	Non-Generators	0	0	1	---	---
DOT OPS	Incident and Accident Data	0	---	---	---	---
DOD	Department of Defense Sites	0	0	0	0	0
FUDS	Formerly Used Defense Sites	0	0	0	0	0
CONSENT	Superfund Consent Decrees	0	0	0	0	0
ROD	Records of Decision	0	0	0	0	0
UMTRA	Uranium Mill Tailings Sites	0	0	0	0	---
MINES	Mines Master Index File	0	1	0	---	---
TRIS	Toxic Chemical Release Inventory System	0	---	---	---	---
TSCA	Toxic Substances Control Act	0	---	---	---	---
FTTS	FIFRA/TSCA Tracking System	0	---	---	---	---
HIST FTTS	FIFRA/TSCA Tracking System	0	---	---	---	---
SSTS	Section 7 Tracking Systems	0	---	---	---	---
ICIS	Integrated Compliance Information System	0	---	---	---	---
PADS	PCB Activity Database System	0	---	---	---	---
MLTS	Material Licensing Tracking System	0	---	---	---	---
RADINFO	Radiation Information Database	0	---	---	---	---
FINDS	Facility Index System	0	---	---	---	---
RAATS	RCRA Administrative Action Tracking	0	---	---	---	---
RMP	Risk Management Plans	0	---	---	---	---
METHANE SITE	Methane Site Investigations	0	---	---	---	---
DRYCLEANERS	Cleaner Facilities	0	0	0	---	---
NPDES	Permitted Facility Listing	0	0	0	---	---
AIRS	Permitted Facility & Emissions Listing	0	---	---	---	---
UMTRA	Uranium Mill Tailings Sites	0	---	---	---	---
ASBESTOS	Asbestos Abatement & Demolition Projects	0	---	---	---	---
INDIAN RESERV	Indian Reservations	0	0	0	0	0
SCRD DRYCLEANER	State Coalition for Remediation of Cleaners	0	0	0	0	---
COAL ASH AREA	Coal Combustion Residues Surface List	0	0	0	0	---
PCB TRANSFORMER	PCB Transformer	0	---	---	---	---
COAL ASH DOE	Steam-Electric Plan Operation Data	0	---	---	---	---
MWMP	Medical Waste Management Program	0	0	0	---	---
PROC	Certified Processors Database	0	0	0	0	---

TABLE III (cont'd)
EDR Radius Map Summary

DATABASE	TYPE OF RECORDS	SUBJECT PROPERTY	<⅛ MILE	⅛ - ¼ MILE	¼ - ½ MILE	½ - 1 MILE
EDR HIGH RISK HISTORICAL RECORDS						
EDR Exclusive Records						
EDR Manufactured Gas Plants	Manufactured Gas Plants	0	0	0	0	0
EDR Historical Auto Stations	EDR Historical Auto Stations	0	3	---	---	---
EDR Historical Cleaners	EDR Historical Cleaners	0	2	---	---	---
EDR RECOVERED GOVERNMENT ARCHIVES						
EDR Proprietary Records						
RGA LF	Landfill	---	---	---	---	---
RGA LUST	Leaking UST	0	---	---	---	---

0 = No sites in radius identified
--- = Not Searched

The subject property addresses were not listed in the EDR-provided government database report. No sites with reported releases of hazardous substances or petroleum products to the subsurface were reported within a one-quarter-mile radius of the subject property.

In general, only potentially hazardous substances or petroleum products released from facilities located approximately up-gradient and within a few hundred feet of the site, or in a cross-gradient direction close to the site, are judged to have a reasonable potential of migrating to the site. This opinion is based on the assumption that materials generally do not migrate large distances laterally within the soil, but rather tend to migrate with groundwater in the general direction of groundwater flow.

No orphan sites were identified in the EDR-provided government database report.

No engineering control sites, sites with institutional controls, or sites with deed restrictions were listed for the subject property, adjacent sites or vicinity properties in the EDR-provided government database report.

No Indian reservations or LUSTs on Indian land were reported on the subject property, adjacent sites or vicinity properties in the EDR-provided government database report.

The remaining properties identified by EDR within the specified search radius of the subject property, which appeared on local, state, or federally published lists of sites that use of have had releases of hazardous materials, were determined through SALEM's field observations to be of sufficient distance and/or situated hydraulically cross/down-gradient of the subject property, such that impacts to the subject property are not likely.

9.0 POTENTIAL VAPOR ENCROACHMENT CONDITION

Vapor intrusion is a way by which chemicals in soil and groundwater can migrate into indoor air. Chemical vapors moving up through soil and into a building are a potential source of indoor air contamination and may pose a risk to human health. In evaluating the potential for a VEC on the subject property, SALEM

attempted to determine if there was information indicating that chemicals of concern were located within the "critical distance," defined as the lineal distance between the nearest edge of a contaminated plume and the nearest target property boundary. Based on ASTM E 2600-15 *Standard Guide for Vapor Encroachment Screening on Property Involved in Real Estate Transactions*, the "critical distance" is equal to 100 feet, with the exception of dissolved petroleum hydrocarbons, which have a "critical distance" of 30 feet. If non-aqueous phase petroleum hydrocarbons are present, the 100-foot "critical distance" is utilized.

9.1 Vapor Encroachment Screening

SALEM has performed a Vapor Encroachment Screening (Tier 1) in general accordance with the scope and limitations of ASTM Standard Practice E2600-15 for the subject property. SALEM utilized site and site vicinity specific criteria including groundwater gradient, distance of area properties of environmental concern from the subject property, and the types of constituents of concern which were released to evaluate potential vapor encroachment issues. The purpose of this Vapor Encroachment Screening (Tier 1) is to identify the existing or potential VEC, (as defined by ASTM E2600-15) affecting the subject property. As part of the screening, SALEM has completed the following questionnaire, as duplicated from Section X3 of ASTM E2600-15.

TABLE IV
Vapor Encroachment Questionnaire

QUESTION	RESPONSE	COMMENTS
1. Property Type?	Residential & Vacant	
2. Are there buildings/structures on the subject property?	Yes	Two Single-Family Dwellings
3. Will buildings/structures be constructed on the subject property in the future?	Yes	
4. If buildings exist or are proposed, do/will they have elevators?	Unknown	
5. Type of level below grade (existing or proposed)?	Unknown	
6. Is there ventilation below grade?	No	
7. Sump pumps, floor drains, or trenches (existing or proposed)?	No	
8. Radon or methane mitigation system installed?	No	
9. Heating system type (existing or proposed)?	HVAC	
10. Type of fuel energy (existing or proposed)?	Natural Gas	
11. Have there ever been any environmental problems at the subject property?	No	
12. Does/will a gas station operate anywhere on the subject property?	No	
13. Do any tenants use hazardous chemicals in relatively large quantities on the subject property?	No	
14. Have any tenants ever complained about odors in the building or experience health-related problems that may have been associated with the building?	Unknown	
15. Are the operations (or proposed operations to be performed) on the subject property OSHA regulated?	No	
16. Are there any existing or proposed USTs or ASTs located on the subject property?	No	
17. Are there any sensitive receptors (children, elderly, people in poor health, etc.) that occupy or will occupy the subject property?	No	

TABLE V
Additional VEC Criteria

QUESTION	RESPONSE	COMMENTS
1. Is the subject property known to have current or past contamination?	No	
2. Is contamination of the subject property suspected?	No	

TABLE V (cont'd)
Additional VEC Criteria

QUESTION	RESPONSE	COMMENTS
3. Is an adjacent property known to have current or past contamination which may have impacted the subject property?	No	
4. Is a nearby property known to have current or past contamination which may have impacted the subject property?	No	
5. Is regional groundwater contamination known to exist beneath the subject property?	No	
6. Are you aware of other conditions which may result in vapor intrusion at the subject property?	No	

Based upon the results of the Tier 1 VES, a VEC appears to not exist at the subject property. As such, no further assessment is recommended.

10.0 DISCUSSION OF FINDINGS

Historical Uses

The subject property located on the southeast corner of Highway 287 and Arapahoe Road in Erie, Colorado comprises an approximate 45-acre irregular-shaped parcel (Boulder County APNs 146534100004 through -06) of primarily vacant land with the exception of two single-family dwellings and associated out buildings, as well as a small surface water body (Prince Lake). SALEM's review of historical aerial photographs indicates that the northwest portion of the subject property was historically occupied by Prince Lake and the northeast portion has been occupied by a single-family residential dwelling and its associated garage and shed structures since at least 1937 until the present. The southern half of the subject property was historically utilized as agricultural land from at least 1937 until 1971. The southern portion of the subject property was subsequently primarily vacant land with the exception of a single-family dwelling and associated garage and barn structures constructed sometime between 1993 and 1999.

Additionally, an oil well was developed near the central eastern subject property boundary in 1985, which was later plugged and abandoned in 1996. A mud pit associated with the drilling of the oil well may be buried within a 25- to 50-foot radius of the well head, and is anticipated to exist at an approximate depth of three to five feet below bgs and cover an area of approximately 300 square feet. Drilling mud is dense slurry circulated through the well bore to lubricate and cool the drill bit, circulate cuttings and other debris to the surface for extraction, and to counter the build-up of hydrostatic pressures encountered in geologic formations. Drilling mud may be water or oil based. Water-based muds are generally considered non-hazardous and are the most common type of mud. Oil-based mud is generally considered "hazardous." It is not known if a mud pit is buried proximate to the abandoned oil well located on the subject property or what type of drilling mud was used to drill the on-site oil well. No surface indication of a drilling mud pit was observed during SALEM's reconnaissance of the subject property and adjacent properties. Based upon the proposed use of the subject property for residential development, the presence of a buried drilling mud pit and an abandoned oil well have the potential to present an adverse impact to human health and the

environment at the subject property and presents an REC in connection with the historical use of the subject property.

Current Uses

At the time of SALEM's April 20, 2016 site reconnaissance, the approximate 45-acre irregular-shaped subject property was primarily vacant land with the exception of two single-family dwellings with their associated out buildings and Prince Lake. The two-story single-family dwelling with sub-grade basement and its associated garage and shed structures on the 6.01-acre parcel of vacant land at 10960 Arapahoe Road located on the northeast corner of the subject property, are all of wood-frame construction with a shingle-roofing system. The multi-level with partial subgrade basement single-family dwelling and its associated garage and barn structures on the 22.20-acre parcel of vacant land at 504 West Lucerne Drive, located on the southern half of the subject property are of wood-frame construction and shingle or metal-roofing system. The single-family dwelling and associated barn structures were constructed between 1993 and 1999. The northwest portion of the subject property comprises approximately 17.13 acres and is occupied by Prince Lake.

During the visual observations of the subject property, exposed surface soils did not exhibit obvious signs of discoloration. Obvious evidence (vent pipes, fill pipes, dispensers, etc.) of USTs was not noted within the area observed. No standing water or major depressions (with the exception of Prince Lake) were observed on the subject property. No indications of former structures, such as foundations, were observed on the subject property. An approximate 5-10 foot wide ditch transects the subject property (between Prince Lake and the southern residential dwelling property) in an east to west direction from Highway 287 towards the adjoining property to the east.

Based on observations made during SALEM's site reconnaissance and contacts with State and local regulatory agencies, there is no evidence of RECs in connection with the current use of the subject property.

Adjacent Properties

Based on SALEM's field observations, review of the EDR Radius Map Report and consultation with local regulatory agencies, no RECs exist in connection with the subject property from adjacent property uses.

10.1 Evaluation of Data Gaps/Data Failure

In accordance with ASTM E1527-13 guidance, data gaps represent a lack of or inability to obtain information required by this practice despite good faith efforts by the environmental professional to gather such information. Data gaps may result from incompleteness in any of the activities required by this practice. Data failure represents the failure to achieve the historical research objects of this practice even after reviewing the standard historical sources that are reasonably ascertainable and likely to be useful. Data failure is one type of data gap. The following is a summary of data gaps encountered in the process of preparing this report including an observation as the presumed significance of that data gap to the conclusions of this assessment.

- Some of the intervals between documented historical sources exceeded five years.

However, taken in consideration with the available information obtained in the course of preparing this report in conjunction with professional experience, there is no evidence to suggest that these data gaps might alter the conclusions of this assessment.

11.0 SUMMARY AND CONCLUSIONS

We have performed a *Phase I Environmental Site Assessment* in conformance with the scope and limitations of ASTM Practice E1527-13 and 40 C.F.R. Part 312 of the Proposed Nine Mile Corner Development located on the southeast corner of Highway 287 and Arapahoe Road in Erie, Colorado, (Boulder County APNs 146534100004 through -06) the *property*. Any exceptions to, or deletions from, this practice are described in Section 13 of this *report*. During the course of this assessment, SALEM identified the following evidence of a REC in connection with the subject property as defined by ASTM E1527-13:

- SALEM's review of COGCC records indicates that one plugged abandoned oil well is located near the central eastern property boundary. A mud pit associated with the drilling of the oil well may be buried within a 25- to 50-foot radius of the well head, and is anticipated to exist at an approximate depth of three to five feet bgs and cover an area of approximately 300 square feet. Drilling mud is dense slurry circulated through the well bore to lubricate and cool the drill bit, circulate cuttings and other debris to the surface for extraction, and to counter the build-up of hydrostatic pressures encountered in geologic formations. Drilling mud may be water or oil based. Water-based muds are generally considered non-hazardous and are the most common type of mud. Oil-based mud is generally considered "hazardous." It is not known if a drilling mud pit is buried proximate to the abandoned oil well located on the subject property or what type of drilling mud was used to drill the on-site oil well. No surface indication of a drilling mud pit was observed during SALEM's reconnaissance of the subject property and adjacent properties. Based upon the proposed use of the subject property for residential development, the presence of a buried drilling mud pit and an abandoned oil well have the potential to present an adverse impact to human health and the environment at the subject property. Therefore, SALEM recommends locating the oil well, as well as its potential associated mud pit on the subject property, for the purpose of collecting soil samples within the former mud pit to determine the characteristics of the drilling mud. Additionally, SALEM recommends that the on-site inactive oil well be re-abandoned in accordance with all current applicable COGCC requirements.

Additionally, the following Site Development Issues were identified:

- Two single-family dwellings occupy the northeast and southern portions of the subject property. According to the TEPWD records, a septic system and a domestic water well are likely associated with each of the single-family dwellings. The presence of septic systems and water wells are not anticipated to adversely environmentally impact the subject property due to their presumed use for domestic purposes only. If the septic systems and water wells are encountered during the redevelopment of the subject property and are not to be used in any planned redevelopment, they should be properly abandoned/closed or destroyed in accordance with state and local guidelines.

- During SALEM's site reconnaissance, an approximately 900 foot by 700 foot surface water body identified as Prince Lake was observed to occupy the northwest portion of the subject property. Prince Lake is observed to be approximately 10-15 feet below the graded surface elevation of the adjoining properties. Minimal standing water was observed in the lake. Additionally, a 5-10 foot wide ridge transects the subject property (between Prince Lake and the southern residential dwelling property) in an east to west direction from Highway 287 towards the adjoining property to the east. Based upon the proposed use of the subject property for residential and commercial development, it is understood that fill material will be imported to bring the depressions to grade. SALEM recommends the prospective fill material source documentation be obtained to include laboratory analytical data to ensure the fill material does not contain elevated concentrations of hazardous substances and petroleum products.

12.0 LIMITATIONS

This Phase I ESA Report has been prepared for the exclusive use of **Evergreen Devco, Inc.** and its subsidiaries and affiliates. Unauthorized use of or reliance on the information contained in this report, unless given express written consent by SALEM and **Evergreen Devco, Inc.**, is strictly prohibited. The following limitations and exceptions apply:

- The scope of work completed was designed solely to meet the needs of SALEM's client. SALEM shall not be liable for any unintended usage of this report by another party. In addition, based on the ASTM guidelines, the ESA is only valid if completed within 180 days of an acquisition or the transaction necessitating the ESA.

- Consistent with the ASTM guidelines, this ESA was designed to reduce, but not eliminate the potential for RECs at the subject property, within reasonable limits of time and cost. The ESA is not intended to be exhaustive or all-inclusive and does not represent a guarantee of the identification of all possible environmental risk.

- Information in this report is based on personal interviews, government records, published resources, and various historical documents. Accuracy and completeness of information varies among information sources and is often inaccurate or incomplete. The information utilized in this ESA is from sources deemed to be reliable; however, no representation or warranty is made as to the accuracy thereof. SALEM will have no ongoing obligation to obtain and include information that was not reasonably ascertainable, practically reviewable or provided to SALEM in a reasonable timeframe to formulate an opinion and complete the assessment by the agreed upon due date.

- The ESA includes some information that may be relevant to regulatory compliance, but is not intended and shall not be construed as a compliance audit and cannot be considered a verification of regulatory compliance. While the general environmental setting of the subject property is described, this assessment is not intended to be a formal flood plain or wetland determination, and no warranty is made thereof. Depending on its past, present or future intended use, the property under review may or may not be subject to regulation and permitting under environmental and health and safety laws, such as, but not limited to, the Clean Air Act, the Clean Water Act, the Solid Waste Disposal Act, the Occupational Safety and Health Act, and other federal, state and local regulations. SALEM assumes no responsibility or liability respecting regulatory permitting or compliance issues.

- Client is advised that if the ESA is obtained with the intent of qualifying the purchaser as an innocent landowner, contiguous property owner, or bona fide prospective purchaser under CERCLA, there will be continuing obligations of due care and responsiveness and additional legal requirements that may apply to such status. SALEM accepts and undertakes no responsibility as to such requirements and advises that counsel be separately consulted with respect to such requirements.

- The findings and conclusions presented in this Phase I ESA Report are based on field review and observations and on data obtained from the sources listed in the report. The findings of this report are valid as of the present. The passage of time, natural processes or human intervention on the subject property or adjacent properties and changes in the regulations can cause changed conditions which can invalidate the findings and conclusions presented in this report.

13.0 QUALIFICATIONS

This Phase I ESA was conducted under the supervision or responsible charge of SALEM's undersigned environmental professional with oversight from the undersigned registered engineer. The work was conducted in accordance with ASTM E1527-13, generally accepted industry standards for environmental due diligence in place at the time of the preparation of this report, and SALEM's quality-control policies.

We declare that, to the best of our professional knowledge and belief, we meet the definition of environmental professional as defined in §312.10 of 40 CFR 312 and we have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the subject property. We have developed and performed the all appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312.

14.0 REFERENCES

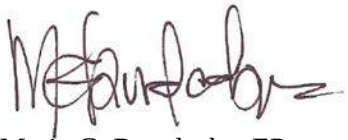
The following list summarizes the references utilized in preparing this report:

- Aerial photographs provided by Environmental Data Resources, Inc.
- Boulder County Assessor's Office records.
- Boulder County Environmental Health records.
- Colorado Department of Labor & Employment – Division of Oil and Public Safety records.
- Colorado Oil & Gas Conservation Commission records.
- Federal and State regulatory agency lists compiled by EDR.
- Sanborn Fire Insurance Maps for Erie, Colorado (EDR).
- The Munger Map Book, Colorado – Alaska Oil & Gas Fields, Munger Maps – 1999.
- Town of Erie Building Department records.
- Town of Erie Fire Department records.
- U.S. EPA Federal Superfund Liens List 1995.
- U.S. Geological Survey, 7.5 minute Erie, Colorado topographic quadrangle map, dated 1984.

If you have any questions, or if we may be of further assistance, please do not hesitate to contact our office at (303) 848-3945.

Respectfully submitted,

SALEM Engineering Group, Inc.



Maria G. Ruvalcaba, EP
Senior Environmental Project Manager



Clarence Jiang, PE, GE
Project Engineer
RCE No. 50233/ RGE No. 2477



Photo 1: View of the standing water in Prince Lake located on the northwest portion of the subject property.



Photo 2: View of the northern subject property boundary.

PHOTOGRAPHS	PROJECT NO. 7-416-0419	SALEM engineering group, inc.
PROPOSED NINE MILE CORNER DEVELOPMENT SEC HIGHWAY 287 & ARAPAHOE ROAD ERIE, COLORADO	DATE: May 2016	
	PAGE: Page 1 of 10	



Photo 3: View of Prince Lake facing east.



Photo 4: View of the Prince Lake facing southwest.



Photo 5: View of Prince Lake facing northwest.



Photo 6: View of unpaved road south of Prince Lake facing west.



Photo 7: View of ridge on the south side of Prince Lake.



Photo 8: View of the vacant land on the northeast side of the subject property.



Photo 9: View of single-family residential dwelling at 10960 Arapahoe Road.



Photo 10: View of garage and shed structures associates with 10960 Arapahoe Road.



Photo 11: View of domestic water well system.



Photo 12: View of the northeast portion of the subject property facing east.



Photo 13: View of the southern portion of the subject property facing south.



Photo 14: View of the driveway entrance to the 504 W. Lucerne Drive residential dwelling.



Photo 15: View of single-family residential dwelling at 504 West Lucerne Drive.



Photo 16: View of barn structure associated with 504 W. Lucerne Drive.



Photo 17: View of the vacant land on the southeast portion of the property.



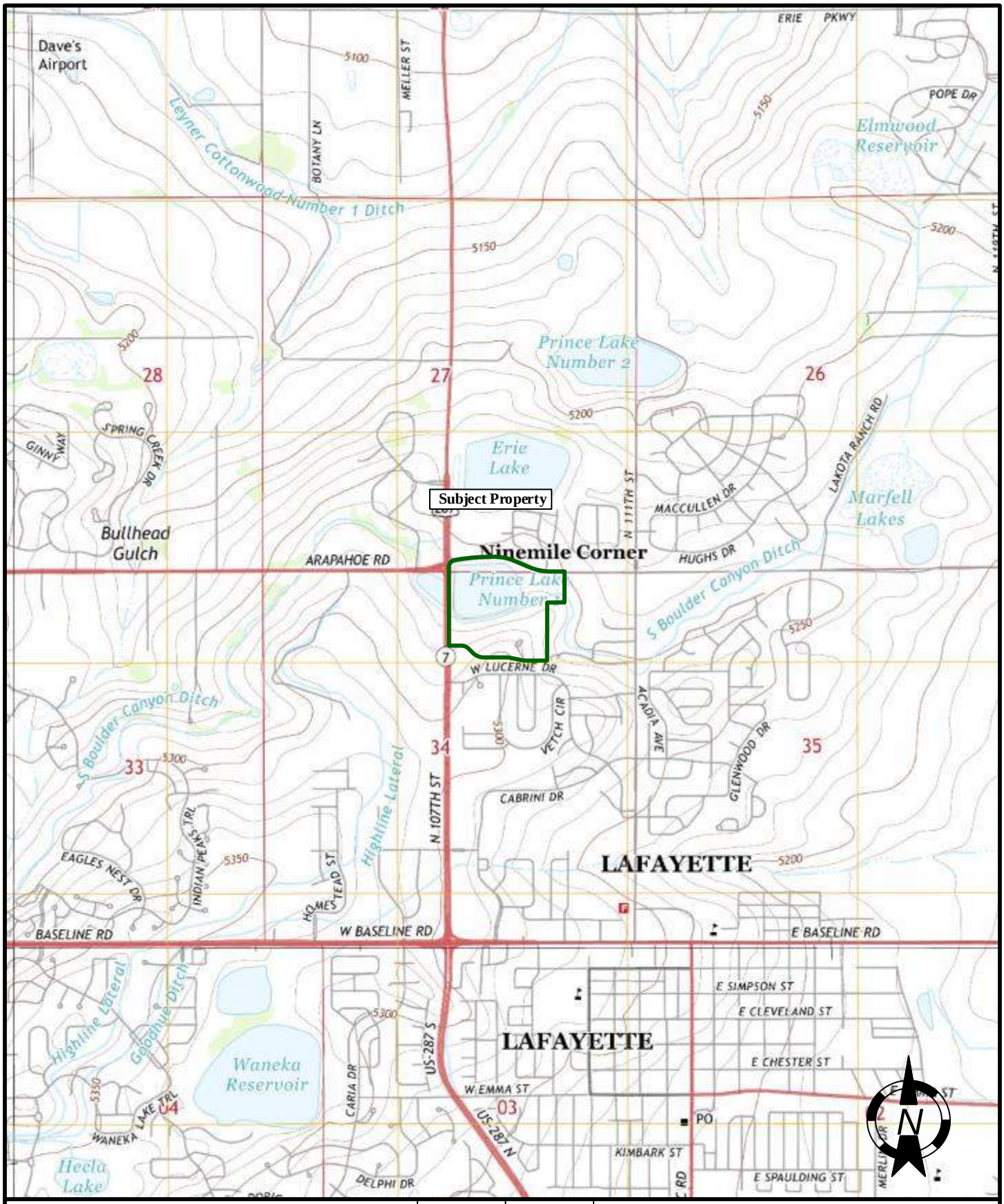
Photo 18: View of the vacant land on the southwest portion of the property.



Photo 19: View of the adjoining property to the east.



Photo 18: View of the adjoining property to the south.



TOPOGRAPHIC MAP (2013)	SCALE: NTS	DATE: May 2016
PROPOSED NINE MILE CORNER SEC HIGHWAY 287 & ARAPAHOE ROAD ERIE, COLORADO	DRAWN BY: KV	APPROVED BY: MR
	PROJECT NO. 7-416-0419	FIGURE NO. 1

SALEM engineering group, inc.



AERIAL PHOTOGRAPH (2015)	SCALE: NTS	DATE: May 2016	SALEM engineering group, inc.
PROPOSED NINE MILE CORNER SEC HIGHWAY 287 & ARAPAHOE ROAD ERIE, COLORADO	DRAWN BY: KV	APPROVED BY: MR	
	PROJECT NO. 7-416-0419	FIGURE NO. 2	



SITE MAP	SCALE: NTS	DATE: May 2016
PROPOSED NINE MILE CORNER SEC HIGHWAY 287 & ARAPAHOE ROAD ERIE, COLORADO	DRAWN BY: KV	APPROVED BY: MR
	PROJECT NO. 7-416-0419	FIGURE NO. 3

SALEM engineering group, inc.

APPENDIX

A

Land Title
GUARANTEE COMPANY
Since 1967

Customer Distribution

Our Order Number: ABZ70471321

Date: 10-19-2015

Property Address: VACANT LAND AT HWY 287 AND ARAPAHOE, ERIE, CO 80516

For Closing Assistance
Tom Blake
3033 E 1ST AVE #600
DENVER, CO 80206
303-331-6237 (phone)
303-393-4959 (fax)
tblake@ltgc.com

Closer's Assistant
NED DAVIS
3033 E 1ST AVE #600
DENVER, CO 80206
303-331-6213 (phone)
303-393-3989 (fax)
ndavis@ltgc.com

For Title Assistance
KIM ZIMMERMAN
5975 GREENWOOD PLAZA BLVD
GREENWOOD VILLAGE, CO 80111
720-406-2083 (phone)
303-393-4842 (fax)
kzimmerman@ltgc.com

EVERGREEN DEVCO
Attention: TYLER CARLSON
1873 S BELLAIRE ST #1106
DENVER, CO 80222
303-552-6160 (phone)
303-757-0462 (work)
303-280-2978 (work fax)
tcarlson@evgre.com
Delivered via: Electronic Mail

TOWN OF ERIE
Attention: A.J. KRIEGER
ajkrieger@erieco.gov
Delivered via: Electronic Mail

EVERGREEN DEVCO INC
Attention: RUSSELL PERKINS
2390 E CAMELBACK RD #410
PHOENIX, AZ 85016
602-758-8627 (phone)
602-567-7129 (work)
602-567-7143 (work fax)
rperkins@evgre.com
Delivered via: Electronic Mail

LAND TITLE GUARANTEE COMPANY
Attention: SHERRI GOLDSTEIN
3033 E 1ST AVE #600
DENVER, CO 80206
303-321-1880 (work)
303-322-7603 (work fax)
sgoldstein@ltgc.com
Delivered via: Electronic Mail

Land Title
GUARANTEE COMPANY
Since 1967

Wire Instructions

"Per Colorado Good Funds Statute, Land Title cannot accept funds in the form of a personal check or an ACH payment"

Bank:	FIRSTBANK OF COLORADO
Address:	10403 W COLFAX AVENUE LAKEWOOD, CO 80215
Phone:	303-237-5000
Credit:	LAND TITLE GUARANTEE COMPANY
ABA No:	107005047
Account:	2160521825
Attention:	Tom Blake
Reference	ABZ70471321

*If any of the above information is missing, the wire will be returned to sender.

*If you have questions or concerns, please contact your closer.

*Please remit funds in the form of a cashiers check or wire

Land Title Guarantee Company

Estimate of Title Fees

Order Number: ABZ70471321 Date: 10-19-2015

Property Address: VACANT LAND AT HWY 287 AND ARAPAHOE, ERIE, CO 80516

Buyer/Borrower: EVERGREEN DEVCO, INC., A CALIFORNIA CORPORATION

Seller: TOWN OF ERIE URBAN RENEWAL AUTHORITY, AS TO PARCELS A AND B
THE TOWN OF ERIE, WELD COUNTY, STATE OF COLORADO, A MUNICIPAL CORPORATION, AS TO PARCEL C

Visit Land Title's website at www.ltgc.com for directions to any of our offices.

Estimate of Title Insurance Fees	
ALTA Owners Policy 06-17-06 (Reissue Rate)	$8,152.00
Tax Certificate	$63.00
If Land Title Guarantee Company will be closing this transaction, the fees listed above will be collected at closing.	
Total	$8,215.00
THANK YOU FOR YOUR ORDER!	

ALTA COMMITMENT
Old Republic National Title Insurance Company
Schedule A

Order Number: ABZ70471321

Customer Ref-Loan No.:

Property Address:

VACANT LAND AT HWY 287 AND ARAPAHOE, ERIE, CO 80516

1. Effective Date:

10-12-2015 at 5:00 P.M.

2. Policy to be Issued and Proposed Insured:

"ALTA" Owner's Policy 06-17-06 $10,000,000.00
Proposed Insured:
EVERGREEN DEVCO, INC., A CALIFORNIA CORPORATION

3. The estate or interest in the land described or referred to in this Commitment and covered herein is:

A FEE SIMPLE

4. Title to the estate or interest covered herein is at the effective date hereof vested in:

TOWN OF ERIE URBAN RENEWAL AUTHORITY, AS TO PARCELS A AND B
THE TOWN OF ERIE, WELD COUNTY, STATE OF COLORADO, A MUNICIPAL CORPORATION, AS TO PARCEL C

5. The Land referred to in this Commitment is described as follows:

PARCEL A:

PART OF THE NORTH HALF NORTHEAST QUARTER OF SECTION 34, TOWNSHIP 1 NORTH, RANGE 69 WEST OF THE 6TH PRINCIPAL MERIDIAN, DESCRIBED AS FOLLOWS:

BEGINNING AT THE SOUTHWEST CORNER OF THE NORTH HALF NORTHEAST QUARTER FROM WHENCE THE NORTHWEST CORNER OF SAID NORTH HALF NORTHEAST QUARTER BEARS NORTH 00°04'00" EAST; THENCE SOUTH 89°48'30" EAST ALONG THE SOUTH LINE OF SAID NORTH HALF NORTHEAST QUARTER, A DISTANCE OF 1434.83 FEET; THENCE NORTH 00°14'20" EAST, 845.98 FEET TO THE SOUTH LINE OF THAT PROPERTY CONVEYED BY FLOYD E. HARRIS AND NEVADIA HARRIS TO LEONARD L. LANHAM AND NINA E. LANHAM, RECORDED MAY 15, 1968 ON FILM 635 AT RECEPTION NO. 879012; THENCE NORTH 89°41'50" WEST ALONG SAID SOUTH LINE, A DISTANCE OF 366.57 FEET TO A POINT ON THE EAST LINE OF THAT PROPERTY CONVEYED BY DEED FROM FLOYD EUGENE HARRIS AND NEVADIA HARRIS TO THE TOWN OF ERIE, A MUNICIPAL CORPORATION, RECORDED APRIL 29, 1968 IN FILM 633 AT RECEPTION NO. 877395; THENCE SOUTH 00°58'00" WEST ALONG SAID EAST LINE, 31.12 FEET TO THE CENTERLINE OF THE SOUTH BOULDER CANYON IRRIGATION DITCH; THENCE TRAVERSING ALONG THE CENTERLINE OF SAID DITCH AND THE SOUTH LINE OF PROPERTY DESCRIBED ON FILM 633 AT RECEPTION NO. 877395, THE FOLLOWING COURSES AND DISTANCES:
SOUTH 71°36'00" WEST, 508.65 FEET;
THENCE SOUTH 73°48'00" WEST, 241.52 FEET;
THENCE NORTH 89°40'00" WEST, 140.82 FEET;
THENCE NORTH 77°42'00" WEST, 114.23 FEET;
THENCE NORTH 62°24'00" WEST, 118.52 FEET TO A POINT ON THE WEST LINE OF THE NORTH HALF NORTHEAST QUARTER OF SAID SECTION 34;
SAID POINT BEING ALSO THE SOUTHWEST CORNER OF THAT PROPERTY DESCRIBED ON FILM 633 AT

Order Number: ABZ70471321

Customer Ref-Loan No.:

RECEPTION NO. 877395; THENCE SOUTH 00°04'00" WEST ALONG SAID WEST LINE OF THE NORTH HALF NORTHEAST QUARTER, A DISTANCE OF 675.12 FEET TO THE TRUE POINT OF BEGINNING,

EXCEPTING THEREFROM THAT PORTION DESCRIBED IN DEED RECORDED APRIL 15, 1983 AT RECEPTION NO. 543786, AND IN DEED RECORDED FEBRUARY 20, 1997 ON FILM NO. 2187 AT RECEPTION NO. 1678309,
COUNTY OF BOULDER, STATE OF COLORADO.

PARCEL B:

A PORTION OF THE NORTH 1/2 OF THE NORTHEAST 1/4 OF SECTION 34, TOWNSHIP 1 NORTH, RANGE 69 WEST OF THE 6TH PRINCIPAL MERIDIAN, DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT ON THE NORTH LINE OF SAID NORTHEAST 1/4, 20 FEET WEST OF THE NORTHEAST CORNER OF THE NORTHWEST 1/4 OF THE NORTHEAST 1/4; THENCE NORTH 89°41'50" WEST ALONG SAID NORTH LINE, 230.64 FEET; THENCE SOUTH 00°58' WEST, 469.96 FEET; THENCE SOUTH 89°41'50" EAST, 618.52; THENCE NORTH 00°14'20" EAST, 469.93 FEET TO THE NORTH LINE OF SAID NORTHEAST 1/4; THENCE NORTH 89°41'50" WEST, ALONG SAID NORTH LINE TO THE TRUE POINT OF BEGINNING;
EXCEPTING THEREFROM THAT PORTION CONVEYED TO THE COUNTY OF BOULDER BY THE DEED RECORDED NOVEMBER 29, 1913 IN BOOK 381 AT PAGE 127,

COUNTY OF BOULDER, STATE OF COLORADO.

PARCEL C:

PARCEL I:

A PART OF THE NORTHWEST 1/4 OF THE NORTHEAST 1/4 OF SECTION 34, TOWNSHIP 1 NORTH, RANGE 69 WEST OF THE 6TH PRINCIPAL MERIDIAN, COUNTY OF BOULDER, STATE OF COLORADO, MORE PARTICULARLY DESCRIBED AS FOLLOWS:
BEGINNING AT THE NORTH 1/4 CORNER OF SAID SECTION; THENCE SOUTH 0°09' WEST 642.7 FEET; THENCE SOUTH 69°45' EAST 211.4 FEET; THENCE NORTH 85° EAST 195 FEET; THENCE NORTH 71°53' EAST 718 FEET; THENCE NORTH 24°20' EAST 539 FEET TO A POINT ON THE NORTH LINE OF SAID SECTION, 20 FEET WEST OF THE NORTHEAST CORNER OF SAID NORTHWEST 1/4 OF THE NORTHEAST 1/4; THENCE WEST ALONG SAID NORTH LINE OF SAID SECTION TO THE PLACE OF BEGINNING;

EXCEPTING THEREFROM THAT PORTION CONVEYED TO THE COUNTY OF BOULDER BY THE DEED RECORDED NOVEMBER 29, 1913 IN BOOK 381 AT PAGE 127;
AND EXCEPT THAT PORTION DESCRIBED IN DEED RECORDED APRIL 29, 1968 UNDER RECEPTION NO. 877396;
AND EXCEPT THAT PORTION CONVEYED TO THE STATE DEPARTMENT OF HIGHWAYS, DIVISION OF HIGHWAYS, STATE OF COLORADO, BY THE DEED RECORDED FEBRUARY 8, 1983 UNDER RECEPTION NO. 532304;
AND EXCEPT THAT PORTION CONVEYED TO THE DEPARTMENT OF TRANSPORTATION, STATE OF COLORADO BY THE DEED RECORDED JANUARY 2, 1998 UNDER RECEPTION NO. 1759789.

ALTA COMMITMENT
Old Republic National Title Insurance Company
Schedule A

Order Number: ABZ70471321

Customer Ref-Loan No.:

PARCEL II:

A PORTION OF THE NORTHWEST 1/4 OF THE NORTHEAST 1/4 OF SECTION 34, TOWNSHIP 1 NORTH, RANGE 69 WEST OF THE 6TH PRINCIPAL MERIDIAN, COUNTY OF BOULDER, STATE OF COLORADO, DESCRIBED AS FOLLOWS:

COMMENCING AT THE NORTH QUARTER CORNER OF SECTION 34, TOWNSHIP 1 NORTH, RANGE 69 WEST OF THE 6TH PRINCIPAL MERIDIAN, THENCE SOUTH 0°09' WEST, 642.7 FEET; THENCE SOUTH 69°45' EAST, 2.59 FEET TO A POINT ON THE WEST LINE OF THE NORTHEAST QUARTER OF SAID SECTION 34, THE TRUE POINT OF BEGINNING; THENCE SOUTH 69°45' EAST, 208.81 FEET; THENCE NORTH 85°0' EAST, 195.00 FEET; THENCE NORTH 71°53' EAST, 718.00 FEET; THENCE SOUTH 0°58' WEST, 31.12 FEET TO A POINT ON THE CENTERLINE OF THE SOUTH BOULDER CANYON DITCH; THENCE WESTERLY, ALONG THE SAID DITCH CENTERLINE AS FOLLOWS: SOUTH 71°36' WEST, 508.65 FEET; SOUTH 73°48' WEST, 241.52 FEET; NORTH 89°40' WEST, 140.82 FEET; NORTH 77°42' WEST, 114.23 FEET; NORTH 62°24' WEST, 118.52 FEET TO A POINT ON THE WEST LINE OF THE NORTHEAST QUARTER OF SAID SECTION 34; THENCE NORTH 0°04' WEST, ALONG THE SAID WEST LINE OF THE NORTHEAST QUARTER, 11.00 FEET TO THE TRUE POINT OF BEGINNING;

EXCEPTING THEREFROM THAT PORTION CONVEYED TO THE STATE DEPARTMENT OF HIGHWAYS DIVISION OF HIGHWAYS, STATE OF COLORADO BY DEED RECORDED FEBRUARY 8, 1983 UNDER RECEPTION NO. 532304.

PARCEL III:

THAT PORTION OF THE SOUTHWEST 1/4 OF THE SOUTHEAST 1/4 OF SECTION 27, TOWNSHIP 1 NORTH, RANGE 69 WEST OF THE 6TH PRINCIPAL MERIDIAN, COUNTY OF BOULDER, STATE OF COLORADO, LYING SOUTH OF THE COUNTY ROAD AS DESCRIBED IN DEED RECORDED NOVEMBER 29, 1913 IN BOOK 381 AT PAGE 127;

EXCEPTING THEREFROM THAT PORTION CONVEYED TO THE STATE DEPARTMENT OF HIGHWAYS, DIVISION OF HIGHWAYS, STATE OF COLORADO, BY THE DEED RECORDED FEBRUARY 8, 1983 UNDER RECEPTION NO. 532304.

NOTE: THE FINAL POLICY DOES NOT IN ANY WAY GUARANTEE OR INSURE THE DIMENSIONS OF THE ABOVE DESCRIBED LAND, THE LEGAL DESCRIPTION IS DERIVED FROM THE CHAIN OF TITLE AND ONLY AN ACCURATE SURVEY CAN DETERMINE THE DIMENSIONS.

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ALTA COMMITMENT
Old Republic National Title Insurance Company
Schedule B-1

(Requirements)

Order Number: ABZ70471321

The following are the requirements to be complied with:

Payment to or for the account of the grantors or mortgagors of the full consideration for the estate or interest to be insured.

Proper instrument(s) creating the estate or interest to be insured must be executed and duly filed for record, to-wit:

1. ORDINANCE AUTHORIZING THE SALE OF SUBJECT PROPERTY AND THE EXECUTION OF NECESSARY DOCUMENTS BY THE TOWN OF ERIE AND TOWN OF ERIE URBAN RENEWAL AUTHORITY.

2. WARRANTY DEED FROM TOWN OF ERIE URBAN RENEWAL AUTHORITY AND THE TOWN OF ERIE TO EVERGREEN DEVCO, INC., A CALIFORNIA CORPORATION CONVEYING SUBJECT PROPERTY.

   NOTE: THE ISSUANCE OF THE POLICIES AND/OR ENDORSEMENTS REFERENCED IN THIS COMMITMENT ARE SUBJECT TO THE APPROVAL OF THE UNDERWRITER OF SAID POLICIES AND/OR ENDORSEMENTS. THIS COMMITMENT MAY BE REVISED AS REQUIRED BY THE UNDERWRITER TO ISSUE THE POLICIES AND/OR ENDORSEMENTS REQUESTED. THIS NOTE WILL BE DELETED UPON THE RECEIPT OF SAID APPROVAL.

Old Republic National Title Insurance Company
Schedule B-2

(Exceptions)

Order Number: ABZ70471321

The policy or policies to be issued will contain exceptions to the following unless the same are disposed of to the satisfaction of the Company:

1. **Any facts, rights, interests, or claims thereof, not shown by the Public Records but that could be ascertained by an inspection of the Land or that may be asserted by persons in possession of the Land.**

2. **Easements, liens or encumbrances, or claims thereof, not shown by the Public Records.**

3. **Any encroachment, encumbrance, violation, variation, or adverse circumstance affecting the Title that would be disclosed by an accurate and complete land survey of the Land and not shown by the Public Records.**

4. **Any lien, or right to a lien, for services, labor or material heretofore or hereafter furnished, imposed by law and not shown by the Public Records.**

5. **Defects, liens, encumbrances, adverse claims or other matters, if any, created, first appearing in the public records or attaching subsequent to the effective date hereof but prior to the date of the proposed insured acquires of record for value the estate or interest or mortgage thereon covered by this Commitment.**

6. **(a) Taxes or assessments that are not shown as existing liens by the records of any taxing authority that levies taxes or assessments on real property or by the Public Records; (b) proceedings by a public agency that may result in taxes or assessments, or notices of such proceedings, whether or not shown by the records of such agency or by the Public Records.**

7. **(a) Unpatented mining claims; (b) reservations or exceptions in patents or in Acts authorizing the issuance thereof; (c) water rights, claims or title to water.**

   EXISTING LEASES AND TENANCIES, IF ANY.

8. ALL COAL THAT MAY BE UNDERNEATH THE SURFACE OF THE LAND HEREIN DESCRIBED, ALSO SUCH RIGHT OF WAY AND OTHER GROUNDS AS MAY BE NECESSARY FOR THE PROPER WORKING OF ANY COAL MINES THAT MAY BE DEVELOPED UPON SAID PREMISES AND FOR THE TRANSPORTATION OF THE COAL FROM THE SAME, AS RESERVED UNTO THE UNION PACIFIC RAILWAY COMPANY IN THE DEED RECORDED JUNE 11, 1891 IN BOOK 138 AT PAGE 469, AND ANY AND ALL ASSIGNMENTS THEREOF OR INTERESTS THEREIN.

   (AFFECTS PARCEL C (III))

9. A RIGHT OF WAY FOR DITCHES IN, ON AND OVER SAID PREMISES AND THE RIGHT TO ENTER UPON SAID PREMISES FOR THE PURPOSE OF REPAIRING AND MAINTAINING SUCH DITCHES, AS RESERVED IN DEED RECORDED MARCH 23, 1893 IN BOOK 158 AT PAGE 300.

   (AFFECTS PARCEL C (III))

10. ALL COAL THAT MAY BE UNDERNEATH THE SURFACE OF THE LAND, AND THE EXCLUSIVE RIGHT TO PROSPECT, SINK SHAFT OR SHAFTS AND MINE FOR THE SAME; ALSO RESERVING SUCH RIGHT OF WAY AND OTHER GROUNDS AS MAY BE NECESSARY FOR THE PROPER WORKING OF ANY COAL MINE THAT MAY BE DEVELOPED UPON SAID PREMISES AND FOR THE TRANSPORTATION OF COAL FROM THE SAME, AS RESERVED UNTO THE COLORADO MORTGAGE AND INVESTMENT CO., LTD., A CORPORATION ORGANIZED AND EXISTING UNDER THE LAWS OF GREAT BRITAIN AND IRELAND; ANDREW WHITTON; JAMES GUTHRIE; AND ALEXANDER GOURLAY

Old Republic National Title Insurance Company
Schedule B-2

(Exceptions)

Order Number: ABZ70471321

The policy or policies to be issued will contain exceptions to the following unless the same are disposed of to the satisfaction of the Company:

IN THE DEED RECORDED OCTOBER 18, 1901 IN BOOK 249 AT PAGE 209, AND ANY AND ALL ASSIGNMENTS THEREOF OR INTERESTS THEREIN.

NOTE: MINERAL DEED RECORDED FEBRUARY 27, 1907 IN BOOK 296 AT PAGE 299.

NOTE: MINERAL DEED RECORDED SEPTEMBER 11, 1929 IN BOOK 566 AT PAGE 360.

(AFFECTS PARCELS A AND B)

11. ALL COAL OR OTHER MINERALS THAT MAY BE UNDERNEATH THE SURFACE OF THE LAND; AND THE EXCLUSIVE RIGHT TO PROSPECT, SINK SHAFT OR SHAFTS, AND MINE FOR THE SAME, AS RESERVED UNTO THE COLORADO MORTGAGE & INVESTMENT COMPANY, LIMITED, A CORPORATION ORGANIZED AND EXISTING UNDER THE LAWS OF GREAT BRITAIN AND IRELAND; ANDREW WHITTON; JAMES GUTHRIE; AND ALEXANDER GOURLEY IN THE DEED RECORDED JANUARY 21, 1904 IN BOOK 251 AT PAGE 460, AND ANY AND ALL ASSIGNMENTS THEREOF OR INTERESTS THEREIN.

    (AFFECTS PARCELS B AND C(I))

12. AN UNDIVIDED ONE-HALF INTEREST IN THE COAL AND OTHER MINERALS LYING UNDERNEATH THE SURFACE OF THE LAND AS CONVEYED TO GEORGE MURRAY, EDWARD E. HOLMES AND ALFRED N. GOSSETT BY THE DEED RECORDED FEBRUARY 27, 1907 IN BOOK 296 AT PAGE 299.

    (AFFECTS PARCELS A, B AND C(II))

13. ALL COAL AND OTHER MINERALS UNDERNEATH THE SURFACE OF THE LAND, AND THE EXCLUSIVE RIGHT TO PROSPECT, SINK SHAFT OR SHAFTS, AND MINE FOR THE SAME; ALSO RESERVING SUCH RIGHT OF WAY AND OTHER GROUNDS AS MAY BE NECESSARY FOR THE PROPER WORKING OF ANY COAL OR OTHER MINE OR MINES THAT MAY BE DEVELOPED UPON SAID PREMISES AND FOR THE TRANSPORTATION OF THE PRODUCTS THEREFROM, AND FOR SUCH SURFACE AREA SO REQUIRED, AS RESERVED UNTO THE COLORADO MORTGAGE AND INVESTMENT COMPANY, LIMITED, A CORPORATION ORGANIZED AND EXISTING UNDER THE LAWS OF GREAT BRITAIN AND IRELAND; ANDREW WHITTON; JAMES GUTHRIE; AND ALEXANDER GOURLAY IN THE DEED RECORDED JANUARY 15, 1910 IN BOOK 340 AT PAGE 259, AND ANY AND ALL ASSIGNMENTS THEREOF OR INTERESTS THEREIN.

    (AFFECTS A, B AND C(II))

14. AN UNDIVIDED 2½% INTEREST IN AND TO ALL THE OIL AND GAS IN AND UNDER AND THAT MAY BE PRODUCED FROM THE LAND, AS CONVEYED TO ROY R. CARPENTER BY THE DEED RECORDED JULY 22, 1924 IN BOOK 511 AT PAGE 168, AND ANY AND ALL ASSIGNMENTS THEREOF OR INTERESTS THEREIN.

    (AFFECTS ALL PARCELS)

15. THE RIGHT TO MAINTAIN, REPLACE AND USE WATER PIPE LINE; AND THE RIGHT TO DRAW WATER FROM SAID RESERVOIR BY MEANS OF SAID PIPE LINE FOR DOMESTIC USE, TOGETHER WITH THE RIGHT OF INGRESS AND EGRESS TO REPAIR AND MAINTAIN THE SAME, AS RESERVED UNTO GEORGE L. SCHOFIELD, A. MAUDE SCHOFIELD, FLOYD EUGENE HARRIS, NEVADIA HARRIS, BENNETT W. MUIR AND FRIEDA E. MUIR IN THE DEED RECORDED NOVEMBER 2, 1956 IN BOOK

Old Republic National Title Insurance Company
Schedule B-2

(Exceptions)

Order Number: ABZ70471321

The policy or policies to be issued will contain exceptions to the following unless the same are disposed of to the satisfaction of the Company:

1028 AT PAGE 471.

(AFFECTS PARCEL C(III))

16. ANY RIGHTS OR INTERESTS OF THIRD PARTIES WHICH EXIST OR ARE CLAIMED TO EXIST IN AND OVER THE PRESENT AND PAST BED, BANKS OR WATERS OF SOUTH BOULDER CANYON DITCH, SAID DITCH BEING REFERRED TO IN THE LEGAL DESCRIPTION CONTAINED IN DEED RECORDED APRIL 29, 1968 UNDER RECEPTION NO. 877395 AND DEED RECORDED MAY 21, 1969 UNDER RECEPTION NO. 913694.

    (AFFECTS PARCELS A, AND C(II))

17. ANY CHANGES IN AREA DUE TO THE RELOCATION OR MOVEMENT OF SOUTH BOULDER CANYON DITCH, SAID DITCH BEING DESCRIBED IN THE LEGAL DESCRIPTION CONTAINED IN DEED RECORDED APRIL 29, 1968 UNDER RECEPTION NO. 877395 AND DEED RECORDED MAY 21, 1969 UNDER RECEPTION NO. 913694.

    (AFFECTS PARCELS A AND C(II))

18. AN EASEMENT FOR ROADWAY AND FOR THE MAINTENANCE AND REPAIR OF RESERVOIR, AS RESERVED UNTO THE TOWN OF ERIE IN THE DEED RECORDED APRIL 29, 1968 UNDER RECEPTION NO. 877396.

    (AFFECTS PARCEL B)

19. EASEMENT GRANTED TO PUBLIC SERVICE COMPANY OF COLORADO, FOR NATURAL GAS FACILITIES, AND INCIDENTAL PURPOSES, BY INSTRUMENT RECORDED AUGUST 04, 1981, UNDER RECEPTION NO. 457820.

    (AFFECTS PARCEL A)

20. OIL AND GAS LEASE BETWEEN TOWN OF ERIE, LESSOR, AND MARTIN EXPLORATION MANAGEMENT CORP., LESSEE, RECORDED MARCH 31, 1983 UNDER RECEPTION NO. 541012, AND ANY AND ALL ASSIGNMENTS THEREOF, OR INTEREST THEREIN.

    NOTE: AFFIDAVIT OF PRODUCTION RECORDED JULY 30, 1985 UNDER RECEPTION NO. 702639. REVISED AFFIDAVIT OF PRODUCTION RECORDED APRIL 21, 1986 UNDER RECEPTION NO. 754068 AND RECORDED JUNE 12, 1986 UNDER RECEPTION NO. 766082.

    NOTE: NOTICE OF OIL AND GAS INTERESTS AND SURFACE USE IN CONNECTION WITH THE ABOVE LEASE RECORDED JANUARY 23, 2001 UNDER RECEPTION NO. 2112332.

    (AFFECTS PARCELS B, C(I) AND C(II))

21. OIL AND GAS LEASE BETWEEN RODGER D. BEERY AND CAMILLA R. BEERY, LESSORS, AND MARTIN EXPLORATION MANAGEMENT CORP., LESSEE, RECORDED APRIL 11, 1983 UNDER RECEPTION NO. 542944, AND ANY AND ALL ASSIGNMENTS THEREOF, OR INTEREST THEREIN.

    NOTE: AFFIDAVIT OF PRODUCTION RECORDED JULY 30, 1985, UNDER RECEPTION NO. 702639. REVISED AFFIDAVIT OF PRODUCTION RECORDED APRIL 21, 1986 UNDER RECEPTION NO. 754068

Old Republic National Title Insurance Company
Schedule B-2

(Exceptions)

Order Number: ABZ70471321

The policy or policies to be issued will contain exceptions to the following unless the same are disposed of to the satisfaction of the Company:

AND RECORDED JUNE 12, 1986 UNDER RECEPTION NO. 766082.

(AFFECTS PARCEL A)

22. RIGHT OF WAY EASEMENT FOR PIPELINE, AND INCIDENTAL PURPOSES, AS GRANTED TO CDM PIPELINE COMPANY, INC., A COLORADO CORPORATION IN INSTRUMENT RECORDED JULY 16, 1984 UNDER RECEPTION NO. 634026, AND CORRECTION AND AMENDMENT OF PIPELINE RIGHT-OF-WAY GRANT RECORDED OCTOBER 15, 1984 UNDER RECEPTION NO. 652036.

    PIPELINE SURVEY MAP RECORDED SEPTEMBER 28, 1984 UNDER RECEPTION NO. 649253.

    (AFFECTS PARCEL A)

23. (ITEM INTENTIONALLY DELETED)

24. ANY TAX, LIEN, FEE, OR ASSESSMENT BY REASON OF INCLUSION OF SUBJECT PROPERTY IN THE LONGMONT FIRE PROTECTION DISTRICT, AS EVIDENCED BY INSTRUMENT RECORDED APRIL 29, 1985, UNDER RECEPTION NO. 685397 AND MODIFIED ORDER OF INCLUSION RECORDED SEPTEMBER 3, 1985 UNDER RECEPTION NO. 710155.

    (AFFECTS ALL PARCELS)

25. OIL AND GAS LEASE BETWEEN GEORGE W. KUHL, VIVIAN M. KUHL, RODGER D. KUHL AND JANE M. KUHL, LESSORS, AND O.D. PRESLEY, LESSEE, RECORDED MAY 06, 1985 UNDER RECEPTION NO. 686620, AND ANY AND ALL ASSIGNMENTS THEREOF, OR INTEREST THEREIN.

    NOTE: AFFIDAVIT OF PRODUCTION RECORDED JULY 30, 1985 UNDER RECEPTION NO. 702639. REVISED AFFIDAVIT OF PRODUCTION RECORDED APRIL 21, 1986 UNDER RECEPTION NO. 754068 AND RECORDED JUNE 12, 1986 UNDER RECEPTION NO. 766082.

    (AFFECTS PARCEL B)

26. OIL AND GAS LEASE BETWEEN ROY N. AUSTIN, LESSOR, AND O.D. PRESLEY, LESSEE, RECORDED MAY 06, 1985 UNDER RECEPTION NO. 686626, AND ANY AND ALL ASSIGNMENTS THEREOF, OR INTEREST THEREIN.

    NOTE: AFFIDAVIT OF PRODUCTION RECORDED JULY 30, 1985 UNDER RECEPTION NO. 702639. REVISED AFFIDAVIT OF PRODUCTION RECORDED APRIL 21, 1986 UNDER RECEPTION NO. 754068 AND RECORDED JUNE 12, 1986 UNDER RECEPTION NO. 766082.

    (AFFECTS ALL PARCELS)

27. OIL AND GAS LEASE BETWEEN JANE KUEHNER, MARY F. DEHAAN, MICHAEL R. SHELTON, MARK L. SHELTON, BRUCE D. CARPENTER, JEAN K. CARPENTER, GLENN C. CARPENTER AND SARAH A. CARPENTER, LESSORS, AND O.D. PRESLEY, LESSEE, RECORDED AUGUST 06, 1985 UNDER RECEPTION NO. 703693, AND ANY AND ALL ASSIGNMENTS THEREOF, OR INTEREST THEREIN.

    NOTE: REVISED AFFIDAVIT OF PRODUCTION RECORDED APRIL 21, 1986 UNDER RECEPTION NO. 754068 AND RECORDED JUNE 12, 1986 UNDER RECEPTION NO. 766082.

Old Republic National Title Insurance Company
Schedule B-2

(Exceptions)

Order Number: ABZ70471321

The policy or policies to be issued will contain exceptions to the following unless the same are disposed of to the satisfaction of the Company:

NOTE: RATIFICATIONS OF OIL AND GAS LEASE RECORDED JUNE 12, 1986 UNDER RECEPTION NOS. 766084, 766085 AND 766086.

(AFFECTS ALL PARCELS)

28. OIL AND GAS LEASE BETWEEN CLAUDE JONES AND ALINE JONES, LESSORS, AND O.D. PRESLEY, LESSEE, RECORDED AUGUST 06, 1985 UNDER RECEPTION NO. 703694, AND ANY AND ALL ASSIGNMENTS THEREOF, OR INTEREST THEREIN.

    NOTE: REVISED AFFIDAVIT OF PRODUCTION RECORDED APRIL 21, 1986 UNDER RECEPTION NO. 754068 AND RECORDED JUNE 12, 1986 UNDER RECEPTION NO. 766082.

    (AFFECTS ALL PARCELS)

29. OIL AND GAS LEASE BETWEEN EVAN DUVAL, JR. AND O.D. PRESLEY, LESSORS, AND RICHARDSON OIL COMPANY, LESSEE, RECORDED AUGUST 06, 1985 UNDER RECEPTION NO. 703697, AND ANY AND ALL ASSIGNMENTS THEREOF, OR INTEREST THEREIN.

    NOTE: REVISED AFFIDAVIT OF PRODUCTION RECORDED APRIL 21, 1986 UNDER RECEPTION NO. 754068 AND RECORDED JUNE 12, 1986 UNDER RECEPTION NO. 766082.

    (AFFECTS PARCELS A, B AND C(I AND II))

30. OIL AND GAS LEASE BETWEEN WINNIFRED H. EWALT, LESSOR, AND O.D. PRESLEY, LESSEE, RECORDED OCTOBER 08, 1985 UNDER RECEPTION NO. 717948, AND ANY AND ALL ASSIGNMENTS THEREOF, OR INTEREST THEREIN.

    NOTE: REVISED AFFIDAVIT OF PRODUCTION RECORDED APRIL 21, 1986 UNDER RECEPTION NO. 754068 AND RECORDED JUNE 12, 1986 UNDER RECEPTION NO. 766082.

    NOTE: RATIFICATION OF OIL AND GAS LEASE RECORDED JUNE 12, 1986 UNDER RECEPTION NO. 766083.

    (AFFECTS ALL PARCELS)

31. OIL AND GAS LEASE BETWEEN JAY P. WALKER, LESSOR, AND O.D. PRESLEY, LESSEE, RECORDED JULY 09, 1986 UNDER RECEPTION NO. 772253, AND ANY AND ALL ASSIGNMENTS THEREOF, OR INTEREST THEREIN.

    (AFFECTS ALL PARCELS)

32. MINERAL DEED RECORDED MARCH 5, 1992 UNDER RECEPTION NO. 1165768.

    (AFFECTS SE 1/4 OF SECTION 27 AND THE N 1/2 OF THE NE 1/4 OF SECTION 34)

33. OIL AND GAS LEASE BETWEEN PAUL K. LASNIK, LESSOR, AND MARTIN EXPLORATION MANAGEMENT COMPANY, LESSEE, RECORDED MARCH 17, 1992 UNDER RECEPTION NO. 1168168, AND ANY AND ALL ASSIGNMENTS THEREOF, OR INTEREST THEREIN.

    (AFFECTS ALL PARCELS)

Old Republic National Title Insurance Company
Schedule B-2

(Exceptions)

Order Number: ABZ70471321

The policy or policies to be issued will contain exceptions to the following unless the same are disposed of to the satisfaction of the Company:

34. OIL AND GAS LEASE BETWEEN HELEN M. MASTRIONA AND FRANK M. MASTRIONA, LESSORS, AND MARTIN EXPLORATION MANAGEMENT COMPANY, LESSEE, RECORDED MARCH 24, 1992 UNDER RECEPTION NO. 1169721, AND ANY AND ALL ASSIGNMENTS THEREOF, OR INTEREST THEREIN.

    (AFFECTS ALL PARCELS)

35. OIL AND GAS LEASE BETWEEN DOROTHY J. BLACKBURN AND JOSEPH BLACKBURN, LESSORS, AND MARTIN EXPLORATION MANAGEMENT COMPANY, LESSEE, RECORDED MARCH 24, 1992 UNDER RECEPTION NO. 1169722, AND ANY AND ALL ASSIGNMENTS THEREOF, OR INTEREST THEREIN.

    (AFFECTS ALL PARCELS)

36. OIL AND GAS LEASE BETWEEN DOLORES T. FORBIS AND DERL D. FORBIS, LESSORS, AND MARTIN EXPLORATION MANAGEMENT COMPANY, LESSEE, RECORDED MARCH 30, 1992 UNDER RECEPTION NO. 1171195, AND ANY AND ALL ASSIGNMENTS THEREOF, OR INTEREST THEREIN.

    (AFFECTS ALL PARCELS)

37. OIL AND GAS LEASE BETWEEN MARTIN EXPLORATION MANAGEMENT COMPANY, LESSOR, AND BASIN EXPLORATION INCORPORATED, LESSEE, RECORDED NOVEMBER 08, 1993 UNDER RECEPTION NO. 1358710, AND ANY AND ALL ASSIGNMENTS THEREOF, OR INTEREST THEREIN.

    NOTE: NOTICE OF OIL AND GAS INTERESTS AND SURFACE USE IN CONNECTION WITH THE ABOVE LEASE RECORDED JANUARY 23, 2001 UNDER RECEPTION NO. 2112332.

    (AFFECTS ALL PARCELS)

38. RESOLUTION #94-25, PERTAINING TO ANNEXATION, RECORDED NOVEMBER 9, 1994 UNDER RECEPTION NO. 1477392 AND MAP IN CONNECTION THEREWITH RECORDED NOVEMBER 9, 1994 UNDER RECEPTION NO. 1477393.

    (AFFECTS PARCEL C (I, II & III) AND A PORTION OF PARCEL B)

39. TERMS, CONDITIONS, PROVISIONS, BURDENS AND OBLIGATIONS AS SET FORTH IN NELSON AGREEMENT REGARDING USE OF PUBLIC STREET RECORDED JULY 24, 1998 UNDER RECEPTION NO. 1827415.

    (AFFECTS PARCEL A)

40. REQUEST FOR NOTIFICATION OF SURFACE DEVELOPMENT AS EVIDENCED BY INSTRUMENT RECORDED MAY 17, 2002 UNDER RECEPTION NO. 2288464.

    (AFFECTS PARCEL C(III))

41. REQUEST FOR NOTIFICATION OF SURFACE DEVELOPMENT AS EVIDENCED BY INSTRUMENT RECORDED OCTOBER 23, 2007 UNDER RECEPTION NO. 2890878.

    (AFFECTS PARCEL C(III))

Old Republic National Title Insurance Company
Schedule B-2

(Exceptions)

Order Number: ABZ70471321

The policy or policies to be issued will contain exceptions to the following unless the same are disposed of to the satisfaction of the Company:

42. REQUEST FOR NOTIFICATION OF SURFACE DEVELOPMENT AS EVIDENCED BY INSTRUMENT RECORDED DECEMBER 21, 2007 UNDER RECEPTION NO. 2900941.

    (AFFECTS PARCEL C(III))

43. TERMS, CONDITIONS, PROVISIONS, BURDENS AND OBLIGATIONS AS SET FORTH IN LONG-TERM LEASE PURCHASE OPTION AGREEMENT DATED JANUARY 10, 2012 BY AND BETWEEN THE TOWN OF ERIE URBAN RENEWAL AUTHORITY AND BRIAN NELSON AND SHAWNA NELSON, AS MEMORIALIZED BY RECORD NOTICE RECORDED WITH WARRANTY DEED JANUARY 17, 2012 UNDER RECEPTION NO. 3196450.

    NOTE: BY WARRANTY DEED RECORDED JANUARY 16, 2013 UNDER RECEPTION NO. 3282584, BRIAN NELSON AND SHAWNA NELSON CONVEYED OPTION TO PURCHASE, AS SET FORTH IN SAID AGREEMENT, TO TOWN OF ERIE URBAN RENEWAL AUTHORITY.

    (AFFECTS PARCEL A)

44. OIL AND GAS LEASE BETWEEN NOBLE ENERGY, INC., A DELAWARE CORPORATION AND EXTRACTION OIL & GAS, LLC, A DELAWARE LIMITED LIABILITY COMPANY, RECORDED MARCH 11, 2015 UNDER RECEPTION NO. 3432573 AND ANY AND ALL ASSIGNMENTS THEREOF, OR INTEREST THEREIN.

    (AFFECTS PARCEL C (III))

45. RESOLUTION #05-2015, PERTAINING TO ANNEXATION, RECORDED APRIL 21, 2015 UNDER RECEPTION NO. 3440934 AND MAP IN CONNECTION THEREWITH RECORDED APRIL 21, 2015 UNDER RECEPTION NO. 3440932.

46. RESOLUTION #06-2015, PERTAINING TO ZONING, RECORDED APRIL 21, 2015 UNDER RECEPTION NO. 3440935 AND MAP IN CONNECTION THEREWITH RECORDED APRIL 21, 2015 UNDER RECEPTION NO. 3440933.

    (ITEMS 45-46 AFFECT PARCEL A AND A PORTION OF PARCEL B)

JOINT NOTICE OF PRIVACY POLICY OF

LAND TITLE GUARANTEE COMPANY,
LAND TITLE GUARANTEE COMPANY - GRAND JUNCTION,
LAND TITLE GUARANTEE COMPANY OF SUMMIT COUNTY
LAND TITLE INSURANCE CORPORATION AND
OLD REPUBLIC NATIONAL TITLE INSURANCE COMPANY

This Statement is provided to you as a customer of Land Title Guarantee Company and Meridian Land Title, LLC, as agents for Land Title Insurance Corporation and Old Republic National Title Insurance Company.

We want you to know that we recognize and respect your privacy expectations and the requirements of federal and state privacy laws. Information security is one of our highest priorities. We recognize that maintaining your trust and confidence is the bedrock of our business. We maintain and regularly review internal and external safeguards against unauthorized access to non-public personal information ("Personal Information").

In the course of our business, we may collect Personal Information about you from:

- applications or other forms we receive from you, including communications sent through TMX, our web-based transaction management system;
- your transactions with, or from the services being performed by, us, our affiliates, or others;
- a consumer reporting agency, if such information is provided to us in connection with your transaction;

  and

- the public records maintained by governmental entities that we either obtain directly from those entities, or from our affiliates and non-affiliates.

Our policies regarding the protection of the confidentiality and security of your Personal Information are as follows:

- We restrict access to all Personal Information about you to those employees who need to know that information in order to provide products and services to you.
- We maintain physical, electronic and procedural safeguards that comply with federal standards to protect your Personal Information from unauthorized access or intrusion.
- Employees who violate our strict policies and procedures regarding privacy are subject to disciplinary action.
- We regularly access security standards and procedures to protect against unauthorized access to Personal Information.

WE DO NOT DISCLOSE ANY PERSONAL INFORMATION ABOUT YOU WITH ANYONE FOR ANY PURPOSE THAT IS NOT PERMITTED BY LAW.

Consistent with applicable privacy laws, there are some situations in which Personal Information may be disclosed. We may disclose your Personal Information when you direct or give us permission; when we are required by law to do so, for example, if we are served a subpoena; or when we suspect fraudulent or criminal activities. We also may disclose your Personal Information when otherwise permitted by applicable privacy laws such as, for example, when disclosure is needed to enforce our rights arising out of any agreement, transaction or relationship with you.

Our policy regarding dispute resolution is as follows. Any controversy or claim arising out of or relating to our privacy policy, or the breach thereof, shall be settled by arbitration in accordance with the rules of the American Arbitration Association, and judgment upon the award rendered by the arbitrator(s) may be entered in any court having jurisdiction thereof.

LAND TITLE GUARANTEE COMPANY

LAND TITLE GUARANTEE COMPANY - GRAND JUNCTION

DISCLOSURE STATEMENTS

Note: Pursuant to CRS 10-11-122, notice is hereby given that:

A) The Subject real property may be located in a special taxing district.
B) A certificate of taxes due listing each taxing jurisdiction will be obtained from the county treasurer of the county in which the real property is located or that county treasurer's authorized agent unless the proposed insured provides written instructions to the contrary. (for an Owner's Policy of Title Insurance pertaining to a sale of residential real property)
C) The information regarding special districts and the boundaries of such districts may be obtained from the Board of County Commissioners, the County Clerk and Recorder, or the County Assessor.

Note: Effective September 1, 1997, CRS 30-10-406 requires that all documents received for recording or filing in the clerk and recorder's office shall contain a top margin of at least one inch and a left, right and bottom margin of at least one half of an inch. The clerk and recorder may refuse to record or file any document that does not conform, except that, the requirement for the top margin shall not apply to documents using forms on which space is provided for recording or filing information at the top margin of the document.

Note: Colorado Division of Insurance Regulations 3-5-1, Paragraph G of Article VII requires that "Every title entity shall be responsible for all matters which appear of record prior to the time of recording whenever the title entity conducts the closing and is responsible for recording or filing of legal documents resulting from the transaction which was closed". Provided that Land Title Guarantee Company conducts the closing of the insured transaction and is responsible for recording the legal documents from the transaction, exception number 5 will not appear on the Owner's Title Policy and the Lenders Policy when issued.

Note: Affirmative mechanic's lien protection for the Owner may be available (typically by deletion of Exception no. 4 of Schedule B-2 of the Commitment from the Owner's Policy to be issued) upon compliance with the following conditions:

A) The land described in Schedule A of this commitment must be a single family residence which includes a condominium or townhouse unit.
B) No labor or materials have been furnished by mechanics or material-men for purposes of construction on the land described in Schedule A of this Commitment within the past 6 months.
C) The Company must receive an appropriate affidavit indemnifying the Company against un-filed mechanic's and material-men's liens.
D) The Company must receive payment of the appropriate premium.
E) If there has been construction, improvements or major repairs undertaken on the property to be purchased within six months prior to the Date of the Commitment, the requirements to obtain coverage for unrecorded liens will include: disclosure of certain construction information; financial information as to the seller, the builder and or the contractor; payment of the appropriate premium fully executed Indemnity Agreements satisfactory to the company, and, any additional requirements as may be necessary after an examination of the aforesaid information by the Company.

No coverage will be given under any circumstances for labor or material for which the insured has contracted for or agreed to pay.

Note: Pursuant to CRS 10-11-123, notice is hereby given:

This notice applies to owner's policy commitments disclosing that a mineral estate has been severed from the surface estate, in Schedule B-2.

A) That there is recorded evidence that a mineral estate has been severed, leased, or otherwise conveyed from the surface estate and that there is a substantial likelihood that a third party holds some or all interest in oil, gas, other minerals, or geothermal energy in the property; and
B) That such mineral estate may include the right to enter and use the property without the surface owner's permission.

Note: Pursuant to CRS 10-1-128(6)(a), It is unlawful to knowingly provide false, incomplete, or misleading facts or information to an insurance company for the purpose of defrauding or attempting to defraud the company. Penalties may include imprisonment, fines, denial of insurance, and civil damages. Any insurance company or agent of an insurance company who knowingly provides false, incomplete, or misleading facts or information to a policyholder or claimant for the purpose of defrauding or attempting to defraud the policyholder or claimant with regard to a settlement or award payable from insurance proceeds shall be reported to the Colorado Division of Insurance within the Department of Regulatory Agencies.

ALTA Commitment - 2006 Rev.

OLD REPUBLIC NATIONAL TITLE INSURANCE COMPANY, a Minnesota corporation, (Company) for a valuable consideration, commits to issue its policy or policies of title insurance, as identified in Schedule A, in favor of the Proposed Insured named in Schedule A, as owner or mortgagee of the estate or interest in the land described or referred to in Schedule A, upon payment of the premiums and charges and compliance with the requirements; all subject to the provisions of Schedule A and B and to the Conditions of this Commitment.

This Commitment shall be effective only when the identity of the Proposed Insured and the amount of the policy or policies committed for have been inserted in Schedule A by the Company. All liability and obligation under this commitment shall cease and terminate six months after the Effective Date or when the policy or policies committed for shall issue, whichever first occurs, provided that the failure to issue such policy or policies is not the fault of the Company.

CONDITIONS AND STIPULATIONS

1. The term "mortgage", when used herein, shall include deed of trust, trust deed, or other security instrument.
2. If the proposed Insured has or acquires actual knowledge of any defect, lien, encumbrance, adverse claim or other matter affecting the estate or interest or mortgage thereon covered by this Commitment other than those shown in Schedule B hereof, and shall fail to disclose such knowledge to Company in writing, the Company shall be relieved from liability for any loss or damage resulting from any act of reliance hereon to the extent the Company is prejudiced by failure to so disclose such knowledge. If the proposed Insured shall disclose such knowledge to the Company, or if the Company otherwise acquires actual knowledge of any such defect, lien, encumbrance, adverse claim or other matter, the Company at its option may amend Schedule B of this Commitment accordingly, but such amendment shall not relieve the Company from liability previously incurred pursuant to paragraph 3 of these Conditions and Stipulations.
3. Liability of the Company under this Commitment shall be only to the named proposed Insured and such parties included under the definition of Insured in the form of policy or policies committed for and only for actual loss incurred in reliance hereon in undertaking in good faith (a) to comply with the requirements hereof or (b) to eliminate exceptions shown in Schedule B, or (c) to acquire or create the estate or interest or mortgage thereon covered by this Commitment. In no event shall such liability exceed the amount stated in Schedule A for the policy or policies committed for and such liability is subject to the insuring provisions and the Conditions and Stipulations and the Exclusions from Coverage of the form of policy or policies committed for in favor of the proposed Insured which are hereby incorporated by reference and are made a part of this Commitment except as expressly modified herein.
4. This commitment is a contract to issue one or more title insurance policies and is not an abstract of title or a report of the condition of title. Any action or actions or rights of action that the proposed Insured may have or may bring against the Company arising out of the status of the title to the estate or interest or the status of the mortgage thereon covered by this Commitment must be based on and are subject to the provisions of this Commitment.
5. The policy to be issued contains an arbitration clause. All arbitrable matters when the Amount of Insurance is $2,000,000 or less shall be arbitrated at the option of either the Company or the Insured as the exclusive remedy of the parties. You may review a copy of the arbitration rules at www.alta.org.

STANDARD EXCEPTIONS

In addition to the matters contained in the Conditions and Stipulations and Exclusions from Coverage above referred to, this Commitment is also subject to the following:

1. Rights or claims of parties in possession not shown by the Public Records.
2. Easements, or claims of easements, not shown by the Public Records.
3. Discrepancies, conflicts in boundary lines, shortage in area, encroachments, and any facts which a correct survey or inspection of the Land would disclose and which are not shown by the Public Records.
4. Any lien, or right to a lien, for services, labor or material theretofore or hereafter furnished, imposed by law and not shown by the Public Records.
5. Defects, liens, encumbrances, adverse claims or other matters, if any, created, first appearing in the Public Records or attaching subsequent to the effective date hereof but prior to the date the proposed insured acquires of record for value the estate or interest or mortgage thereon covered by this Commitment.

IN WITNESS WHEREOF, Old Republic National Title Insurance Company has caused its corporate name and seal to be affixed by its duly authorized officers on the date shown in Schedule A to be valid when countersigned by a validating officer or other authorized signatory.

Issued by:
Land Title Guarantee Company
3033 East First Avenue
Suite 600
Denver, Colorado 80206
303-321-1880

John E. Freyer
President

Authorized Officer or Agent

OLD REPUBLIC NATIONAL TITLE INSURANCE COMPANY

Old Republic National Title Insurance Company
a Stock Company
400 Second Avenue South
Minneapolis, Minnesota 55401
(612)371-1111

Mark Bilbrey
President

Rande Yeager
Secretary

AMERICAN LAND TITLE ASSOCIATION

APPENDIX

B

SALEM
engineering group, inc.

7887 East Belleview Ave, Suite 1100
Denver, Colorado 80111
(303) 848-3945 Office
(303) 848-3946 Fax

PHASE I ESA (ASTM E1527-13)
USER QUESTIONNAIRE

PROPOSED DEVELOPMENT
SEC OF HWY. 287& ARAPAHOE ROAD
ERIE, COLORADO

Date: 5/25/16 Site Address: SEC Arapahoe & Hwy 287, Erie, CO

Respondent Name: Russell Perkins **Phone No. (required):** 602-808-8600

Company Name & Address: EVERGREEN DEVCO, INC.

Introduction

"In order to qualify for one of the *Landowner Liability Protections (LLPs)* offered by the Small Business Liability Relief and Brownfield Revitalization Act of 2001 (the 'Brownfields Amendments'), the user must provide the following information (if available) to the environmental professional. Failure to provide this information could result in a determination that 'all appropriate inquiry' is not completed"- American Society for Testing and Materials (ASTM) E1527-13 Appendix X3: User Questionnaire

1. Are you aware of any environmental cleanup liens against the subject property that are filed or recorded under federal, tribal, state, or local law?

No.

2. Are you aware of any activity use limitations (AULs) such as engineering controls, land use restrictions, or institutional controls that are in place at the subject property and/or have been filed or recorded in a registry under federal, tribal, state, or local law?

No.

3. As the user of the Phase I Environmental Site Assessment (ESA), do you have any specialized knowledge or experience related to the subject property or nearby properties? For example, are you involved in the same line of business as the current or former occupants of the subject property or an adjacent property so that you would have specialized knowledge of the chemicals and processes used by this type of business?

No.

4. Does the purchase price being paid for the subject property reasonably reflect the fair market value of the subject property? If you conclude that there is a difference, have you considered whether the lower purchase price is because contamination is known or believed to be present at the subject property?

YES.

5. Are you aware of commonly known or reasonably ascertainable information about the subject property that would help the environmental professional to identify conditions indicative of releases or threatened releases? For example:

A. Do you know the past uses of the subject property?

No.

B. Do you know of specific chemicals that are present or once were present at the subject property?

No.

C. Do you know of spills or other chemical releases that have taken place at the subject property?

No.

D. Do you know of any environmental cleanups that have taken place at the subject property?

No.

6. As the user of the Phase I ESA, based on your knowledge and experience related to the subject property, are there any obvious indicators that point to the presence or likely presence of contamination at the subject property?

NO.

I, the user of this Phase I ESA (or authorized representative of the User), do hereby attest that I have carefully considered the questions herein and have presented answers to the best of my knowledge and ability based upon the Responsibilities of the User as required within ASTM E1527-13 guidance.

Name RUSSELL PERKINS **(Please Print)** Date 5/25/16

Signature

APPENDIX

C



AERIAL PHOTOGRAPHS

PROPOSED NINE MILE CORNER
SEC HIGHWAY 287 & ARAPAHOE ROAD
ERIE, COLORADO

SCALE:	DATE:
NTS	May 2016
DRAWN BY:	**APPROVED BY:**
KV	MR
PROJECT NO.	**YEAR:**
7-416-0419	1937

SALEM engineering group, inc.



AERIAL PHOTOGRAPHS	SCALE: NTS	DATE: May 2016
PROPOSED NINE MILE CORNER SEC HIGHWAY 287 & ARAPAHOE ROAD ERIE, COLORADO	DRAWN BY: KV	APPROVED BY: MR
	PROJECT NO. 7-416-0419	YEAR: 1941

SALEM engineering group, inc.



AERIAL PHOTOGRAPHS	SCALE: NTS	DATE: May 2016
PROPOSED NINE MILE CORNER SEC HIGHWAY 287 & ARAPAHOE ROAD ERIE, COLORADO	DRAWN BY: KV	APPROVED BY: MR
	PROJECT NO. 7-416-0419	YEAR: 1949

SALEM engineering group, inc.

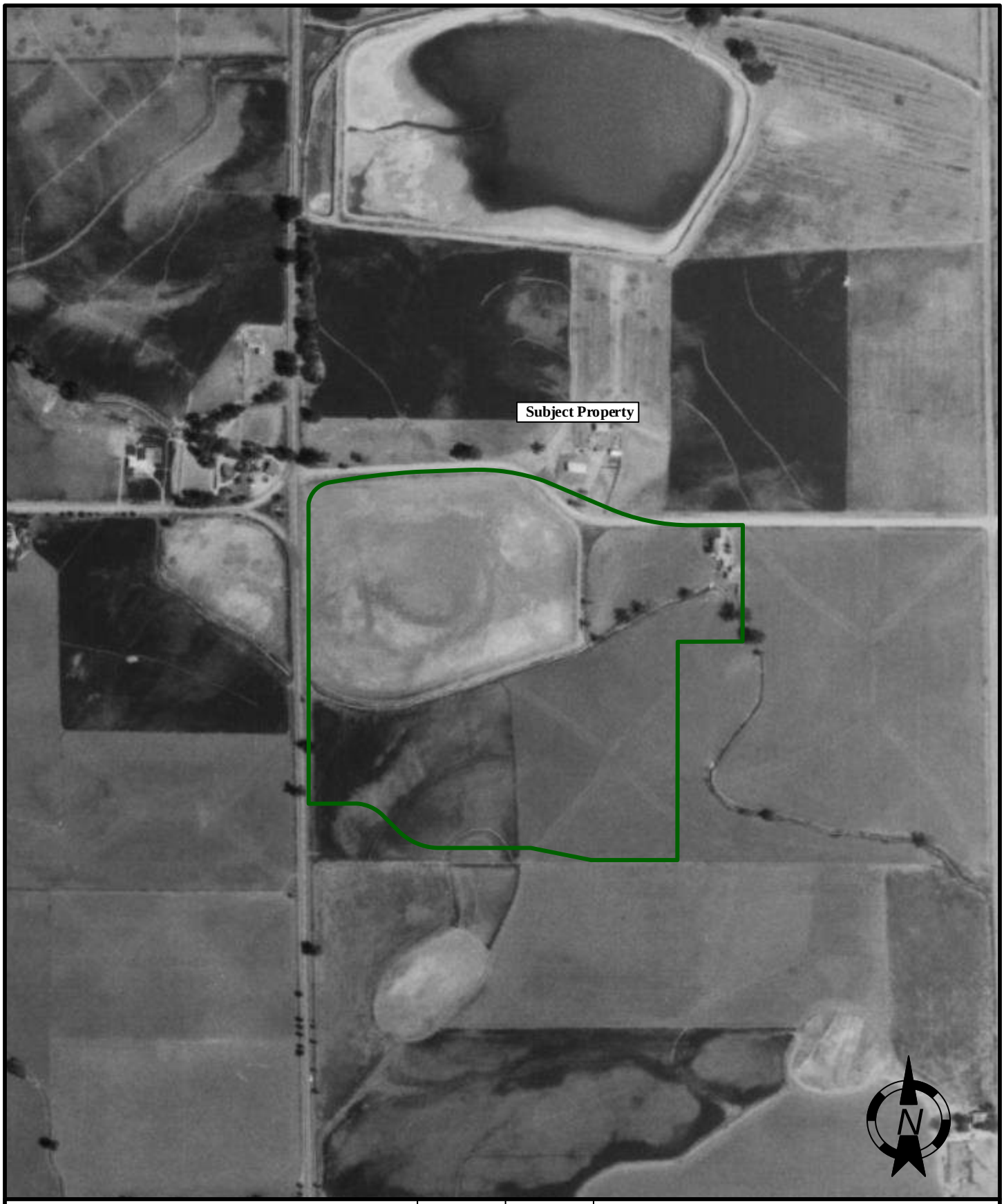


AERIAL PHOTOGRAPHS

PROPOSED NINE MILE CORNER
SEC HIGHWAY 287 & ARAPAHOE ROAD
ERIE, COLORADO

SCALE:	DATE:
NTS	May 2016
DRAWN BY:	**APPROVED BY:**
KV	MR
PROJECT NO.	**YEAR:**
7-416-0419	1955

SALEM engineering group, inc.



AERIAL PHOTOGRAPHS	SCALE: NTS	DATE: May 2016
PROPOSED NINE MILE CORNER SEC HIGHWAY 287 & ARAPAHOE ROAD ERIE, COLORADO	DRAWN BY: KV	APPROVED BY: MR
	PROJECT NO. 7-416-0419	YEAR: 1963

SALEM engineering group, inc.

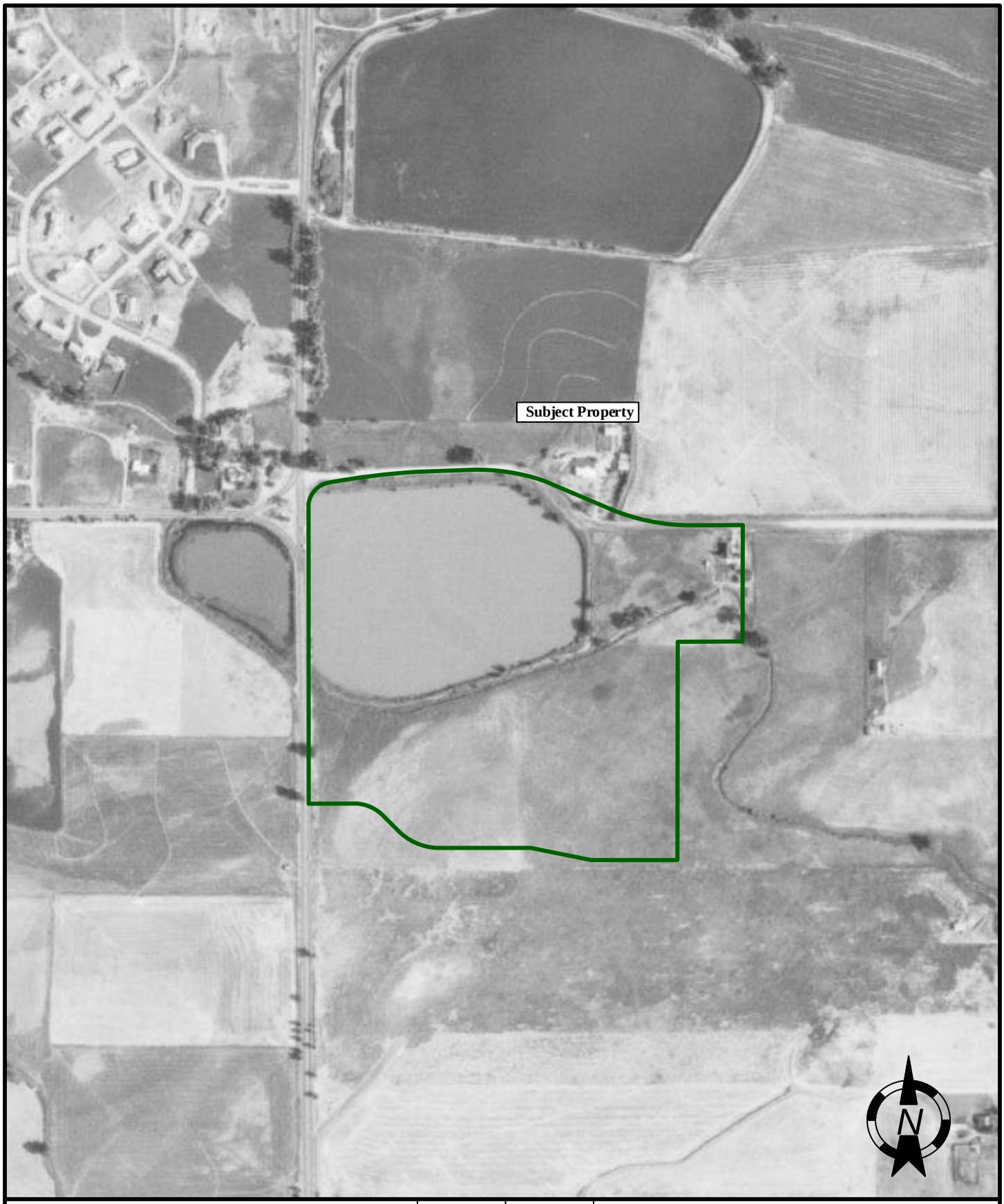


AERIAL PHOTOGRAPHS

PROPOSED NINE MILE CORNER
SEC HIGHWAY 287 & ARAPAHOE ROAD
ERIE, COLORADO

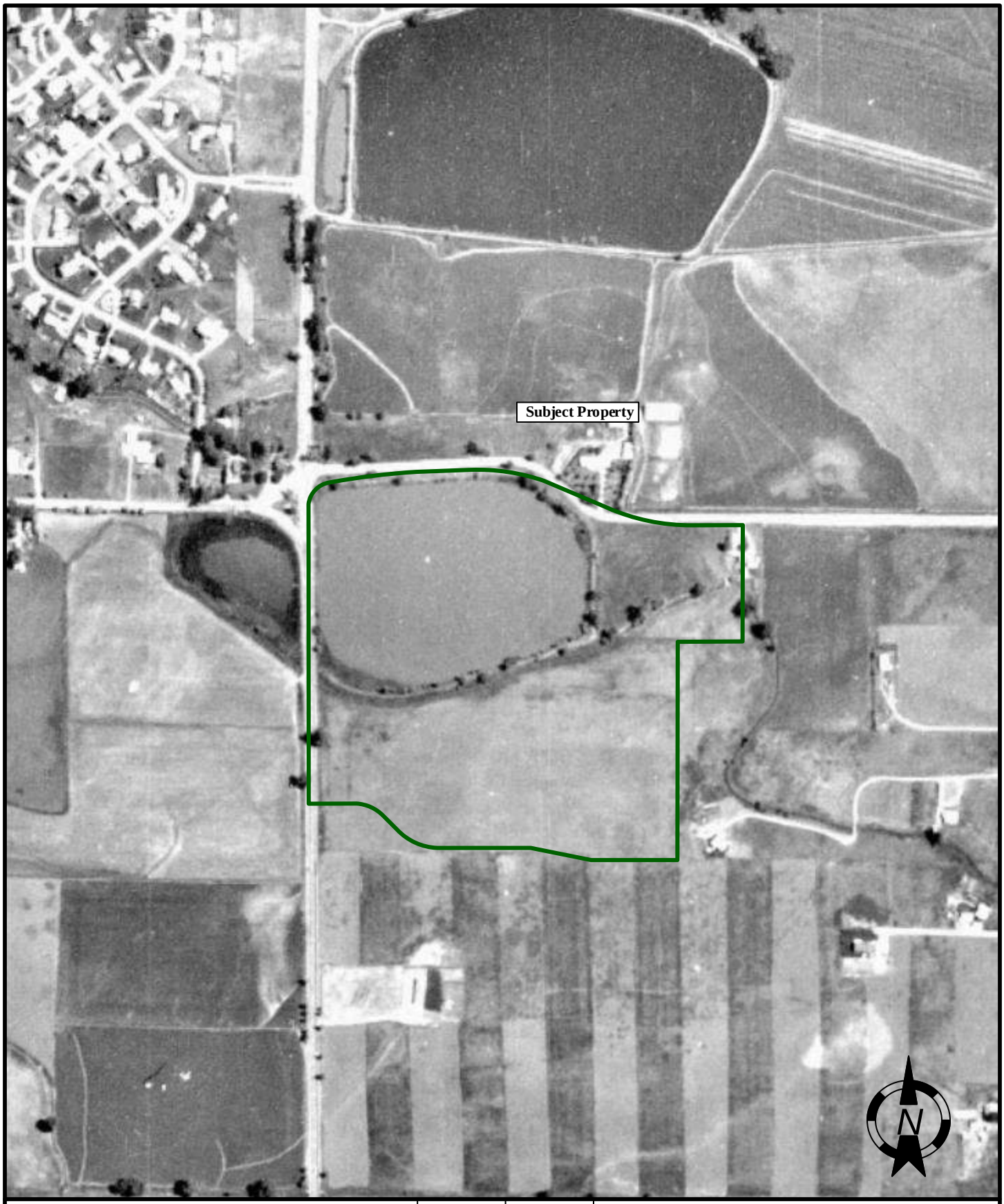
SCALE:	DATE:
NTS	May 2016
DRAWN BY:	**APPROVED BY:**
KV	MR
PROJECT NO.	**YEAR:**
7-416-0419	1966

SALEM engineering group, inc.



AERIAL PHOTOGRAPHS	SCALE: NTS	DATE: May 2016
PROPOSED NINE MILE CORNER SEC HIGHWAY 287 & ARAPAHOE ROAD ERIE, COLORADO	DRAWN BY: KV	APPROVED BY: MR
	PROJECT NO. 7-416-0419	YEAR: 1971

SALEM engineering group, inc.



AERIAL PHOTOGRAPHS

PROPOSED NINE MILE CORNER
SEC HIGHWAY 287 & ARAPAHOE ROAD
ERIE, COLORADO

SCALE:	DATE:
NTS	May 2016
DRAWN BY:	**APPROVED BY:**
KV	MR
PROJECT NO.	**YEAR:**
7-416-0419	1978

SALEM engineering group, inc.



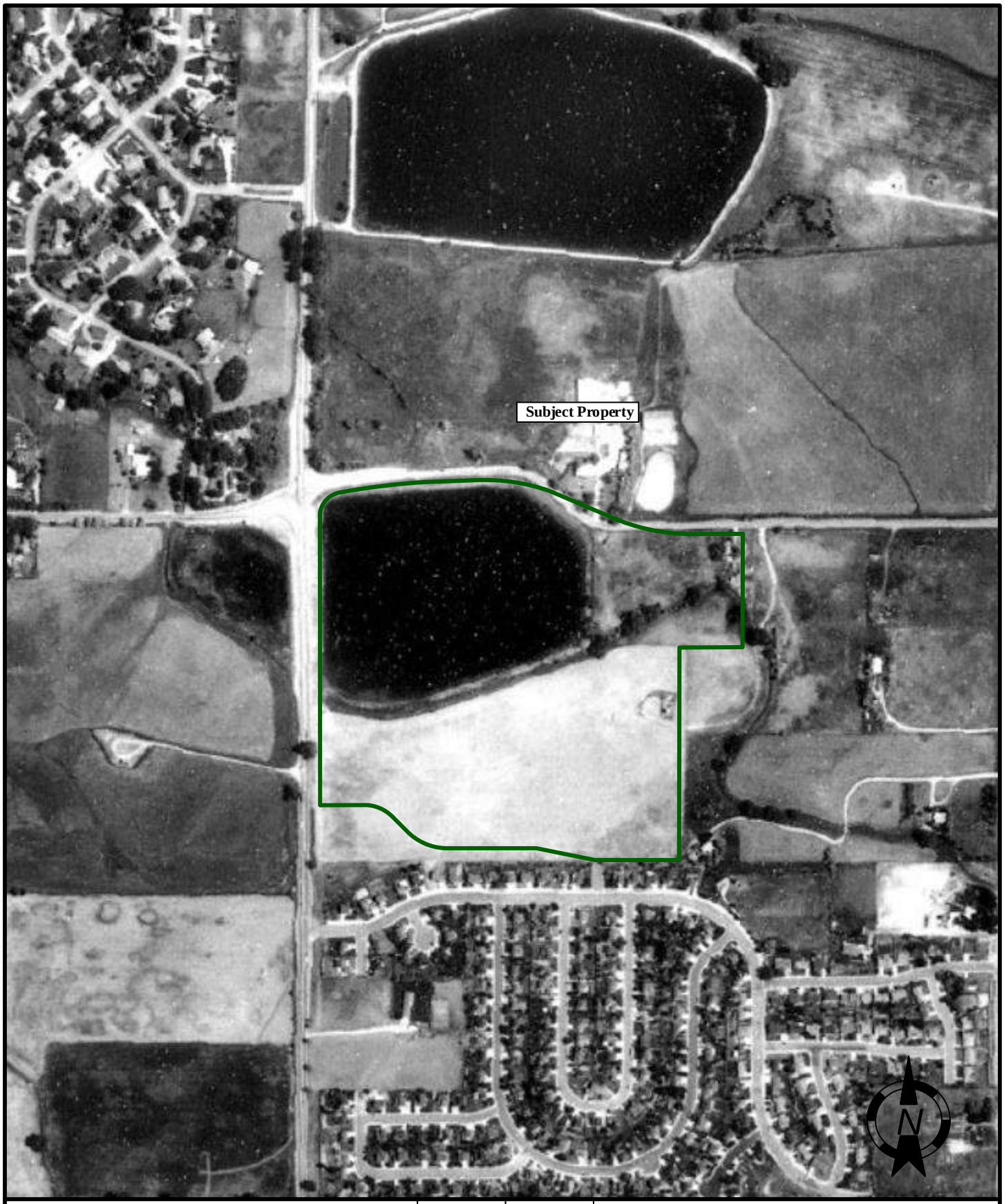
AERIAL PHOTOGRAPHS	SCALE: NTS	DATE: May 2016
PROPOSED NINE MILE CORNER SEC HIGHWAY 287 & ARAPAHOE ROAD ERIE, COLORADO	DRAWN BY: KV	APPROVED BY: MR
	PROJECT NO. 7-416-0419	YEAR: 1983

SALEM engineering group, inc.



AERIAL PHOTOGRAPHS	SCALE: NTS	DATE: May 2016
PROPOSED NINE MILE CORNER SEC HIGHWAY 287 & ARAPAHOE ROAD ERIE, COLORADO	DRAWN BY: KV	APPROVED BY: MR
	PROJECT NO. 7-416-0419	YEAR: 1988

SALEM engineering group, inc.



AERIAL PHOTOGRAPHS

PROPOSED NINE MILE CORNER
SEC HIGHWAY 287 & ARAPAHOE ROAD
ERIE, COLORADO

SCALE:	DATE:
NTS	May 2016
DRAWN BY:	**APPROVED BY:**
KV	MR
PROJECT NO.	**YEAR:**
7-416-0419	1993

SALEM engineering group, inc.



AERIAL PHOTOGRAPHS

SCALE:	DATE:
NTS	May 2016
DRAWN BY:	APPROVED BY:
KV	MR
PROJECT NO.	YEAR:
7-416-0419	1999

PROPOSED NINE MILE CORNER
SEC HIGHWAY 287 & ARAPAHOE ROAD
ERIE, COLORADO

SALEM engineering group, inc.



AERIAL PHOTOGRAPHS

SCALE:	DATE:
NTS	May 2016
DRAWN BY:	APPROVED BY:
KV	MR
PROJECT NO.	YEAR:
7-416-0419	2002

PROPOSED NINE MILE CORNER
SEC HIGHWAY 287 & ARAPAHOE ROAD
ERIE, COLORADO

SALEM engineering group, inc.



AERIAL PHOTOGRAPHS	SCALE: NTS	DATE: May 2016
PROPOSED NINE MILE CORNER SEC HIGHWAY 287 & ARAPAHOE ROAD ERIE, COLORADO	DRAWN BY: KV	APPROVED BY: MR
	PROJECT NO. 7-416-0419	YEAR: 2005

SALEM engineering group, inc.



AERIAL PHOTOGRAPHS	SCALE: NTS	DATE: May 2016
PROPOSED NINE MILE CORNER SEC HIGHWAY 287 & ARAPAHOE ROAD ERIE, COLORADO	DRAWN BY: KV	APPROVED BY: MR
	PROJECT NO. 7-416-0419	YEAR: 2006

SALEM engineering group, inc.



AERIAL PHOTOGRAPHS	SCALE: NTS	DATE: May 2016
PROPOSED NINE MILE CORNER SEC HIGHWAY 287 & ARAPAHOE ROAD ERIE, COLORADO	DRAWN BY: KV	APPROVED BY: MR
	PROJECT NO. 7-416-0419	YEAR: 2009

SALEM engineering group, inc.



AERIAL PHOTOGRAPHS	SCALE: NTS	DATE: May 2016
PROPOSED NINE MILE CORNER SEC HIGHWAY 287 & ARAPAHOE ROAD ERIE, COLORADO	DRAWN BY: KV	APPROVED BY: MR
	PROJECT NO. 7-416-0419	YEAR: 2011

SALEM engineering group, inc.



AERIAL PHOTOGRAPHS	SCALE: NTS	DATE: May 2016
PROPOSED NINE MILE CORNER SEC HIGHWAY 287 & ARAPAHOE ROAD ERIE, COLORADO	DRAWN BY: KV	APPROVED BY: MR
	PROJECT NO. 7-416-0419	YEAR: 2015

SALEM engineering group, inc.

APPENDIX

D

Vacant Land
Arapahoe Road
Erie, CO 80026

Inquiry Number: 4589777.5
April 15, 2016

The EDR-City Directory Image Report

Environmental Data Resources Inc

6 Armstrong Road
Shelton, CT 06484
800.352.0050
www.edrnet.com

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SECTION

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Findings

City Directory Images

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

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EXECUTIVE SUMMARY

DESCRIPTION

Environmental Data Resources, Inc.'s (EDR) City Directory Report is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's City Directory Report includes a search of available city directory data at 5 year intervals.

RESEARCH SUMMARY

The following research sources were consulted in the preparation of this report. A check mark indicates where information was identified in the source and provided in this report.

Year	Target Street	Cross Street	Source
2013	☑	☑	Cole Information Services
2008	☑	☑	Cole Information Services
2003	☑	☑	Cole Information Services
1999	☑	☑	Cole Information Services
1995	☑	☑	Cole Information Services
1992	☑	☑	Cole Information Services
1987	☐	☐	Polk's City Directory
1982	☐	☐	Polk's City Directory
1977	☐	☐	Polk's City Directory
1972	☐	☐	Polk's City Directory
1966	☐	☐	Polk's City Directory
1962	☐	☐	Polk's City Directory

RECORD SOURCES

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FINDINGS

TARGET PROPERTY STREET

Arapahoe Road
Erie, CO 80026

Year	*CD Image*	*Source*	
ARAPAHOE RD			
2013	pg A1	Cole Information Services	
2008	pg A3	Cole Information Services	
2003	pg A5	Cole Information Services	
1999	pg A7	Cole Information Services	
1995	pg A10	Cole Information Services	
1992	pg A13	Cole Information Services	
1987	-	Polk's City Directory	Street not listed in Source
1982	-	Polk's City Directory	Street not listed in Source
1977	-	Polk's City Directory	Street not listed in Source
1972	-	Polk's City Directory	Street not listed in Source
1966	-	Polk's City Directory	Street not listed in Source
1962	-	Polk's City Directory	Street not listed in Source

FINDINGS

CROSS STREETS

Year	*CD Image*	*Source*	
N 107TH ST			
2013	pg. A2	Cole Information Services	
2008	pg. A4	Cole Information Services	
2003	pg. A6	Cole Information Services	
1999	pg. A9	Cole Information Services	
1995	pg. A12	Cole Information Services	
1992	pg. A15	Cole Information Services	
1987	-	Polk's City Directory	Street not listed in Source
1982	-	Polk's City Directory	Street not listed in Source
1977	-	Polk's City Directory	Street not listed in Source
1972	-	Polk's City Directory	Street not listed in Source
1966	-	Polk's City Directory	Street not listed in Source
1962	-	Polk's City Directory	Street not listed in Source

City Directory Images

Target Street	Cross Street	Source
✓	-	Cole Information Services

ARAPAHOE RD 2013

2850	COUNTRY IN THE VILLAGE
	STRUTTIN PUP
	STUDIO BERNINA
	TODD BISCHOFF STATE FARM INSURANCE
	WALDENS LOCK SERVICES
3333	AAA 24 7 ADVANCED LOCKSMITH
	ALBERTA DEVELOPMENT PARTNERS
	ERIE LIQUORS INC
	PAPA MURPHYS TAKE N BAKE PIZZA
	SAFEWAY
	STARBUCKS COFFEE
3334	CIRCLE K
3335	AAA COLORADO LOCKSMITH
	ANY TIME TOWING & ROADSIDE ASSISTANC
	COST CUTTER FAMILY HAIR SALON
	DAIRY QUEEN
	HERITAGE CLEANERS
	SEMILLA CONSULTING
	SUBWAY SANDWICHES
	TIP TOE NAILS
3336	SMILING MOOSE DELI
	STARBUCKS COFFEE
3338	MIRANDA LOCKSMITH
	US BANK
9728	VICTOR TIEFEL

Target Street	Cross Street	Source
-	✓	Cole Information Services

N 107TH ST 2013

2140	JIM STRIEBY
2348	EDWARD MENARD
2390	JOHN BEAUPRE
2395	GERALD WRIGHT
2885	DANIEL DASKO
2889	LOUIS SHARP
2931	HAROLD SORENSEN
2967	ANNA VERMEULEN
3191	OCCUPANT UNKNOWN
3350	HANS FREDERICKS
3907	OCCUPANT UNKNOWN
3993	SANDRA LAWSON
4001	DOUGLAS TIEFEL
5004	DUANE HILMAS
5005	TAMARA SPANO

Target Street	Cross Street	Source
✓	-	Cole Information Services

ARAPAHOE RD 2008

2770	32ND AVE BOUTIQUE & GALLERY
	A ALGAZ
	BARLOWS PREMIUM CIGARS & PIPES
	DALTON TECHNOLOGY GROUP LLC
	DEMANDEDGE
	EDWARD D JONES & CO LP
	FAMILY HEARING CENTER
	HEART & HOME
	JANE HEATH
	JENNINGS ARCHITECTURE
	JOES BIKE SHOP
	MEDRANO AGENCY CORP
	MERIDIAN WINE & SPIRITS
	MMP LLC
	NEW APPROACH LLC
	OVER THE MOON KIDS
	OVI LLC
	R2JS LLC
	SAFETY NET LLC
	STEPHEN TAYLOR
	TIMBALIER DRY GOODS LLC
	WHATS COOKING
3331	RIDGE LIQUORS
3333	ERIE LIQUORS INC
	HERITAGE CLEANERS ERIE
	PAPA MURPHYS TAKE & BAKE PIZZA
	SAFEWAY
	SAFEWAY PHARMACY 1667
3334	FARMER NONA
	FIRST HAND MANAGEMENT
3335	COLORADO PET CARE
	COST CUTTERS FAMILY HAIR SALON
	COSTCUTTERS
	DAIRY QUEEN RESTAURANT
	DEAN CARPENTER
	NATASCHA RUCKSTUHL
	QUADRANT CONSULTING PARTNERS INC
	SEMILLA CONSULTING
	SUBWAY 20268
	SUBWAY SANDWICHES & SALADS
	WASHINGTON MUTUAL
3338	U S BANK
	U S BANK NATIONAL ASSOCIATION
9725	D GODDARD

Target Street	Cross Street	Source
-	✓	Cole Information Services

N 107TH ST 2008

2140	MARY STRIEBY
2146	JIM STRIEBY
2348	EDWARD MENARD
2390	JOHN BEAUPRE
2395	OCCUPANT UNKNOWN
2885	OCCUPANT UNKNOWN
2889	LOUIS SHARP
2931	HAROLD SORENSEN
	RAMS HEAD MINING & MINERAL INC
2967	ANNA VERMEULEN
3191	MICHAEL JAMES
3350	TYLER ALDRIDGE
3907	OCCUPANT UNKNOWN
3993	JOSEPH GOMEZ
4001	DOUGLAS TIEFEL
5004	DUANE HILMAS
5005	SAMUEL SPANO

Target Street	Cross Street	Source
✓	-	Cole Information Services

ARAPAHOE RD 2003

2770	A ALGAZ
	BARLOWS PREMIUM CIGARS & PIPES
	BEAM & RAYMOND ASSOCS
	BRUCE WOOLSEY
	BYRNE PATRICIA A ENTRPRS INC
	COAL CREEK MEDICAL SUPPORT
	FAMILY HEARING CTR
	FIVE ELEMENTS
	GATOS DESIGNS
	HUNAN GARDEN
	MERIDIAN WINE & SPIRITS
	MOUNTAIN AIR OXYGEN SERVICE
	STEVEN CAMPBELL
	SUNSHINE SCRAPPER
3333	BLOCKBUSTER VIDEO
	GREAT AMRCN TIRE & AUTO SRVC
	HERITAGE CLEANERS ERIE
	PAPA MURPHYS TAKE & BAKE PIZZA
	RIDGE LIQUORS
	SAFEWAY FOOD & DRUG
3334	POPEYE S TEXACO
3335	BAHAMA BRONZ TANNING SALON
	COST CUTTERS FAMILY HAIR CARE
	DAIRY QUEEN
	PANOPTIC VISION INC
	SUBWAY SANDWICHES & SALADS
3338	SALVADOR VIDRIO
9725	D GODDARD

Target Street	Cross Street	Source
-	✓	Cole Information Services

N 107TH ST 2003

2140	JAMES STRIEBY
2348	EDWARD MENARD
	ES RESOURCE MANAGEMENT
2390	ARTHUR NERVIG
2395	NORRIS ECHTERNACHT
2885	JARED PRONTO
2889	LOUIS SHARP
2931	HAROLD SORENSEN
	RAMS HEAD MINING & MINERAL
3191	DAVID SANCHEZ
3350	MICHAEL NIEMANN
3883	OCCUPANT UNKNOWN
3907	OCCUPANT UNKNOWN
3993	OCCUPANT UNKNOWN
5004	DUANE HILMAS
5005	SAMUEL SPANO

Target Street	Cross Street	Source
✓	-	Cole Information Services

ARAPAHOE RD 1999

9728	OCCUPANT UNKNOWN
9776	RICHARD GIMENO
9850	ANN HAZEN
	ARTHUR IVES
	E DAVIS
	LYNN FREDRICKSON
	MARK HEINEMANN
9960	W R BROOKS QUARTERHORSES
10038	RICHARD ROLLINS
10042	GLENN ANGSTADT
10046	ROBERT HASKINS
10050	DONALD CLARK
10116	LAST WORD THE
	M WELCH
10136	LAURA CHOUINARD
10138	OCCUPANT UNKNOWN
10150	ALAN KENNEY
10156	WILLIAM HOWLAND
10162	PAUL ALKEMA
10189	JOHN TURNER
10195	RICK BLAND
10199	WENDY GRUDIN
	WESTWIND DOG TRAINING CENTER
10201	JODY COLLINS
10203	GERALD CHODIL
10221	GALEN KERBER
10231	HOWARD MUNZEL
10245	HELEN HOLLANDSWORTH
	K DE L
10251	HENRY KUGELER
10261	CLYDE WEBB
10282	JUDY CAMERON
10364	BEN WEEMS
	C ANDERSON
	C SMITH
	CRAIG CORONA
	DAVID WHITE
	DON BROWNING
	EILEEN DRAPER
	GREG TEXTORIS
	KRIS MATTINGLY
	KRISTI PLUTT
	L WHEELER
	MICHAEL SPARKS
	TERESA SULLIVAN
	TIMOTHY HAGERTY
	TRACY SWEELY
10473	RICHARD MILLER
10535	WILMA RIVERA
10538	ARCADIA DESIGN

ARAPAHOE RD 1999 (Cont'd)

10538	KATE IRELAN
	ROCKY MOUNTAIN MANUFACTURING INCORPORATED
10611	KNOX KUPPINGER
10695	D JOHNSON
	W PALMER
10869	OCCUPANT UNKNOWN
10960	OCCUPANT UNKNOWN
10994	PAT GONZALES
11070	OCCUPANT UNKNOWN
12300	JERRY DONLEY
12400	BREAKTHROUGH SYSTEMS
	TERRY SPEAR
12420	ARAPAHOE PACKING INCORPORATED
	OCCUPANT UNKNOWN
12424	JOHN FAHEY
12512	DANA POWELL

Target Street	Cross Street	Source
-	✓	Cole Information Services

N 107TH ST 1999

1290	MIKE BOKAN
2140	OCCUPANT UNKNOWN
2146	JIM STRIEBY
2348	OCCUPANT UNKNOWN
2390	ARTHUR NERVIG
2395	NORRIS ECHTERNACHT
2885	CHERYL BILSTEIN
2889	LOUIS SHARP
2931	HAROLD SORENSEN
2967	PHILIP MADDALONI
3191	ADMINISTRATION AERATION & LANDSCAPING
	CARLA SANCHEZ
3350	THOMAS FREDERICKS
3883	GOOSE HAVEN SAND & GRAVEL
	GRACON CORPORATION
3907	BETTER BLOOMS & GARDENS
	NORTH AMERICAN LANDSCAPES
	OCCUPANT UNKNOWN
3993	JOSEPH GOMEZ
4801	ALEXANDER DAWSON SCHOOL
	TAYLOR BALL
5004	OCCUPANT UNKNOWN
5005	SAM SPANO

Target Street	Cross Street	Source
✓	-	Cole Information Services

ARAPAHOE RD 1995

9728	WHITE, RICHARD M
9776	GIMENO, RICHARD D
9850	CARTER, ABHI
	MEEKER, SALLY
	PHIPPS, CLAY
9960	OCCUPANT UNKNOWNN
	W R BROOKS QUARTERHORSES
10038	ROLLINS, RICHARD R
10042	ANGSTADT, GLENN
10046	HASKINS, ROBERT J
10050	CLARK, DONALD L
10116	OCCUPANT UNKNOWNN
10138	LUCIO, JOE L
10150	KENNEY, ALAN
10156	HOWLAND, WILLIAM W
10162	ALKEMA, PAUL
10167	OCCUPANT UNKNOWNN
10189	TURNER, JOHN M
10191	VICKERS, EDNA
10199	HOLLINGSHEAD, KENT
10201	COLLINS, JOAN
10203	CHODIL, GERALD
10205	OCCUPANT UNKNOWNN
10221	SMITH, MORRIS J
10231	MUNZEL, HOWARD E
10245	BURKE, LOWELL
	K DE L
10251	KUGELER, HENRY A JR
10261	WEBB, CLYDE E
10282	CAMERON, JUDY
10364	COLEMAN, MARK
	DRAPER, EILEEN
	ECKERT, G
	HELENE DES ROSIERS
	HUPPERT, E
	KELLOGG, JOE
	KING, B T
	MATTINGLY, KRIS
	MCALLEY, LAUREN
	PLUTT, KRISTI
	SCHOTT, G
	SMITH, C D
	WEEMS, BEN F
	WHITE, DAVID
	WHITE, DAVID B
10473	MILLER, RICHARD P
10611	KUPPINGER, KNOX D
10693	JILL STARCERVICH DVM
	MIKE OLEA
	PETS & PALS

ARAPAHOE RD 1995 (Cont'd)

10695	AIST, PAUL A
	DANFORD, JESSICA
	JOHNSON, D
10869	MORRIS, GEOFF
10960	KUHL, RODGER D
11070	MCBRIDE, RAY
12300	DONLEY, JERRY
12400	BREAKTHROUGH SYSTEMS
	SPEAR, TERRY
12412	OCCUPANT UNKNOWNN
12420	ARAPAHOE PACKING INC
	DONLEY, JERRY
12424	PROUD, TIM
12428	JUNG, DONALD L
12500	OCCUPANT UNKNOWNN
12512	POWELL, DANA

Target Street	Cross Street	Source
-	✓	Cole Information Services

N 107TH ST 1995

1290	BOKAN, MIKE
2140	OCCUPANT UNKNOWNN
	WESTERN MEDICAL EQUIPMENT CORP
2146	STRIEBY, JIM D
2348	MENARD, EDWARD A
2390	NERVIG, ARTHUR T
2395	ECHTERNACHT, NORRIS
2885	SHEPARD, DON
2889	SHARP, LOUIS E
2931	SORENSEN, HAROLD D
2967	PAQUETTE, SUSAN E
3350	FREDERICKS, THOMAS A
	REEVES, BETH
3883	GOOSE HAVEN SAND & GRAVEL
	JACKSON, CHARLES J
3907	JHLC
3993	LAWSON, SANDRA
4801	ALEXANDER DAWSON SCHOOL
	ALFORD, PETER
	BROWN, DAVID H
	CHANDLER, PETER
	CONKLIN, NANCY W
	COOK, HEATHER L
	DELANEY, CARROLL
	KIME, NOBLE P
	LEEDS, GREGORY T
	LORD, NATE
	MCCOOL, P
	MEYERS, WILLIAM
	OVERDORF, SCOTT
	SCHROTH, AMY E
	TAYLOR, C
5005	SPANO, SAM

Target Street	Cross Street	Source
✓	-	Cole Information Services

ARAPAHOE RD 1992

9725	WEYNAND, MARY G
9728	WHITE, RICHARD M
9776	GIMENO, RICHARD D
9850	STOUMEN, ALAN L
9960	W R BROOKS QRTRHRS
10038	ROLLINS, RICHARD R
10042	ANGSTADT, GLENN
10046	HASKINS, ROBERT J
10050	CLARK, DONALD L
10116	DAVID L STRONG
	STRONG, DAVID
10150	KENNEY, ALAN
10156	HOWLAND, WILLIAM W
10162	ALKEMA, PAUL
10189	TURNER, JOHN M
10195	HEERMANS, JOHN W
10199	MOORE, WAYNE
10201	COLLINS, LLOYD K
10203	CHODIL, GERALD
10205	POPE, JACK D
	WOLF, RANDY
10221	SMITH, MORRIS J
10231	MUNZEL, HOWARD E
10245	BURKE, LOWELL
	K DE L
10251	KUGELER, HENRY A JR
10261	WEBB, CLYDE E
10282	CAMERON, JUDY
10364	BENNETT, J
	BILELLO, NANCY
	BRADBURN, SUSAN
	CHESTSAS, LEON
	DAUKAS, CAROL
	DRAPER, EILEEN
	FURNARI, L
	JACOBY, WILLIAM
	MATTINGLY, KRIS
	MERRILL, SARAH
	PLUTT, KRISTI
	WEEMS, BEN F
	ZOLLER, PAULA
10473	MILLER, RICHARD P
10535	RIVERA, ROBERT A
10611	KUPPINGER, KNOX D
10693	PETS&PALS
10869	MORRIS, GEOFF
10960	KUHL, RODGER D
11070	MCBRIDE, RAY
12400	BREAKTHROUGH SYSTM
12412	POWELL, DANA

Target Street	Cross Street	Source
✓	-	Cole Information Services

ARAPAHOE RD 1992 (Cont'd)

12420 ARAPAHOE PACKING
12424 PROUD, TIM
103641 TYRRELL, THOMAS
103642 MCALLEY, LAUREN

Target Street	Cross Street	Source
-	✓	Cole Information Services

N 107TH ST 1992

1290	BOKAN, MIKE
2140	STRIEBY, ROBERT A SR
2146	BUSH, MAY J
2390	NERVIG, ARTHUR T
2395	ECHTERNACHT, NORRIS
2889	SHARP, LOUIS E
2931	SORENSEN, HAROLD D
3350	DOCKTER, KORTNEY
3883	GOOSE HVN SND&GRVL
	JACKSON, CHARLES J
3907	TURNER, J K
3993	GOMEZ, JOE
4801	ALEXANDER DWSN SCH
	BUNNING, GIL
	CHANDLER, PETER
	CONKLIN, N W
	DELANEY, CAROLL F
	HACKETT, MARTY
	HARRIS, THOMAS
	JAMISON, STEPHEN R
	KIME, NOBLE P
	MEYERS, WILLIAM
	POWELL, GREGORY
	SCHROTH, AMY E
	SMUDZ, J
	TAYLOR, C
	WEEKS, RICHARD
5005	SPANO, SAM
33507	FREDERICKS, THOMAS A

APPENDIX

E

Vacant Land

Arapahoe Road

Erie, CO 80026

Inquiry Number: 4589777.3

April 12, 2016

Certified Sanborn® Map Report

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

Certified Sanborn® Map Report

04/12/16

Site Name:

Vacant Land
Arapahoe Road
Erie, CO 80026
EDR Inquiry # 4589777.3

Client Name:

Salem Engineering Group
4729 West Jacquelyn Ave
Fresno, CA 93722
Contact: Maria G. Ruvalcaba

The Sanborn Library has been searched by EDR and maps covering the target property location as provided by Salem Engineering Group were identified for the years listed below. The Sanborn Library is the largest, most complete collection of fire insurance maps. The collection includes maps from Sanborn, Bromley, Perris & Browne, Hopkins, Barlow, and others. Only Environmental Data Resources Inc. (EDR) is authorized to grant rights for commercial reproduction of maps by the Sanborn Library LLC, the copyright holder for the collection. Results can be authenticated by visiting www.edrnet.com/sanborn.

The Sanborn Library is continually enhanced with newly identified map archives. This report accesses all maps in the collection as of the day this report was generated.

Certified Sanborn Results:

Certification # C442-44FB-BD40

PO # 7-416-0419

Project 7-416-0419

UNMAPPED PROPERTY

This report certifies that the complete holdings of the Sanborn Library, LLC collection have been searched based on client supplied target property information, and fire insurance maps covering the target property were not found.

Sanborn® Library search results

Certification #: C442-44FB-BD40

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- ☑ Library of Congress
- ☑ University Publications of America
- ☑ EDR Private Collection

The Sanborn Library LLC Since 1866™

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APPENDIX

F

COGIS - WELL Information

Scout Card | Related | Insp. | MIT | GIS | Doc | COA | Wellbore | Orders

Surface Location Data for API # 05-013-06205 Status: PA 5/7/1996

Well Name/No:	PRINCE LAKE #1-34 (click well name for production)		
Operator:	RICHARDSON OPERATING COMPANY - 60523		
Status Date:	5/7/1996	Federal or State Lease #:	
County:	BOULDER #013	Location:	NWNE 34 1N69W 6 PM
Field:	WATTENBERG - #90750	Elevation:	5,264 ft.
Planned Location	720 FNL 1400 FEL	Lat/Long: 40.012717/-105.098229	Lat/Long Calculated From Footages

Wellbore Data for Sidetrack #00 Status: PA 5/7/1996

Spud Date:	5/22/1985	Spud Date is:	ACTUAL

Wellbore Permit

Permit #:	19850605	Expiration Date:	9/11/1985
Prop Depth/Form:	8700	Surface Mineral Owner Same:	Y
Mineral Owner:	FEE	Surface Owner:	
Unit:		Unit Number:	

Formation and Spacing: Code: NB-CD , Formation: NIOBRARA-CODELL , Order: 0 , Unit Acreage: 80, Drill Unit:

Wellbore Completed

Completion Date:	6/27/1985		
Measured TD:	8697	Measured PB depth:	8678
True Vertical TD:		True Vertical PB depth:	

Log Types: DIL, CNL, CDL, CBL

Casing: String Type: SURF , Hole Size: 12.25, Size: 8.625, Top: 0, Depth: 726, Weight: 24

Cement: Sacks: 400, Top: 0, Bottom: , Method Grade:

Casing: String Type: 1ST , Hole Size: 7.875, Size: 4.5, Top: 0, Depth: 8720, Weight: 11.6

Cement: Sacks: 320, Top: 0, Bottom: , Method Grade:

Formation	Log Top	Log Bottom	Cored	DSTs
NIOBRARA	7748			
CODELL	8160			

Completed information for formation NB-CD Status: AB 5/7/1996

1st Production Date:	7/2/1985	Choke Size:	0.219
Status Date:	5/7/1996	Open Hole Completion:	
Commingled:		Production Method:	FLOWING
Formation Name:	NIOBRARA-CODELL	Status:	AB

Formation Treatment

Treatment Date: 6/27/1985

Treatment summary: 113,000 GAL X-LINKED FLUID. 349,500# PROPPANT

Tubing Size:		Tubing Setting Depth:	
Tubing Packer Depth:		Tubing Multiple Packer:	
Open Hole Top:		Open Hole Bottom:	

Initial Test Data:

Test Date:	7/4/1985	Test Method:	FLOWING
Hours Tested:	24	Gas Type:	SHALE
Gas Disposal:	VENTED		

Test Type	Measure
BBLS_H2O	122
BBLS_OIL	105
CALC_GOR	3810
CASING_PRESS	1000
GRAVITY_OIL	48
MCF_GAS	400

Perforation Data:

Interval Bottom:	8176	Interval Top:	7750
# of Holes:	13	Hole Size:	0.375

COGIS - LOCATION Information

Related Insp GIS Doc COA Orders

PRINCE LAKE-61N69W - #379786 Information

Status: CL

Location ID:	**379786**	Location Name/No:	**PRINCE LAKE-61N69W /34NWNE**
Location Status:	**CL**	Status Date:	**4/14/2009**
Operator Name:	**RICHARDSON OPERATING COMPANY**	Operator Number:	**60523**
County:	**BOULDER - #013**	Location:	**NWNE 34 1N69W**
Facility Type:	**LOCATION**	Lat/Long:	**40.012717/-105.098229**
Form 2A Document #:		Form 2A Expiration:	**N/A**

Location Inventory

Special Purpose Pits:**0**	Drilling Pits:**0**	Wells:**0**	Production Pits:**0**
Condensate Tanks:**0**	Water Tanks:**0**	Separators:**0**	Electric Motors:**0**
Gas or Diesel Motors:**0**	Cavity Pumps:**0**	LACT Unit:**0**	Pump Jacks:**0**
Electric Generators:**0**	Gas Pipeline:**0**	Oil Pipeline:**0**	Water Pipeline:**0**
Gas Compressors:**0**	VOC Combustor:**0**	Oil Tanks:**0**	Dehydrator Units:**0**
Multi-Well Pits:**0**	Pigging Station:**0**	Flare:**0**	Fuel Tanks:**0**
0:**0**			

Facility Well(s)

API Number:	05-013-06205	Operator Name:	**RICHARDSON OPERATING COMPANY # 60523** Well Name: **PRINCE LAKE # 1-34**
Well Status:	**PA**		Location: NWNE 341N 69W

OGCC FORM 2
Rev. 1/78

STATE OF COLORADO
OIL AND GAS CONSERVATION COMMISSION
DEPARTMENT OF NATURAL RESOURCES

RECEIVED
MAY 10 1985
COLO. OIL & GAS CONS. COMM.

APPLICATION
FOR PERMIT TO DRILL, DEEPEN, OR RE-ENTER AND OPERATE

1a. TYPE OF WORK: DRILL [X] DEEPEN [ ] RE-ENTER [ ]

b. TYPE OF WELL: OIL WELL [X] GAS WELL [ ] OTHER — SINGLE ZONE [ ] MULTIPLE ZONE [X] NB-CD

2. NAME OF OPERATOR: Richardson Oil Company — PHONE NO.: 698-1139

3. ADDRESS OF OPERATOR: P.O. Box 9808, Denver, CO 80209

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements.)
At surface: 720'FNL, 1400'FEL, Section 34, T1N, R69W (NW¼ NE¼)
At proposed prod. zone: "

5. LEASE DESIGNATION AND SERIAL NO.: Fee

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: N/A

7. UNIT AGREEMENT NAME: Prince Lake

8. FARM OR LEASE NAME: Prince Lake

9. WELL NO.: 1

10. FIELD AND POOL, OR WILDCAT: Wattenberg

11. SEC., T., R., M., OR BLK. AND SURVEY OR AREA: Section 34 T1N, R69W, 6th P.M.

12. COUNTY: Boulder — 13. STATE: CO

14. DISTANCE IN MILES AND DIRECTION FROM NEAREST TOWN OR POST OFFICE: 1 mile north Lafeyette, Colorado

15. DISTANCE FROM PROPOSED LOCATION TO NEAREST PROPERTY OR LEASE LINE, FT. (Also to nearest drlg. line, if any): 720'

16. NO. OF ACRES IN LEASE*: 80

17. NO. OF ACRES AND/OR DRILLING UNIT ASSIGNED TO THIS WELL: 80

18. DISTANCE FROM PROPOSED LOCATION TO NEAREST WELL, DRILLING, COMPLETED, OR APPLIED FOR, ON THIS LEASE, FT.: 1320'

19. PROPOSED DEPTH: 8700

20. ROTARY OR CABLE TOOLS: Rotary

21. ELEVATIONS (Show whether DF, RT, GR, etc.): GR 5264' NB-CD

22. APPROX. DATE WORK WILL START: 5/20/85

23. PROPOSED CASING AND CEMENTING PROGRAM

SIZE OF HOLE	SIZE OF CASING	WEIGHT PER FOOT	SETTING DEPTH	QUANTITY OF CEMENT
12¼"	8 5/8"	24#	700'	300 sx
7 7/8"	4½"	11.6#	8700'	200 sx Class "G" regular

24. IS SURFACE OWNER A PARTY TO LEASING AGREEMENT? YES [X] NO [ ]
If NO, surface bond must be on file.

*DESCRIBE LEASE

Township 1 North, Range 69 West
Section 34: N½ NE¼

OPER. NO. 74540
DSLR. NO. 90750
FIELD NO.
LEASE NO.
NB-CD

00042483

24. SIGNED David B. Richardson TITLE President DATE

(This space for Federal or State Office use)

PERMIT NO. 85-605 APPROVAL DATE MAY 13 1985 EXPIRATION DATE SEP 11 '85

APPROVED BY William Smith TITLE DIRECTOR O & G Cons. Comm. DATE MAY 13 1985

CONDITIONS OF APPROVAL, IF ANY.

COMPLY WITH RULE 217 (E) TRAINING TO [illegible] ZONES

See Instructions On Reverse Side

A.P.I. NUMBER
05 013 6205

INSTRUCTIONS

Before any person shall commence operations for the drilling of any well, such person shall file with the Director an application on Form 2 for a permit to drill, along with a filing and service fee of Seventy-five Dollars ($75), and must secure the Director's approval before proceeding with such operation. Wells drilled for stratigraphic information only shall be exempt from paying the filing and service fee.

Before any person shall commence operations for the deepening of a well to any source of supply other than the existing producing horizon or for the reentry of a well, such person shall file an application on Form 2 and secure approval of the Director.

Form 2 shall be filed in duplicate for wells on all Patented and Federal lands, and in triplicate for wells on all State lands. An accurate plat or map showing the location of the well and showing measurements necessary for the determination thereof shall be filed with the Director. Unless operations are commenced within one hundred twenty (120) days after the date of approval, the permit will become null and void; however, for good cause shown, the Director may grant an extension not to exceed an additional one hundred twenty (120) days.

Fill in all applicable spaces.

RECEIVED

JUL 3 1 1985

COLO. OIL & GAS CONS. COMM.

RICHARDSON OIL COMPANY

PRINCE LAKE #1

NW NE SECTION 34, T1N, R69W

BOULDER COUNTY, COLORADO



GEOLOGIC REPORT

RECOMMENDATIONS

WELL DATA

SERVICES

DAILY REPORTS

MUD RECORD

BIT RECORD

DEVIATIONS

DRILLING CURVE

FORMATION TOPS

FORMATION SUMMARY

Mark N. Worland

Geologist

414 Tungsten Place
Longmont, Colorado 80501

RECOMMENDATIONS

The recommendation to run production casing on the Prince Lake #1 was based on the sample cuttings, the drilling time log, and the dual induction density-neutron gamma ray log suite. Secondary objectives were the Sussex and J Sandstone formations. All zones will be discussed in descending stratigraphic order.

The first zone of interest to be drilled was the Sussex Sandstone at 4791'. This formation appeared in the samples as a fine to medium grained clear to frosted sand. There was no visible oil stain on washed chips and no real drilling break was noted.

I feel that if the Sussex is completed, it should be done only after all other possible zones of production have been played out. Completion of this zone may also yield formation waters that could contaminate water sensitive zones such as the Niobrara.

The next zone to be encountered is the Niobrara Formation at 7731'. The Niobrara in this well exhibits typical shale and slightly chalky marlstone benches with occasional calcite filled fractures. Samples yielded bluish yellow cuts and slight bluish halos. No visible fluorescence could be detected on washed chips, but traces of oil staining were noted on various samples tested.

I believe the Niobrara in this well should be completed in the A and B benches where E-logs show the best porosities and/or fracturing.

The Codell Sandstone formation at 8158' was the primary zone of interest in this well. Sample cuttings appeared as a fine grained quartz sand with clay infillings and various quantities of other mineral and rock debris. A fair drilling break was observed. Washed chips yielded milky yellow cuts drying to a yellow halo. Traces of oil staining were noted on most washed chips. E-logs give the Codell 7 ohms of resistivity and 14% maximum effective porosity.

It is my opinion that the Codell in this well should be completed, and could yield very good hydrocarbon production.

The final zone drilled in this well was the J Sandstone formation at 8503'. This sand is composed of white to clear quartz grains very tightly cemented. Traces of dead oil stain were noted on occasional washed chips. Only trace sample shows were observed. Wireline logs show the J to have 13% maximum effective porosity and 15 ohms of resistivity.

I feel the J Sandstone formation in this well could be completed but only after all primary objectives of the well have been exhausted. This formation may yield only marginal hydrocarbon production.

WELL DATA

OPERATOR:	Richardson Oil Company
WELL NAME:	Prince Lake #1
LOCATION:	NW NE Section 34, T1N, R69W Boulder County, Colorado
FIELD:	Wattenberg
ELEVATIONS:	5264' GL 5275' KB
ROAD DIRECTIONS:	Take US Highway 287 north from Denver through Lafayette to Colorado Highway 7. Go right and proceed east around Prince Lake for .5 miles. Go south through farm buildings and field .25 miles. Go west .2 miles to location.
SURFACE CASING:	Ran 17 joints of new 8-5/8", 24 lb. surface casing. Set at 729 KB. Cemented with 400 sacks of cement, plug down at 1045 May 23, 1985.
SPUD DATE:	May 22, 1985 1730
DRILLING COMPLETED:	June 3, 1985 0545
TOTAL DEPTH:	Driller 8700' Logger 8700'
LAST FORMATION PENETRATED:	Skull Creek
WELL STATUS:	Production casing is to be run for a completion attempt in the Niobrara, Codell and J Sandstone formations.
OPERATOR REPRESENTATIVES:	David Richardson James Richardson Thomas Morgan

SERVICES

CONTRACTOR:	Exeter Drilling Northern Rig #22 Denver, Colorado Toolpusher: Scott Wilson
MUD:	Summit Drilling Fluids Denver, Colorado Engineers: Fred Spadi Bill Hughes Craig Miller
MUDLOGGING:	None
CONSULTING GEOLOGY:	Mark N. Worland Longmont, Colorado
CORES:	None
DRILLSTEM TESTS:	None
WIRELINE LOGS:	Great Guns Brighton, Colorado Engineer: A. Sierra

DAILY REPORTS

The following summary of drilling operations was prepared from the Rig Tour Reports. Depths are at the start of the morning tour (11:00 p.m.).

DAY	DATE	DEPTH	OPERATIONS
01	5-22	0'	Move in and rig up (16-1/2). Drlg. rat hole and mouse hole (2). Drlg. 12-1/4" surface hole (2-1/2). Survey (1/4). Drlg.(1). Survey (1/4). Drlg. (1-1/2).
02	5-23	317'	Drlg.(3/4). Survey (1/4). Drlg.(2-3/4). Survey(1/4). Drlg.(4). Short trip for surface casing (1). Circulate (1/4). Survey (1/4). Trip for casing (1/4). Run surface casing (2). Wait on cement, and nipple up (10). Drlg. plug (1/2). Drlg. (1-3/4).
03	5-24	898'	Service rig (1/4). Drlg. (3/4). Survey (1/4). Drlg. (3-1/4). Survey (1/4). Drlg.(1-3/4). Survey (1/4). Drlg. (1-1/4). Service rig (1/4). Drlg. (1-3/4). Survey (1/4). Drlg. (4). Survey (1/4). Drlg. (1-1/2). Service rig (1/4). Drlg. (2-3/4). Survey (1/4). Drlg. (4-3/4).
04	5-25	2631'	Service rig and survey (1/4). Drlg. (2-1/.4). Trip for bit (3). Drlg. (2-1/2). Service rig (1/4). Drlg. (2-1/2). Survey (1/2). Drlg. (4-3/4). Service rig (1/4). Drlg. (2-1/4). Survey (1/4). Drlg. (2-3/4). Trip for hole in pipe (1-1/2). Drlg. (1).
05	5-26	3990'	Service rig (1/4). Drlg. (4-3/4). Survey (1/4). Drlg. (2-3/4) Service rig (1/4). Drlg. (7-3/4). Service rig (1/4). Drlg. (2-1/4). Survey (1/4). Trip for new pipe (5-1/4).
06	5-27	4908'	Trip for new pipe (2-1/4). Service rig (1/4). Drlg. (5-1/2). Service rig (1/4). Drlg. (7-3/4). Service rig and survey (1/2). Drlg. (7-1/2).
07	5-28	5648'	Service rig (1/4). Drlg. (2-1/4). Trip for hole in pipe (2-1/2). Drlg. (3). Service rig (1/4). Drlg. (7-3/4). Service rig (1/4). Survey (1/4). Trip for bit (4). Drlg. (3-1/2).
08	5-29	6137'	Service rig (1/4). Drlg.(7-3/4). Service rig (1/4). Drlg. (7-3/4). Service rig(1/4). Drlg. (2-1/2). Trip for pipe (4-1/2). Drlg. (3/4).
09	5-30	6789'	Service rig (1/4). Drlg. (3). Trip for hole in pipe (3-1/2). Drlg. (1-1/4). Service rig (1/4). Drlg. (7-3/4). Service rig (1/4). Drlg. (7-1/4). Trip for hole in pipe (1/2).

DAY	DATE	DEPT	OPERATIONS
10	5-31	7518'	Trip for hole in pipe (2). Service rig (1/4). Drlg. (5-3/4) Service rig (1/2). Drlg. (7-1/2). Service rig (1/4) Drlg. (7-3/4).
11	6-1	8093'	Drlg. (5). Trip for hole in pipe (4-1/4). Drlg. (1/4). Trip for hole in pipe (2-1/4). Cut drilling line (1). Trip in hole (1-3/4). Drlg. (2-1/2). Service rig (1/4). Drlg. (6-3/4).
12	6-2	8356'	Service rig (1/4). Drlg. (7-3/4). Service rig (1/4). Drlg. (4). Survey (1/4). Trip for bit (5-3/4). Drlg. 2-3/4). Service rig (1/4). Drlg. (2-3/4).
13	6-3	8652'	Service rig (1/4). Drlg. (6-1/2). Circulate for logs (1-3/4). Survey (1/4). Trip out for logs (2-3/4). Run logs (5-1/2).

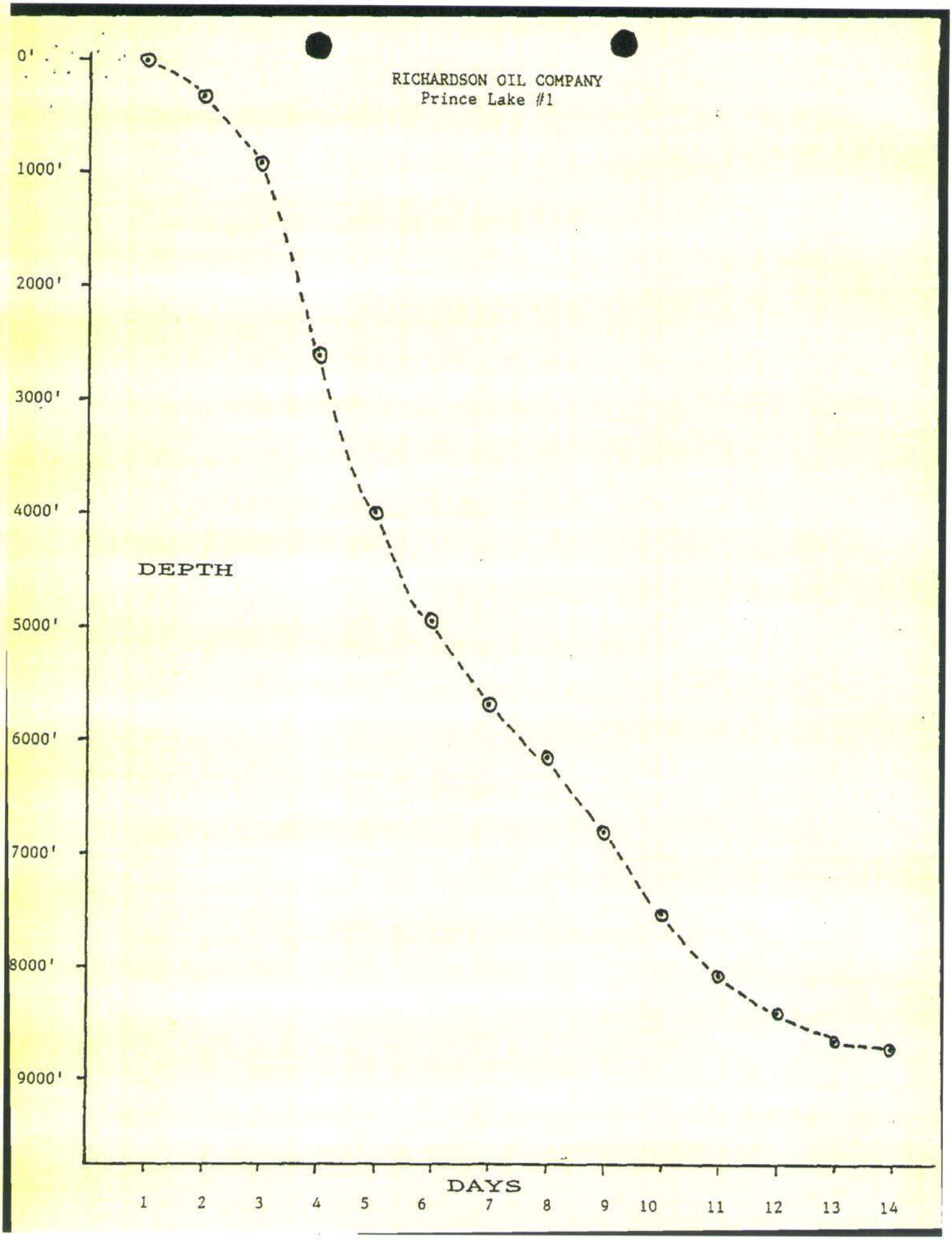
NOTE: After E-logs were run, another 20' of rathole was drilled. The total depth of this well is 8720' KB.

FORMATION TOPS

FORMATION	LOG TOP	5225' KB DATUM	SAMPLE TOP
SUSSEX SANDSTONE	4791'	+ 484'	4752'
NIOBRARA FORMATION	7731'	-2456'	7750'
FORT HAYS LIMESTONE	8139'	-2864'	8150'
CODELL SANDSTONE	8158'	-2883'	8167'
CARLILE SHALE	8178'	-2903'	8185'
GREENHORN FORMATION	8240'	-2965'	8234'
GRANEROS FORMATION	8420'	-3145'	8410'
J SILTSTONE	8577'	-3302'	8575'
J SANDSTONE	8603'	-3328'	8616'
SKULL CREEK	8626'	-3351'	8631'
TD RIG	8700'	-3425'	--
TD LOGGERS	8700'	-3425'	--
TD AFTER RATHOLE	8720'	-3445'	--

DRILLING CURVE

DAY	DEPTH
1	0'
2	317'
3	898'
4	2631'
5	3990'
6	4908'
7	5648'
8	6137'
9	6789'
10	7518'
11	8093'
12	8356'
13	8652'
14	8700'


RICHARDSON OIL COMPANY
Prince Lake #1
0'
1000'
2000'
3000'
4000'
5000'
6000'
7000'
8000'
9000'
DEPTH
DAYS
1
2
3
4
5
6
7
8
9
10
11
12
13
14

FORMATION SUMMARY

The following suample descriptions are interpretative and tied to the wireline logs.

Sample quality was poor through the section drilled with fresh water and fair through the section drilled after mud up samples were collected as follows:

DEPTH	INTERVAL
4500' - 7600'	20'
7600' - TD'	10'

Grain size, rounding, and sorting was determined by the use of the American Stratigraphic Standards - AMSTRAT.

Sample study begins with the Sussex Sandstone.

SUSSEX SANDSTONE TOP: 4791' DATUM: +484'

4791' to 4850' — Sandstone, gray; white; clear to frosted; fine lower to medium lower grained; sub-angular to sub-rounded; poorly sorted dirty; clay filled; unconsolidated; loose quartz; pyrite; micaceous; slighty calcareous; no visible fluorescence or oil staining; very faint light blue cut; no visible halo.

NIOBRARA FORMATION TOP: 7731' DATUM: - 2456'

7731' to 7830' — Marlstone, black; dark gray; brown; tan; mottled in part; firm to hard; brittle; blocky to splintery; earthy; pyrite; carbonaceous; limey; chalky at times; micaceous; sooty; occasional calcite filled fracture; chips decrepitate in HCL to a brown bubbly foram; trace visible oil fluorescence; trace visible oil staining on washed chips and occasional calcite fracture fills. Slight milky blue to cloudy yellow cuts drying to a dull yellow halo leaving a brown oil residue.

7830' to 7920' — Shale, brown; black; dark gray; platey to splintery; hard; brittle; pyrite; micaceous; carbonaceous; very calcareous; trace yellow bentonite; sooty; trace sandy; very slight trace sample shows same as 7731' to 7830'.

7920' to 7950' — Marlstone, same as 7731' to 7830'. Fair sample shows with trace visible brown oil stain on washed chips. Trace visible dull gold flourescence; cloudy yellow to milky yellow cut drying to a yellow halo. Trace streaming cut on thin calcite fracture fills. Trace brown oil residue.

7950' to 8030'	Shale; same as 7830' to 7920'. Very poor sample shows.
8030' to 8050'	Marlstone, black; dark gray; dark brown; platey to blocky; firm to hard; sooty; argillaceous; trace pyrite; chips decrepitate to a brown bubbly foam in HCL; slightly chalky; limey in part; no visible fluorescence; very slight trace blue cut; no visible halo; trace brown residue.
8050' to 8139'	Shale, black; dark gray; dark brown; firm to hard; splintery to blocky; silty in part; earthy; very calcareous pyrite; slightly limey; trace bentonite; micaceous; no visible shows.
FORT HAYS LIMESTONE	TOP: 8139' DATUM: -2864'
8139' to 8158'	Limestone, gray; brown; light brown; tan; hard; splintery to platey; micro to cryptocrystaline; dense; trace fossiliferous; pyrite; argillaceous; trace very thin calcite filled fractures; bright yellow mineral fluorescence; trace yellow milky cut drying to a pale yellow halo; trace brown residue.
CODELL SANDSTONE	TOP: 8158' DATUM: - 2483'
8158' to 8178'	Sandstone, dark brown to dark gray; grains are clear to frosted quartz; very fine lower to fine upper grained; friable; loose; unconsolidated in part; clay filled; sub-angular to sub-rounded; moderately sorted; pyrite; trace carbonaceous debris; trace glauconite; salt and pepper; calcareous; trace visible brown oil stain on washed chips; dull yellow fluorescence; yellow milky to bleeding cut drying to a yellow halo, leaving a light brown residue.
CARLILE SHALE	TOP: 8178' DATUM: -2903'
8178' to 8240'	Shale, black; dark gray; hard to firm; platey to blocky; silty; earthy; micaceous; trace pyrite; trace sandy; calcareous; slightly limey; no visible fluorescence; stain or cut.
GREENHORN FORMATION	TOP: 8240' DATUM: - 2965'
8240' to 8420'	Shale, black; dark gray; brown; firm to hard; platey to blocky; micaceous; slightly calcareous; earthy; pyrite; with stringers of limestone; tan to brown; hard; platey; slightly sandy; no visible shows.

GRANEROS FORMATION	TOP: 8420'	DATUM: -3145'
8420' to 8577'	Shale, black; dark gray; soft to firm; platey to blocky; earthy; micaceous; silty; slightly sandy; very slightly calcareous; pyrite with traces of light green cream and yellow speckled bentonite; no visible shows.	
J SILTSTONE	TOP: 8577'	DATUM: -3302'
8577' to 8603'	Siltstone, gray; light gray; hard; blocky to platey; argillaceous to shaley; micaceous; slightly to non-calcareous; no visible shows.	
J SANDSTONE	TOP: 8603'	DATUM: -3328'
8603' to 8626'	Sandstone, white; frosted; very fine lower to fine upper grained; sub-angular to sub-rounded; moderately sorted; tight; quartzitic; siliceous cement; slight trace of dead oil stain on occasional washed fragments; frequent stringers of dark shale; no visible fluorescence; very slight trace yellow cloudy cut; no halo or brown residue.	
SKULL CREEK	TOP: 8626'	DATUM: -3351'
8626' to 8700'	Shale, black; dark gray; firm to hard; blocky; platey; sandy stringers; silty; micaceous; no visible shows.	

DEVIATIONS

DEPTH	DEGREES
91'	3/4°
184'	1/2°
379'	3/4°
594'	3/4°
738'	1/4°
1051'	3/4°
1356'	2°
1447'	1-1/4°
1722'	1-1/4°
2021'	1-1/4°
2327'	1/2°
2631'	1/2°
2784'	3/4°
3301'	1-1/4°
3815'	1/2°
4302'	1-1/4°
4908'	1-3/4°
5402'	1-/14°
6045'	2°
8604'	1-1/2°
8700'	1-1/2°

BIT RECORD

BIT #	SIZE	MAKE	TYPE	DEPTH OUT	FOOTAGE
A	12-1/4"	SEC	S-335	738'	738'
1A	7-7/8"	HTC	J-1	2784'	2046'
1	7-7/8"	STC	FDS	4908'	2124'
2	7-7/8"	HTC	J-2	6045'	1137'
3	7-7/8"	HTC	J-11	8604'	2559'
4	7-7/8"	HTC	J-22-C	8700'	96'

BIT #	HOURS	WEIGHT	RPM	PUMP PRESSURE	REMARKS
A	12.5	15K	145	800	Retip
1A	25.75	25K	145	1300	Retip
1	33.25	35K	90	1450	EV5333
2	33.75	36K	90	1300	FD472
3	87.25	38K	90	1200	HD415
4	12.0	35K	60	1350	FK325

MUD RECORD

Drilled with fresh water and native mud to approximately 7400'.

TIME	DAY	DATE	DEPTH	WEIGHT	VISCOSITY	pH	FILTRATE
0945	1	5-22	S P U D	M U D			
0900	5	5-26	4515'	F R E S H	W A T E R		
2230	9	5-30	7518'	9.1	46	9.5	6.0
0900	10	5-31	7720'	9.4	43	9.5	8.0
0230	11	6-1	8160'	9.9	43	9.0	7.2
0530	12	6-2	8500'	9.9+	42	9.0	7.2
0500	13	6-3	8695'	9.9+	83	9.5	6.8

Logged with a viscosity of 83 and a weight of 9.9 without difficulty.

OGCC FORM 4
Rev 8/89

STATE OF COLORADO
OIL AND GAS CONSERVATION COMMISSION
DEPARTMENT OF NATURAL RESOURCES

NOV 27 1996

SUBMIT ORIGINAL AND 1 COPY

FOR OFFICE USE ONLY
ET | FE | UC | SE

SUNDRY NOTICES AND REPORTS ON WELLS

(Do not use this form for proposals to drill or to deepen or plug back to a different reservoir. Use "APPLICATION FOR PERMIT—" for such proposals.)

5. FEDERAL/INDIAN OR STATE LEASE NO.: FEE

1. ☐ OIL WELL ☒ GAS WELL ☐ COALBED METHANE ☐ INJECTION WELL ☐ OTHER

6. PERMIT NO.:

2. NAME OF OPERATOR: RICHARDSON OPERATING CO.

7. API NO.: 05-013-6205

3. ADDRESS OF OPERATOR: 1700 LINCOLN ST., SUITE 1700
CITY: DENVER, STATE: CO ZIP CODE: 80203

8. WELL NAME: PRINCE LAKE

9. WELL NUMBER: #1-34

4. LOCATION OF WELL (Report location clearly and in accordance with any State requirements. See also space 17 below.)
At surface: 720' FNL 1400' FEL
At proposed prod. zone:

10. FIELD OR WILDCAT: WATTENBERG

12. COUNTY: BOULDER

11. QTR. QTR. SEC., T.R. AND MERIDIAN: NW¼ NE ¼ SEC. 34 T1N R69

Check Appropriate Box To Indicate Nature of Notice, Report or Notification

13A. NOTICE OF INTENTION TO:	13B. SUBSEQUENT REPORT OF:	13C. NOTIFICATION OF:
☐ PLUG AND ABANDON	☒ FINAL PLUG AND ABANDONMENT (SUBMIT 3RD PARTY CEMENT VERIFICATION AND JOB LOG)	☐ SHUT-IN, TEMPORARILY ABANDONED (DATE _____) (REQUIRED EVERY 6 MONTHS)
☐ MULTIPLE COMPLETION	☐ ABANDONED LOCATION (WELL NEVER DRILLED - SITE MUST BE RESTORED WITHIN 6 MONTHS)	☐ PRODUCTION RESUMED (DATE _____)
☐ COMMINGLE ZONES	☐ REPAIRED WELL	☐ LOCATION CHANGE (SUBMIT NEW PLAT)
☐ FRACTURE TREAT	☐ OTHER	☐ WELL NAME CHANGE
☐ REPAIR WELL	*Use Form 5 - Well Completion or Recompletion Report and Log for subsequent report of Multiple/Commingled Completions and Recompletions	☐ OTHER
☐ OTHER		

14. DESCRIBE PROPOSED OR COMPLETED OPERATIONS ON THIS FORM (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work. If well is directionally drilled, give subsurface locations and measured and true vertical depths for all markers and zones pertinent

15. DATE OF WORK 5-7-96

00042390

FINAL P & A NOTICE

SET CIBP @ 7700'. DUMP BAIL 3SX CMT ON PLUG

PLUGGED FROM 675' TO 775' W/40SX. TOP PLUG SET W/10 SX

SEE ATTATCHMENTS

SURFACE IS RESTORED

16. I hereby certify that the foregoing is true and correct

SIGNED _____ TELEPHONE NO. (303) 830-8000

NAME (PRINT) MITCHELL STEINKE TITLE OPERATIONS MANAGER DATE _____

(This space for Federal or State office use)

APPROVED _____ TITLE _____ DATE 12/10/96

CONDITIONS OF APPROVAL, IF ANY:

CEMENTER'S ENERGY INC.

P O BOX 1587 • SCOTTSBLUFF, NE 69363-1587 • (308) 632-8855

FAX 308-632-3991

Our Invoice

№ 16274

V134290 NOV 19 1996

Date 5-7-96	Well Owner RICHARDSON OPER.	Well No. #1	Lease PRINCE LAKE
County BOULDER	State COLORADO		Field
Charge To RICHARDSON OPERATING COMPANY			Charge Code
Address 1700 LINCOLN ST., SUITE 1700			For Office Use Only
City, State DENVER, COLORADO 80203			
Pump Truck No. 1209	Code	Bulk Truck No. 1211	Code
Type of Job		Depth	Ft. to
Surface		Bottom of Surface	Ft. to
(Plug) 4½" CASING		Plug Landed @ Ft.	Time On 0700 A.M.
Production		Pipe Landed @ Ft.	Time Off 0830

Reference No.	Description	Qty.	Meas.	Unit Price	Amount
	Pump Truck Charge				
	Cement Neat ✓	50	SX		1400 00
	Poz. Mix				
	Calcium Chloride	ROPCO			
	Gel % Flo-Seal %				
	Handling Charge	7571		plug Casing	
	Hauling Charge				
	Additional Pump Charge AFE	Deck			
	Mileage P.T. L080-C	108010	99		1442.00
	B.T.			17850	
	Plug				6/3/96
	PLUGGED FROM 675 TO 775' W/ 40 SX. TOP PLUG SET W/ 10 SX.				
				POSTED	

Remarks:	Tax Reference Code	Sub Total	1400 00
	State %	Tax	42 00
	Disc	Total	1442 00

Truck No.	Code	State Mileage	Nebraska	Colorado	Wyoming	Other	Total Mileage
1209		Pump Truck		46			
1211		Bulk Truck		46			

We do not assume any responsibility for any damage or conditions resulting from our services. All pricing is subject to review and revision.

Delivered By BART-JOHN

Received by T. Owens 5/7/96

Customer or His Agent

ASAP PERFORATORS, INC.

1290

7206 W. 12th Street
Greeley, CO 80634
303-353-5118

CHARGE TO: Richardson Operating Co
INVOICE ADDRESS: 1700 Lincoln Ste 1700
CITY: Denver 80203 | STATE: Co | DATE COMPL: 5-6-96
WELL NO.: Prince Lake # 1 | CUST. ORDER:

LEGAL DESCRIPTION	FIELD	COUNTY	STATE	LOCATION NAME
	Wattenberg	Boulder	Co	

Customer agrees to be bound by the terms and conditions set forth on the reverse side of this form. If account is not paid when due, customer shall be responsible for reasonable attorney's fees, interest and costs of collection until account is "fully paid".

RECEIVED MAY 19 1996 A.M. P.M.

SIGNATURE OF CUSTOMER OR AUTHORIZED REPRESENTATIVE — DATE — TIME

SERVICE	QUANTITY	UNIT PRICE	AMOUNT	PERFORATION RECORD DEPTH	NO. OF SHOTS
Set 3.50" CIBP At 7700'		Rpts			
Dumped 3x Cement Via Bailer	7591	(cement) plug + abandon			
	108010	99	1600.00		
Cut Casing At 6500'			17850		
	Voucher Date:			6/3/96	
				AFE 1080-C	
		Bid Price	1600 00		
				POSTED	
	1 1	6/3/96			

I certify that the above ordered services, equipment, materials and products have been received.

X [signature] 5/6/96
SIGNATURE OF CUSTOMER — DATE

SUBTOTAL	
TAX	
ESTIMATED TOTAL $	1600 00

PRICES SUBJECT TO CORRECTION BY BILLING DEPARTMENT

UNIT NUMBER 1			UNIT NUMBER		
CREW NAMES	EMPLOYEE NO.	JOB BONUS	CREW NAMES	EMPLOYEE NO.	JOB BONUS
ENGR. Bullard Zack	[illegible]	6/3/96	ENGR.		
OPER.			OPER.		
OPER.			OPER.		

APPENDIX

G

Vacant Land
Arapahoe Road
Erie, CO 80026

Inquiry Number: 4589777.2s
April 12, 2016

The EDR Radius Map™ Report with GeoCheck®

Environmental Data Resources Inc

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

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Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

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EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-13) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

ARAPAHOE ROAD
ERIE, CO 80026

COORDINATES

Latitude (North):	40.0137440 - 40° 0' 49.47''
Longitude (West):	105.1005290 - 105° 6' 1.90''
Universal Tranverse Mercator:	Zone 13
UTM X (Meters):	491420.4
UTM Y (Meters):	4429077.5
Elevation:	5258 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	5955101 ERIE, CO
Version Date:	2013
South Map:	5958934 LAFAYETTE, CO
Version Date:	2013

AERIAL PHOTOGRAPHY IN THIS REPORT

Portions of Photo from:	20110723, 20110718
Source:	USDA

MAPPED SITES SUMMARY

Target Property Address:
ARAPAHOE ROAD
ERIE, CO 80026

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft. & mi.) DIRECTION
A1		3335 ARAPAHOE RD	EDR Hist Cleaner	Lower	84, 0.016, NNW
A2		3332 ARAPAHOE RD	EDR Hist Auto	Lower	86, 0.016, North
A3	GREAT AMERICAN TIRE	3332 ARAPAHOE RD	AST	Lower	86, 0.016, North
A4		3333 ARAPAHOE RD	EDR Hist Auto	Lower	87, 0.016, North
A5	SAFEWAY STORE # 1667	3333 ARAPAHOE RD #B	RCRA-CESQG	Lower	87, 0.016, North
A6		3333 ARAPAHOE RD	EDR Hist Cleaner	Lower	87, 0.016, North
7		708 KNOB CT	EDR Hist Auto	Higher	271, 0.051, South
8	CIRCLE K STORE #2709	3334 ARAPAHOE	UST	Lower	509, 0.096, NNW
9	SHIRK BORROW PIT		MINES	Higher	553, 0.105, WSW
10	NUOCI ESTATES: NICHO	1021 N 111TH ST	RCRA NonGen / NLR	Higher	1285, 0.243, SE

EXECUTIVE SUMMARY

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL ---------- National Priority List
Proposed NPL ---------- Proposed National Priority List Sites
NPL LIENS ---------- Federal Superfund Liens

Federal Delisted NPL site list

Delisted NPL ---------- National Priority List Deletions

Federal CERCLIS list

FEDERAL FACILITY ---------- Federal Facility Site Information listing
SEMS ---------- Superfund Enterprise Management System

Federal CERCLIS NFRAP site list

SEMS-ARCHIVE ---------- Superfund Enterprise Management System Archive

Federal RCRA CORRACTS facilities list

CORRACTS ---------- Corrective Action Report

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF ---------- RCRA - Treatment, Storage and Disposal

Federal RCRA generators list

RCRA-LQG ---------- RCRA - Large Quantity Generators
RCRA-SQG ---------- RCRA - Small Quantity Generators

Federal institutional controls / engineering controls registries

LUCIS ---------- Land Use Control Information System
US ENG CONTROLS ---------- Engineering Controls Sites List
US INST CONTROL ---------- Sites with Institutional Controls

EXECUTIVE SUMMARY

Federal ERNS list

ERNS ---------- Emergency Response Notification System

State- and tribal - equivalent CERCLIS

SHWS ---------- This state does not maintain a SHWS list. See the Federal CERCLIS list and Federal NPL list.

State and tribal landfill and/or solid waste disposal site lists

SWF/LF ---------- Solid Waste Sites & Facilities

State and tribal leaking storage tank lists

LUST ---------- Leaking Underground Storage Tank List
LAST ---------- Leaking Aboveground Storage Tank Listing
INDIAN LUST ---------- Leaking Underground Storage Tanks on Indian Land
LUST TRUST ---------- RAP Site Listing

State and tribal registered storage tank lists

FEMA UST ---------- Underground Storage Tank Listing
INDIAN UST ---------- Underground Storage Tanks on Indian Land

State and tribal institutional control / engineering control registries

AUL ---------- Environmental Covenants and Environmental Use Restrictions List

State and tribal voluntary cleanup sites

INDIAN VCP ---------- Voluntary Cleanup Priority Listing
VCP ---------- Voluntary Cleanup & Redevelopment Act Application Tracking Report

State and tribal Brownfields sites

BROWNFIELDS ---------- Brownfields Sites Listing

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS ---------- A Listing of Brownfields Sites

Local Lists of Landfill / Solid Waste Disposal Sites

HIST LF ---------- Historical Landfill List
SWRCY ---------- Registered Recyclers Listing
INDIAN ODI ---------- Report on the Status of Open Dumps on Indian Lands
ODI ---------- Open Dump Inventory
DEBRIS REGION 9 ---------- Torres Martinez Reservation Illegal Dump Site Locations

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL ---------- Delisted National Clandestine Laboratory Register

CDL ---- Meth Lab Locations
US CDL ---- National Clandestine Laboratory Register

Local Land Records

LIENS 2 ---- CERCLA Lien Information

Records of Emergency Release Reports

HMIRS ---- Hazardous Materials Information Reporting System
CO ERNS ---- Spills Database
SPILLS 90 ---- SPILLS 90 data from FirstSearch

Other Ascertainable Records

FUDS ---- Formerly Used Defense Sites
DOD ---- Department of Defense Sites
SCRD DRYCLEANERS ---- State Coalition for Remediation of Drycleaners Listing
US FIN ASSUR ---- Financial Assurance Information
EPA WATCH LIST ---- EPA WATCH LIST
2020 COR ACTION ---- 2020 Corrective Action Program List
TSCA ---- Toxic Substances Control Act
TRIS ---- Toxic Chemical Release Inventory System
SSTS ---- Section 7 Tracking Systems
ROD ---- Records Of Decision
RMP ---- Risk Management Plans
RAATS ---- RCRA Administrative Action Tracking System
PRP ---- Potentially Responsible Parties
PADS ---- PCB Activity Database System
ICIS ---- Integrated Compliance Information System
FTTS ---- FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
MLTS ---- Material Licensing Tracking System
COAL ASH DOE ---- Steam-Electric Plant Operation Data
COAL ASH EPA ---- Coal Combustion Residues Surface Impoundments List
PCB TRANSFORMER ---- PCB Transformer Registration Database
RADINFO ---- Radiation Information Database
HIST FTTS ---- FIFRA/TSCA Tracking System Administrative Case Listing
DOT OPS ---- Incident and Accident Data
CONSENT ---- Superfund (CERCLA) Consent Decrees
INDIAN RESERV ---- Indian Reservations
FUSRAP ---- Formerly Utilized Sites Remedial Action Program
UMTRA ---- Uranium Mill Tailings Sites
LEAD SMELTERS ---- Lead Smelter Sites
US AIRS ---- Aerometric Information Retrieval System Facility Subsystem
US MINES ---- Mines Master Index File
FINDS ---- Facility Index System/Facility Registry System
AIRS ---- Permitted Facility & Emissions Listing
ASBESTOS ---- Asbestos Abatement & Demolition Projects
METHANE SITE ---- Methane Site Investigations - Jefferson County 1980
Methane Investigation ---- Methane Gas & Swamp Findings
DRYCLEANERS ---- Drycleaner Facilities
Financial Assurance ---- Financial Assurance Information Listing
NPDES ---- Permitted Facility Listing
UMTRA ---- Uranium Mill Tailings Sites

EXECUTIVE SUMMARY

FUELS PROGRAM---------- EPA Fuels Program Registered Listing
ECHO---------- Enforcement & Compliance History Information

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP---------- EDR Proprietary Manufactured Gas Plants

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA LF---------- Recovered Government Archive Solid Waste Facilities List
RGA LUST---------- Recovered Government Archive Leaking Underground Storage Tank

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

STANDARD ENVIRONMENTAL RECORDS

Federal RCRA generators list

RCRA-CESQG: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

A review of the RCRA-CESQG list, as provided by EDR, and dated 12/09/2015 has revealed that there is 1 RCRA-CESQG site within approximately 0.25 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
SAFEWAY STORE # 1667	3333 ARAPAHOE RD #B	N 0 - 1/8 (0.016 mi.)	A5	9

State and tribal registered storage tank lists

UST: The Underground Storage Tank database contains registered USTs. USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA). The source is the State Oil Inspector's Office's Tank List.

A review of the UST list, as provided by EDR, and dated 09/21/2015 has revealed that there is 1 UST site within approximately 0.25 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
CIRCLE K STORE #2709 Tank Status: Currently In Use Facility Id: 15306	3334 ARAPAHOE	NNW 0 - 1/8 (0.096 mi.)	8	11

AST: The Aboveground Storage Tank database contains registered ASTs. The source is the State Oil Inspector's Office's Tank List.

A review of the AST list, as provided by EDR, and dated 09/21/2015 has revealed that there is 1 AST site within approximately 0.25 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
GREAT AMERICAN TIRE Tank Status: Temporarily Out Of Use Tank Status: Permanently Closed Facility Id: 15148	3332 ARAPAHOE RD	N 0 - 1/8 (0.016 mi.)	A3	8

ADDITIONAL ENVIRONMENTAL RECORDS

Other Ascertainable Records

RCRA NonGen / NLR: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

A review of the RCRA NonGen / NLR list, as provided by EDR, and dated 12/09/2015 has revealed that there is 1 RCRA NonGen / NLR site within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
NUOCI ESTATES: NICHO	1021 N 111TH ST	SE 1/8 - 1/4 (0.243 mi.)	10	13

EXECUTIVE SUMMARY

MINES: This dataset represents permitted mines in the State of Colorado

A review of the MINES list, as provided by EDR, and dated 09/19/2011 has revealed that there is 1 MINES site within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
SHIRK BORROW PIT Facility Id: M1983042		WSW 0 - 1/8 (0.105 mi.)	9	12

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR Hist Auto: EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

A review of the EDR Hist Auto list, as provided by EDR, has revealed that there are 3 EDR Hist Auto sites within approximately 0.125 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
Not reported	708 KNOB CT	S 0 - 1/8 (0.051 mi.)	7	11

Lower Elevation	Address	Direction / Distance	Map ID	Page
Not reported	3332 ARAPAHOE RD	N 0 - 1/8 (0.016 mi.)	A2	8
Not reported	3333 ARAPAHOE RD	N 0 - 1/8 (0.016 mi.)	A4	9

EDR Hist Cleaner: EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

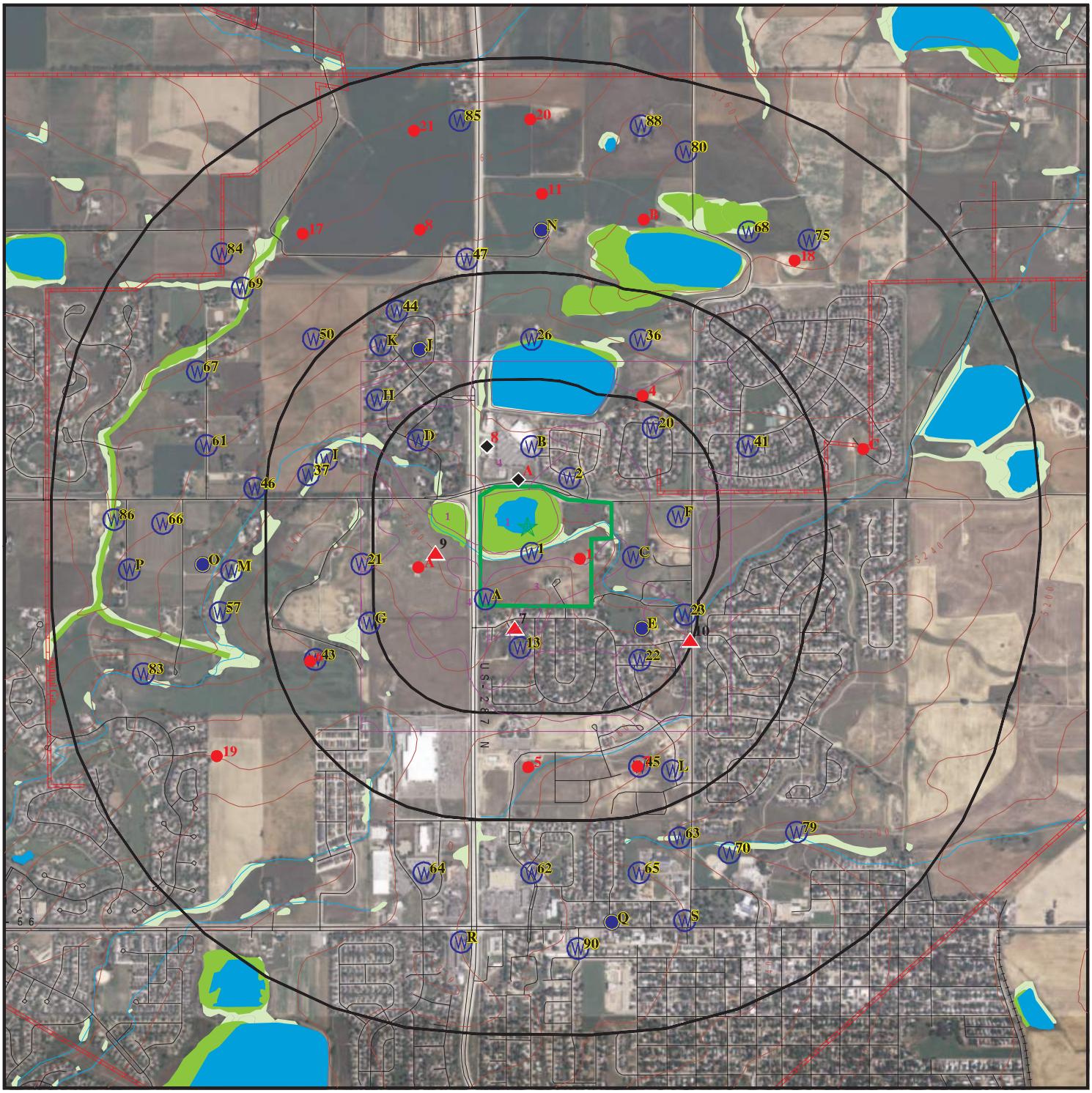
A review of the EDR Hist Cleaner list, as provided by EDR, has revealed that there are 2 EDR Hist Cleaner sites within approximately 0.125 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
Not reported	3335 ARAPAHOE RD	NNW 0 - 1/8 (0.016 mi.)	A1	8
Not reported	3333 ARAPAHOE RD	N 0 - 1/8 (0.016 mi.)	A6	11

EXECUTIVE SUMMARY

There were no unmapped sites in this report.

OVERVIEW MAP - 4589777.2S



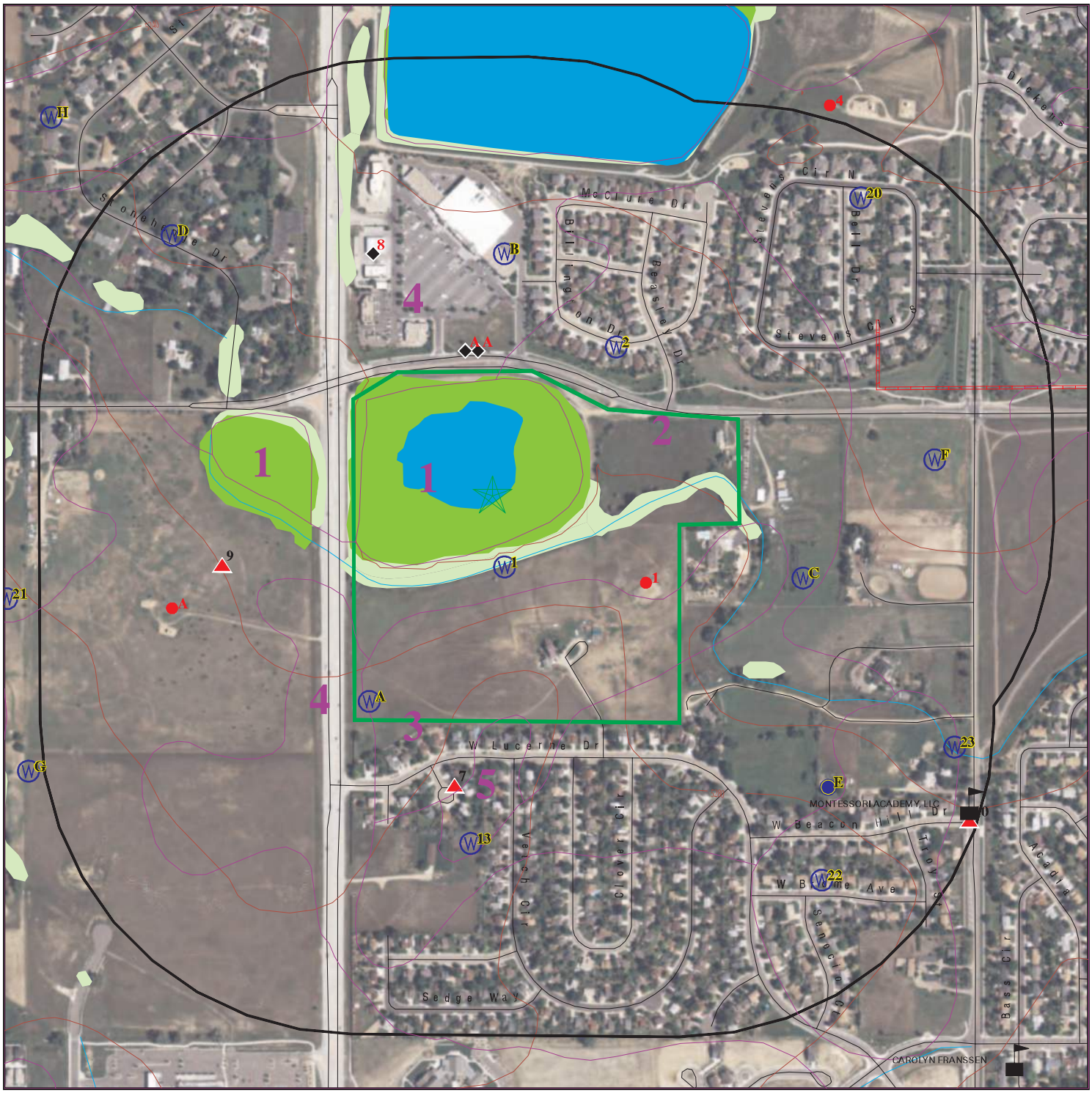
- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- Pipelines
- 100-year flood zone
- 500-year flood zone
- National Wetland Inventory
- State Wetlands

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: Vacant Land	CLIENT: Salem Engineering Group
ADDRESS: Arapahoe Road Erie CO 80026	CONTACT: Maria G. Ruvalcaba
LAT/LONG: 40.013744 / 105.100529	INQUIRY #: 4589777.2s DATE: April 12, 2016 1:39 pm

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DETAIL MAP - 4589777.2S



Target Property

Sites at elevations higher than or equal to the target property

Sites at elevations lower than the target property

Manufactured Gas Plants

Sensitive Receptors

National Priority List Sites

Dept. Defense Sites

0 1/16 1/8 1/4 Miles

Indian Reservations BIA

Pipelines

100-year flood zone

500-year flood zone

National Wetland Inventory

State Wetlands

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME:	Vacant Land	CLIENT:	Salem Engineering Group
ADDRESS:	Arapahoe Road Erie CO 80026	CONTACT:	Maria G. Ruvalcaba
LAT/LONG:	40.013744 / 105.100529	INQUIRY #:	4589777.2s
		DATE:	April 12, 2016 1:39 pm

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MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Federal NPL site list								
NPL	1.000		0	0	0	0	NR	0
Proposed NPL	1.000		0	0	0	0	NR	0
NPL LIENS	0.001		0	NR	NR	NR	NR	0
Federal Delisted NPL site list								
Delisted NPL	1.000		0	0	0	0	NR	0
Federal CERCLIS list								
FEDERAL FACILITY	0.500		0	0	0	NR	NR	0
SEMS	0.500		0	0	0	NR	NR	0
Federal CERCLIS NFRAP site list								
SEMS-ARCHIVE	0.500		0	0	0	NR	NR	0
Federal RCRA CORRACTS facilities list								
CORRACTS	1.000		0	0	0	0	NR	0
Federal RCRA non-CORRACTS TSD facilities list								
RCRA-TSDF	0.500		0	0	0	NR	NR	0
Federal RCRA generators list								
RCRA-LQG	0.250		0	0	NR	NR	NR	0
RCRA-SQG	0.250		0	0	NR	NR	NR	0
RCRA-CESQG	0.250		1	0	NR	NR	NR	1
Federal institutional controls / engineering controls registries								
LUCIS	0.500		0	0	0	NR	NR	0
US ENG CONTROLS	0.500		0	0	0	NR	NR	0
US INST CONTROL	0.500		0	0	0	NR	NR	0
Federal ERNS list								
ERNS	0.001		0	NR	NR	NR	NR	0
State- and tribal - equivalent CERCLIS								
SHWS	N/A		N/A	N/A	N/A	N/A	N/A	N/A
State and tribal landfill and/or solid waste disposal site lists								
SWF/LF	0.500		0	0	0	NR	NR	0
State and tribal leaking storage tank lists								
LUST	0.500		0	0	0	NR	NR	0
LAST	0.500		0	0	0	NR	NR	0
INDIAN LUST	0.500		0	0	0	NR	NR	0
LUST TRUST	0.500		0	0	0	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
State and tribal registered storage tank lists								
FEMA UST	0.250		0	0	NR	NR	NR	0
UST	0.250		1	0	NR	NR	NR	1
AST	0.250		1	0	NR	NR	NR	1
INDIAN UST	0.250		0	0	NR	NR	NR	0
State and tribal institutional control / engineering control registries								
AUL	0.500		0	0	0	NR	NR	0
State and tribal voluntary cleanup sites								
INDIAN VCP	0.500		0	0	0	NR	NR	0
VCP	0.500		0	0	0	NR	NR	0
State and tribal Brownfields sites								
BROWNFIELDS	0.500		0	0	0	NR	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS	0.500		0	0	0	NR	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
HIST LF	0.500		0	0	0	NR	NR	0
SWRCY	0.500		0	0	0	NR	NR	0
INDIAN ODI	0.500		0	0	0	NR	NR	0
ODI	0.500		0	0	0	NR	NR	0
DEBRIS REGION 9	0.500		0	0	0	NR	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US HIST CDL	0.001		0	NR	NR	NR	NR	0
CDL	0.001		0	NR	NR	NR	NR	0
US CDL	0.001		0	NR	NR	NR	NR	0
Local Land Records								
LIENS 2	0.001		0	NR	NR	NR	NR	0
Records of Emergency Release Reports								
HMIRS	0.001		0	NR	NR	NR	NR	0
CO ERNS	0.001		0	NR	NR	NR	NR	0
SPILLS 90	0.001		0	NR	NR	NR	NR	0
Other Ascertainable Records								
RCRA NonGen / NLR	0.250		0	1	NR	NR	NR	1
FUDS	1.000		0	0	0	0	NR	0
DOD	1.000		0	0	0	0	NR	0
SCRD DRYCLEANERS	0.500		0	0	0	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
US FIN ASSUR	0.001		0	NR	NR	NR	NR	0
EPA WATCH LIST	0.001		0	NR	NR	NR	NR	0
2020 COR ACTION	0.250		0	0	NR	NR	NR	0
TSCA	0.001		0	NR	NR	NR	NR	0
TRIS	0.001		0	NR	NR	NR	NR	0
SSTS	0.001		0	NR	NR	NR	NR	0
ROD	1.000		0	0	0	0	NR	0
RMP	0.001		0	NR	NR	NR	NR	0
RAATS	0.001		0	NR	NR	NR	NR	0
PRP	0.001		0	NR	NR	NR	NR	0
PADS	0.001		0	NR	NR	NR	NR	0
ICIS	0.001		0	NR	NR	NR	NR	0
FTTS	0.001		0	NR	NR	NR	NR	0
MLTS	0.001		0	NR	NR	NR	NR	0
COAL ASH DOE	0.001		0	NR	NR	NR	NR	0
COAL ASH EPA	0.500		0	0	0	NR	NR	0
PCB TRANSFORMER	0.001		0	NR	NR	NR	NR	0
RADINFO	0.001		0	NR	NR	NR	NR	0
HIST FTTS	0.001		0	NR	NR	NR	NR	0
DOT OPS	0.001		0	NR	NR	NR	NR	0
CONSENT	1.000		0	0	0	0	NR	0
INDIAN RESERV	0.001		0	NR	NR	NR	NR	0
FUSRAP	1.000		0	0	0	0	NR	0
UMTRA	0.500		0	0	0	NR	NR	0
LEAD SMELTERS	0.001		0	NR	NR	NR	NR	0
US AIRS	0.001		0	NR	NR	NR	NR	0
US MINES	0.250		0	0	NR	NR	NR	0
FINDS	0.001		0	NR	NR	NR	NR	0
AIRS	0.001		0	NR	NR	NR	NR	0
ASBESTOS	0.001		0	NR	NR	NR	NR	0
METHANE SITE	0.001		0	NR	NR	NR	NR	0
Methane Investigation	0.001		0	NR	NR	NR	NR	0
DRYCLEANERS	0.250		0	0	NR	NR	NR	0
Financial Assurance	0.001		0	NR	NR	NR	NR	0
MINES	0.250		1	0	NR	NR	NR	1
NPDES	0.001		0	NR	NR	NR	NR	0
UMTRA	0.500		0	0	0	NR	NR	0
FUELS PROGRAM	0.250		0	0	NR	NR	NR	0
ECHO	0.001		0	NR	NR	NR	NR	0
EDR HIGH RISK HISTORICAL RECORDS								
EDR Exclusive Records								
EDR MGP	1.000		0	0	0	0	NR	0
EDR Hist Auto	0.125		3	NR	NR	NR	NR	3
EDR Hist Cleaner	0.125		2	NR	NR	NR	NR	2
EDR RECOVERED GOVERNMENT ARCHIVES								
Exclusive Recovered Govt. Archives								
RGA LF	0.001		0	NR	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
RGA LUST	0.001		0	NR	NR	NR	NR	0
- Totals --		0	9	1	0	0	0	10

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

N/A = This State does not maintain a SHWS list. See the Federal CERCLIS list.

A1
NNW
< 1/8
0.016 mi.
84 ft.

Relative:
Lower

Actual:
5255 ft.

EDR Hist Cleaner **1015045275**
N/A

3335 ARAPAHOE RD
ERIE, CO 80516

Site 1 of 6 in cluster A

EDR Historical Cleaners:

Name:	HERITAGE CLEANERS
Year:	2010
Address:	3335 ARAPAHOE RD
Name:	HERITAGE CLEANERS
Year:	2011
Address:	3335 ARAPAHOE RD
Name:	HERITAGE CLEANERS
Year:	2012
Address:	3335 ARAPAHOE RD

A2
North
< 1/8
0.016 mi.
86 ft.

Relative:
Lower

Actual:
5255 ft.

EDR Hist Auto **1015432758**
N/A

3332 ARAPAHOE RD
ERIE, CO 80516

Site 2 of 6 in cluster A

EDR Historical Auto Stations:

Name:	GREAT AMERICAN TIRE & AUTO INC
Year:	2004
Address:	3332 ARAPAHOE RD
Name:	GREAT AMERICAN TIRE & AUTO CENTER
Year:	2005
Address:	3332 ARAPAHOE RD

A3
North
< 1/8
0.016 mi.
86 ft.

Relative:
Lower

Actual:
5255 ft.

GREAT AMERICAN TIRE AND AUTO SERVICE #114 **AST** **A100288595**
3332 ARAPAHOE RD **N/A**
ERIE, CO 80516

Site 3 of 6 in cluster A

AST:

Facility ID:	15148

Owner:

Owner Id:	18222
Owner Name:	Great American LLC
Owner Address:	5670 Greenwood Plaza Blvd Ste 350
Owner City/State/Zip:	Greenwood Village, CO 80111
Owner County:	Arapahoe
Tank Tag:	15148-1
Tank Status:	Temporarily Out Of Use
Date Tank Installed:	Not reported
Tank Age:	Not reported
Tank Contents:	Oil/Other (Multi-Comp)
Tank Type:	AST
Tank Tag:	15148-2
Tank Status:	Temporarily Out Of Use

GREAT AMERICAN TIRE AND AUTO SERVICE #114 (Continued) **A100288595**

Date Tank Installed: Not reported
Tank Age: Not reported
Tank Contents: Waste Oil
Tank Type: AST

Tank Tag: 15148-3
Tank Status: Permanently Closed
Date Tank Installed: Not reported
Tank Age: Not reported
Tank Contents: LPG
Tank Type: LPG

A4 **EDR Hist Auto** **1015432793**
North **3333 ARAPAHOE RD** **N/A**
< 1/8 **ERIE, CO 80516**
0.016 mi.
87 ft. **Site 4 of 6 in cluster A**

Relative:
Lower

Actual:
5255 ft.

EDR Historical Auto Stations:
Name: GREAT AMERICAN FAST LUBE
Year: 2001
Address: 3333 ARAPAHOE RD

Name: GREAT AMRCN TIRE & AUTO SRVC
Year: 2002
Address: 3333 ARAPAHOE RD

A5 **SAFEWAY STORE # 1667** **RCRA-CESQG** **1016955460**
North **3333 ARAPAHOE RD #B** **COR000234740**
< 1/8 **ERIE, CO 80516**
0.016 mi.
87 ft. **Site 5 of 6 in cluster A**

Relative:
Lower

Actual:
5255 ft.

RCRA-CESQG:
Date form received by agency: 09/03/2014
Facility name: SAFEWAY STORE # 1667
Facility address: 3333 ARAPAHOE RD #B
ERIE, CO 80516
EPA ID: COR000234740
Mailing address: STONERIDGE MALL RD
PLEASANTON, CA 94588
Contact: KEITH B POWERS
Contact address: STONERIDGE MALL RD
PLEASANTON, CA 94588
Contact country: US
Contact telephone: 925-226-5655
Contact email: KEITH.POWERS@SAFEWAY.COM
EPA Region: 08
Classification: Conditionally Exempt Small Quantity Generator
Description: Handler: generates 100 kg or less of hazardous waste per calendar month, and accumulates 1000 kg or less of hazardous waste at any time; or generates 1 kg or less of acutely hazardous waste per calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste; or generates 100 kg or less

SAFEWAY STORE # 1667 (Continued) **1016955460**

of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste during any calendar month, and accumulates at any time: 1 kg or less of acutely hazardous waste; or 100 kg or less of any residue or contaminated soil, waste or other debris resulting from the cleanup of a spill, into or on any land or water, of acutely hazardous waste

Owner/Operator Summary:

Owner/operator name:	ARAPAHOE RIDGE RETAIL CENTER LLC
Owner/operator address:	AVENUE OF THE STAR LOS ANGELES, 90067
Owner/operator country:	US
Owner/operator telephone:	Not reported
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	09/03/2014
Owner/Op end date:	Not reported

Owner/operator name:	SAFEWAY STORE #1667
Owner/operator address:	ARAPAHOE RD #B ERIE, 80516
Owner/operator country:	US
Owner/operator telephone:	Not reported
Legal status:	Private
Owner/Operator Type:	Operator
Owner/Op start date:	09/03/2014
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	No
Mixed waste (haz. and radioactive):	No
Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	No
Furnace exemption:	No
Used oil fuel burner:	No
Used oil processor:	No
User oil refiner:	No
Used oil fuel marketer to burner:	No
Used oil Specification marketer:	No
Used oil transfer facility:	No
Used oil transporter:	No

. Waste code:	D001
. Waste name:	IGNITABLE WASTE

. Waste code:	D002
. Waste name:	CORROSIVE WASTE

. Waste code:	P075
. Waste name:	NICOTINE, & SALTS (OR) PYRIDINE, 3-(1-METHYL-2-PYRROLIDINYL)-,(S)-, & SALTS

SAFEWAY STORE # 1667 (Continued) **1016955460**

Violation Status: No violations found

A6 **EDR Hist Cleaner** **1015045227**
North **3333 ARAPAHOE RD** **N/A**
< 1/8 **ERIE, CO 80516**
0.016 mi.
87 ft. **Site 6 of 6 in cluster A**

Relative:
Lower

Actual:
5255 ft.

EDR Historical Cleaners:

Name:	HERITAGE CLEANERS ERIE
Year:	2004
Address:	3333 ARAPAHOE RD
Name:	HERITAGE CLEANERS ERIE
Year:	2005
Address:	3333 ARAPAHOE RD
Name:	HERITAGE CLEANERS ERIE
Year:	2006
Address:	3333 ARAPAHOE RD
Name:	HERITAGE CLEANERS ERIE
Year:	2007
Address:	3333 ARAPAHOE RD
Name:	HERITAGE CLEANERS ERIE
Year:	2008
Address:	3333 ARAPAHOE RD

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7 **EDR Hist Auto** **1015609616**
South **708 KNOB CT** **N/A**
< 1/8 **LAFAYETTE, CO 80026**
0.051 mi.
271 ft.

Relative:
Higher

Actual:
5305 ft.

EDR Historical Auto Stations:

Name:	MOTOR ART
Year:	2003
Address:	708 KNOB CT

---

8 **CIRCLE K STORE #2709895** **UST** **U003806172**
NNW **3334 ARAPAHOE** **N/A**
< 1/8 **ERIE, CO 80516**
0.096 mi.
509 ft.

Relative:
Lower

Actual:
5245 ft.

CO UST:

Facility ID:	15306

Owner:

Owner Id:	20775
Owner Name:	Circle K Stores Inc
Owner Address:	1130 W Warner Rd
Owner City/State/Zip:	Tempe, AZ 85284
Owner County:	Maricopa

CIRCLE K STORE #2709895 (Continued) **U003806172**

Tank Tag:	15306-1
Tank Status:	Currently In Use
Date Tank Installed:	02/04/2000
Tank Age:	15.7050835553019
Tank Chemical:	Gasoline - Unleaded Regular (RUL)
Tank Type:	UST

Tank Tag:	15306-2
Tank Status:	Currently In Use
Date Tank Installed:	02/04/2000
Tank Age:	15.7050835553019
Tank Chemical:	Gasoline - Premium (PUL)
Tank Type:	UST

Tank Tag:	15306-3
Tank Status:	Currently In Use
Date Tank Installed:	02/04/2000
Tank Age:	15.7050835553019
Tank Chemical:	Diesel
Tank Type:	UST

---

9 **SHIRK BORROW PIT** **MINES** **S112329491**
WSW **N/A**
< 1/8 **BOULDER (County), CO**
0.105 mi.
553 ft.

Relative:
Higher

Actual:
5280 ft.

MINES:

Facility Id:	M1983042
Mine Type:	Surface
Status Description:	Terminated
Date Status:	03/20/1986
Permittee:	Flatiron Paving Company
Permit Type:	111
Date Permit Issued:	03/24/1983
Permit Acreage:	8.5
Commodity 2:	Not reported
Annual Fee:	350
Required Surety:	0
Required I:	48
Actual Surety:	0
Township:	1
North or South:	N
Range:	69
Range Direction:	W
Prime Meridian:	06
Section:	34
Quarter:	NW
Quarter Quarter:	NE
Quarter1:	Not reported
UTM X:	491074.5
UTM Y:	4428986.4000000004
PS X UTM:	491074.5
PS Y UTM:	4428986.4000000004
Latitutde:	40.012920000000001
Longitude:	-105.10458

SHIRK BORROW PIT (Continued) **S112329491**

Post Mining:	Rangeland
Pre Mining:	Rangeland
Max Allowed Disturbed Acres:	8.5
Affected Acres:	8
Date Last Inspection:	Not reported
Mineral Owner:	Private
Surface Owner:	Private
Permit Specialist Assigned:	LKW

10
SE
1/8-1/4
0.243 mi.
1285 ft.

Relative:
Higher

Actual:
5262 ft.

NUOCI ESTATES: NICHOLAS & GRACE NUOCI **RCRA NonGen / NLR** **1007370185**
1021 N 111TH ST **COR000208140**
LAFAYETTE, CO 80026

RCRA NonGen / NLR:

Date form received by agency:	04/19/2004
Facility name:	NUOCI ESTATES: NICHOLAS & GRACE NUOCI
Facility address:	1021 N 111TH ST LAFAYETTE, CO 80026
EPA ID:	COR000208140
Mailing address:	N 111TH ST LAFAYETTE, CO 80026
Contact:	HARRY GRACE
Contact address:	STONEHEDGE DR LAFAYETTE, CO 80026
Contact country:	US
Contact telephone:	(303) 673-9765
Contact email:	Not reported
EPA Region:	08
Classification:	Non-Generator
Description:	Handler: Non-Generators do not presently generate hazardous waste

Owner/Operator Summary:

Owner/operator name:	ESTATES OF NICHOLAS NUOCI & GRACE NUOCI
Owner/operator address:	COFFMAN ST STE 200 C/O GRANT,GRANT & GOIRAN LAFAYETTE, CO 80520
Owner/operator country:	US
Owner/operator telephone:	(303) 673-9765
Legal status:	Private
Owner/Operator Type:	Owner
Owner/Op start date:	04/19/2004
Owner/Op end date:	Not reported

Owner/operator name:	NUOCI ESTATES: NICHOLAS & GRACE NUOCI
Owner/operator address:	N 111TH ST LAFAYETTE, CO 80026
Owner/operator country:	US
Owner/operator telephone:	(303) 673-9765
Legal status:	Private
Owner/Operator Type:	Operator
Owner/Op start date:	04/19/2004
Owner/Op end date:	Not reported

Handler Activities Summary:

U.S. importer of hazardous waste:	No
Mixed waste (haz. and radioactive):	No

NUOCI ESTATES: NICHOLAS & GRACE NUOCI (Continued) **1007370185**

Recycler of hazardous waste:	No
Transporter of hazardous waste:	No
Treater, storer or disposer of HW:	No
Underground injection activity:	No
On-site burner exemption:	No
Furnace exemption:	No
Used oil fuel burner:	No
Used oil processor:	No
User oil refiner:	No
Used oil fuel marketer to burner:	No
Used oil Specification marketer:	No
Used oil transfer facility:	No
Used oil transporter:	No

. Waste code: D001
. Waste name: IGNITABLE WASTE

. Waste code: D002
. Waste name: CORROSIVE WASTE

. Waste code: D003
. Waste name: REACTIVE WASTE

. Waste code: F001
. Waste name: THE FOLLOWING SPENT HALOGENATED SOLVENTS USED IN DEGREASING: TETRACHLOROETHYLENE, TRICHLORETHYLENE, METHYLENE CHLORIDE, 1,1,1-TRICHLOROETHANE, CARBON TETRACHLORIDE AND CHLORINATED FLUOROCARBONS; ALL SPENT SOLVENT MIXTURES/BLENDS USED IN DEGREASING CONTAINING, BEFORE USE, A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THE ABOVE HALOGENATED SOLVENTS OR THOSE SOLVENTS LISTED IN F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

. Waste code: F003
. Waste name: THE FOLLOWING SPENT NONHALOGENATED SOLVENTS: XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANONE, AND METHANOL; ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONLY THE ABOVE SPENT NONHALOGENATED SOLVENTS; AND ALL SPENT SOLVENT MIXTURES/BLENDS CONTAINING, BEFORE USE, ONE OR MORE OF THE ABOVE NONHALOGENATED SOLVENTS, AND A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) OF ONE OR MORE OF THOSE SOLVENTS LISTED IN F001, F002, F004, AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF THESE SPENT SOLVENTS AND SPENT SOLVENT MIXTURES.

. Waste code: F027
. Waste name: DISCARDED UNUSED FORMULATIONS CONTAINING TRI-, TETRA-, OR PENTACHLOROPHENOL OR DISCARDED UNUSED FORMULATIONS CONTAINING COMPOUNDS DERIVED FROM THESE CHLOROPHENOLS. (THIS LISTING DOES NOT INCLUDE FORMULATIONS CONTAINING HEXACHLOROPHENE SYNTHESIZED FROM PREPURIFIED 2,4,5-TRICHLOROPHENOL AS THE SOLE COMPONENT.)

. Waste code: P075
. Waste name: NICOTINE, & SALTS (OR) PYRIDINE, 3-(1-METHYL-2-PYRROLIDINYL)-,(S)-, & SALTS

. Waste code: P115

NUOCI ESTATES: NICHOLAS & GRACE NUOCI (Continued) **1007370185**

. Waste name: SULFURIC ACID, DITHALLIUM (1+) SALT (OR) THALLIUM(I) SULFATE

. Waste code: U036
. Waste name: 4,7-METHANO-1H-INDENE, 1,2,4,5,6,7,8,8-OCTACHLORO-2,3,3A,4,7,7A-HEXAHYDRO- (OR) CHLORDANE, ALPHA & GAMMA ISOMERS

. Waste code: U051
. Waste name: CREOSOTE

. Waste code: U061
. Waste name: BENZENE, 1,1'-(2,2,2-TRICHLOROETHYLIDENE)BIS[4-CHLORO- (OR) DDT

. Waste code: U103
. Waste name: DIMETHYL SULFATE (OR) SULFURIC ACID, DIMETHYL ESTER

. Waste code: U122
. Waste name: FORMALDEHYDE

. Waste code: U129
. Waste name: CYCLOHEXANE, 1,2,3,4,5,6-HEXACHLORO-, (1ALPHA, 2ALPHA, 3BETA, 4ALPHA, 5ALPHA, 6BETA)- (OR) LINDANE

. Waste code: U154
. Waste name: METHANOL (I) (OR) METHYL ALCOHOL (I)

. Waste code: U247
. Waste name: BENZENE, 1,1'-(2,2,2-TRICHLOROETHYLIDENE)BIS[4-METHOXY- (OR) METHOXYCHLOR

Violation Status: No violations found

Count: 0 records. ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
		NO SITES FOUND			

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 10/30/2015
Date Data Arrived at EDR: 11/07/2015
Date Made Active in Reports: 01/04/2016
Number of Days to Update: 58

Source: EPA
Telephone: N/A
Last EDR Contact: 04/05/2016
Next Scheduled EDR Contact: 04/18/2016
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 6
Telephone: 214-655-6659

EPA Region 3
Telephone 215-814-5418

EPA Region 7
Telephone: 913-551-7247

EPA Region 4
Telephone 404-562-8033

EPA Region 8
Telephone: 303-312-6774

EPA Region 5
Telephone 312-886-6686

EPA Region 9
Telephone: 415-947-4246

EPA Region 10
Telephone 206-553-8665

Proposed NPL: Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 10/30/2015
Date Data Arrived at EDR: 11/07/2015
Date Made Active in Reports: 01/04/2016
Number of Days to Update: 58

Source: EPA
Telephone: N/A
Last EDR Contact: 04/05/2016
Next Scheduled EDR Contact: 04/18/2016
Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Federal Delisted NPL site list

Delisted NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 10/30/2015
Date Data Arrived at EDR: 11/07/2015
Date Made Active in Reports: 01/04/2016
Number of Days to Update: 58

Source: EPA
Telephone: N/A
Last EDR Contact: 04/05/2016
Next Scheduled EDR Contact: 04/18/2016
Data Release Frequency: Quarterly

Federal CERCLIS list

FEDERAL FACILITY: Federal Facility Site Information listing

A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPA Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Date of Government Version: 03/26/2015
Date Data Arrived at EDR: 04/08/2015
Date Made Active in Reports: 06/11/2015
Number of Days to Update: 64

Source: Environmental Protection Agency
Telephone: 703-603-8704
Last EDR Contact: 04/08/2016
Next Scheduled EDR Contact: 07/18/2016
Data Release Frequency: Varies

SEMS: Superfund Enterprise Management System

SEMS (Superfund Enterprise Management System) tracks hazardous waste sites, potentially hazardous waste sites, and remedial activities performed in support of EPA's Superfund Program across the United States. The list was formerly know as CERCLIS, renamed to SEMS by the EPA in 2015. The list contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This dataset also contains sites which are either proposed to or on the National Priorities List (NPL) and the sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 01/11/2016
Date Data Arrived at EDR: 01/22/2016
Date Made Active in Reports: 03/18/2016
Number of Days to Update: 56

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 04/05/2016
Next Scheduled EDR Contact: 06/06/2016
Data Release Frequency: Quarterly

Federal CERCLIS NFRAP site list

SEMS-ARCHIVE: Superfund Enterprise Management System Archive

SEMS-ARCHIVE (Superfund Enterprise Management System Archive) tracks sites that have no further interest under the Federal Superfund Program based on available information. The list was formerly known as the CERCLIS-NFRAP, renamed to SEMS ARCHIVE by the EPA in 2015. EPA may perform a minimal level of assessment work at a site while it is archived if site conditions change and/or new information becomes available. Archived sites have been removed and archived from the inventory of SEMS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list the site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. The decision does not necessarily mean that there is no hazard associated with a given site; it only means that. based upon available information, the location is not judged to be potential NPL site.

Date of Government Version: 01/11/2016
Date Data Arrived at EDR: 01/22/2016
Date Made Active in Reports: 03/18/2016
Number of Days to Update: 56

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 04/05/2016
Next Scheduled EDR Contact: 06/06/2016
Data Release Frequency: Quarterly

Federal RCRA CORRACTS facilities list

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 12/09/2015
Date Data Arrived at EDR: 03/02/2016
Date Made Active in Reports: 04/05/2016
Number of Days to Update: 34

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 03/30/2016
Next Scheduled EDR Contact: 07/11/2016
Data Release Frequency: Quarterly

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF: RCRA - Treatment, Storage and Disposal

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 12/09/2015
Date Data Arrived at EDR: 03/02/2016
Date Made Active in Reports: 04/05/2016
Number of Days to Update: 34

Source: Environmental Protection Agency
Telephone: 303-312-6149
Last EDR Contact: 03/30/2016
Next Scheduled EDR Contact: 07/11/2016
Data Release Frequency: Quarterly

Federal RCRA generators list

RCRA-LQG: RCRA - Large Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 12/09/2015
Date Data Arrived at EDR: 03/02/2016
Date Made Active in Reports: 04/05/2016
Number of Days to Update: 34

Source: Environmental Protection Agency
Telephone: 303-312-6149
Last EDR Contact: 03/30/2016
Next Scheduled EDR Contact: 07/11/2016
Data Release Frequency: Quarterly

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 12/09/2015
Date Data Arrived at EDR: 03/02/2016
Date Made Active in Reports: 04/05/2016
Number of Days to Update: 34

Source: Environmental Protection Agency
Telephone: 303-312-6149
Last EDR Contact: 03/30/2016
Next Scheduled EDR Contact: 07/11/2016
Data Release Frequency: Quarterly

RCRA-CESQG: RCRA - Conditionally Exempt Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 12/09/2015
Date Data Arrived at EDR: 03/02/2016
Date Made Active in Reports: 04/05/2016
Number of Days to Update: 34

Source: Environmental Protection Agency
Telephone: 303-312-6149
Last EDR Contact: 03/30/2016
Next Scheduled EDR Contact: 07/11/2016
Data Release Frequency: Varies

Federal institutional controls / engineering controls registries

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 05/28/2015
Date Data Arrived at EDR: 05/29/2015
Date Made Active in Reports: 06/11/2015
Number of Days to Update: 13

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 02/16/2016
Next Scheduled EDR Contact: 05/30/2016
Data Release Frequency: Varies

US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 09/10/2015
Date Data Arrived at EDR: 09/11/2015
Date Made Active in Reports: 11/03/2015
Number of Days to Update: 53

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 02/29/2016
Next Scheduled EDR Contact: 06/13/2016
Data Release Frequency: Varies

US INST CONTROL: Sites with Institutional Controls

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 09/10/2015
Date Data Arrived at EDR: 09/11/2015
Date Made Active in Reports: 11/03/2015
Number of Days to Update: 53

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 02/29/2016
Next Scheduled EDR Contact: 06/13/2016
Data Release Frequency: Varies

Federal ERNS list

ERNS: Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 06/22/2015
Date Data Arrived at EDR: 06/26/2015
Date Made Active in Reports: 09/16/2015
Number of Days to Update: 82

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 03/30/2016
Next Scheduled EDR Contact: 07/11/2016
Data Release Frequency: Annually

State- and tribal - equivalent CERCLIS

SHWS: This state does not maintain a SHWS list. See the Federal CERCLIS list and Federal NPL list.

State Hazardous Waste Sites. State hazardous waste site records are the states' equivalent to CERCLIS. These sites may or may not already be listed on the federal CERCLIS list. Priority sites planned for cleanup using state funds (state equivalent of Superfund) are identified along with sites where cleanup will be paid for by potentially responsible parties. Available information varies by state.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: Department of Public Health & Environment
Telephone: 303-692-3300
Last EDR Contact: 02/16/2016
Next Scheduled EDR Contact: 05/30/2016
Data Release Frequency: N/A

State and tribal landfill and/or solid waste disposal site lists

SWF/LF: Solid Waste Sites & Facilities

Solid Waste Facilities/Landfill Sites. SWF/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 12/04/2014
Date Data Arrived at EDR: 02/13/2015
Date Made Active in Reports: 03/04/2015
Number of Days to Update: 19

Source: Department of Public Health & Environment
Telephone: 303-692-3300
Last EDR Contact: 02/12/2016
Next Scheduled EDR Contact: 05/23/2016
Data Release Frequency: Annually

State and tribal leaking storage tank lists

LUST: Leaking Underground Storage Tank List

Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state.

Date of Government Version: 01/19/2016
Date Data Arrived at EDR: 01/22/2016
Date Made Active in Reports: 03/04/2016
Number of Days to Update: 42

Source: Department of Labor and Employment, Oil Inspection Section
Telephone: 303-318-8521
Last EDR Contact: 03/07/2016
Next Scheduled EDR Contact: 06/20/2016
Data Release Frequency: Quarterly

LAST: Leaking Aboveground Storage Tank Listing

A listing of leaking aboveground storage tank sites.

Date of Government Version: 01/19/2016
Date Data Arrived at EDR: 01/22/2016
Date Made Active in Reports: 03/04/2016
Number of Days to Update: 42

Source: Department of Labor & Employment
Telephone: 303-318-8525
Last EDR Contact: 03/17/2016
Next Scheduled EDR Contact: 06/20/2016
Data Release Frequency: Varies

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 03/30/2015
Date Data Arrived at EDR: 04/28/2015
Date Made Active in Reports: 06/22/2015
Number of Days to Update: 55

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 01/25/2016
Next Scheduled EDR Contact: 05/09/2016
Data Release Frequency: Varies

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 08/20/2015
Date Data Arrived at EDR: 10/30/2015
Date Made Active in Reports: 02/18/2016
Number of Days to Update: 111

Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 01/25/2016
Next Scheduled EDR Contact: 05/09/2016
Data Release Frequency: Varies

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 11/24/2015
Date Data Arrived at EDR: 12/01/2015
Date Made Active in Reports: 01/04/2016
Number of Days to Update: 34

Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 01/25/2016
Next Scheduled EDR Contact: 05/09/2016
Data Release Frequency: Semi-Annually

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 10/13/2015
Date Data Arrived at EDR: 10/23/2015
Date Made Active in Reports: 02/18/2016
Number of Days to Update: 118

Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 01/25/2016
Next Scheduled EDR Contact: 05/09/2016
Data Release Frequency: Quarterly

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 01/08/2015
Date Data Arrived at EDR: 01/08/2015
Date Made Active in Reports: 02/09/2015
Number of Days to Update: 32

Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 01/27/2016
Next Scheduled EDR Contact: 05/09/2016
Data Release Frequency: Quarterly

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land
A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 10/27/2015
Date Data Arrived at EDR: 10/29/2015
Date Made Active in Reports: 01/04/2016
Number of Days to Update: 67

Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 02/22/2016
Next Scheduled EDR Contact: 05/09/2016
Data Release Frequency: Varies

INDIAN LUST R5: Leaking Underground Storage Tanks on Indian Land
Leaking underground storage tanks located on Indian Land in Michigan, Minnesota and Wisconsin.

Date of Government Version: 11/04/2015
Date Data Arrived at EDR: 11/13/2015
Date Made Active in Reports: 01/04/2016
Number of Days to Update: 52

Source: EPA, Region 5
Telephone: 312-886-7439
Last EDR Contact: 01/25/2016
Next Scheduled EDR Contact: 05/09/2016
Data Release Frequency: Varies

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 01/07/2016
Date Data Arrived at EDR: 01/08/2016
Date Made Active in Reports: 02/18/2016
Number of Days to Update: 41

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 01/25/2016
Next Scheduled EDR Contact: 05/09/2016
Data Release Frequency: Quarterly

TRUST: Lust Trust Sites
Reimbursement application package. The 1989 Colorado General Assembly established Colorado's Petroleum Storage Tank Fund. The Fund reimburses eligible applicants for allowable costs incurred in cleaning up petroleum contamination from underground and aboveground petroleum storage tanks, as well as for third-party liability expenses. Remediation of contamination caused by railroad or aircraft fuel is not eligible for reimbursement. The Fund satisfies federal Environmental Protection Agency financial assurance requirements. Monies in the Fund come from various sources, predominantly the state environmental surcharge imposed on all petroleum products except railroad or aircraft fuel.

Date of Government Version: 10/08/2015
Date Data Arrived at EDR: 10/09/2015
Date Made Active in Reports: 10/14/2015
Number of Days to Update: 5

Source: Department of Labor and Employment, Oil Inspection Section
Telephone: 303-318-8521
Last EDR Contact: 03/15/2016
Next Scheduled EDR Contact: 07/11/2016
Data Release Frequency: Varies

State and tribal registered storage tank lists

FEMA UST: Underground Storage Tank Listing
A listing of all FEMA owned underground storage tanks.

Date of Government Version: 01/01/2010
Date Data Arrived at EDR: 02/16/2010
Date Made Active in Reports: 04/12/2010
Number of Days to Update: 55

Source: FEMA
Telephone: 202-646-5797
Last EDR Contact: 04/11/2016
Next Scheduled EDR Contact: 07/25/2016
Data Release Frequency: Varies

UST: Underground Storage Tank Database
Registered Underground Storage Tanks. UST's are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 09/21/2015
Date Data Arrived at EDR: 09/22/2015
Date Made Active in Reports: 10/21/2015
Number of Days to Update: 29

Source: Department of Labor and Employment, Oil Inspection Section
Telephone: 303-318-8521
Last EDR Contact: 03/07/2016
Next Scheduled EDR Contact: 06/20/2016
Data Release Frequency: Quarterly

AST: Aboveground Tank List
Aboveground storage tank locations.

Date of Government Version: 09/21/2015
Date Data Arrived at EDR: 09/22/2015
Date Made Active in Reports: 10/21/2015
Number of Days to Update: 29

Source: Department of Labor and Employment, Oil Inspection Section
Telephone: 303-318-8521
Last EDR Contact: 03/07/2016
Next Scheduled EDR Contact: 06/20/2016
Data Release Frequency: Semi-Annually

INDIAN UST R7: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 09/23/2014
Date Data Arrived at EDR: 11/25/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 65

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 01/25/2016
Next Scheduled EDR Contact: 05/09/2016
Data Release Frequency: Varies

INDIAN UST R8: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 10/13/2015
Date Data Arrived at EDR: 10/23/2015
Date Made Active in Reports: 02/18/2016
Number of Days to Update: 118

Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 01/25/2016
Next Scheduled EDR Contact: 05/09/2016
Data Release Frequency: Quarterly

INDIAN UST R9: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 12/14/2014
Date Data Arrived at EDR: 02/13/2015
Date Made Active in Reports: 03/13/2015
Number of Days to Update: 28

Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 01/27/2016
Next Scheduled EDR Contact: 05/09/2016
Data Release Frequency: Quarterly

INDIAN UST R10: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 01/07/2016
Date Data Arrived at EDR: 01/08/2016
Date Made Active in Reports: 02/18/2016
Number of Days to Update: 41

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 01/25/2016
Next Scheduled EDR Contact: 05/09/2016
Data Release Frequency: Quarterly

INDIAN UST R6: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 08/20/2015
Date Data Arrived at EDR: 10/30/2015
Date Made Active in Reports: 02/18/2016
Number of Days to Update: 111

Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 01/25/2016
Next Scheduled EDR Contact: 05/09/2016
Data Release Frequency: Semi-Annually

INDIAN UST R1: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 10/20/2015
Date Data Arrived at EDR: 10/29/2015
Date Made Active in Reports: 01/04/2016
Number of Days to Update: 67

Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 02/22/2016
Next Scheduled EDR Contact: 05/09/2016
Data Release Frequency: Varies

INDIAN UST R4: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 11/24/2015
Date Data Arrived at EDR: 12/01/2015
Date Made Active in Reports: 01/04/2016
Number of Days to Update: 34

Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 01/25/2016
Next Scheduled EDR Contact: 05/09/2016
Data Release Frequency: Semi-Annually

INDIAN UST R5: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 11/05/2015
Date Data Arrived at EDR: 11/13/2015
Date Made Active in Reports: 01/04/2016
Number of Days to Update: 52

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 01/25/2016
Next Scheduled EDR Contact: 05/09/2016
Data Release Frequency: Varies

State and tribal institutional control / engineering control registries

AUL: Environmental Real Covenants List

Senate Bill 01-145 gave authority to the Colorado Department of Public Health and Environment to approve requests to restrict the future use of a property using an enforceable agreement called an environmental covenant. When a contaminated site is not cleaned up completely, land use restrictions may be used to ensure that the selected cleanup remedy is adequately protective of human health and the environment.

Date of Government Version: 01/25/2016
Date Data Arrived at EDR: 02/05/2016
Date Made Active in Reports: 03/04/2016
Number of Days to Update: 28

Source: Department of Public Health & Environment
Telephone: 303-692-3331
Last EDR Contact: 02/01/2016
Next Scheduled EDR Contact: 05/16/2016
Data Release Frequency: Varies

State and tribal voluntary cleanup sites

INDIAN VCP R1: Voluntary Cleanup Priority Listing

A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 07/27/2015
Date Data Arrived at EDR: 09/29/2015
Date Made Active in Reports: 02/18/2016
Number of Days to Update: 142

Source: EPA, Region 1
Telephone: 617-918-1102
Last EDR Contact: 04/01/2016
Next Scheduled EDR Contact: 07/11/2016
Data Release Frequency: Varies

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng

A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27

Source: EPA, Region 7
Telephone: 913-551-7365
Last EDR Contact: 04/20/2009
Next Scheduled EDR Contact: 07/20/2009
Data Release Frequency: Varies

VCP: Voluntary Cleanup & Redevelopment Act Application Tracking Report

The Voluntary Cleanup and Redevelopment Act is intended to permit and encourage voluntary cleanups by providing a method to determine clean-up responsibilities in planning the reuse of property. The VCRA was intended for sites which were not covered by existing regulatory programs.

Date of Government Version: 12/16/2015
Date Data Arrived at EDR: 01/13/2016
Date Made Active in Reports: 03/04/2016
Number of Days to Update: 51

Source: Department of Public Health and Environmental
Telephone: 303-692-3331
Last EDR Contact: 01/13/2016
Next Scheduled EDR Contact: 04/25/2016
Data Release Frequency: Semi-Annually

State and tribal Brownfields sites

BROWNFIELDS: Brownfields Sites Listing
Brownfields Sites Listing

Date of Government Version: 01/25/2016
Date Data Arrived at EDR: 01/27/2016
Date Made Active in Reports: 03/04/2016
Number of Days to Update: 37

Source: Department of Public Health & Environment
Telephone: 303-692-3331
Last EDR Contact: 01/25/2016
Next Scheduled EDR Contact: 05/09/2016
Data Release Frequency: Varies

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites
Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped, open land, and both improves and protects the environment. Assessment, Cleanup and Redevelopment Exchange System (ACRES) stores information reported by EPA Brownfields grant recipients on brownfields properties assessed or cleaned up with grant funding as well as information on Targeted Brownfields Assessments performed by EPA Regions. A listing of ACRES Brownfield sites is obtained from Cleanups in My Community. Cleanups in My Community provides information on Brownfields properties for which information is reported back to EPA, as well as areas served by Brownfields grant programs.

Date of Government Version: 12/22/2015
Date Data Arrived at EDR: 12/23/2015
Date Made Active in Reports: 02/18/2016
Number of Days to Update: 57

Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 03/22/2016
Next Scheduled EDR Contact: 07/04/2016
Data Release Frequency: Semi-Annually

Local Lists of Landfill / Solid Waste Disposal Sites

HISTORICAL LANDFILL: Historical Landfill List
Abandoned/Inactive Landfills.

Date of Government Version: 01/31/1993
Date Data Arrived at EDR: 04/24/1994
Date Made Active in Reports: 05/30/1994
Number of Days to Update: 36

Source: Department of Public Health & Environment
Telephone: 303-692-3300
Last EDR Contact: 09/05/1996
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

SWRCY: Registered Recyclers Listing
A listing of registered recycler locations in the state of Colorado.

Date of Government Version: 11/23/2015
Date Data Arrived at EDR: 12/21/2015
Date Made Active in Reports: 02/04/2016
Number of Days to Update: 45

Source: Department of Public Health & Environment
Telephone: 303-692-3337
Last EDR Contact: 03/14/2016
Next Scheduled EDR Contact: 06/27/2016
Data Release Frequency: Varies

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands
Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52

Source: Environmental Protection Agency
Telephone: 703-308-8245
Last EDR Contact: 02/01/2016
Next Scheduled EDR Contact: 05/16/2016
Data Release Frequency: Varies

ODI: Open Dump Inventory
An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 08/09/2004
Date Made Active in Reports: 09/17/2004
Number of Days to Update: 39
Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations
A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009
Date Data Arrived at EDR: 05/07/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 137
Source: EPA, Region 9
Telephone: 415-947-4219
Last EDR Contact: 01/25/2016
Next Scheduled EDR Contact: 05/09/2016
Data Release Frequency: No Update Planned

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL: National Clandestine Laboratory Register
A listing of clandestine drug lab locations that have been removed from the DEAs National Clandestine Laboratory Register.

Date of Government Version: 09/17/2015
Date Data Arrived at EDR: 12/04/2015
Date Made Active in Reports: 02/18/2016
Number of Days to Update: 76
Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 03/01/2016
Next Scheduled EDR Contact: 06/13/2016
Data Release Frequency: No Update Planned

CDL: Meth Lab Locations
Meth lab locations that were reported to the Department of Public Health & Environment.

Date of Government Version: 01/04/2016
Date Data Arrived at EDR: 01/05/2016
Date Made Active in Reports: 03/04/2016
Number of Days to Update: 59
Source: Department of Public Health and Environment
Telephone: 303-692-3023
Last EDR Contact: 04/04/2016
Next Scheduled EDR Contact: 07/18/2016
Data Release Frequency: Quarterly

US CDL: Clandestine Drug Labs
A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 09/17/2015
Date Data Arrived at EDR: 12/04/2015
Date Made Active in Reports: 02/18/2016
Number of Days to Update: 76
Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 03/01/2016
Next Scheduled EDR Contact: 06/13/2016
Data Release Frequency: Quarterly

Local Land Records

LIENS 2: CERCLA Lien Information
A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 02/18/2014
Date Data Arrived at EDR: 03/18/2014
Date Made Active in Reports: 04/24/2014
Number of Days to Update: 37

Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 03/11/2016
Next Scheduled EDR Contact: 05/09/2016
Data Release Frequency: Varies

Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System
Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 06/24/2015
Date Data Arrived at EDR: 06/26/2015
Date Made Active in Reports: 09/02/2015
Number of Days to Update: 68

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 03/30/2016
Next Scheduled EDR Contact: 07/11/2016
Data Release Frequency: Annually

CO ERNS: Spills Database
State reported spills.

Date of Government Version: 01/04/2016
Date Data Arrived at EDR: 01/05/2016
Date Made Active in Reports: 03/04/2016
Number of Days to Update: 59

Source: Department of Public Health and Environmental
Telephone: 303-692-2000
Last EDR Contact: 04/04/2016
Next Scheduled EDR Contact: 07/18/2016
Data Release Frequency: Quarterly

SPILLS 90: SPILLS90 data from FirstSearch
Spills 90 includes those spill and release records available exclusively from FirstSearch databases. Typically, they may include chemical, oil and/or hazardous substance spills recorded after 1990. Duplicate records that are already included in EDR incident and release records are not included in Spills 90.

Date of Government Version: 10/15/2012
Date Data Arrived at EDR: 01/03/2013
Date Made Active in Reports: 02/06/2013
Number of Days to Update: 34

Source: FirstSearch
Telephone: N/A
Last EDR Contact: 01/03/2013
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

Other Ascertainable Records

RCRA NonGen / NLR: RCRA - Non Generators / No Longer Regulated
RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 12/09/2015
Date Data Arrived at EDR: 03/02/2016
Date Made Active in Reports: 04/05/2016
Number of Days to Update: 34

Source: Environmental Protection Agency
Telephone: 303-312-6149
Last EDR Contact: 03/30/2016
Next Scheduled EDR Contact: 07/11/2016
Data Release Frequency: Varies

FUDS: Formerly Used Defense Sites
The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 01/31/2015
Date Data Arrived at EDR: 07/08/2015
Date Made Active in Reports: 10/13/2015
Number of Days to Update: 97

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 03/11/2016
Next Scheduled EDR Contact: 06/20/2016
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 11/10/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 62

Source: USGS
Telephone: 888-275-8747
Last EDR Contact: 01/15/2016
Next Scheduled EDR Contact: 04/25/2016
Data Release Frequency: Semi-Annually

FEDLAND: Federal and Indian Lands

Federally and Indian administrated lands of the United States. Lands included are administrated by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 02/06/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 339

Source: U.S. Geological Survey
Telephone: 888-275-8747
Last EDR Contact: 01/15/2016
Next Scheduled EDR Contact: 04/25/2016
Data Release Frequency: N/A

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing

The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 03/07/2011
Date Data Arrived at EDR: 03/09/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 54

Source: Environmental Protection Agency
Telephone: 615-532-8599
Last EDR Contact: 02/19/2016
Next Scheduled EDR Contact: 05/30/2016
Data Release Frequency: Varies

US FIN ASSUR: Financial Assurance Information

All owners and operators of facilities that treat, store, or dispose of hazardous waste are required to provide proof that they will have sufficient funds to pay for the clean up, closure, and post-closure care of their facilities.

Date of Government Version: 09/01/2015
Date Data Arrived at EDR: 09/03/2015
Date Made Active in Reports: 11/03/2015
Number of Days to Update: 61

Source: Environmental Protection Agency
Telephone: 202-566-1917
Last EDR Contact: 02/16/2016
Next Scheduled EDR Contact: 05/30/2016
Data Release Frequency: Quarterly

EPA WATCH LIST: EPA WATCH LIST

EPA maintains a "Watch List" to facilitate dialogue between EPA, state and local environmental agencies on enforcement matters relating to facilities with alleged violations identified as either significant or high priority. Being on the Watch List does not mean that the facility has actually violated the law only that an investigation by EPA or a state or local environmental agency has led those organizations to allege that an unproven violation has in fact occurred. Being on the Watch List does not represent a higher level of concern regarding the alleged violations that were detected, but instead indicates cases requiring additional dialogue between EPA, state and local agencies - primarily because of the length of time the alleged violation has gone unaddressed or unresolved.

Date of Government Version: 08/30/2013
Date Data Arrived at EDR: 03/21/2014
Date Made Active in Reports: 06/17/2014
Number of Days to Update: 88

Source: Environmental Protection Agency
Telephone: 617-520-3000
Last EDR Contact: 02/09/2016
Next Scheduled EDR Contact: 05/23/2016
Data Release Frequency: Quarterly

2020 COR ACTION: 2020 Corrective Action Program List

The EPA has set ambitious goals for the RCRA Corrective Action program by creating the 2020 Corrective Action Universe. This RCRA cleanup baseline includes facilities expected to need corrective action. The 2020 universe contains a wide variety of sites. Some properties are heavily contaminated while others were contaminated but have since been cleaned up. Still others have not been fully investigated yet, and may require little or no remediation. Inclusion in the 2020 Universe does not necessarily imply failure on the part of a facility to meet its RCRA obligations.

Date of Government Version: 04/22/2013
Date Data Arrived at EDR: 03/03/2015
Date Made Active in Reports: 03/09/2015
Number of Days to Update: 6

Source: Environmental Protection Agency
Telephone: 703-308-4044
Last EDR Contact: 02/12/2016
Next Scheduled EDR Contact: 05/23/2016
Data Release Frequency: Varies

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2012
Date Data Arrived at EDR: 01/15/2015
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 14

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 03/24/2016
Next Scheduled EDR Contact: 07/04/2016
Data Release Frequency: Every 4 Years

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 11/24/2015
Date Made Active in Reports: 04/05/2016
Number of Days to Update: 133

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 02/24/2016
Next Scheduled EDR Contact: 06/06/2016
Data Release Frequency: Annually

SSTS: Section 7 Tracking Systems

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 12/10/2010
Date Made Active in Reports: 02/25/2011
Number of Days to Update: 77

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 01/25/2016
Next Scheduled EDR Contact: 05/09/2016
Data Release Frequency: Annually

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 11/25/2013
Date Data Arrived at EDR: 12/12/2013
Date Made Active in Reports: 02/24/2014
Number of Days to Update: 74

Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 03/08/2016
Next Scheduled EDR Contact: 06/20/2016
Data Release Frequency: Annually

RMP: Risk Management Plans

When Congress passed the Clean Air Act Amendments of 1990, it required EPA to publish regulations and guidance for chemical accident prevention at facilities using extremely hazardous substances. The Risk Management Program Rule (RMP Rule) was written to implement Section 112(r) of these amendments. The rule, which built upon existing industry codes and standards, requires companies of all sizes that use certain flammable and toxic substances to develop a Risk Management Program, which includes a(n): Hazard assessment that details the potential effects of an accidental release, an accident history of the last five years, and an evaluation of worst-case and alternative accidental releases; Prevention program that includes safety precautions and maintenance, monitoring, and employee training measures; and Emergency response program that spells out emergency health care, employee training measures and procedures for informing the public and response agencies (e.g the fire department) should an accident occur.

Date of Government Version: 08/01/2015
Date Data Arrived at EDR: 08/26/2015
Date Made Active in Reports: 11/03/2015
Number of Days to Update: 69

Source: Environmental Protection Agency
Telephone: 202-564-8600
Last EDR Contact: 01/25/2016
Next Scheduled EDR Contact: 05/09/2016
Data Release Frequency: Varies

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Date Data Arrived at EDR: 07/03/1995
Date Made Active in Reports: 08/07/1995
Number of Days to Update: 35

Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 06/02/2008
Next Scheduled EDR Contact: 09/01/2008
Data Release Frequency: No Update Planned

PRP: Potentially Responsible Parties

A listing of verified Potentially Responsible Parties

Date of Government Version: 10/25/2013
Date Data Arrived at EDR: 10/17/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 3

Source: EPA
Telephone: 202-564-6023
Last EDR Contact: 02/12/2016
Next Scheduled EDR Contact: 05/23/2016
Data Release Frequency: Quarterly

PADS: PCB Activity Database System

PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 07/01/2014
Date Data Arrived at EDR: 10/15/2014
Date Made Active in Reports: 11/17/2014
Number of Days to Update: 33

Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 01/12/2016
Next Scheduled EDR Contact: 04/25/2016
Data Release Frequency: Annually

ICIS: Integrated Compliance Information System

The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 01/23/2015
Date Data Arrived at EDR: 02/06/2015
Date Made Active in Reports: 03/09/2015
Number of Days to Update: 31

Source: Environmental Protection Agency
Telephone: 202-564-5088
Last EDR Contact: 04/08/2016
Next Scheduled EDR Contact: 07/25/2016
Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25
Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 02/22/2016
Next Scheduled EDR Contact: 06/06/2016
Data Release Frequency: Quarterly

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25
Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 02/22/2016
Next Scheduled EDR Contact: 06/06/2016
Data Release Frequency: Quarterly

MLTS: Material Licensing Tracking System
MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 06/26/2015
Date Data Arrived at EDR: 07/10/2015
Date Made Active in Reports: 10/13/2015
Number of Days to Update: 95
Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 02/08/2016
Next Scheduled EDR Contact: 05/23/2016
Data Release Frequency: Quarterly

COAL ASH DOE: Steam-Electric Plant Operation Data
A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 08/07/2009
Date Made Active in Reports: 10/22/2009
Number of Days to Update: 76
Source: Department of Energy
Telephone: 202-586-8719
Last EDR Contact: 01/13/2016
Next Scheduled EDR Contact: 04/25/2016
Data Release Frequency: Varies

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List
A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 07/01/2014
Date Data Arrived at EDR: 09/10/2014
Date Made Active in Reports: 10/20/2014
Number of Days to Update: 40
Source: Environmental Protection Agency
Telephone: N/A
Last EDR Contact: 03/11/2016
Next Scheduled EDR Contact: 06/20/2016
Data Release Frequency: Varies

PCB TRANSFORMER: PCB Transformer Registration Database
The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 02/01/2011
Date Data Arrived at EDR: 10/19/2011
Date Made Active in Reports: 01/10/2012
Number of Days to Update: 83
Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 01/29/2016
Next Scheduled EDR Contact: 05/09/2016
Data Release Frequency: Varies

RADINFO: Radiation Information Database
The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 07/07/2015
Date Data Arrived at EDR: 07/09/2015
Date Made Active in Reports: 09/16/2015
Number of Days to Update: 69

Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 04/08/2016
Next Scheduled EDR Contact: 07/18/2016
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing

A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing

A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

DOT OPS: Incident and Accident Data

Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 07/31/2012
Date Data Arrived at EDR: 08/07/2012
Date Made Active in Reports: 09/18/2012
Number of Days to Update: 42

Source: Department of Transporation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 02/03/2016
Next Scheduled EDR Contact: 05/16/2016
Data Release Frequency: Varies

CONSENT: Superfund (CERCLA) Consent Decrees

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 04/17/2015
Date Made Active in Reports: 06/02/2015
Number of Days to Update: 46

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 03/24/2016
Next Scheduled EDR Contact: 07/11/2016
Data Release Frequency: Varies

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2013
Date Data Arrived at EDR: 02/24/2015
Date Made Active in Reports: 09/30/2015
Number of Days to Update: 218

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 02/26/2016
Next Scheduled EDR Contact: 06/06/2016
Data Release Frequency: Biennially

INDIAN RESERV: Indian Reservations

This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 12/08/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 34

Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 01/15/2016
Next Scheduled EDR Contact: 04/25/2016
Data Release Frequency: Semi-Annually

FUSRAP: Formerly Utilized Sites Remedial Action Program

DOE established the Formerly Utilized Sites Remedial Action Program (FUSRAP) in 1974 to remediate sites where radioactive contamination remained from Manhattan Project and early U.S. Atomic Energy Commission (AEC) operations.

Date of Government Version: 11/23/2015
Date Data Arrived at EDR: 11/24/2015
Date Made Active in Reports: 02/18/2016
Number of Days to Update: 86

Source: Department of Energy
Telephone: 202-586-3559
Last EDR Contact: 02/08/2016
Next Scheduled EDR Contact: 05/23/2016
Data Release Frequency: Varies

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 09/14/2010
Date Data Arrived at EDR: 10/07/2011
Date Made Active in Reports: 03/01/2012
Number of Days to Update: 146

Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 03/28/2016
Next Scheduled EDR Contact: 06/06/2016
Data Release Frequency: Varies

LEAD SMELTER 1: Lead Smelter Sites

A listing of former lead smelter site locations.

Date of Government Version: 11/25/2014
Date Data Arrived at EDR: 11/26/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 64

Source: Environmental Protection Agency
Telephone: 703-603-8787
Last EDR Contact: 04/07/2016
Next Scheduled EDR Contact: 07/18/2016
Data Release Frequency: Varies

LEAD SMELTER 2: Lead Smelter Sites

A list of several hundred sites in the U.S. where secondary lead smelting was done from 1931and 1964. These sites may pose a threat to public health through ingestion or inhalation of contaminated soil or dust

Date of Government Version: 04/05/2001
Date Data Arrived at EDR: 10/27/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 36

Source: American Journal of Public Health
Telephone: 703-305-6451
Last EDR Contact: 12/02/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

US AIRS (AFS): Aerometric Information Retrieval System Facility Subsystem (AFS)

The database is a sub-system of Aerometric Information Retrieval System (AIRS). AFS contains compliance data on air pollution point sources regulated by the U.S. EPA and/or state and local air regulatory agencies. This information comes from source reports by various stationary sources of air pollution, such as electric power plants, steel mills, factories, and universities, and provides information about the air pollutants they produce. Action, air program, air program pollutant, and general level plant data. It is used to track emissions and compliance data from industrial plants.

Date of Government Version: 10/20/2015
Date Data Arrived at EDR: 10/27/2015
Date Made Active in Reports: 01/04/2016
Number of Days to Update: 69

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 03/24/2016
Next Scheduled EDR Contact: 07/11/2016
Data Release Frequency: Annually

US AIRS MINOR: Air Facility System Data
A listing of minor source facilities.

Date of Government Version: 10/20/2015
Date Data Arrived at EDR: 10/27/2015
Date Made Active in Reports: 01/04/2016
Number of Days to Update: 69

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 03/24/2016
Next Scheduled EDR Contact: 07/11/2016
Data Release Frequency: Annually

US MINES: Mines Master Index File
Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 08/18/2015
Date Data Arrived at EDR: 09/01/2015
Date Made Active in Reports: 01/04/2016
Number of Days to Update: 125

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 03/02/2016
Next Scheduled EDR Contact: 06/13/2016
Data Release Frequency: Semi-Annually

US MINES 2: Ferrous and Nonferrous Metal Mines Database Listing
This map layer includes ferrous (ferrous metal mines are facilities that extract ferrous metals, such as iron ore or molybdenum) and nonferrous (Nonferrous metal mines are facilities that extract nonferrous metals, such as gold, silver, copper, zinc, and lead) metal mines in the United States.

Date of Government Version: 12/05/2005
Date Data Arrived at EDR: 02/29/2008
Date Made Active in Reports: 04/18/2008
Number of Days to Update: 49

Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 03/04/2016
Next Scheduled EDR Contact: 06/13/2016
Data Release Frequency: Varies

US MINES 3: Active Mines & Mineral Plants Database Listing
Active Mines and Mineral Processing Plant operations for commodities monitored by the Minerals Information Team of the USGS.

Date of Government Version: 04/14/2011
Date Data Arrived at EDR: 06/08/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 97

Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 03/04/2016
Next Scheduled EDR Contact: 06/13/2016
Data Release Frequency: Varies

FINDS: Facility Index System/Facility Registry System
Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 07/20/2015
Date Data Arrived at EDR: 09/09/2015
Date Made Active in Reports: 11/03/2015
Number of Days to Update: 55

Source: EPA
Telephone: (303) 312-6312
Last EDR Contact: 03/08/2016
Next Scheduled EDR Contact: 06/20/2016
Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

AIRS: Permitted Facility & Emissions Listing
A listing of Air Pollution Control Division permits and emissions data.

Date of Government Version: 12/08/2015
Date Data Arrived at EDR: 12/10/2015
Date Made Active in Reports: 02/04/2016
Number of Days to Update: 56

Source: Department of Public Health & Environment
Telephone: 303-692-3213
Last EDR Contact: 03/07/2016
Next Scheduled EDR Contact: 06/20/2016
Data Release Frequency: Varies

ASBESTOS: Asbestos Abatement & Demolition Projects
Asbestos abatement and demolition projects by the contractor.

Date of Government Version: 12/31/2015
Date Data Arrived at EDR: 02/10/2016
Date Made Active in Reports: 03/04/2016
Number of Days to Update: 23

Source: Department of Public Health & Environment
Telephone: 303-692-3100
Last EDR Contact: 02/10/2016
Next Scheduled EDR Contact: 05/23/2016
Data Release Frequency: Semi-Annually

METHANE SITE: Methane Site Investigations - Jefferson County 1980
The objectives of the study are to define as closely as possible the boundaries of methane producing solid waste landfills.

Date of Government Version: 12/31/1980
Date Data Arrived at EDR: 02/13/1995
Date Made Active in Reports: 04/04/1995
Number of Days to Update: 50

Source: Jefferson County Health Department
Telephone: 303-239-7175
Last EDR Contact: 01/27/1995
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

METHANE INVESTIGATION: Methane Gas & Swamp Findings
The primary objective of this study was to assess methane gas related hazards at selected landfill sites in Colorado. These sites were selected by the Colorado Department of Health following evaluation of responses received from County and Municipal agencies about completed and existing landfills within their jurisdiction.

Date of Government Version: 03/15/1979
Date Data Arrived at EDR: 02/13/1995
Date Made Active in Reports: 04/04/1995
Number of Days to Update: 50

Source: Department of Health
Telephone: 303-640-3335
Last EDR Contact: 01/27/1995
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

DRYCLEANERS: Drycleaner Facilities
A listing of drycleaning facilities.

Date of Government Version: 12/08/2015
Date Data Arrived at EDR: 12/28/2015
Date Made Active in Reports: 02/04/2016
Number of Days to Update: 38

Source: Department of Public Health & Environment
Telephone: 303-692-3213
Last EDR Contact: 03/07/2016
Next Scheduled EDR Contact: 06/20/2016
Data Release Frequency: Varies

Financial Assurance 1: Financial Assurance Information Listing
A listing of financial assurance information for hazardous waste facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 01/12/2016
Date Data Arrived at EDR: 01/14/2016
Date Made Active in Reports: 03/04/2016
Number of Days to Update: 50

Source: Department of Public Health & Environment
Telephone: 303-692-3350
Last EDR Contact: 04/04/2016
Next Scheduled EDR Contact: 07/18/2016
Data Release Frequency: Varies

Financial Assurance 2: Financial Assurance Information Listing

A listing of financial assurance information for solid waste facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 01/13/2016
Date Data Arrived at EDR: 01/15/2016
Date Made Active in Reports: 03/04/2016
Number of Days to Update: 49

Source: Department of Public Health & Environment
Telephone: 303-392-3350
Last EDR Contact: 04/04/2016
Next Scheduled EDR Contact: 07/18/2016
Data Release Frequency: Varies

MINES: Permitted Mines Listing

This dataset represents permitted mines in the State of Colorado

Date of Government Version: 09/19/2011
Date Data Arrived at EDR: 12/26/2012
Date Made Active in Reports: 02/01/2013
Number of Days to Update: 37

Source: Division of Reclamation Mining and safety
Telephone: 303-866-3567
Last EDR Contact: 12/26/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

NPDES: Permitted Facility Listing

A listing of permitted facilities from the Water Quality Control Division.

Date of Government Version: 01/31/2016
Date Data Arrived at EDR: 02/05/2016
Date Made Active in Reports: 03/04/2016
Number of Days to Update: 28

Source: Department of Public Health & Environment
Telephone: 303-692-3611
Last EDR Contact: 02/01/2016
Next Scheduled EDR Contact: 05/16/2016
Data Release Frequency: Varies

UMTRA: Uranium Mill Tailings Sites

There were nine uranium mill tailings sites in Colorado designated for cleanup under the federal Uranium Mill Tailings Radiation Control Act. These nine sites, know commonly as UMTRA sites, were remediated jointly by the State of Colorado and the U.S. Department of Energy during the late 1980's and early 1990's. Mill tailings were removed from 8 of the mill sites and relocated in engineered disposal cells. A disposal cell is designed to encapsulate the material, reduce radon emanation, and prevent the movement of water through the material. At one site, Maybell, CO, the tailings were stabilized in-place at the mill site. After remediation of the tailings was completed, the State and DOE began to investigate the residual impacts to groundwater at the mill sites. The groundwater phase of the UMTRA program is on-going.

Date of Government Version: 11/23/2004
Date Data Arrived at EDR: 03/21/2007
Date Made Active in Reports: 05/02/2007
Number of Days to Update: 42

Source: Department of Public Health & Environment
Telephone: 970-248-7164
Last EDR Contact: 02/22/2016
Next Scheduled EDR Contact: 06/06/2016
Data Release Frequency: Varies

ECHO: Enforcement & Compliance History Information

ECHO provides integrated compliance and enforcement information for about 800,000 regulated facilities nationwide.

Date of Government Version: 09/20/2015
Date Data Arrived at EDR: 09/23/2015
Date Made Active in Reports: 01/04/2016
Number of Days to Update: 103

Source: Environmental Protection Agency
Telephone: 202-564-2280
Last EDR Contact: 03/23/2016
Next Scheduled EDR Contact: 07/04/2016
Data Release Frequency: Quarterly

FUELS PROGRAM: EPA Fuels Program Registered Listing

This listing includes facilities that are registered under the Part 80 (Code of Federal Regulations) EPA Fuels Programs. All companies now are required to submit new and updated registrations.

Date of Government Version: 11/23/2015
Date Data Arrived at EDR: 11/24/2015
Date Made Active in Reports: 02/18/2016
Number of Days to Update: 86

Source: EPA
Telephone: 800-385-6164
Last EDR Contact: 02/24/2016
Next Scheduled EDR Contact: 06/06/2016
Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP: EDR Proprietary Manufactured Gas Plants

The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

EDR Hist Auto: EDR Exclusive Historic Gas Stations

EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR Hist Cleaner: EDR Exclusive Historic Dry Cleaners

EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA LF: Recovered Government Archive Solid Waste Facilities List

The EDR Recovered Government Archive Landfill database provides a list of landfills derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Public Health & Environment in Colorado.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 01/15/2014
Number of Days to Update: 198

Source: Department of Public Health & Environment
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

RGA LUST: Recovered Government Archive Leaking Underground Storage Tank

The EDR Recovered Government Archive Leaking Underground Storage Tank database provides a list of LUST incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Labor and Employment, Oil Inspection Section in Colorado.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 01/02/2014
Number of Days to Update: 185

Source: Department of Labor and Employment, Oil Inspection Section
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

COUNTY RECORDS

ADAMS COUNTY:

Summary Report on Methane Gas Hazards and Surveys Conducted on Domestic and Demolition Landfills in Adams County

As of May 8, 1978, all known landfills or dumping sites in the Adams County area have been surveyed.

Date of Government Version: 05/08/1978
Date Data Arrived at EDR: 02/16/1995
Date Made Active in Reports: 04/04/1995
Number of Days to Update: 47

Source: Tri-County Health Department
Telephone: 303-761-1340
Last EDR Contact: 01/27/1995
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

ARAPAHOE COUNTY:

A Survey of Landfills in Arapahoe County

A survey of Arapahoe County was conducted from August through November, 1977, of all open and closed landfills and dumpsites in the county. Each of the sites found was classified as domestic or demolition.

Date of Government Version: 12/31/1978
Date Data Arrived at EDR: 02/16/1995
Date Made Active in Reports: 04/04/1995
Number of Days to Update: 47

Source: Tri-County Health Department
Telephone: 303-761-1340
Last EDR Contact: 01/27/1995
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

BOULDER COUNTY:

Old Landfill Sites

Landfill sites in Boulder county.

Date of Government Version: 05/01/1986
Date Data Arrived at EDR: 11/14/1995
Date Made Active in Reports: 12/07/1995
Number of Days to Update: 23

Source: Boulder County Health Department
Telephone: 303-441-1182
Last EDR Contact: 01/30/1998
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

DENVER COUNTY:

Landfills in Denver County
Landfill sites in the city and county of Denver.

Date of Government Version: 02/13/2014
Date Data Arrived at EDR: 05/16/2014
Date Made Active in Reports: 06/13/2014
Number of Days to Update: 28

Source: City and County of Denver
Telephone: 720-913-4839
Last EDR Contact: 03/24/2016
Next Scheduled EDR Contact: 07/04/2016
Data Release Frequency: No Update Planned

Investigation of Methane Gas Hazards
The purpose of this study was to assess the actual and potential generation, migration, explosive and related problem associated with specified old landfills, and to identify existing and potential problems, suggested strategies to prevent, abate, and control such problems and recommend investigative and monitoring functions as may be deemed necessary. Eight sites determined to be priorities due to population density and potential hazards to population and property were selected by the Colorado Department of Health.

Date of Government Version: 01/01/1981
Date Data Arrived at EDR: 01/29/2013
Date Made Active in Reports: 03/08/2013
Number of Days to Update: 38

Source: City and County of Denver Department of Environmental Health
Telephone: 720-865-5522
Last EDR Contact: 01/15/2013
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

DOUGLAS COUNTY:

Douglas County Landfill Key
Landfill sites in Douglas county.

Date of Government Version: 06/12/1991
Date Data Arrived at EDR: 02/16/1995
Date Made Active in Reports: 04/04/1995
Number of Days to Update: 47

Source: Tri-County Health Department
Telephone: 303-761-1340
Last EDR Contact: 01/27/1995
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

PUEBLO COUNTY:

Designated Disposal & Landfill Sites
Only inert materials. Asphalt, cement, dirt & rock unless otherwise specified. These sites are no longer active.

Date of Government Version: 04/30/1990
Date Data Arrived at EDR: 11/16/1995
Date Made Active in Reports: 12/07/1995
Number of Days to Update: 21

Source: Pueblo City-County Health Department
Telephone: 719-583-4300
Last EDR Contact: 11/13/1995
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

TRI COUNTY:

Tri-County Area Solid Waste Facilities List (Adams, Arapahoe and Douglas Counties)
Closed Domestic Landfills in Adams County, Closed Domestic Landfills in Arapahoe County, Closed Demolition Landfills in Arapahoe County, Closed Domestic Landfills in Douglas County.

Date of Government Version: 10/15/1983
Date Data Arrived at EDR: 02/16/1995
Date Made Active in Reports: 04/04/1995
Number of Days to Update: 47

Source: Tri-County Health Department
Telephone: 303-761-1340
Last EDR Contact: 01/27/1995
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

WELD COUNTY:

Solid Waste Facilities in Weld County
Solid Waste Facilities in Weld County.

Date of Government Version: 12/05/2014
Date Data Arrived at EDR: 12/12/2014
Date Made Active in Reports: 01/07/2015
Number of Days to Update: 26

Source: Weld County Department of Public Health
Telephone: 970-304-6415
Last EDR Contact: 02/12/2016
Next Scheduled EDR Contact: 05/23/2016
Data Release Frequency: No Update Planned

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

CT MANIFEST: Hazardous Waste Manifest Data
Facility and manifest data. Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a tsd facility.

Date of Government Version: 07/30/2013
Date Data Arrived at EDR: 08/19/2013
Date Made Active in Reports: 10/03/2013
Number of Days to Update: 45

Source: Department of Energy & Environmental Protection
Telephone: 860-424-3375
Last EDR Contact: 02/18/2016
Next Scheduled EDR Contact: 05/30/2016
Data Release Frequency: No Update Planned

NY MANIFEST: Facility and Manifest Data
Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

Date of Government Version: 02/01/2016
Date Data Arrived at EDR: 02/03/2016
Date Made Active in Reports: 03/22/2016
Number of Days to Update: 48

Source: Department of Environmental Conservation
Telephone: 518-402-8651
Last EDR Contact: 02/03/2016
Next Scheduled EDR Contact: 05/16/2016
Data Release Frequency: Annually

PA MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 07/24/2015
Date Made Active in Reports: 08/18/2015
Number of Days to Update: 25

Source: Department of Environmental Protection
Telephone: 717-783-8990
Last EDR Contact: 01/19/2016
Next Scheduled EDR Contact: 05/02/2016
Data Release Frequency: Annually

WI MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 03/19/2015
Date Made Active in Reports: 04/07/2015
Number of Days to Update: 19

Source: Department of Natural Resources
Telephone: N/A
Last EDR Contact: 03/14/2016
Next Scheduled EDR Contact: 06/27/2016
Data Release Frequency: Annually

Oil/Gas Pipelines
Source: PennWell Corporation
Petroleum Bundle (Crude Oil, Refined Products, Petrochemicals, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)) N = Natural Gas Bundle (Natural Gas, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)). This map includes information copyrighted by PennWell Corporation. This information is provided on a best effort basis and PennWell Corporation does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of PennWell.

Electric Power Transmission Line Data
Source: PennWell Corporation
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GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.

Daycare Centers: Daycare Listing
Source: Department of Human Services
Telephone: 303-866-5958

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2011 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Riparian Vegetation Data
Source: Division of Wildlife
Telephone: 970-416-3360

Current USGS 7.5 Minute Topographic Map
Source: U.S. Geological Survey

STREET AND ADDRESS INFORMATION

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GEOCHECK ®- PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

VACANT LAND
ARAPAHOE ROAD
ERIE, CO 80026

TARGET PROPERTY COORDINATES

Latitude (North):	40.013744 - 40° 0' 49.48''
Longitude (West):	105.100529 - 105° 6' 1.90''
Universal Tranverse Mercator:	Zone 13
UTM X (Meters):	491420.4
UTM Y (Meters):	4429077.5
Elevation:	5258 ft. above sea level

USGS TOPOGRAPHIC MAP

Target Property Map:	5955101 ERIE, CO
Version Date:	2013
South Map:	5958934 LAFAYETTE, CO
Version Date:	2013

EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principal investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

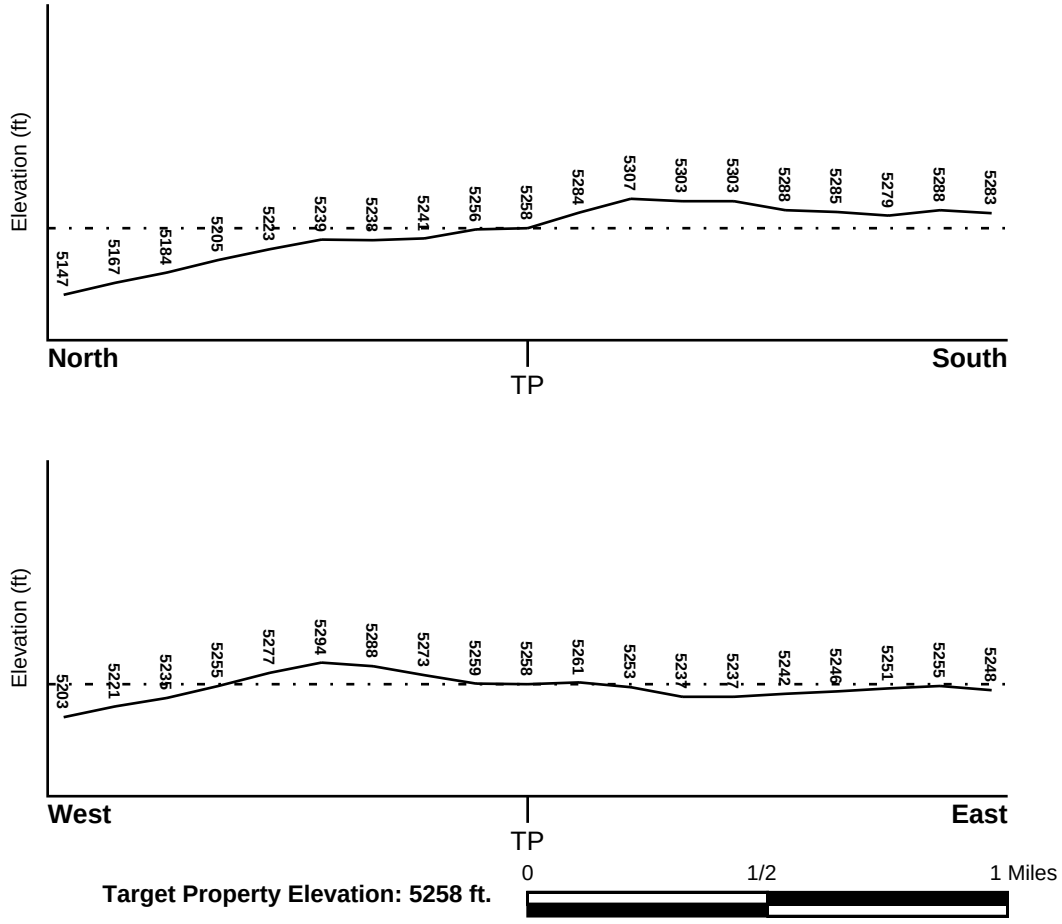
TOPOGRAPHIC INFORMATION

Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY

General Topographic Gradient: General NNE

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES



Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Target Property County	FEMA Flood Electronic Data
BOULDER, CO	YES - refer to the Overview Map and Detail Map

Flood Plain Panel at Target Property: 08013C0440F - FEMA Q3 Flood data

Additional Panels in search area: 08013C0576F - FEMA Q3 Flood data

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Data Coverage
NOT AVAILABLE	YES - refer to the Overview Map and Detail Map

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

AQUIFLOW®

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

MAP ID	LOCATION FROM TP	GENERAL DIRECTION GROUNDWATER FLOW
Not Reported		

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

ROCK STRATIGRAPHIC UNIT

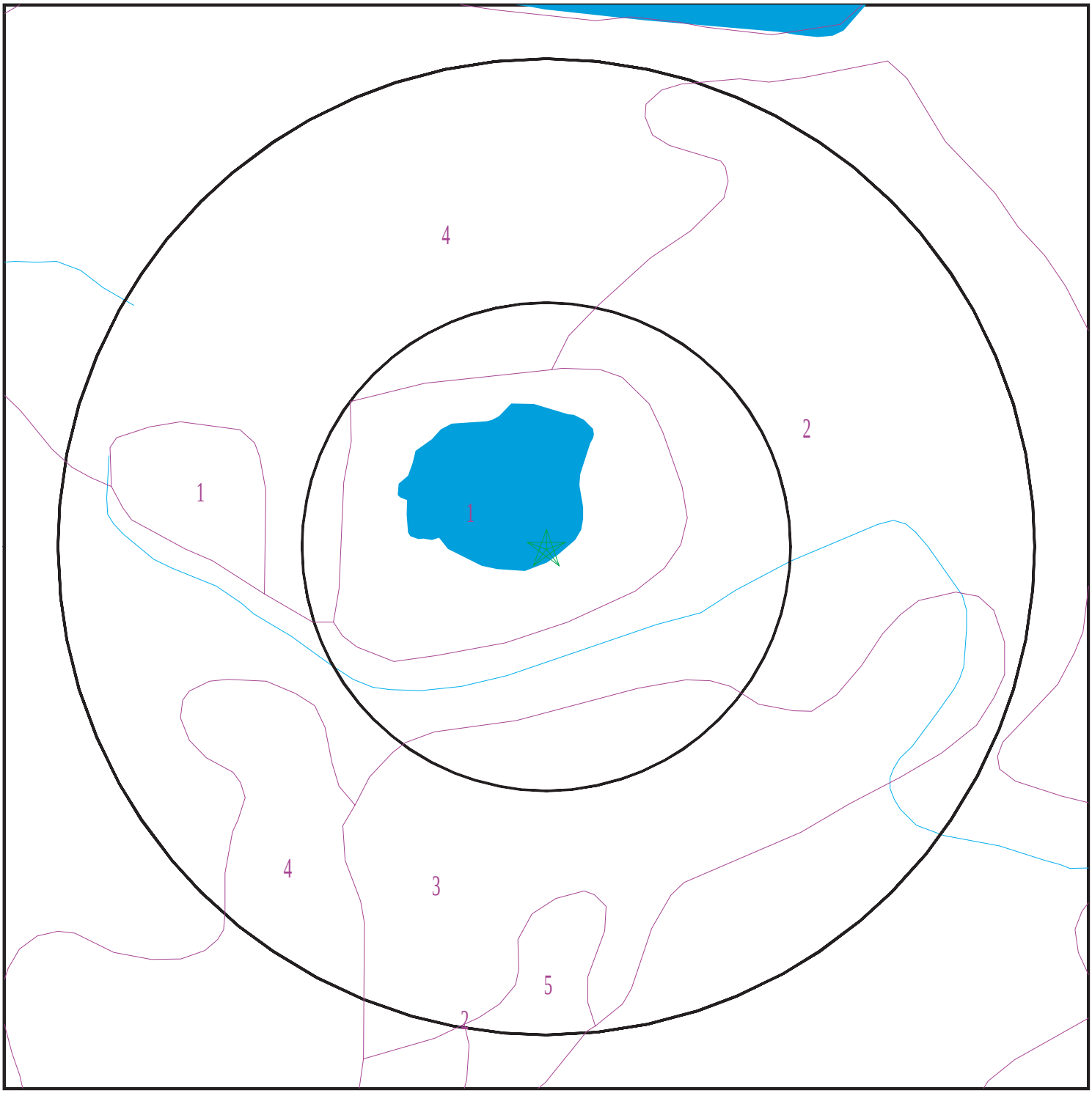
Era:	Mesozoic
System:	Cretaceous
Series:	Navarro Group
Code:	uK4 *(decoded above as Era, System & Series)*

GEOLOGIC AGE IDENTIFICATION

Category: Stratified Sequence

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

SSURGO SOIL MAP - 4589777.2s



Target Property
SSURGO Soil
Water

0 1/16 1/8 1/4 Miles

N

SITE NAME:	Vacant Land	CLIENT:	Salem Engineering Group
ADDRESS:	Arapahoe Road Erie CO 80026	CONTACT:	Maria G. Ruvalcaba
LAT/LONG:	40.013744 / 105.100529	INQUIRY #:	4589777.2s
		DATE:	April 12, 2016 1:40 pm

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GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. The following information is based on Soil Conservation Service SSURGO data.

Soil Map ID: 1

Soil Component Name: Water

Soil Surface Texture:
Hydrologic Group: Not reported

Soil Drainage Class:
Hydric Status: Partially hydric

Corrosion Potential - Uncoated Steel: Not Reported

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

No Layer Information available.

Soil Map ID: 2

Soil Component Name: Ascalon

Soil Surface Texture: sandy loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Partially hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	7 inches	sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42.34 Min: 14.11	Max: 7.8 Min: 6.6
2	7 inches	18 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14.11 Min: 4.23	Max: 7.8 Min: 6.6
3	18 inches	59 inches	fine sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42.34 Min: 14.11	Max: 9 Min: 7.9

Soil Map ID: 3

Soil Component Name: Ascalon

Soil Surface Texture: sandy loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Partially hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	5 inches	sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42.34 Min: 14.11	Max: 7.8 Min: 6.6
2	5 inches	16 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand.	Max: 14.11 Min: 4.23	Max: 7.8 Min: 6.6
3	16 inches	59 inches	fine sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42.34 Min: 14.11	Max: 9 Min: 7.9

Soil Map ID: 4

Soil Component Name: Ascalon

Soil Surface Texture: sandy loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Partially hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	7 inches	sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42.34 Min: 14.11	Max: 7.8 Min: 6.6
2	7 inches	18 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14.11 Min: 4.23	Max: 7.8 Min: 6.6
3	18 inches	59 inches	fine sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42.34 Min: 14.11	Max: 9 Min: 7.9

Soil Map ID: 5

Soil Component Name: Ascalon

Soil Surface Texture: sandy loam

Hydrologic Group: Class B - Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well drained

Hydric Status: Partially hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	5 inches	sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42.34 Min: 14.11	Max: 7.8 Min: 6.6
2	5 inches	16 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	COARSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand.	Max: 14.11 Min: 4.23	Max: 7.8 Min: 6.6
3	16 inches	59 inches	fine sandy loam	Granular materials (35 pct. or less passing No. 200), Silty, or Clayey Gravel and Sand.	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 42.34 Min: 14.11	Max: 9 Min: 7.9

LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

WELL SEARCH DISTANCE INFORMATION

DATABASE	SEARCH DISTANCE (miles)
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 0.001 miles
State Database	1.000

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
E16	USGS40000215790	1/4 - 1/2 Mile SE
23	USGS40000215797	1/4 - 1/2 Mile ESE
G24	USGS40000215791	1/4 - 1/2 Mile WSW
G25	USGS40000215792	1/4 - 1/2 Mile WSW

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
J31	USGS40000215991	1/4 - 1/2 Mile NNW
L48	USGS40000215688	1/2 - 1 Mile SSE
L49	USGS40000215689	1/2 - 1 Mile SSE
N54	USGS40000216076	1/2 - 1 Mile North
N55	USGS40000216077	1/2 - 1 Mile North
O60	USGS40000215823	1/2 - 1 Mile West
70	USGS40000218219	1/2 - 1 Mile SSE
Q76	USGS40000215567	1/2 - 1 Mile SSE

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No PWS System Found		

Note: PWS System location is not always the same as well location.

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
1	CO6000000053541	0 - 1/8 Mile South
2	CO6000000052592	1/8 - 1/4 Mile NE
A3	CO6000000439059	1/8 - 1/4 Mile SSW
B4	CO6000000193873	1/8 - 1/4 Mile North
B5	CO6000000232312	1/8 - 1/4 Mile North
B6	CO6000000183743	1/8 - 1/4 Mile North
A7	CO6000000261385	1/8 - 1/4 Mile SSW
C8	CO6000000369751	1/8 - 1/4 Mile ESE
C9	CO6000000283275	1/4 - 1/2 Mile ESE
C10	CO6000000055104	1/4 - 1/2 Mile ESE
C11	CO6000000056207	1/4 - 1/2 Mile ESE
C12	CO6000000056208	1/4 - 1/2 Mile ESE
13	CO6000000056384	1/4 - 1/2 Mile South
D14	CO6000000055644	1/4 - 1/2 Mile NW
D15	CO6000000056724	1/4 - 1/2 Mile NW
F17	CO6000000260930	1/4 - 1/2 Mile East
F18	CO6000000491915	1/4 - 1/2 Mile East
E19	CO6000000056594	1/4 - 1/2 Mile SE
20	CO6000000054270	1/4 - 1/2 Mile NE
21	CO6000000056496	1/4 - 1/2 Mile WSW
22	CO6000000055583	1/4 - 1/2 Mile SE
26	CO6000000054384	1/4 - 1/2 Mile North
H27	CO6000000056387	1/4 - 1/2 Mile NW
H28	CO6000000031921	1/4 - 1/2 Mile NW
H29	CO6000000489543	1/4 - 1/2 Mile NW
I30	CO6000000202210	1/4 - 1/2 Mile WNW
J32	CO6000000285479	1/4 - 1/2 Mile NNW
J33	CO6000000056385	1/4 - 1/2 Mile NNW
I34	CO6000000423514	1/4 - 1/2 Mile WNW

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
J35	CO6000000057045	1/2 - 1 Mile NNW
36	CO6000000231734	1/2 - 1 Mile NNE
37	CO6000000298762	1/2 - 1 Mile WNW
K38	CO6000000055848	1/2 - 1 Mile NW
I39	CO6000000199859	1/2 - 1 Mile WNW
K40	CO6000000056026	1/2 - 1 Mile NW
41	CO6000000183474	1/2 - 1 Mile ENE
K42	CO6000000486819	1/2 - 1 Mile NW
43	CO6000000055905	1/2 - 1 Mile WSW
44	CO6000000488007	1/2 - 1 Mile NNW
45	CO6000000053399	1/2 - 1 Mile SSE
46	CO6000000057296	1/2 - 1 Mile West
47	CO6000000032207	1/2 - 1 Mile NNW
50	CO6000000220061	1/2 - 1 Mile NW
M51	CO6000000056549	1/2 - 1 Mile West
M52	CO6000000493543	1/2 - 1 Mile West
N53	CO6000000053929	1/2 - 1 Mile North
M56	CO6000000259809	1/2 - 1 Mile West
57	CO6000000057177	1/2 - 1 Mile WSW
O58	CO6000000258680	1/2 - 1 Mile West
O59	CO6000000285718	1/2 - 1 Mile West
61	CO6000000054872	1/2 - 1 Mile WNW
62	CO6000000218199	1/2 - 1 Mile South
63	CO6000000057593	1/2 - 1 Mile SSE
64	CO6000000238282	1/2 - 1 Mile SSW
65	CO6000000054517	1/2 - 1 Mile SSE
66	CO6000000306497	1/2 - 1 Mile West
67	CO6000000228902	1/2 - 1 Mile WNW
68	CO6000000245091	1/2 - 1 Mile NE
69	CO6000000196445	1/2 - 1 Mile NW
P71	CO6000000287251	1/2 - 1 Mile West
Q72	CO6000000039567	1/2 - 1 Mile SSE
Q73	CO6000000039566	1/2 - 1 Mile SSE
Q74	CO6000000253906	1/2 - 1 Mile SSE
75	CO6000000245093	1/2 - 1 Mile NE
Q77	CO6000000039564	1/2 - 1 Mile SSE
Q78	CO6000000039565	1/2 - 1 Mile SSE
79	CO6000000255246	1/2 - 1 Mile SE
80	CO6000000275091	1/2 - 1 Mile NNE
P81	CO6000000342519	1/2 - 1 Mile West
P82	CO6000000342520	1/2 - 1 Mile West
83	CO6000000057277	1/2 - 1 Mile WSW
84	CO6000000490874	1/2 - 1 Mile NW
85	CO6000000056423	1/2 - 1 Mile North
86	CO6000000056197	1/2 - 1 Mile West
R87	CO6000000355337	1/2 - 1 Mile South
88	CO6000000055348	1/2 - 1 Mile NNE
S89	CO6000000053484	1/2 - 1 Mile SSE
90	CO6000000478197	1/2 - 1 Mile South
S91	CO6000000039568	1/2 - 1 Mile SSE
R92	CO6000000355338	1/2 - 1 Mile South
S93	CO6000000039569	1/2 - 1 Mile SSE

OTHER STATE DATABASE INFORMATION

STATE OIL/GAS WELL INFORMATION

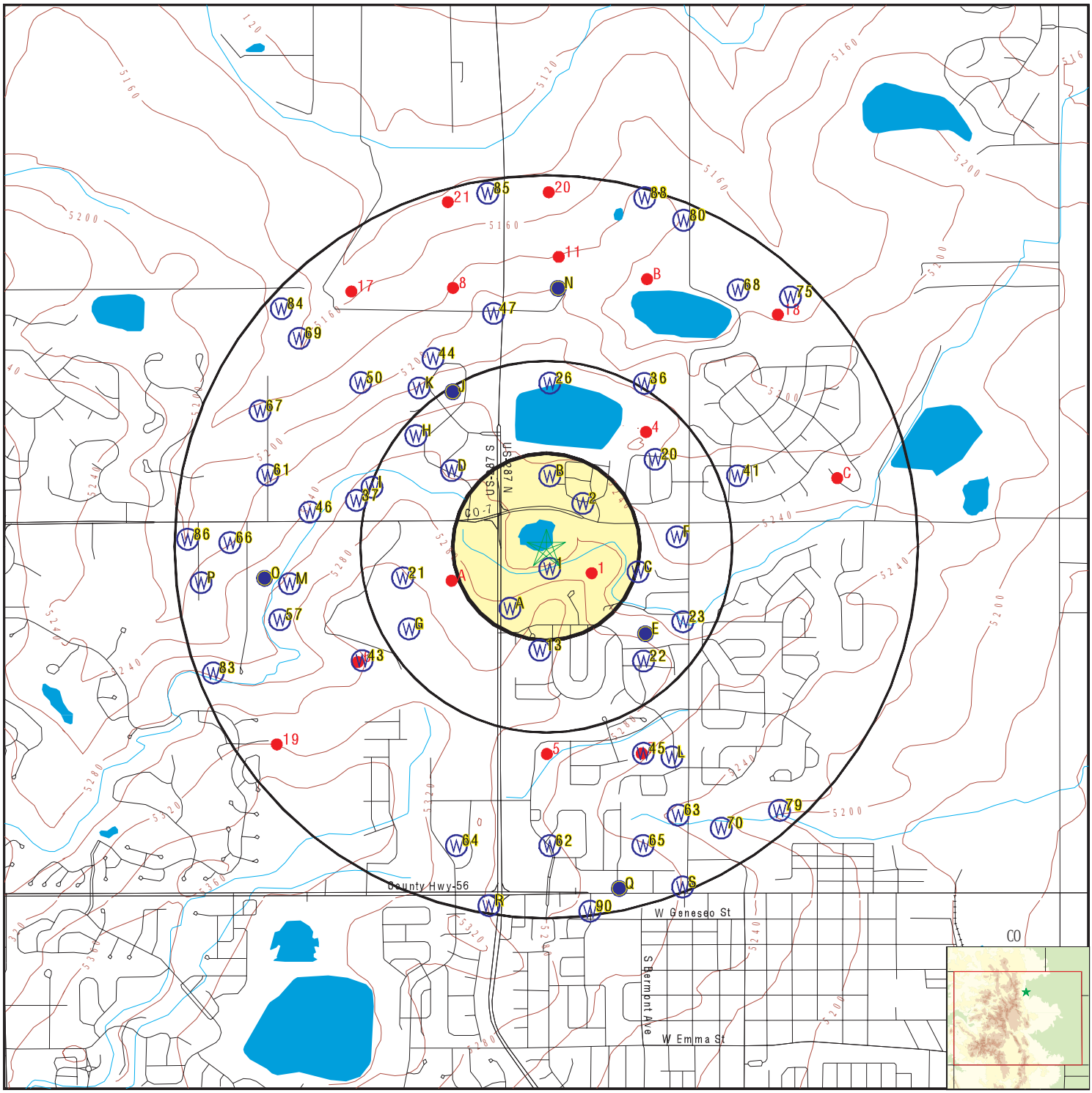
MAP ID	WELL ID	LOCATION FROM TP
1	COOG10000007554	1/8 - 1/4 Mile ESE

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

STATE OIL/GAS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
A2	COOG10000007535	1/4 - 1/2 Mile WSW
A3	COOG10000007526	1/4 - 1/2 Mile WSW
4	COOG10000007518	1/4 - 1/2 Mile NE
5	COOG10000007500	1/2 - 1 Mile South
6	COOG10000007514	1/2 - 1 Mile WSW
7	COOG10000007515	1/2 - 1 Mile SSE
8	COOG10000007608	1/2 - 1 Mile NNW
B9	COOG10000007770	1/2 - 1 Mile NNE
B10	COOG10000007607	1/2 - 1 Mile NNE
11	COOG10000007771	1/2 - 1 Mile North
C12	COOG10000007484	1/2 - 1 Mile ENE
C13	COOG10000070568	1/2 - 1 Mile ENE
C14	COOG10000070570	1/2 - 1 Mile ENE
C15	COOG10000070569	1/2 - 1 Mile ENE
C16	COOG10000070567	1/2 - 1 Mile ENE
17	COOG10000007704	1/2 - 1 Mile NW
18	COOG10000088515	1/2 - 1 Mile NE
19	COOG10000007809	1/2 - 1 Mile SW
20	COOG10000007791	1/2 - 1 Mile North
21	COOG10000007703	1/2 - 1 Mile NNW

PHYSICAL SETTING SOURCE MAP - 4589777.2s



- County Boundary
- Major Roads
- Contour Lines
- Earthquake epicenter, Richter 5 or greater
- Water Wells
- Public Water Supply Wells
- Cluster of Multiple Icons
- Groundwater Flow Direction
- GI Indeterminate Groundwater Flow at Location
- GV Groundwater Flow Varies at Location
- Oil, gas or related wells

SITE NAME:	Vacant Land	CLIENT:	Salem Engineering Group
ADDRESS:	Arapahoe Road Erie CO 80026	CONTACT:	Maria G. Ruvalcaba
LAT/LONG:	40.013744 / 105.100529	INQUIRY #:	4589777.2s
		DATE:	April 12, 2016 1:39 pm

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GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation

	Database	EDR ID Number
1 **South** **0 - 1/8 Mile** **Higher**	**CO WELLS**	**CO6000000053541**

Fid:	53540	Objectid:	53541
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=9009471		
Receipt:	9009471	Permit:	15832-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	5
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	34
Q160:	NE	Q40:	NW
Q10:	Not Reported	Coordew:	0
Coordewdir:	Not Reported	Coordns:	0
Coordnsdir:	Not Reported		
Utmx:	491436.2		
Utmy:	4429193.4		
Locaccurac:	Spotted from quarters		
Latdecdeg:	40.012896		
Longdecdeg:	-105.100345		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	1		
Permissued:	Not Reported		
Permexpire:	Not Reported		
Wellconstr:	Not Reported		
Firstbenef:	1963-06-14		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	1524 N. Main St., Longmont, CO		
Elev:	0	Welldepth:	40
Topperfcas:	0	Botperfcas:	0
Yield:	20		
Staticwl:	13		
Applicantn:	LAW LLOYD L		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	491436.2		
Disputmy:	4429193.4		
Latitude:	40.012896255		
Longitude:	-105.100344904		
Site id:	CO6000000053541		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation

	Database	EDR ID Number
2 NE 1/8 - 1/4 Mile Lower	**CO WELLS**	**CO6000000052592**

Fid:	52591	Objectid:	52592
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=9008496		
Receipt:	9008496	Permit:	4310-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	27
Q160:	SE	Q40:	SW
Q10:	Not Reported	Coordew:	1539
Coordewdir:	E	Coordns:	269
Coordnsdir:	S		
Utmx:	491579.5		
Utmy:	4429474.9		
Locaccurac:	Spotted from section lines		
Latdecdeg:	40.015434		
Longdecdeg:	-105.098669		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	1		
Permissued:	Not Reported		
Permexpire:	Not Reported		
Wellconstr:	Not Reported		
Firstbenef:	1959-09-10		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	340
Topperfcas:	0	Botperfcas:	0
Yield:	30		
Staticwl:	70		
Applicantn:	BERGSTROM L L & BERGSTROM MAYBELLE		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	491579.5		
Disputmy:	4429474.9		
Latitude:	40.0154339457		
Longitude:	-105.098669464		
Site id:	CO6000000052592		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation

Database | EDR ID Number

A3
SSW
1/8 - 1/4 Mile
Higher

CO WELLS | **CO6000000439059**

Fid:	439058	Objectid:	439059
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0470410		
Receipt:	0470410	Permit:	91378--A
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	20		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	34
Q160:	NE	Q40:	NW
Q10:	Not Reported	Coordew:	2550
Coordewdir:	E	Coordns:	1200
Coordnsdir:	N		
Utmx:	491268.8		
Utmy:	4429028.9		
Locaccurac:	Spotted from section lines		
Latdecdeg:	40.011412		
Longdecdeg:	-105.102304		
Use1:	HOUSEHOLD USE ONLY	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	LARAMIE FOX HILLS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	0		
Permissued:	2001-01-09		
Permexpire:	2003-01-09		
Wellconstr:	2001-08-02		
Firstbenef:	Not Reported		
Pumpinstal:	2001-12-19		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	480
Topperfcas:	360	Botperfcas:	480
Yield:	7		
Staticwl:	10		
Applicantn:	ERIE TOWN OF URBAN RENEWAL AUTHORITY		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	491268.8		
Disputmy:	4429028.9		
Latitude:	40.0114124329		
Longitude:	-105.10230417		
Site id:	CO6000000439059		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation

	Database	EDR ID Number
B4 **North** **1/8 - 1/4 Mile** **Lower**	**CO WELLS**	**CO6000000193873**

Fid:	193872	Objectid:	193873
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0000660A		
Receipt:	0000660A	Permit:	1999007-AB
Wdid:	Not Reported	Currstatus:	Well Abandoned
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	27
Q160:	SE	Q40:	SW
Q10:	Not Reported	Coordew:	0
Coordewdir:	Not Reported	Coordns:	0
Coordnsdir:	Not Reported		
Utmx:	491436.4		
Utmy:	4429594.4		
Locaccurac:	Spotted from quarters		
Latdecdeg:	40.016509		
Longdecdeg:	-105.100348		
Use1:	OTHER	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	0		
Permissued:	Not Reported		
Permexpire:	Not Reported		
Wellconstr:	Not Reported		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	1999-01-19		
Comment :	Not Reported		
Elev:	0	Welldepth:	0
Topperfcas:	0	Botperfcas:	0
Yield:	0		
Staticwl:	0		
Applicantn:	COLORADO WATERWELL PUMP SERVICE		
Completewe:	0	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	491436		
Disputmy:	4429594		
Latitude:	40.0165091734		
Longitude:	-105.100347851		
Site id:	CO6000000193873		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation

	Database	EDR ID Number
B5 **North** **1/8 - 1/4 Mile** **Lower**	**CO WELLS**	**CO6000000232312**

Fid:	232311	Objectid:	232312
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0035754		
Receipt:	0035754	Permit:	35754-MH
Wdid:	Not Reported	Currstatus:	Permit Issued; Completion Status Unknown
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	27
Q160:	SE	Q40:	SW
Q10:	Not Reported	Coordew:	0
Coordewdir:	Not Reported	Coordns:	0
Coordnsdir:	Not Reported		
Utmx:	491436.4		
Utmy:	4429594.4		
Locaccurac:	Spotted from quarters		
Latdecdeg:	40.016509		
Longdecdeg:	-105.100348		
Use1:	OTHER	Use2:	Not Reported
Specialuse:	MONITORING WELL	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	acres		
Annappropr:	0		
Permissued:	1999-03-09		
Permexpire:	1999-06-09		
Wellconstr:	Not Reported		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	0
Topperfcas:	0	Botperfcas:	0
Yield:	0		
Staticwl:	0		
Applicantn:	ERIE TOWN OF		
Completewe:	2	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	491455.3		
Disputmy:	4429617		
Latitude:	40.0165091734		
Longitude:	-105.100347851		
Site id:	CO6000000232312		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

B6
North
1/8 - 1/4 Mile
Lower | **CO WELLS** | **CO6000000183743**

Fid:	183742	Objectid:	183743
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=C070391		
Receipt:	C070391	Permit:	391-WCB
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	27
Q160:	SE	Q40:	SW
Q10:	Not Reported	Coordew:	0
Coordewdir:	Not Reported	Coordns:	0
Coordnsdir:	Not Reported		
Utmx:	491436.5		
Utmy:	4429594.5		
Locaccurac:	Spotted from quarters		
Latdecdeg:	40.01651		
Longdecdeg:	-105.100347		
Use1:	DOMESTIC	Use2:	STOCK
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	0		
Permissued:	1956-09-05		
Permexpire:	Not Reported		
Wellconstr:	Not Reported		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	300
Topperfcas:	0	Botperfcas:	0
Yield:	0		
Staticwl:	0		
Applicantn:	HODGSON EARL		
Completewe:	3	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	491446.3		
Disputmy:	4429622.2		
Latitude:	40.0165100754		
Longitude:	-105.100346681		
Site id:	CO6000000183743		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation

Database | EDR ID Number

A7
SSW
1/8 - 1/4 Mile
Higher

CO WELLS | **CO6000000261385**

Fid:	261384	Objectid:	261385
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0081643		
Receipt:	0081643	Permit:	91378-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	34
Q160:	NE	Q40:	NW
Q10:	Not Reported	Coordew:	2750
Coordewdir:	W	Coordns:	1250
Coordnsdir:	N		
Utmx:	491257		
Utmy:	4429014		
Locaccurac:	Spotted from section lines		
Latdecdeg:	40.011277		
Longdecdeg:	-105.102442		
Use1:	HOUSEHOLD USE ONLY	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	.33000001		
Permissued:	1977-07-01		
Permexpire:	Not Reported		
Wellconstr:	1977-08-17		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	0
Topperfcas:	0	Botperfcas:	0
Yield:	0		
Staticwl:	85		
Applicantn:	BEERY ROGER D & CAMILLA R		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	491257		
Disputmy:	4429014		
Latitude:	40.0112780652		
Longitude:	-105.10244223		
Site id:	CO6000000261385		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation

	Database	EDR ID Number
C8 **ESE** **1/8 - 1/4 Mile** **Lower**	**CO WELLS**	**CO6000000369751**

Fid:	369750	Objectid:	369751
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0371075		
Receipt:	0371075	Permit:	180895-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	10		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	34
Q160:	NE	Q40:	NE
Q10:	Not Reported	Coordew:	960
Coordewdir:	E	Coordns:	715
Coordnsdir:	N		
Utmx:	491754.3		
Utmy:	4429174.4		
Locaccurac:	Spotted from section lines		
Latdecdeg:	40.012728		
Longdecdeg:	-105.096617		
Use1:	HOUSEHOLD USE ONLY	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	.33000001		
Permissued:	1994-08-23		
Permexpire:	1996-08-23		
Wellconstr:	1994-11-30		
Firstbenef:	Not Reported		
Pumpinstal:	1995-05-05		
Wellplugge:	Not Reported		
Comment :	NO PUMP TEST		
Elev:	0	Welldepth:	450
Topperfcas:	270	Botperfcas:	450
Yield:	10		
Staticwl:	70		
Applicantn:	GONZALES PATRICK ALAN		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	491754.3		
Disputmy:	4429174.4		
Latitude:	40.0127282364		
Longitude:	-105.096617383		
Site id:	CO6000000369751		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation

	Database	EDR ID Number
C9 **ESE** **1/4 - 1/2 Mile** **Lower**	**CO WELLS**	**CO6000000283275**

Fid:	283274	Objectid:	283275
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0213668		
Receipt:	0213668	Permit:	60163--A
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	34
Q160:	NE	Q40:	NE
Q10:	Not Reported	Coordew:	790
Coordewdir:	E	Coordns:	810
Coordnsdir:	N		
Utmx:	491805.9		
Utmy:	4429144.9		
Locaccurac:	Spotted from section lines		
Latdecdeg:	40.012463		
Longdecdeg:	-105.096012		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	acres		
Annappropr:	0		
Permissued:	1981-04-14		
Permexpire:	1983-04-14		
Wellconstr:	1971-04-06		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	460
Topperfcas:	251	Botperfcas:	460
Yield:	15		
Staticwl:	50		
Applicantn:	STONES FRED		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	491805.9		
Disputmy:	4429144.9		
Latitude:	40.0124629508		
Longitude:	-105.096012398		
Site id:	CO6000000283275		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

C10
ESE
1/4 - 1/2 Mile
Lower

CO WELLS **CO6000000055104**

Fid:	55103	Objectid:	55104
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=9011111		
Receipt:	9011111	Permit:	38801-
Wdid:	0605611	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	34
Q160:	NE	Q40:	NE
Q10:	Not Reported	Coordew:	0
Coordewdir:	Not Reported	Coordns:	0
Coordnsdir:	Not Reported		
Utmx:	491843.5		
Utmy:	4429191.4		
Locaccurac:	Spotted from quarters		
Latdecdeg:	40.012882		
Longdecdeg:	-105.095572		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	1		
Permissued:	1969-07-29		
Permexpire:	Not Reported		
Wellconstr:	1969-07-29		
Firstbenef:	1969-07-29		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	10960 Arapahoe Rd., Longmont, CO.		
Elev:	0	Welldepth:	400
Topperfcas:	220	Botperfcas:	400
Yield:	40		
Staticwl:	20		
Applicantn:	SOSA OLVIN H GALDAMEZ		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	491843		
Disputmy:	4429191		
Latitude:	40.0128822696		
Longitude:	-105.095572415		
Site id:	CO6000000055104		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation

	Database	EDR ID Number
C11 **ESE** **1/4 - 1/2 Mile** **Lower**	**CO WELLS**	**CO6000000056207**

Fid:	56206	Objectid:	56207
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=9012223		
Receipt:	9012223	Permit:	60163-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	34
Q160:	NE	Q40:	NE
Q10:	Not Reported	Coordew:	0
Coordewdir:	Not Reported	Coordns:	0
Coordnsdir:	Not Reported		
Utmx:	491843.5		
Utmy:	4429191.4		
Locaccurac:	Spotted from quarters		
Latdecdeg:	40.012882		
Longdecdeg:	-105.095572		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	1		
Permissued:	1972-05-05		
Permexpire:	Not Reported		
Wellconstr:	1972-08-11		
Firstbenef:	1972-08-11		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	460
Topperfcas:	231	Botperfcas:	460
Yield:	15		
Staticwl:	40		
Applicantn:	STONES FRED W & GENEVIEVE L		
Completewe:	3	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	491853.3		
Disputmy:	4429219.2		
Latitude:	40.0128822696		
Longitude:	-105.095572415		
Site id:	CO6000000056207		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation

	Database	EDR ID Number
C12 **ESE** **1/4 - 1/2 Mile** **Lower**	**CO WELLS**	**CO6000000056208**

Fid:	56207	Objectid:	56208
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=9012224		
Receipt:	9012224	Permit:	60164-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	34
Q160:	NE	Q40:	NE
Q10:	Not Reported	Coordew:	0
Coordewdir:	Not Reported	Coordns:	0
Coordnsdir:	Not Reported		
Utmx:	491843.5		
Utmy:	4429191.4		
Locaccurac:	Spotted from quarters		
Latdecdeg:	40.012882		
Longdecdeg:	-105.095572		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	1		
Permissued:	1972-05-05		
Permexpire:	1974-05-05		
Wellconstr:	1974-03-05		
Firstbenef:	1974-03-05		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	1435 N. 111th St., Lafayette, CO.		
Elev:	0	Welldepth:	480
Topperfcas:	260	Botperfcas:	480
Yield:	0		
Staticwl:	40		
Applicantn:	SZOTT JOE & HEATHER		
Completewe:	3	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	491862.3		
Disputmy:	4429214		
Latitude:	40.0128822696		
Longitude:	-105.095572415		
Site id:	CO6000000056208		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

13
South
1/4 - 1/2 Mile
Higher | **CO WELLS** | **CO6000000056384**

Fid:	56383	Objectid:	56384
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=9012401		
Receipt:	9012401	Permit:	63869-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	34
Q160:	NE	Q40:	SW
Q10:	Not Reported	Coordew:	2140
Coordewdir:	E	Coordns:	1820
Coordnsdir:	N		
Utmx:	491392.6		
Utmy:	4428839.4		
Locaccurac:	Spotted from section lines		
Latdecdeg:	40.009706		
Longdecdeg:	-105.100851		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	1		
Permissued:	1972-09-01		
Permexpire:	Not Reported		
Wellconstr:	1972-09-23		
Firstbenef:	1972-09-23		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	560
Topperfcas:	322	Botperfcas:	525
Yield:	15		
Staticwl:	100		
Applicantn:	BOKAN MIKE		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	491392.6		
Disputmy:	4428839.4		
Latitude:	40.0097063525		
Longitude:	-105.100851085		
Site id:	CO6000000056384		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation

	Database	EDR ID Number
D14 **NW** **1/4 - 1/2 Mile** **Lower**	**CO WELLS**	**CO6000000055644**

Fid:	55643	Objectid:	55644
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=9011659		
Receipt:	9011659	Permit:	48421-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	27
Q160:	SW	Q40:	SE
Q10:	Not Reported	Coordew:	0
Coordewdir:	Not Reported	Coordns:	0
Coordnsdir:	Not Reported		
Utmx:	491028.1		
Utmy:	4429596.4		
Locaccurac:	Spotted from quarters		
Latdecdeg:	40.016523		
Longdecdeg:	-105.105132		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	1		
Permissued:	1971-08-27		
Permexpire:	Not Reported		
Wellconstr:	1971-09-07		
Firstbenef:	1971-09-03		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	427
Topperfcas:	210	Botperfcas:	427
Yield:	15		
Staticwl:	150		
Applicantn:	BICKMORE CHRISTOPHER J & WENDY SULLIVAN		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	491028.1		
Disputmy:	4429596.4		
Latitude:	40.016522951		
Longitude:	-105.105132311		
Site id:	CO6000000055644		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

D15
NW
1/4 - 1/2 Mile
Lower

CO WELLS **CO6000000056724**

Fid:	56723	Objectid:	56724
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=9012739		
Receipt:	9012739	Permit:	70944-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	27
Q160:	SW	Q40:	SE
Q10:	Not Reported	Coordew:	1900
Coordewdir:	W	Coordns:	800
Coordnsdir:	S		
Utmx:	490994.5		
Utmy:	4429640		
Locaccurac:	Spotted from section lines		
Latdecdeg:	40.016915		
Longdecdeg:	-105.105527		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	1		
Permissued:	1973-08-27		
Permexpire:	Not Reported		
Wellconstr:	Not Reported		
Firstbenef:	1972-05-05		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	0
Topperfcas:	0	Botperfcas:	0
Yield:	0		
Staticwl:	0		
Applicantn:	SWIFT JOHN E		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	490994.5		
Disputmy:	4429640		
Latitude:	40.0169154187		
Longitude:	-105.105526639		
Site id:	CO6000000056724		

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

E16
SE
1/4 - 1/2 Mile
Higher

FED USGS **USGS40000215790**

Org. Identifier:	USGS-CO		
Formal name:	USGS Colorado Water Science Center		
Monloc Identifier:	USGS-400038105054201		
Monloc name:	SB00106934ADB1		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	10190005	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	40.0105403
Longitude:	-105.0955392	Sourcemap scale:	24000
Horiz Acc measure:	5	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	5270.00
Vert measure units:	feet	Vertacc measure val:	005
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Denver Basin aquifer system		
Formation type:	Fox Hills Formation		
Aquifer type:	Not Reported		
Construction date:	19730418	Welldepth:	515
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 2

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1977-10-20	86.90		1977-10-19	86.90	

F17
East
1/4 - 1/2 Mile
Lower

CO WELLS **CO6000000260930**

Fid:	260929	Objectid:	260930
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0080292		
Receipt:	0080292	Permit:	90545-
Wdid:	Not Reported	Currstatus:	Permit Expired
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	34
Q160:	NE	Q40:	NE
Q10:	Not Reported	Coordew:	200
Coordewdir:	E	Coordns:	200
Coordnsdir:	N		
Utmx:	491986.9		
Utmy:	4429330		

Locaccurac:	Spotted from section lines		
Latdecdeg:	40.014131		
Longdecdeg:	-105.093894		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	acres		
Annappropr:	0		
Permissued:	1977-05-23		
Permexpire:	Not Reported		
Wellconstr:	Not Reported		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	0
Topperfcas:	0	Botperfcas:	0
Yield:	0		
Staticwl:	0		
Applicantn:	RAZO JAMES E		
Completewe:	0	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	491986.9		
Disputmy:	4429330		
Latitude:	40.0141323965		
Longitude:	-105.093893863		
Site id:	CO6000000260930		

F18
East
1/4 - 1/2 Mile
Lower

CO WELLS **CO6000000491915**

Fid:	491914	Objectid:	491915
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0910144		
Receipt:	0910144	Permit:	73303-
Wdid:	Not Reported	Currstatus:	Permit Expired
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	5		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	34
Q160:	NE	Q40:	NE
Q10:	Not Reported	Coordew:	200
Coordewdir:	E	Coordns:	200
Coordnsdir:	N		
Utmx:	491987		
Utmy:	4429330		

Locaccurac:	Spotted from section lines		
Latdecdeg:	40.014132		
Longdecdeg:	-105.093893		
Use1:	HOUSEHOLD USE ONLY	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	0		
Permissued:	1974-02-08		
Permexpire:	1977-02-08		
Wellconstr:	Not Reported		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	0
Topperfcas:	0	Botperfcas:	0
Yield:	0		
Staticwl:	0		
Applicantn:	MELIN THOMAS		
Completewe:	0	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	491987		
Disputmy:	4429330		
Latitude:	40.0141323983		
Longitude:	-105.093892691		
Site id:	CO6000000491915		

E19
SE
1/4 - 1/2 Mile
Higher

CO WELLS **CO6000000056594**

Fid:	56593	Objectid:	56594
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=9012610		
Receipt:	9012610	Permit:	68232-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	1.77		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	34
Q160:	NE	Q40:	SE
Q10:	Not Reported	Coordew:	628
Coordewdir:	E	Coordns:	1645
Coordnsdir:	N		
Utmx:	491853.8		
Utmy:	4428890.5		

Locaccurac:	Spotted from section lines		
Latdecdeg:	40.010171		
Longdecdeg:	-105.095448		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	acres		
Annappropr:	0		
Permissued:	1973-03-29		
Permexpire:	1975-03-29		
Wellconstr:	1973-04-18		
Firstbenef:	1973-04-18		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	225 Beacon Hill Dr., Lafayette, CO.		
Elev:	0	Welldepth:	515
Topperfcas:	302	Botperfcas:	510
Yield:	15		
Staticwl:	140		
Applicantn:	KIER GREG & GERRI		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	491853.8		
Disputmy:	4428890.5		
Latitude:	40.010171328		
Longitude:	-105.09544795		
Site id:	CO6000000056594		

20
NE
1/4 - 1/2 Mile
Lower

CO WELLS **CO6000000054270**

Fid:	54269	Objectid:	54270
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=9010225		
Receipt:	9010225	Permit:	26032-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	27
Q160:	SW	Q40:	SE
Q10:	Not Reported	Coordew:	515
Coordewdir:	E	Coordns:	900
Coordnsdir:	S		
Utmx:	491892.5		
Utmy:	4429665.5		

Locaccurac:	Spotted from section lines		
Latdecdeg:	40.017154		
Longdecdeg:	-105.095004		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	1		
Permissued:	Not Reported		
Permexpire:	Not Reported		
Wellconstr:	Not Reported		
Firstbenef:	1966-01-15		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	L3-B5=1700 Maple Glen aka 1862 Stillwater Wy		
Elev:	0	Welldepth:	48
Topperfcas:	0	Botperfcas:	0
Yield:	20		
Staticwl:	44		
Applicantn:	NEWHAUSER JOHN		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	491892.5		
Disputmy:	4429665.5		
Latitude:	40.0171542724		
Longitude:	-105.095004189		
Site id:	CO6000000054270		

21
WSW
1/4 - 1/2 Mile
Higher

CO WELLS **CO6000000056496**

Fid:	56495	Objectid:	56496
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=9012512		
Receipt:	9012512	Permit:	66115-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	34
Q160:	NW	Q40:	NW
Q10:	Not Reported	Coordew:	1250
Coordewdir:	W	Coordns:	800
Coordnsdir:	N		
Utmx:	490799		
Utmy:	4429153.5		

Locaccurac:	Spotted from section lines		
Latdecdeg:	40.01253		
Longdecdeg:	-105.107811		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	1		
Permissued:	1972-11-02		
Permexpire:	Not Reported		
Wellconstr:	1975-04-22		
Firstbenef:	1975-04-22		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	480
Topperfcas:	188	Botperfcas:	480
Yield:	15		
Staticwl:	85		
Applicantn:	WEEMS BEN F		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	490799		
Disputmy:	4429153.5		
Latitude:	40.01253006		
Longitude:	-105.10781061		
Site id:	CO6000000056496		

22
SE
1/4 - 1/2 Mile Higher

CO WELLS **CO6000000055583**

Fid:	55582	Objectid:	55583
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=9011597		
Receipt:	9011597	Permit:	47092-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	34
Q160:	NE	Q40:	SE
Q10:	Not Reported	Coordew:	0
Coordewdir:	Not Reported	Coordns:	0
Coordnsdir:	Not Reported		
Utmx:	491841.7		
Utmy:	4428791.9		

Locaccurac:	Spotted from quarters		
Latdecdeg:	40.009283		
Longdecdeg:	-105.095588		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	1		
Permissued:	1971-06-30		
Permexpire:	Not Reported		
Wellconstr:	1971-07-09		
Firstbenef:	1971-07-13		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	475
Topperfcas:	263	Botperfcas:	475
Yield:	15		
Staticwl:	50		
Applicantn:	WANG XUEQUING & YIHONG ZHANG		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	491841.7		
Disputmy:	4428791.9		
Latitude:	40.0092828473		
Longitude:	-105.095588485		
Site id:	CO6000000055583		

23
ESE **FED USGS** **USGS40000215797**
1/4 - 1/2 Mile
Lower

Org. Identifier:	USGS-CO		
Formal name:	USGS Colorado Water Science Center		
Monloc Identifier:	USGS-400039105053501		
Monloc name:	SB00106934ADA		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	10190005	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	40.0108181
Longitude:	-105.0935947	Sourcemap scale:	24000
Horiz Acc measure:	5	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	5250.00
Vert measure units:	feet	Vertacc measure val:	5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Not Reported		

Aquifer type:	Not Reported		
Construction date:	19710101	Welldepth:	475
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 14

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1983-09-21	46.78		1983-03-09	38.91	
1982-10-14	44.85				
1982-03-02	46.30				
Note: The site was being pumped.					
1981-10-14	51.85		1981-03-05	41.95	
1980-10-21	63.39		1980-03-03	41.15	
1979-10-02	61.65				
Note: The site had been pumped recently.					
1979-03-13	45.13		1978-10-25	57.67	
1978-03-14	44.22				
1977-10-18	65.49				
Note: The site had been pumped recently.					
1977-03-16	46.98				

G24
WSW
1/4 - 1/2 Mile
Higher

FED USGS **USGS40000215791**

Org. Identifier:	USGS-CO		
Formal name:	USGS Colorado Water Science Center		
Monloc Identifier:	USGS-400038105062500		
Monloc name:	SB00106934BDBB SITE 388		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	10190005	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	40.0105404
Longitude:	-105.1074841	Sourcemap scale:	Not Reported
Horiz Acc measure:	1	Horiz Acc measure units:	minutes
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	Not Reported
Vert measure units:	Not Reported	Vertacc measure val:	Not Reported
Vert accmeasure units:	Not Reported		
Vertcollection method:	Not Reported		
Vert coord refsys:	Not Reported	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Laramie Formation		
Aquifer type:	Not Reported		
Construction date:	Not Reported	Welldepth:	Not Reported
Welldepth units:	Not Reported	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

G25
WSW
1/4 - 1/2 Mile
Higher

FED USGS **USGS40000215792**

Org. Identifier:	USGS-CO		
Formal name:	USGS Colorado Water Science Center		
Monloc Identifier:	USGS-400038105062501		
Monloc name:	SB00106934BDB		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	10190005	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	40.0105404
Longitude:	-105.1074841	Sourcemap scale:	Not Reported
Horiz Acc measure:	5	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	5305.00
Vert measure units:	feet	Vertacc measure val:	5.
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Laramie Formation		
Aquifer type:	Not Reported		
Construction date:	19720101	Welldepth:	520
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1976-09-01	80.00	

26
North
1/4 - 1/2 Mile
Lower

CO WELLS **CO6000000054384**

Fid:	54383	Objectid:	54384
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=9010340		
Receipt:	9010340	Permit:	27778-
Wdid:	0605867	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	27
Q160:	SE	Q40:	NW
Q10:	Not Reported	Coordew:	0
Coordewdir:	Not Reported	Coordns:	0
Coordnsdir:	Not Reported		
Utmx:	491436.9		
Utmy:	4429996.4		

Locaccurac:	Spotted from quarters		
Latdecdeg:	40.020131		
Longdecdeg:	-105.100347		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	1		
Permissued:	1966-06-20		
Permexpire:	Not Reported		
Wellconstr:	1966-07-05		
Firstbenef:	1966-07-05		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	400
Topperfcas:	224	Botperfcas:	400
Yield:	14		
Staticwl:	50		
Applicantn:	ERIE TOWN OF		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	491436.9		
Disputmy:	4429996.4		
Latitude:	40.0201311021		
Longitude:	-105.100347298		
Site id:	CO6000000054384		

H27
NW
1/4 - 1/2 Mile
Lower

CO WELLS **CO6000000056387**

Fid:	56386	Objectid:	56387
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=9012404		
Receipt:	9012404	Permit:	63872-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	LIVENGOOD HILLS		
Filing:	Not Reported	Lot:	54
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	27
Q160:	SW	Q40:	SE
Q10:	Not Reported	Coordew:	1425
Coordewdir:	W	Coordns:	1175
Coordnsdir:	S		
Utmx:	490849.3		
Utmy:	4429754.9		

Locaccurac:	Spotted from section lines		
Latdecdeg:	40.017949		
Longdecdeg:	-105.10723		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	1		
Permissued:	1972-09-01		
Permexpire:	Not Reported		
Wellconstr:	1972-09-27		
Firstbenef:	1972-09-27		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	310
Topperfcas:	0	Botperfcas:	0
Yield:	15		
Staticwl:	65		
Applicantn:	KERN WILLIAM C		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	490849.3		
Disputmy:	4429754.9		
Latitude:	40.0179490788		
Longitude:	-105.107229713		
Site id:	CO6000000056387		

H28
NW
1/4 - 1/2 Mile
Lower

CO WELLS **CO6000000031921**

Fid:	31920	Objectid:	31921
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=3653386		
Receipt:	3653386	Permit:	63872--A
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	STONEHENGE		
Filing:	Not Reported	Lot:	16
Block:	1	Ctyparclid:	Not Reported
Parcelsize:	1		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	27
Q160:	SW	Q40:	SE
Q10:	Not Reported	Coordew:	1425
Coordewdir:	W	Coordns:	1195
Coordnsdir:	S		
Utmx:	490849.3		
Utmy:	4429761		

Locaccurac:	Spotted from section lines		
Latdecdeg:	40.018004		
Longdecdeg:	-105.10723		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	LARAMIE FOX HILLS
Aquifer2:	Not Reported		
Permitarea:	1		
Permitunit:	ACRES		
Annappropr:	0		
Permissued:	2012-02-08		
Permexpire:	2014-02-08		
Wellconstr:	2012-06-20		
Firstbenef:	Not Reported		
Pumpinstal:	2012-12-05		
Wellplugge:	Not Reported		
Comment :	Construction Variance 2012-070-A was granted 7/2/2012 NWL		
Elev:	5240	Welldepth:	420
Topperfcas:	280	Botperfcas:	400
Yield:	10		
Staticwl:	20		
Applicantn:	WILSON MARK & ANITA KOELZER		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	490849.3		
Disputmy:	4429761		
Latitude:	40.0180040382		
Longitude:	-105.107229799		
Site id:	CO6000000031921		

H29
NW
1/4 - 1/2 Mile
Lower

CO WELLS **CO6000000489543**

Fid:	489542	Objectid:	489543
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0907647		
Receipt:	0907647	Permit:	65600-
Wdid:	Not Reported	Currstatus:	Permit Expired
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	STONEHENGE		
Filing:	Not Reported	Lot:	16
Block:	1	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	27
Q160:	SW	Q40:	NE
Q10:	Not Reported	Coordew:	1500
Coordewdir:	W	Coordns:	1300
Coordnsdir:	S		
Utmx:	490872		
Utmy:	4429793		

Locaccurac:	Spotted from section lines		
Latdecdeg:	40.018292		
Longdecdeg:	-105.106964		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	0		
Permissued:	1972-10-16		
Permexpire:	Not Reported		
Wellconstr:	Not Reported		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	2008 Salisbury Ct, Lafayette		
Elev:	0	Welldepth:	0
Topperfcas:	0	Botperfcas:	0
Yield:	0		
Staticwl:	0		
Applicantn:	CLAUS JAMES L		
Completewe:	0	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	490872		
Disputmy:	4429793		
Latitude:	40.0182925964		
Longitude:	-105.106964246		
Site id:	CO6000000489543		

I30
WNW
1/4 - 1/2 Mile
Higher

CO WELLS **CO6000000202210**

Fid:	202209	Objectid:	202210
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0011372B		
Receipt:	0011372B	Permit:	146845--A
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	REPLACE LR	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	27
Q160:	SW	Q40:	SW
Q10:	Not Reported	Coordew:	1000
Coordewdir:	W	Coordns:	500
Coordnsdir:	S		
Utmx:	490720.7		
Utmy:	4429550		

Locaccurac:	Spotted from section lines		
Latdecdeg:	40.016102		
Longdecdeg:	-105.108734		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	LARAMIE FOX HILLS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	acres		
Annappropr:	0		
Permissued:	1987-02-06		
Permexpire:	Not Reported		
Wellconstr:	1987-03-03		
Firstbenef:	Not Reported		
Pumpinstal:	1987-04-08		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	385
Topperfcas:	155	Botperfcas:	385
Yield:	15		
Staticwl:	130		
Applicantn:	MILLER RICHARD P.		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	490720.7		
Disputmy:	4429550		
Latitude:	40.0161015745		
Longitude:	-105.10873374		
Site id:	CO6000000202210		

J31
NNW
1/4 - 1/2 Mile
Lower

FED USGS **USGS40000215991**

Org. Identifier:	USGS-CO		
Formal name:	USGS Colorado Water Science Center		
Monloc Identifier:	USGS-400111105061601		
Monloc name:	SB00106927CAD		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	10190005	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	40.0197071
Longitude:	-105.104984	Sourcemap scale:	24000
Horiz Acc measure:	5	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	5235.00
Vert measure units:	feet	Vertacc measure val:	5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Not Reported		

Aquifer type:	Not Reported		
Construction date:	19720929	Welldepth:	390
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 9

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1981-03-05	9.05		1980-10-22	9.12	
1980-02-25	9.03		1979-10-31	9.01	
1979-03-13	8.12		1978-10-26	9.14	
1978-03-13	9.09		1977-10-13	9.10	
1977-03-16	4.30				

J32
NNW
1/4 - 1/2 Mile
Lower

CO WELLS **CO6000000285479**

Fid:	285478	Objectid:	285479
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0217612		
Receipt:	0217612	Permit:	121913-
Wdid:	Not Reported	Currstatus:	Not Reported
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	STONEHENGE		
Filing:	1	Lot:	14
Block:	2	Ctyparclid:	Not Reported
Parcelsize:	1		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	27
Q160:	SW	Q40:	NE
Q10:	Not Reported	Coordew:	1970
Coordewdir:	W	Coordns:	1800
Coordnsdir:	S		
Utmx:	491014.6		
Utmy:	4429944.5		
Locaccurac:	Spotted from section lines		
Latdecdeg:	40.019659		
Longdecdeg:	-105.105295		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	acres		
Annappropr:	0		
Permissued:	1981-08-31		
Permexpire:	Not Reported		
Wellconstr:	Not Reported		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	2044 Stonehenge Cir		
Elev:	0	Welldepth:	0
Topperfcas:	0	Botperfcas:	0
Yield:	0		
Staticwl:	0		

Applicantn:	EDWARDS W F		
Completewe:	0	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	491014.6		
Disputmy:	4429944.5		
Latitude:	40.0196591046		
Longitude:	-105.105295324		
Site id:	CO6000000285479		

J33
NNW
1/4 - 1/2 Mile
Lower

CO WELLS **CO6000000056385**

Fid:	56384	Objectid:	56385
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=9012402		
Receipt:	9012402	Permit:	63870-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	STONEHENGE		
Filing:	Not Reported	Lot:	8
Block:	3	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	27
Q160:	SW	Q40:	NE
Q10:	Not Reported	Coordew:	1975
Coordewdir:	W	Coordns:	1835
Coordnsdir:	S		
Utmx:	491016		
Utmy:	4429955.4		
Locaccurac:	Spotted from section lines		
Latdecdeg:	40.019757		
Longdecdeg:	-105.105279		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	1		
Permissued:	1972-09-01		
Permexpire:	Not Reported		
Wellconstr:	1980-10-13		
Firstbenef:	1972-09-01		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	405
Topperfcas:	180	Botperfcas:	405
Yield:	15		
Staticwl:	28		

Applicantn:	SHAFFER JOYCE		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	491016		
Disputmy:	4429955.4		
Latitude:	40.0197573258		
Longitude:	-105.105279068		
Site id:	CO6000000056385		

I34
WNW
1/4 - 1/2 Mile
Higher

CO WELLS **CO6000000423514**

Fid:	423513	Objectid:	423514
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0447389		
Receipt:	0447389	Permit:	146845--A
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	WINDRIDGE		
Filing:	Not Reported	Lot:	A
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	37.07		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	27
Q160:	SW	Q40:	SW
Q10:	Not Reported	Coordew:	800
Coordewdir:	W	Coordns:	300
Coordnsdir:	S		
Utmx:	490659.9		
Utmy:	4429489.4		
Locaccurac:	Spotted from section lines		
Latdecdeg:	40.015555		
Longdecdeg:	-105.109445		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	LARAMIE FOX HILLS
Aquifer2:	Not Reported		
Permitarea:	1		
Permitunit:	ACRES		
Annappropr:	0		
Permissued:	1999-07-15		
Permexpire:	2001-07-15		
Wellconstr:	2000-02-17		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	420
Topperfcas:	180	Botperfcas:	420
Yield:	15		
Staticwl:	75		

Applicantn:	MILLER RICHARD P		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	490659.9		
Disputmy:	4429489.4		
Latitude:	40.0155549126		
Longitude:	-105.109445314		
Site id:	CO6000000423514		

J35
NNW
1/2 - 1 Mile
Lower

CO WELLS **CO6000000057045**

Fid:	57044	Objectid:	57045
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=9013058		
Receipt:	9013058	Permit:	79565-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	27
Q160:	SW	Q40:	NE
Q10:	Not Reported	Coordew:	1910
Coordewdir:	W	Coordns:	1950
Coordnsdir:	S		
Utmx:	490996		
Utmy:	4429990.4		
Locaccurac:	Spotted from section lines		
Latdecdeg:	40.020072		
Longdecdeg:	-105.105514		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	1		
Permissued:	Not Reported		
Permexpire:	Not Reported		
Wellconstr:	Not Reported		
Firstbenef:	1977-04-20		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	165
Topperfcas:	0	Botperfcas:	0
Yield:	12		
Staticwl:	25		

Applicantn:	PERICHETTI JAMES Y & JOANN M		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	490996		
Disputmy:	4429990.4		
Latitude:	40.0200724546		
Longitude:	-105.105513924		
Site id:	CO6000000057045		

36
NNE **CO WELLS** **CO6000000231734**
1/2 - 1 Mile
Lower

Fid:	231733	Objectid:	231734
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0035203		
Receipt:	0035203	Permit:	35203-MH
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	27
Q160:	SE	Q40:	NE
Q10:	Not Reported	Coordew:	0
Coordewdir:	Not Reported	Coordns:	0
Coordnsdir:	Not Reported		
Utmx:	491846.2		
Utmy:	4429994.4		
Locaccurac:	Spotted from quarters		
Latdecdeg:	40.020117		
Longdecdeg:	-105.095551		
Use1:	OTHER	Use2:	Not Reported
Specialuse:	MONITORING WELL	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	acres		
Annappropr:	0		
Permissued:	1998-12-01		
Permexpire:	1999-03-01		
Wellconstr:	1999-01-05		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	FOR MONITORING LEVELS IN ERIE LAKE 6 WELLS		
Elev:	0	Welldepth:	60
Topperfcas:	10	Botperfcas:	20
Yield:	0		
Staticwl:	7		

Applicantn:	ERIE TOWN OF		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	491846.2		
Disputmy:	4429994.4		
Latitude:	40.0201171365		
Longitude:	-105.095550867		
Site id:	CO6000000231734		

37
WNW
1/2 - 1 Mile
Higher

CO WELLS **CO6000000298762**

Fid:	298761	Objectid:	298762
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0241899		
Receipt:	0241899	Permit:	134261-
Wdid:	Not Reported	Currstatus:	Permit Issued; Completion Status Unknown
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	27
Q160:	SW	Q40:	SW
Q10:	Not Reported	Coordew:	600
Coordewdir:	W	Coordns:	300
Coordnsdir:	S		
Utmx:	490599.1		
Utmy:	4429489.5		
Locaccurac:	Spotted from section lines		
Latdecdeg:	40.015555		
Longdecdeg:	-105.110158		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	acres		
Annappropr:	0		
Permissued:	1984-01-30		
Permexpire:	Not Reported		
Wellconstr:	Not Reported		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	0
Topperfcas:	0	Botperfcas:	0
Yield:	0		
Staticwl:	0		

Applicantn:	BOULTER S L		
Completewe:	0	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	490599.1		
Disputmy:	4429489.5		
Latitude:	40.0155551384		
Longitude:	-105.110157756		
Site id:	CO6000000298762		

K38
NW
1/2 - 1 Mile
Lower

CO WELLS **CO6000000055848**

Fid:	55847	Objectid:	55848
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=9011865		
Receipt:	9011865	Permit:	52605-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	STONEHENGE		
Filing:	Not Reported	Lot:	3
Block:	2	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	27
Q160:	SW	Q40:	NE
Q10:	Not Reported	Coordew:	1500
Coordewdir:	W	Coordns:	1800
Coordnsdir:	S		
Utmx:	490871.3		
Utmy:	4429945.4		
Locaccurac:	Spotted from section lines		
Latdecdeg:	40.019666		
Longdecdeg:	-105.106975		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	1		
Permissued:	1972-03-10		
Permexpire:	Not Reported		
Wellconstr:	1972-06-29		
Firstbenef:	1972-06-29		
Pumpinstal:	1972-06-29		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	32
Topperfcas:	12	Botperfcas:	32
Yield:	6		
Staticwl:	12		

Applicantn:	MOXNESS D D		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	490871.3		
Disputmy:	4429945.4		
Latitude:	40.0196656759		
Longitude:	-105.106974594		
Site id:	CO6000000055848		

I39
WNW
1/2 - 1 Mile
Lower

CO WELLS **CO6000000199859**

Fid:	199858	Objectid:	199859
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0009383		
Receipt:	0009383	Permit:	Not Reported
Wdid:	Not Reported	Currstatus:	Permit Issued; Completion Status Unknown
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	27
Q160:	SW	Q40:	SW
Q10:	Not Reported	Coordew:	0
Coordewdir:	Not Reported	Coordns:	0
Coordnsdir:	Not Reported		
Utmx:	490619.7		
Utmy:	4429598.4		
Locaccurac:	Spotted from quarters		
Latdecdeg:	40.016537		
Longdecdeg:	-105.109918		
Use1:	Not Reported	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	acres		
Annappropr:	0		
Permissued:	Not Reported		
Permexpire:	Not Reported		
Wellconstr:	Not Reported		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	0
Topperfcas:	0	Botperfcas:	0
Yield:	0		
Staticwl:	0		

Applicantn:	BOULTER S L		
Completewe:	0	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	490619.7		
Disputmy:	4429598.4		
Latitude:	40.0165365307		
Longitude:	-105.109917944		
Site id:	CO6000000199859		

K40
NW
1/2 - 1 Mile
Lower

CO WELLS **CO6000000056026**

Fid:	56025	Objectid:	56026
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=9012042		
Receipt:	9012042	Permit:	56186-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	STOENHENGE		
Filing:	Not Reported	Lot:	4
Block:	2	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	27
Q160:	SW	Q40:	NE
Q10:	Not Reported	Coordew:	1500
Coordewdir:	W	Coordns:	1900
Coordnsdir:	S		
Utmx:	490871.2		
Utmy:	4429975.9		
Locaccurac:	Spotted from section lines		
Latdecdeg:	40.01994		
Longdecdeg:	-105.106976		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	1		
Permissued:	1972-04-06		
Permexpire:	Not Reported		
Wellconstr:	Not Reported		
Firstbenef:	1974-03-31		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	0
Topperfcas:	0	Botperfcas:	0
Yield:	0		
Staticwl:	0		

Applicantn:	LEWIS BRIAN A.		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	490871.2		
Disputmy:	4429975.9		
Latitude:	40.0199404719		
Longitude:	-105.106976194		
Site id:	CO6000000056026		

41
ENE
1/2 - 1 Mile
Lower

CO WELLS **CO6000000183474**

Fid:	183473	Objectid:	183474
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=C070122		
Receipt:	C070122	Permit:	122-WCB
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	26
Q160:	SW	Q40:	SW
Q10:	Not Reported	Coordew:	0
Coordewdir:	Not Reported	Coordns:	0
Coordnsdir:	Not Reported		
Utmx:	492249		
Utmy:	4429594.5		
Locaccurac:	Spotted from quarters		
Latdecdeg:	40.016518		
Longdecdeg:	-105.090826		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	0		
Permissued:	1954-07-22		
Permexpire:	Not Reported		
Wellconstr:	Not Reported		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	440
Topperfcas:	0	Botperfcas:	0
Yield:	0		
Staticwl:	0		

Applicantn:	ERIE TOWN OF		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	492249		
Disputmy:	4429594.5		
Latitude:	40.0165179283		
Longitude:	-105.090825857		
Site id:	CO6000000183474		

K42
NW
1/2 - 1 Mile
Lower

CO WELLS **CO6000000486819**

Fid:	486818	Objectid:	486819
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0904767		
Receipt:	0904767	Permit:	53307-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	STONEHENGE		
Filing:	1	Lot:	5
Block:	2	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	27
Q160:	SW	Q40:	NE
Q10:	Not Reported	Coordew:	1500
Coordewdir:	W	Coordns:	2000
Coordnsdir:	S		
Utmx:	490871.1		
Utmy:	4430006.5		
Locaccurac:	Spotted from section lines		
Latdecdeg:	40.020216		
Longdecdeg:	-105.106977		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	1		
Permissued:	1972-03-17		
Permexpire:	Not Reported		
Wellconstr:	Not Reported		
Firstbenef:	1973-08-01		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	0
Topperfcas:	0	Botperfcas:	0
Yield:	0		
Staticwl:	0		

Applicantn:	HOWE ALFRED BART		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	490871.1		
Disputmy:	4430006.5		
Latitude:	40.0202161698		
Longitude:	-105.106977797		
Site id:	CO6000000486819		

43
WSW
1/2 - 1 Mile
Higher

CO WELLS **CO6000000055905**

Fid:	55904	Objectid:	55905
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=9011921		
Receipt:	9011921	Permit:	54067-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	34
Q160:	NW	Q40:	SW
Q10:	Not Reported	Coordew:	0
Coordewdir:	Not Reported	Coordns:	0
Coordnsdir:	Not Reported		
Utmx:	490623.4		
Utmy:	4428795.4		
Locaccurac:	Spotted from quarters		
Latdecdeg:	40.009302		
Longdecdeg:	-105.109863		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	1		
Permissued:	1972-03-24		
Permexpire:	Not Reported		
Wellconstr:	1972-05-15		
Firstbenef:	1972-05-15		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	520
Topperfcas:	285	Botperfcas:	520
Yield:	15		
Staticwl:	80		

Applicantn:	WEEMS BEN F		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	490623.4		
Disputmy:	4428795.4		
Latitude:	40.0093017295		
Longitude:	-105.109862987		
Site id:	CO6000000055905		

44
NNW
1/2 - 1 Mile
Lower

CO WELLS **CO6000000488007**

Fid:	488006	Objectid:	488007
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0905983		
Receipt:	0905983	Permit:	58504-
Wdid:	Not Reported	Currstatus:	Permit Expired
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	STONEHENGE		
Filing:	Not Reported	Lot:	6
Block:	2	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	27
Q160:	SW	Q40:	NE
Q10:	Not Reported	Coordew:	1700
Coordewdir:	W	Coordns:	2320
Coordnsdir:	S		
Utmx:	490931.6		
Utmy:	4430103.5		
Locaccurac:	Spotted from section lines		
Latdecdeg:	40.02109		
Longdecdeg:	-105.10627		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	0		
Permissued:	1972-04-21		
Permexpire:	Not Reported		
Wellconstr:	Not Reported		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	0
Topperfcas:	0	Botperfcas:	0
Yield:	0		
Staticwl:	0		

Applicantn:	FREITAG WILLIAM JR		
Completewe:	0	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	490931.6		
Disputmy:	4430103.5		
Latitude:	40.0210907677		
Longitude:	-105.106270179		
Site id:	CO6000000488007		

45
SSE **CO WELLS** **CO6000000053399**
1/2 - 1 Mile
Higher

Fid:	53398	Objectid:	53399
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=9009324		
Receipt:	9009324	Permit:	14354-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	34
Q160:	SE	Q40:	NE
Q10:	Not Reported	Coordew:	0
Coordewdir:	Not Reported	Coordns:	0
Coordnsdir:	Not Reported		
Utmx:	491840		
Utmy:	4428392.4		
Locaccurac:	Spotted from quarters		
Latdecdeg:	40.005683		
Longdecdeg:	-105.095603		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	1		
Permissued:	Not Reported		
Permexpire:	Not Reported		
Wellconstr:	Not Reported		
Firstbenef:	1963-04-03		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	490
Topperfcas:	0	Botperfcas:	0
Yield:	3		
Staticwl:	40		

Applicantn:	NUOCI BROS		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	491840		
Disputmy:	4428392.4		
Latitude:	40.0056834242		
Longitude:	-105.095603382		
Site id:	CO6000000053399		

46
West
1/2 - 1 Mile
Lower

CO WELLS **CO6000000057296**

Fid:	57295	Objectid:	57296
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=9013307		
Receipt:	9013307	Permit:	85471-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	28
Q160:	SE	Q40:	SE
Q10:	Not Reported	Coordew:	63
Coordewdir:	E	Coordns:	130
Coordnsdir:	S		
Utmx:	490397.1		
Utmy:	4429438.9		
Locaccurac:	Spotted from section lines		
Latdecdeg:	40.015097		
Longdecdeg:	-105.112524		
Use1:	HOUSEHOLD USE ONLY	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	.33000001		
Permissued:	Not Reported		
Permexpire:	Not Reported		
Wellconstr:	Not Reported		
Firstbenef:	1977-04-08		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	200
Topperfcas:	0	Botperfcas:	0
Yield:	15		
Staticwl:	35		

Applicantn:	SHEWBERT KENNETH		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	490397.1		
Disputmy:	4429438.9		
Latitude:	40.0150969706		
Longitude:	-105.112523997		
Site id:	CO6000000057296		

47
NNW
1/2 - 1 Mile
Lower

CO WELLS **CO6000000032207**

Fid:	32206	Objectid:	32207
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=3653922		
Receipt:	3653922	Permit:	287648-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	HOUSE WELL	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	EAST COUNTY		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	4.6999998		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	27
Q160:	NW	Q40:	SE
Q10:	Not Reported	Coordew:	2565
Coordewdir:	W	Coordns:	2306
Coordnsdir:	N		
Utmx:	491194.4		
Utmy:	4430298.5		
Locaccurac:	Spotted from section lines		
Latdecdeg:	40.02285		
Longdecdeg:	-105.103193		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	1		
Permitunit:	ACRES		
Annappropr:	0		
Permissued:	2012-03-06		
Permexpire:	Not Reported		
Wellconstr:	Not Reported		
Firstbenef:	1964-12-31		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	400
Topperfcas:	0	Botperfcas:	0
Yield:	15		
Staticwl:	0		

Applicantn:	WRIGHT GERALD & JEANNE		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	491194.4		
Disputmy:	4430298.5		
Latitude:	40.0228504532		
Longitude:	-105.103193147		
Site id:	CO6000000032207		

L48
SSE **FED USGS** **USGS40000215688**
1/2 - 1 Mile
Lower

Org. Identifier:	USGS-CO		
Formal name:	USGS Colorado Water Science Center		
Monloc Identifier:	USGS-400020105053700		
Monloc name:	SB00106934DADA SITE C37		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	10190005	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	40.0055403
Longitude:	-105.0941503	Sourcemap scale:	Not Reported
Horiz Acc measure:	1	Horiz Acc measure units:	minutes
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	Not Reported
Vert measure units:	Not Reported	Vertacc measure val:	Not Reported
Vert accmeasure units:	Not Reported		
Vertcollection method:	Not Reported		
Vert coord refsys:	Not Reported	Countrycode:	US
Aquifername:	Denver Basin aquifer system		
Formation type:	Fox Hills Formation		
Aquifer type:	Not Reported		
Construction date:	Not Reported	Welldepth:	Not Reported
Welldepth units:	Not Reported	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

L49
SSE **FED USGS** **USGS40000215689**
1/2 - 1 Mile
Lower

Org. Identifier:	USGS-CO		
Formal name:	USGS Colorado Water Science Center		
Monloc Identifier:	USGS-400020105053701		
Monloc name:	SB00106934DAD		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	10190005	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	40.0055403
Longitude:	-105.0941503	Sourcemap scale:	Not Reported

Horiz Acc measure:	5	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	5250.00
Vert measure units:	feet	Vertacc measure val:	50
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Laramie Formation		
Aquifer type:	Not Reported		
Construction date:	19630101	Welldepth:	490
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1963-04-01	200.00	

50
NW
1/2 - 1 Mile
Lower

CO WELLS **CO6000000220061**

Fid:	220060	Objectid:	220061
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0025525		
Receipt:	0025525	Permit:	56584-
Wdid:	Not Reported	Currstatus:	Permit Expired
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	2
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	STONEHENGE		
Filing:	Not Reported	Lot:	1
Block:	2	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	27
Q160:	SW	Q40:	NW
Q10:	Not Reported	Coordew:	0
Coordewdir:	Not Reported	Coordns:	0
Coordnsdir:	Not Reported		
Utmx:	490618.4		
Utmy:	4429999.4		
Locaccurac:	Spotted from quarters		
Latdecdeg:	40.020149		
Longdecdeg:	-105.109939		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	acres		
Annappropr:	0		
Permissued:	1972-04-10		

Permexpire:	Not Reported		
Wellconstr:	Not Reported		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	0
Topperfcas:	0	Botperfcas:	0
Yield:	0		
Staticwl:	0		
Applicantn:	HOSHIKO JR HENRY H		
Completewe:	0	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	490618.4		
Disputmy:	4429999.4		
Latitude:	40.0201494285		
Longitude:	-105.109938976		
Site id:	CO6000000220061		

M51
West
1/2 - 1 Mile
Higher

CO WELLS **CO6000000056549**

Fid:	56548	Objectid:	56549
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=9012565		
Receipt:	9012565	Permit:	67555-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	33
Q160:	NE	Q40:	NE
Q10:	Not Reported	Coordew:	300
Coordewdir:	E	Coordns:	1000
Coordnsdir:	N		
Utmx:	490326.9		
Utmy:	4429094.5		
Locaccurac:	Spotted from section lines		
Latdecdeg:	40.011993		
Longdecdeg:	-105.113341		
Use1:	DOMESTIC	Use2:	STOCK
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	1		
Permissued:	1973-02-16		

Permexpire:	Not Reported		
Wellconstr:	1976-06-12		
Firstbenef:	1976-06-12		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	0
Topperfcas:	0	Botperfcas:	0
Yield:	0		
Staticwl:	18		
Applicantn:	DOERR WILLIAM & URSULA		
Completewe:	3	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	490336.3		
Disputmy:	4429122.2		
Latitude:	40.0119932061		
Longitude:	-105.113341446		
Site id:	CO6000000056549		

M52
West
1/2 - 1 Mile
Higher

CO WELLS **CO6000000493543**

Fid:	493542	Objectid:	493543
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0911860		
Receipt:	0911860	Permit:	81997-
Wdid:	Not Reported	Currstatus:	Permit Expired
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	UNKNOWN
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	5		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	33
Q160:	NE	Q40:	NE
Q10:	Not Reported	Coordew:	300
Coordewdir:	E	Coordns:	1000
Coordnsdir:	N		
Utmx:	490326.9		
Utmy:	4429094.4		
Locaccurac:	Spotted from section lines		
Latdecdeg:	40.011992		
Longdecdeg:	-105.113341		
Use1:	HOUSEHOLD USE ONLY	Use2:	DOMESTIC
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	0		
Permissued:	Not Reported		

Permexpire:	Not Reported		
Wellconstr:	Not Reported		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	0
Topperfcas:	0	Botperfcas:	0
Yield:	0		
Staticwl:	0		
Applicantn:	DOERR WILLIAM & URSULA		
Completewe:	0	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	490326		
Disputmy:	4429094		
Latitude:	40.011992305		
Longitude:	-105.113341444		
Site id:	CO6000000493543		

N53
North
1/2 - 1 Mile
Lower

CO WELLS **CO6000000053929**

Fid:	53928	Objectid:	53929
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=9009862		
Receipt:	9009862	Permit:	20967-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	27
Q160:	NE	Q40:	SW
Q10:	Not Reported	Coordew:	0
Coordewdir:	Not Reported	Coordns:	0
Coordnsdir:	Not Reported		
Utmx:	491437.4		
Utmy:	4430397.9		
Locaccurac:	Spotted from quarters		
Latdecdeg:	40.023749		
Longdecdeg:	-105.100347		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	1		
Permissued:	1964-07-29		

Permexpire:	Not Reported		
Wellconstr:	1964-08-03		
Firstbenef:	1964-08-03		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	400
Topperfcas:	172	Botperfcas:	400
Yield:	0		
Staticwl:	0		
Applicantn:	GROW ROGER H		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	491437.4		
Disputmy:	4430397.9		
Latitude:	40.0237485234		
Longitude:	-105.100346738		
Site id:	CO6000000053929		

N54
North
1/2 - 1 Mile
Lower

FED USGS **USGS40000216076**

Org. Identifier:	USGS-CO		
Formal name:	USGS Colorado Water Science Center		
Monloc Identifier:	USGS-400126105055700		
Monloc name:	SB00106927ACDB SITE 395		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	10190005	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	40.0238737
Longitude:	-105.099706	Sourcemap scale:	Not Reported
Horiz Acc measure:	1	Horiz Acc measure units:	minutes
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	Not Reported
Vert measure units:	Not Reported	Vertacc measure val:	Not Reported
Vert accmeasure units:	Not Reported		
Vertcollection method:	Not Reported		
Vert coord refsys:	Not Reported	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Laramie Formation		
Aquifer type:	Not Reported		
Construction date:	Not Reported	Welldepth:	Not Reported
Welldepth units:	Not Reported	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

N55
North
1/2 - 1 Mile
Lower

FED USGS **USGS40000216077**

Org. Identifier:	USGS-CO		
Formal name:	USGS Colorado Water Science Center		
Monloc Identifier:	USGS-400126105055701		
Monloc name:	SB00106927ACD		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	10190005	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	40.0238737
Longitude:	-105.099706	Sourcemap scale:	Not Reported
Horiz Acc measure:	5	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	5201.00
Vert measure units:	feet	Vertacc measure val:	5.
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	19640101	Welldepth:	400
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 15

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1983-09-21	35.60				
Note: The site had been pumped recently.					
1983-03-09	9.45		1982-10-13	17.47	
1982-03-02	18.90		1981-10-13	28.97	
1981-03-05	13.30		1980-10-22	23.98	
1980-02-29	9.41		1979-10-02	19.10	
1979-03-13	19.14		1978-10-25	21.01	
1977-10-13	24.29		1977-03-21	9.80	
1976-09-08	25.30		1976-09-01	29.00	

M56
West
1/2 - 1 Mile
Lower

CO WELLS **CO6000000259809**

Fid:	259808	Objectid:	259809
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0076442		
Receipt:	0076442	Permit:	88056-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	33
Q160:	NE	Q40:	NE
Q10:	Not Reported	Coordew:	470
Coordewdir:	E	Coordns:	660
Coordnsdir:	N		
Utmx:	490274.6		
Utmy:	4429198		

Locaccurac:	Spotted from section lines		
Latdecdeg:	40.012925		
Longdecdeg:	-105.113956		
Use1:	HOUSEHOLD USE ONLY	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	.33000001		
Permissued:	1977-01-18		
Permexpire:	Not Reported		
Wellconstr:	1977-01-27		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	210
Topperfcas:	70	Botperfcas:	210
Yield:	30		
Staticwl:	23		
Applicantn:	BRUMMETT R W		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	490274.6		
Disputmy:	4429198		
Latitude:	40.012925116		
Longitude:	-105.113955803		
Site id:	CO6000000259809		

57
WSW
1/2 - 1 Mile
Higher

CO WELLS **CO6000000057177**

Fid:	57176	Objectid:	57177
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=9013188		
Receipt:	9013188	Permit:	82725-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	33
Q160:	NE	Q40:	SE
Q10:	Not Reported	Coordew:	500
Coordewdir:	E	Coordns:	1400
Coordnsdir:	N		
Utmx:	490266.7		
Utmy:	4428972.4		

Locaccurac:	Spotted from section lines		
Latdecdeg:	40.010892		
Longdecdeg:	-105.114045		
Use1:	HOUSEHOLD USE ONLY	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	.33000001		
Permissued:	Not Reported		
Permexpire:	Not Reported		
Wellconstr:	Not Reported		
Firstbenef:	1976-03-19		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	225
Topperfcas:	0	Botperfcas:	0
Yield:	15		
Staticwl:	22		
Applicantn:	EBERSOLE LESTER O.		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	490266.7		
Disputmy:	4428972.4		
Latitude:	40.0108924215		
Longitude:	-105.114044987		
Site id:	CO6000000057177		

O58
West
1/2 - 1 Mile
Lower

CO WELLS **CO6000000258680**

Fid:	258679	Objectid:	258680
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0069190		
Receipt:	0069190	Permit:	6171-AD
Wdid:	Not Reported	Currstatus:	Application Denied
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	33
Q160:	NE	Q40:	NE
Q10:	Not Reported	Coordew:	675
Coordewdir:	E	Coordns:	700
Coordnsdir:	N		
Utmx:	490212.1		
Utmy:	4429185.5		

Locaccurac:	Spotted from section lines		
Latdecdeg:	40.012812		
Longdecdeg:	-105.114688		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	acres		
Annappropr:	0		
Permissued:	1976-05-26		
Permexpire:	Not Reported		
Wellconstr:	Not Reported		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	0
Topperfcas:	0	Botperfcas:	0
Yield:	0		
Staticwl:	0		
Applicantn:	BURTON PAUL		
Completewe:	0	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	490212.1		
Disputmy:	4429185.5		
Latitude:	40.0128117708		
Longitude:	-105.114687947		
Site id:	CO6000000258680		

O59
West
1/2 - 1 Mile
Lower

CO WELLS **CO6000000285718**

Fid:	285717	Objectid:	285718
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0218080		
Receipt:	0218080	Permit:	121914-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	33
Q160:	NE	Q40:	SE
Q10:	Not Reported	Coordew:	700
Coordewdir:	E	Coordns:	900
Coordnsdir:	N		
Utmx:	490204.9		
Utmy:	4429124.5		

Locaccurac:	Spotted from section lines		
Latdecdeg:	40.012262		
Longdecdeg:	-105.114771		
Use1:	HOUSEHOLD USE ONLY	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	.33000001		
Permissued:	1981-08-31		
Permexpire:	Not Reported		
Wellconstr:	1981-09-13		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	60
Topperfcas:	12	Botperfcas:	60
Yield:	40		
Staticwl:	8		
Applicantn:	TARVIN E G		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	490204.9		
Disputmy:	4429124.5		
Latitude:	40.0122620917		
Longitude:	-105.114771391		
Site id:	CO6000000285718		

O60
West
1/2 - 1 Mile
Lower

FED USGS **USGS40000215823**

Org. Identifier:	USGS-CO		
Formal name:	USGS Colorado Water Science Center		
Monloc Identifier:	USGS-400045105065201		
Monloc name:	SB00106933AAC		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	10190005	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	40.0124849
Longitude:	-105.1149844	Sourcemap scale:	24000
Horiz Acc measure:	5	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	5245.00
Vert measure units:	feet	Vertacc measure val:	5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Not Reported		

Aquifer type:	Not Reported		
Construction date:	19770315	Welldepth:	210
Welldepth units:	ft	Wellholedepth:	210
Wellholedepth units:	ft		

Ground-water levels, Number of Measurements: 9

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1981-03-05	15.30		1980-10-22	13.47	
1980-03-05	16.39		1979-10-02	14.41	
1979-03-13	18.77		1978-10-25	17.74	
1978-03-13	20.02		1977-10-17	19.70	
1977-03-15	19.48				

61
WNW
1/2 - 1 Mile
Lower

CO WELLS **CO6000000054872**

Fid:	54871	Objectid:	54872
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=9010874		
Receipt:	9010874	Permit:	34564-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	28
Q160:	SE	Q40:	SE
Q10:	Not Reported	Coordew:	0
Coordewdir:	Not Reported	Coordns:	0
Coordnsdir:	Not Reported		
Utmx:	490215.6		
Utmy:	4429599.9		
Locaccurac:	Spotted from quarters		
Latdecdeg:	40.016545		
Longdecdeg:	-105.114653		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	1		
Permissued:	Not Reported		
Permexpire:	Not Reported		
Wellconstr:	Not Reported		
Firstbenef:	1968-07-18		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	103
Topperfcas:	0	Botperfcas:	0
Yield:	5		
Staticwl:	30		

Applicantn:	REID JIM		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	490215.6		
Disputmy:	4429599.9		
Latitude:	40.0165454574		
Longitude:	-105.114653184		
Site id:	CO6000000054872		

62
South
1/2 - 1 Mile
Higher

CO WELLS **CO6000000218199**

Fid:	218198	Objectid:	218199
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0024294		
Receipt:	0024294	Permit:	24294-MH
Wdid:	Not Reported	Currstatus:	Well Abandoned
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	34
Q160:	SE	Q40:	SW
Q10:	Not Reported	Coordew:	0
Coordewdir:	Not Reported	Coordns:	0
Coordnsdir:	Not Reported		
Utmx:	491434.4		
Utmy:	4427992.9		
Locaccurac:	Spotted from quarters		
Latdecdeg:	40.00208		
Longdecdeg:	-105.10035		
Use1:	OTHER	Use2:	Not Reported
Specialuse:	MONITORING WELL	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	acres		
Annappropr:	0		
Permissued:	1994-09-09		
Permexpire:	1994-12-09		
Wellconstr:	Not Reported		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	1994-09-19		
Comment :	7 WELLS		
Elev:	0	Welldepth:	0
Topperfcas:	0	Botperfcas:	0
Yield:	0		
Staticwl:	0		

Applicantn:	HENZE MCELWAIN SHAUB LLC		
Completewe:	0	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	491434.4		
Disputmy:	4427992.9		
Latitude:	40.002079999		
Longitude:	-105.100350156		
Site id:	CO6000000218199		

63
SSE **CO WELLS** **CO6000000057593**
1/2 - 1 Mile
Lower

Fid:	57592	Objectid:	57593
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=9013642		
Receipt:	9013642	Permit:	93109-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	34
Q160:	SE	Q40:	SE
Q10:	Not Reported	Coordew:	164
Coordewdir:	E	Coordns:	1086
Coordnsdir:	S		
Utmx:	491990.7		
Utmy:	4428124.5		
Locaccurac:	Spotted from section lines		
Latdecdeg:	40.00327		
Longdecdeg:	-105.093834		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	1		
Permissued:	Not Reported		
Permexpire:	Not Reported		
Wellconstr:	Not Reported		
Firstbenef:	1962-06-08		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	0
Topperfcas:	0	Botperfcas:	0
Yield:	0		
Staticwl:	0		

Applicantn:	CHMIEL LEONARD & JOHANNA P		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	491990.7		
Disputmy:	4428124.5		
Latitude:	40.0032711465		
Longitude:	-105.093834463		
Site id:	CO6000000057593		

64
SSW **CO WELLS** **CO6000000238282**
1/2 - 1 Mile
Higher

Fid:	238281	Objectid:	238282
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0040584		
Receipt:	0040584	Permit:	40584-MH
Wdid:	Not Reported	Currstatus:	Permit Expired
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	34
Q160:	SW	Q40:	SE
Q10:	Not Reported	Coordew:	0
Coordewdir:	Not Reported	Coordns:	0
Coordnsdir:	Not Reported		
Utmx:	491030.7		
Utmy:	4427993.5		
Locaccurac:	Spotted from quarters		
Latdecdeg:	40.002081		
Longdecdeg:	-105.10508		
Use1:	OTHER	Use2:	Not Reported
Specialuse:	MONITORING WELL	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	0		
Permissued:	2002-03-05		
Permexpire:	2002-06-04		
Wellconstr:	Not Reported		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	6 WELLS no data		
Elev:	0	Welldepth:	0
Topperfcas:	0	Botperfcas:	0
Yield:	0		
Staticwl:	0		

Applicantn:	COHERENT TECHNOLOGIES INC		
Completewe:	0	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	491030.7		
Disputmy:	4427993.5		
Latitude:	40.0020812131		
Longitude:	-105.105079698		
Site id:	CO6000000238282		

65
SSE **CO WELLS** **CO6000000054517**
1/2 - 1 Mile
Higher

Fid:	54516	Objectid:	54517
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=9010473		
Receipt:	9010473	Permit:	29806-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	34
Q160:	SE	Q40:	SE
Q10:	Not Reported	Coordew:	0
Coordewdir:	Not Reported	Coordns:	0
Coordnsdir:	Not Reported		
Utmx:	491838.1		
Utmy:	4427992.9		
Locaccurac:	Spotted from quarters		
Latdecdeg:	40.002084		
Longdecdeg:	-105.095621		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	1		
Permissued:	Not Reported		
Permexpire:	Not Reported		
Wellconstr:	Not Reported		
Firstbenef:	1967-02-14		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	60
Topperfcas:	0	Botperfcas:	0
Yield:	15		
Staticwl:	12		

Applicantn:	WILLIAMS RICHARD		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	491838.1		
Disputmy:	4427992.9		
Latitude:	40.0020839974		
Longitude:	-105.095620621		
Site id:	CO6000000054517		

66
West
1/2 - 1 Mile
Lower

CO WELLS **CO6000000306497**

Fid:	306496	Objectid:	306497
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0255202		
Receipt:	0255202	Permit:	88056--A
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	33
Q160:	NE	Q40:	NE
Q10:	Not Reported	Coordew:	1200
Coordewdir:	E	Coordns:	300
Coordnsdir:	N		
Utmx:	490051.4		
Utmy:	4429307		
Locaccurac:	Spotted from section lines		
Latdecdeg:	40.013905		
Longdecdeg:	-105.116573		
Use1:	HOUSEHOLD USE ONLY	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	LARAMIE FOX HILLS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	acres		
Annappropr:	0		
Permissued:	1985-07-09		
Permexpire:	Not Reported		
Wellconstr:	1985-08-01		
Firstbenef:	Not Reported		
Pumpinstal:	1985-10-04		
Wellplugge:	Not Reported		
Comment :	PUMP NOT TESTED		
Elev:	0	Welldepth:	100
Topperfcas:	10	Botperfcas:	90
Yield:	6		
Staticwl:	0		

Applicantn:	ALKEMA P		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	490051.4		
Disputmy:	4429307		
Latitude:	40.0139045784		
Longitude:	-105.116572779		
Site id:	CO6000000306497		

67
WNW
1/2 - 1 Mile
Lower

CO WELLS **CO6000000228902**

Fid:	228901	Objectid:	228902
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0032701		
Receipt:	0032701	Permit:	3113-AD
Wdid:	Not Reported	Currstatus:	Application Denied
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	28
Q160:	SE	Q40:	NE
Q10:	Not Reported	Coordew:	760
Coordewdir:	E	Coordns:	1570
Coordnsdir:	S		
Utmx:	490182.8		
Utmy:	4429877.5		
Locaccurac:	Spotted from section lines		
Latdecdeg:	40.019046		
Longdecdeg:	-105.115042		
Use1:	IRRIGATION	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	acres		
Annappropr:	0		
Permissued:	1972-08-25		
Permexpire:	Not Reported		
Wellconstr:	Not Reported		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	0
Topperfcas:	0	Botperfcas:	0
Yield:	0		
Staticwl:	0		

Applicantn:	ALPENFELS II H. L.		
Completewe:	0	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	490182.8		
Disputmy:	4429877.5		
Latitude:	40.0190461851		
Longitude:	-105.115041733		
Site id:	CO6000000228902		

68
NE
1/2 - 1 Mile
Lower

CO WELLS **CO6000000245091**

Fid:	245090	Objectid:	245091
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0045167		
Receipt:	0045167	Permit:	45167-MH
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	26
Q160:	NW	Q40:	SW
Q10:	Not Reported	Coordew:	0
Coordewdir:	Not Reported	Coordns:	0
Coordnsdir:	Not Reported		
Utmx:	492252.1		
Utmy:	4430399.5		
Locaccurac:	Spotted from quarters		
Latdecdeg:	40.02377		
Longdecdeg:	-105.090799		
Use1:	OTHER	Use2:	Not Reported
Specialuse:	MONITORING WELL	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	0		
Permissued:	2005-06-21		
Permexpire:	2005-09-18		
Wellconstr:	2005-07-01		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	20
Topperfcas:	10	Botperfcas:	20
Yield:	0		
Staticwl:	0		

Applicantn:	YOUNG VENTURES		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	492252.1		
Disputmy:	4430399.5		
Latitude:	40.0237708131		
Longitude:	-105.090799144		
Site id:	CO6000000245091		

69
NW
1/2 - 1 Mile
Lower

CO WELLS **CO6000000196445**

Fid:	196444	Objectid:	196445
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0005331		
Receipt:	0005331	Permit:	1607-AD
Wdid:	Not Reported	Currstatus:	Application Denied
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	28
Q160:	SE	Q40:	NE
Q10:	Not Reported	Coordew:	200
Coordewdir:	E	Coordns:	2600
Coordnsdir:	S		
Utmx:	490352.1		
Utmy:	4430191.5		
Locaccurac:	Spotted from section lines		
Latdecdeg:	40.021877		
Longdecdeg:	-105.113062		
Use1:	IRRIGATION	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	acres		
Annappropr:	0		
Permissued:	1969-07-29		
Permexpire:	Not Reported		
Wellconstr:	Not Reported		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	0
Topperfcas:	0	Botperfcas:	0
Yield:	0		
Staticwl:	0		

Applicantn:	WEBB CLYDE E.		
Completewe:	0	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	490352.1		
Disputmy:	4430191.5		
Latitude:	40.0218771997		
Longitude:	-105.113062483		
Site id:	CO6000000196445		

70
SSE **FED USGS** **USGS40000218219**
1/2 - 1 Mile
Lower

Org. Identifier:	USGS-CO		
Formal name:	USGS Colorado Water Science Center		
Monloc Identifier:	USGS-401000105032701		
Monloc name:	SB00106936DDB		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	10190005	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	40.0027626
Longitude:	-105.0916502	Sourcemap scale:	24000
Horiz Acc measure:	5	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	5100.00
Vert measure units:	feet	Vertacc measure val:	5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Not Reported		
Aquifer type:	Not Reported		
Construction date:	19650602	Welldepth:	600
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 28

Date	Feet below Surface	Feet to Sealevel	Date	Feet below Surface	Feet to Sealevel
1983-09-21	68.80		1983-09-21	68.80	
1983-03-08	72.76		1983-03-08	72.76	
1982-10-13	83.01		1982-10-13	83.01	
1982-03-02	113.90				
Note: The site had been pumped recently.					
1982-03-02	113.90				
Note: The site had been pumped recently.					
1981-10-14	140.00				
Note: The site was being pumped.					
1981-10-14	140.00				
Note: The site was being pumped.					
1981-03-03	100.60		1981-03-03	100.60	
1980-10-21	64.93		1980-10-21	64.93	
1980-02-29	105.33		1980-02-29	105.33	
1979-10-02	164.05		1979-10-02	164.05	
1979-03-13	165.92		1979-03-13	165.92	

Ground-water levels, continued.

Date	Feet below Surface	Feet to Sealevel
1978-10-24	167.44	
1978-03-13	157.88	
1977-10-13	173.60	
1977-03-14	179.40	

Date	Feet below Surface	Feet to Sealevel
1978-10-24	167.44	
1978-03-13	157.88	
1977-10-13	173.60	
1977-03-14	179.40	

P71
West
1/2 - 1 Mile
Lower

CO WELLS **CO6000000287251**

Fid:	287250	Objectid:	287251
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0221459		
Receipt:	0221459	Permit:	123736-
Wdid:	Not Reported	Currstatus:	Permit Issued; Completion Status Unknown
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	33
Q160:	NE	Q40:	NW
Q10:	Not Reported	Coordew:	1400
Coordewdir:	E	Coordns:	800
Coordnsdir:	N		
Utmx:	489991.3		
Utmy:	4429154.5		
Locaccurac:	Spotted from section lines		
Latdecdeg:	40.01253		
Longdecdeg:	-105.117275		
Use1:	HOUSEHOLD USE ONLY	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	acres		
Annappropr:	0		
Permissued:	1981-12-28		
Permexpire:	Not Reported		
Wellconstr:	Not Reported		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	0
Topperfcas:	0	Botperfcas:	0
Yield:	0		
Staticwl:	0		

Applicantn:	LUCIO J L		
Completewe:	0	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	489991.3		
Disputmy:	4429154.5		
Latitude:	40.0125298793		
Longitude:	-105.117274649		
Site id:	CO6000000287251		

Q72
SSE
1/2 - 1 Mile
Higher

CO WELLS **CO6000000039567**

Fid:	39566	Objectid:	39567
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=3662494D		
Receipt:	3662494D	Permit:	292980-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	EW-4	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	34
Q160:	SE	Q40:	SE
Q10:	Not Reported	Coordew:	1025
Coordewdir:	E	Coordns:	52
Coordnsdir:	S		
Utmx:	491726.4		
Utmy:	4427809		
Locaccurac:	Spotted from section lines		
Latdecdeg:	40.000426		
Longdecdeg:	-105.096927		
Use1:	OTHER	Use2:	Not Reported
Specialuse:	MONITORING WELL	Aquifer1:	QUATERNARY ALLUVIUM
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	0		
Permissued:	2013-11-25		
Permexpire:	Not Reported		
Wellconstr:	2013-10-11		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	34
Topperfcas:	17	Botperfcas:	34
Yield:	0		
Staticwl:	24		

Applicantn:	SILCO OIL		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	491726.4		
Disputmy:	4427809		
Latitude:	40.00042601		
Longitude:	-105.096926896		
Site id:	CO6000000039567		

Q73
SSE
1/2 - 1 Mile
Higher

CO WELLS **CO6000000039566**

Fid:	39565	Objectid:	39566
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=3662494C		
Receipt:	3662494C	Permit:	292979-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	EW-3	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	34
Q160:	SE	Q40:	SE
Q10:	Not Reported	Coordew:	1035
Coordewdir:	E	Coordns:	40
Coordnsdir:	S		
Utmx:	491723.4		
Utmy:	4427805.5		
Locaccurac:	Spotted from section lines		
Latdecdeg:	40.000394		
Longdecdeg:	-105.096962		
Use1:	OTHER	Use2:	Not Reported
Specialuse:	MONITORING WELL	Aquifer1:	QUATERNARY ALLUVIUM
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	0		
Permissued:	2013-11-25		
Permexpire:	Not Reported		
Wellconstr:	2013-10-11		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	32
Topperfcas:	17	Botperfcas:	32
Yield:	0		
Staticwl:	24		

Applicantn:	SILCO OIL		
Completewe:	3	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	491733.3		
Disputmy:	4427833.2		
Latitude:	40.0003944464		
Longitude:	-105.096961997		
Site id:	CO6000000039566		

Q74
SSE
1/2 - 1 Mile
Higher

CO WELLS **CO6000000253906**

Fid:	253905	Objectid:	253906
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0051926		
Receipt:	0051926	Permit:	51926-MH
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	34
Q160:	SE	Q40:	SE
Q10:	Not Reported	Coordew:	1035
Coordewdir:	E	Coordns:	40
Coordnsdir:	S		
Utmx:	491723.4		
Utmy:	4427805.5		
Locaccurac:	Spotted from section lines		
Latdecdeg:	40.000394		
Longdecdeg:	-105.096962		
Use1:	OTHER	Use2:	Not Reported
Specialuse:	MONITORING WELL	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	0		
Permissued:	2013-09-18		
Permexpire:	2013-12-16		
Wellconstr:	2013-10-11		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	OPS Six (6) holes to be constructed. 6 wcr received.		
Elev:	5280	Welldepth:	32
Topperfcas:	17	Botperfcas:	32
Yield:	0		
Staticwl:	24		

Applicantn:	SILCO OIL COMPANY		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	491723		
Disputmy:	4427805		
Latitude:	40.0003944464		
Longitude:	-105.096961997		
Site id:	CO6000000253906		

75
NE
1/2 - 1 Mile
Lower

CO WELLS **CO6000000245093**

Fid:	245092	Objectid:	245093
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0045168		
Receipt:	0045168	Permit:	45168-MH
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported
Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	26
Q160:	NW	Q40:	SE
Q10:	Not Reported	Coordew:	1400
Coordewdir:	W	Coordns:	2100
Coordnsdir:	N		
Utmx:	492479.1		
Utmy:	4430368		
Locaccurac:	Spotted from section lines		
Latdecdeg:	40.023489		
Longdecdeg:	-105.088138		
Use1:	OTHER	Use2:	Not Reported
Specialuse:	MONITORING WELL	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	0		
Permissued:	2005-06-21		
Permexpire:	2005-09-18		
Wellconstr:	2005-07-01		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	20
Topperfcas:	10	Botperfcas:	20
Yield:	0		
Staticwl:	0		

Applicantn:	YOUNG VENTURES		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	492479.1		
Disputmy:	4430368		
Latitude:	40.02348906		
Longitude:	-105.088138524		
Site id:	CO6000000245093		

Q76
SSE **FED USGS** **USGS40000215567**
1/2 - 1 Mile
Higher

Org. Identifier:	USGS-CO		
Formal name:	USGS Colorado Water Science Center		
Monloc Identifier:	USGS-400002105054401		
Monloc name:	SB00106934DDC		
Monloc type:	Well		
Monloc desc:	Not Reported		
Huc code:	10190005	Drainagearea value:	Not Reported
Drainagearea Units:	Not Reported	Contrib drainagearea:	Not Reported
Contrib drainagearea units:	Not Reported	Latitude:	40.0005404
Longitude:	-105.0960948	Sourcemap scale:	24000
Horiz Acc measure:	5	Horiz Acc measure units:	seconds
Horiz Collection method:	Interpolated from map		
Horiz coord refsys:	NAD83	Vert measure val:	5265.00
Vert measure units:	feet	Vertacc measure val:	5
Vert accmeasure units:	feet		
Vertcollection method:	Interpolated from topographic map		
Vert coord refsys:	NGVD29	Countrycode:	US
Aquifername:	Not Reported		
Formation type:	Laramie Formation		
Aquifer type:	Not Reported		
Construction date:	19630501	Welldepth:	360
Welldepth units:	ft	Wellholedepth:	Not Reported
Wellholedepth units:	Not Reported		

Ground-water levels, Number of Measurements: 0

Q77
SSE **CO WELLS** **CO6000000039564**
1/2 - 1 Mile
Higher

Fid:	39563	Objectid:	39564
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=3662494A		
Receipt:	3662494A	Permit:	292977-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	EW-1	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported

Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	34
Q160:	SE	Q40:	SE
Q10:	Not Reported	Coordew:	1048
Coordewdir:	E	Coordns:	28
Coordnsdir:	S		
Utmx:	491719.4		
Utmy:	4427802		
Locaccurac:	Spotted from section lines		
Latdecdeg:	40.000363		
Longdecdeg:	-105.097009		
Use1:	OTHER	Use2:	Not Reported
Specialuse:	MONITORING WELL	Aquifer1:	QUATERNARY ALLUVIUM
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	0		
Permissued:	2013-11-25		
Permexpire:	Not Reported		
Wellconstr:	2013-10-11		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	32
Topperfcas:	17	Botperfcas:	32
Yield:	0		
Staticwl:	24		
Applicantn:	SILCO OIL		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	491719.4		
Disputmy:	4427802		
Latitude:	40.000362873		
Longitude:	-105.097008813		
Site id:	CO6000000039564		

Q78
SSE
1/2 - 1 Mile
Higher

CO WELLS **CO6000000039565**

Fid:	39564	Objectid:	39565
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=3662494B		
Receipt:	3662494B	Permit:	292978-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	EW-2	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported

Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	34
Q160:	SE	Q40:	SE
Q10:	Not Reported	Coordew:	1035
Coordewdir:	E	Coordns:	30
Coordnsdir:	S		
Utmx:	491723.3		
Utmy:	4427802.5		
Locaccurac:	Spotted from section lines		
Latdecdeg:	40.000367		
Longdecdeg:	-105.096963		
Use1:	OTHER	Use2:	Not Reported
Specialuse:	MONITORING WELL	Aquifer1:	QUATERNARY ALLUVIUM
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	0		
Permissued:	2013-11-25		
Permexpire:	Not Reported		
Wellconstr:	2013-10-11		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	32
Topperfcas:	12	Botperfcas:	32
Yield:	0		
Staticwl:	24		
Applicantn:	SILCO OIL		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	491723.3		
Disputmy:	4427802.5		
Latitude:	40.0003674164		
Longitude:	-105.09696313		
Site id:	CO6000000039565		

79
SE
1/2 - 1 Mile
Lower

CO WELLS **CO6000000255246**

Fid:	255245	Objectid:	255246
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0052961		
Receipt:	0052961	Permit:	52961-MH
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BROOMFIELD	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported

Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	35
Q160:	SW	Q40:	SW
Q10:	Not Reported	Coordew:	1275
Coordewdir:	W	Coordns:	1150
Coordnsdir:	S		
Utmx:	492429.5		
Utmy:	4428144.5		
Locaccurac:	Spotted from section lines		
Latdecdeg:	40.003455		
Longdecdeg:	-105.088694		
Use1:	OTHER	Use2:	Not Reported
Specialuse:	MONITORING WELL	Aquifer1:	QUATERNARY ALLUVIUM
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	0		
Permissued:	2014-10-01		
Permexpire:	2014-12-30		
Wellconstr:	2014-10-06		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Three (3) holes to be constructed. Three WCR received.		
Elev:	5405	Welldepth:	20
Topperfcas:	5	Botperfcas:	20
Yield:	0		
Staticwl:	0		
Applicantn:	JOHNSTON H KENNETH II		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	492429.5		
Disputmy:	4428144.5		
Latitude:	40.0034553907		
Longitude:	-105.088693858		
Site id:	CO6000000255246		

80
NNE
1/2 - 1 Mile
Lower

CO WELLS **CO6000000275091**

Fid:	275090	Objectid:	275091
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0110004		
Receipt:	0110004	Permit:	42927--A
Wdid:	Not Reported	Currstatus:	Permit Expired
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported

Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	27
Q160:	NE	Q40:	NE
Q10:	Not Reported	Coordew:	120
Coordewdir:	E	Coordns:	980
Coordnsdir:	N		
Utmx:	492017.3		
Utmy:	4430700.9		
Locaccurac:	Spotted from section lines		
Latdecdeg:	40.026484		
Longdecdeg:	-105.093555		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	acres		
Annappropr:	0		
Permissued:	1979-08-27		
Permexpire:	1981-08-27		
Wellconstr:	Not Reported		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	0
Topperfcas:	0	Botperfcas:	0
Yield:	0		
Staticwl:	0		
Applicantn:	HORST THOMAS		
Completewe:	0	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	492017.3		
Disputmy:	4430700.9		
Latitude:	40.0264841639		
Longitude:	-105.093554517		
Site id:	CO6000000275091		

P81
West
1/2 - 1 Mile
Lower

CO WELLS **CO6000000342519**

Fid:	342518	Objectid:	342519
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0326408		
Receipt:	0326408	Permit:	121914--A
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported

Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	33
Q160:	NE	Q40:	NW
Q10:	Not Reported	Coordew:	1720
Coordewdir:	E	Coordns:	900
Coordnsdir:	N		
Utmx:	489893.9		
Utmy:	4429123.9		
Locaccurac:	Spotted from section lines		
Latdecdeg:	40.012253		
Longdecdeg:	-105.118415		
Use1:	HOUSEHOLD USE ONLY	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	acres		
Annappropr:	0		
Permissued:	1991-06-25		
Permexpire:	Not Reported		
Wellconstr:	1991-06-28		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	91219VE		
Elev:	0	Welldepth:	60
Topperfcas:	20	Botperfcas:	60
Yield:	15		
Staticwl:	4		
Applicantn:	CLARK DONALD L		
Completewe:	3	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	489903.3		
Disputmy:	4429151.2		
Latitude:	40.0122530203		
Longitude:	-105.118415431		
Site id:	CO6000000342519		

P82
West
1/2 - 1 Mile
Lower

CO WELLS **CO6000000342520**

Fid:	342519	Objectid:	342520
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0326408A		
Receipt:	0326408A	Permit:	91219-VE
Wdid:	Not Reported	Currstatus:	Permit Issued; Completion Status Unknown
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported

Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	33
Q160:	NE	Q40:	NW
Q10:	Not Reported	Coordew:	1720
Coordewdir:	E	Coordns:	900
Coordnsdir:	N		
Utmx:	489893.9		
Utmy:	4429123.9		
Locaccurac:	Spotted from section lines		
Latdecdeg:	40.012253		
Longdecdeg:	-105.118415		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	acres		
Annappropr:	0		
Permissued:	1991-06-20		
Permexpire:	Not Reported		
Wellconstr:	Not Reported		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	0
Topperfcas:	0	Botperfcas:	0
Yield:	0		
Staticwl:	0		
Applicantn:	CLARK DONALD L		
Completewe:	0	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	489893		
Disputmy:	4429123		
Latitude:	40.0122530203		
Longitude:	-105.118415431		
Site id:	CO6000000342520		

83
WSW
1/2 - 1 Mile
Higher

CO WELLS **CO6000000057277**

Fid:	57276	Objectid:	57277
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=9013288		
Receipt:	9013288	Permit:	84934-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported

Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	33
Q160:	NE	Q40:	SW
Q10:	Not Reported	Coordew:	1450
Coordewdir:	E	Coordns:	2150
Coordnsdir:	N		
Utmx:	489978.5		
Utmy:	4428742.9		
Locaccurac:	Spotted from section lines		
Latdecdeg:	40.008821		
Longdecdeg:	-105.117418		
Use1:	HOUSEHOLD USE ONLY	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	.33000001		
Permissued:	1976-07-21		
Permexpire:	1978-07-21		
Wellconstr:	1976-10-04		
Firstbenef:	1976-07-31		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	225
Topperfcas:	90	Botperfcas:	220
Yield:	15		
Staticwl:	29		
Applicantn:	MALLON TIMOTHY & JEANETTE HRUBES		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	489978.5		
Disputmy:	4428742.9		
Latitude:	40.0088213072		
Longitude:	-105.117418275		
Site id:	CO6000000057277		

84
NW
1/2 - 1 Mile
Lower

CO WELLS **CO6000000490874**

Fid:	490873	Objectid:	490874
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0909070		
Receipt:	0909070	Permit:	68233--A
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported

Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	20		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	28
Q160:	NE	Q40:	SE
Q10:	Not Reported	Coordew:	450
Coordewdir:	E	Coordns:	2245
Coordnsdir:	N		
Utmx:	490275.3		
Utmy:	4430320		
Locaccurac:	Spotted from section lines		
Latdecdeg:	40.023034		
Longdecdeg:	-105.113964		
Use1:	HOUSEHOLD USE ONLY	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	0		
Permissued:	1973-03-29		
Permexpire:	Not Reported		
Wellconstr:	1975-02-25		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	168
Topperfcas:	75	Botperfcas:	168
Yield:	4		
Staticwl:	78		
Applicantn:	ROBERTS JAMES K		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	490275.3		
Disputmy:	4430320		
Latitude:	40.0230340714		
Longitude:	-105.113964417		
Site id:	CO6000000490874		

85
North
1/2 - 1 Mile
Lower

CO WELLS **CO6000000056423**

Fid:	56422	Objectid:	56423
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=9012440		
Receipt:	9012440	Permit:	64762-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported

Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	27
Q160:	NW	Q40:	NE
Q10:	Not Reported	Coordew:	2490
Coordewdir:	W	Coordns:	600
Coordnsdir:	N		
Utmx:	491169.3		
Utmy:	4430818.5		
Locaccurac:	Spotted from section lines		
Latdecdeg:	40.027535		
Longdecdeg:	-105.103494		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	1		
Permissued:	1972-09-26		
Permexpire:	Not Reported		
Wellconstr:	1972-11-02		
Firstbenef:	1972-11-02		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	200
Topperfcas:	60	Botperfcas:	200
Yield:	0		
Staticwl:	32		
Applicantn:	SHARP LOUIS E		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	491169.3		
Disputmy:	4430818.5		
Latitude:	40.0275352609		
Longitude:	-105.103494374		
Site id:	CO6000000056423		

86
West
1/2 - 1 Mile
Lower

CO WELLS **CO6000000056197**

Fid:	56196	Objectid:	56197
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=9012213		
Receipt:	9012213	Permit:	60051-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported

Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	33
Q160:	NE	Q40:	NW
Q10:	Not Reported	Coordew:	1800
Coordewdir:	E	Coordns:	250
Coordnsdir:	N		
Utmx:	489868.4		
Utmy:	4429321.9		
Locaccurac:	Spotted from section lines		
Latdecdeg:	40.014037		
Longdecdeg:	-105.118717		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	LARAMIE FOX HILLS
Aquifer2:	Not Reported		
Permitarea:	5		
Permitunit:	acres		
Annappropr:	3		
Permissued:	1972-05-04		
Permexpire:	Not Reported		
Wellconstr:	1972-07-18		
Firstbenef:	1974-03-26		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	50
Topperfcas:	15	Botperfcas:	50
Yield:	15		
Staticwl:	6		
Applicantn:	HAZZARD BRETT & LEEANNE		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	489868.4		
Disputmy:	4429321.9		
Latitude:	40.0140366475		
Longitude:	-105.118717311		
Site id:	CO6000000056197		

R87
South
1/2 - 1 Mile
Higher

CO WELLS **CO6000000355337**

Fid:	355336	Objectid:	355337
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0349985A		
Receipt:	0349985A	Permit:	169569-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	MW-1	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	RODEO GROUNDS		
Filing:	Not Reported	Lot:	1

Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 S
Range:	69.0 W	Section :	3
Q160:	NW	Q40:	NE
Q10:	Not Reported	Coordew:	1730
Coordewdir:	W	Coordns:	140
Coordnsdir:	N		
Utmx:	491196.8		
Utmy:	4427750.9		
Locaccurac:	Spotted from section lines		
Latdecdeg:	39.999897		
Longdecdeg:	-105.10313		
Use1:	OTHER	Use2:	Not Reported
Specialuse:	MONITORING WELL	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	acres		
Annappropr:	0		
Permissued:	1993-04-22		
Permexpire:	1995-04-22		
Wellconstr:	1991-02-04		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	19
Topperfcas:	9	Botperfcas:	19
Yield:	0		
Staticwl:	0		
Applicantn:	LAFAYETTE CITY OF		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	491196.8		
Disputmy:	4427750.9		
Latitude:	39.999897187		
Longitude:	-105.10313047		
Site id:	CO6000000355337		

88
NNE
1/2 - 1 Mile
Lower

CO WELLS **CO6000000055348**

Fid:	55347	Objectid:	55348
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=9011359		
Receipt:	9011359	Permit:	42927-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported

Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	27
Q160:	NE	Q40:	NE
Q10:	Not Reported	Coordew:	0
Coordewdir:	Not Reported	Coordns:	0
Coordnsdir:	Not Reported		
Utmx:	491848.8		
Utmy:	4430798.4		
Locaccurac:	Spotted from quarters		
Latdecdeg:	40.027361		
Longdecdeg:	-105.095531		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	1		
Permissued:	1970-09-04		
Permexpire:	Not Reported		
Wellconstr:	1970-09-03		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	48
Topperfcas:	12	Botperfcas:	30
Yield:	30		
Staticwl:	10		
Applicantn:	SUSAN JAMES LLC		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	491848.8		
Disputmy:	4430798.4		
Latitude:	40.0273610029		
Longitude:	-105.095530502		
Site id:	CO6000000055348		

S89
SSE
1/2 - 1 Mile
Higher

CO WELLS **CO6000000053484**

Fid:	53483	Objectid:	53484
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=9009413		
Receipt:	9009413	Permit:	15228-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	Not Reported	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported

Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	34
Q160:	SE	Q40:	SE
Q10:	Not Reported	Coordew:	95
Coordewdir:	E	Coordns:	125
Coordnsdir:	S		
Utmx:	492010		
Utmy:	4427831.3		
Locaccurac:	Spotted from section lines		
Latdecdeg:	40.00063		
Longdecdeg:	-105.093605		
Use1:	DOMESTIC	Use2:	Not Reported
Specialuse:	Not Reported	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	1		
Permissued:	Not Reported		
Permexpire:	Not Reported		
Wellconstr:	Not Reported		
Firstbenef:	1963-05-17		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	360
Topperfcas:	0	Botperfcas:	0
Yield:	11		
Staticwl:	45		
Applicantn:	SHERRATT FRANK		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	492010		
Disputmy:	4427831.3		
Latitude:	40.0006296596		
Longitude:	-105.093604743		
Site id:	CO6000000053484		

90
South
1/2 - 1 Mile
Higher

CO WELLS **CO6000000478197**

Fid:	478196	Objectid:	478197
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0539853A		
Receipt:	0539853A	Permit:	263948-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	MW 18	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported

Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 S
Range:	69.0 W	Section :	3
Q160:	NE	Q40:	NW
Q10:	Not Reported	Coordew:	2165
Coordewdir:	E	Coordns:	278
Coordnsdir:	N		
Utmx:	491608.2		
Utmy:	4427708.5		
Locaccurac:	Spotted from section lines		
Latdecdeg:	39.999519		
Longdecdeg:	-105.09831		
Use1:	OTHER	Use2:	Not Reported
Specialuse:	MONITORING WELL	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	0		
Permissued:	2005-06-23		
Permexpire:	Not Reported		
Wellconstr:	2004-03-04		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	15
Topperfcas:	5	Botperfcas:	15
Yield:	0		
Staticwl:	0		
Applicantn:	PEERLESS TYRE CO		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	491608.2		
Disputmy:	4427708.5		
Latitude:	39.9995193602		
Longitude:	-105.098310332		
Site id:	CO6000000478197		

S91
SSE **CO WELLS** **CO6000000039568**
1/2 - 1 Mile
Higher

Fid:	39567	Objectid:	39568
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=3662494E		
Receipt:	3662494E	Permit:	292981-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	EW-5	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported

Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	34
Q160:	SE	Q40:	SE
Q10:	Not Reported	Coordew:	97
Coordewdir:	E	Coordns:	37
Coordnsdir:	S		
Utmx:	492009.3		
Utmy:	4427805		
Locaccurac:	Spotted from section lines		
Latdecdeg:	40.000393		
Longdecdeg:	-105.093613		
Use1:	OTHER	Use2:	Not Reported
Specialuse:	MONITORING WELL	Aquifer1:	QUATERNARY ALLUVIUM
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	0		
Permissued:	2013-11-25		
Permexpire:	Not Reported		
Wellconstr:	2013-10-11		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	32
Topperfcas:	13	Botperfcas:	32
Yield:	0		
Staticwl:	24		
Applicantn:	SILCO OIL		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	492009.3		
Disputmy:	4427805		
Latitude:	40.0003926955		
Longitude:	-105.09361262		
Site id:	CO6000000039568		

R92
South
1/2 - 1 Mile
Higher

CO WELLS **CO6000000355338**

Fid:	355337	Objectid:	355338
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=0349985B		
Receipt:	0349985B	Permit:	169570-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	MW-3	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	RODEO GROUNDS		
Filing:	Not Reported	Lot:	1

Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 S
Range:	69.0 W	Section :	3
Q160:	NW	Q40:	NE
Q10:	Not Reported	Coordew:	1560
Coordewdir:	W	Coordns:	255
Coordnsdir:	N		
Utmx:	491144.7		
Utmy:	4427715.9		
Locaccurac:	Spotted from section lines		
Latdecdeg:	39.999581		
Longdecdeg:	-105.10374		
Use1:	OTHER	Use2:	Not Reported
Specialuse:	MONITORING WELL	Aquifer1:	ALL UNNAMED AQUIFERS
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	acres		
Annappropr:	0		
Permissued:	1993-04-22		
Permexpire:	1995-04-22		
Wellconstr:	1991-05-02		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	19
Topperfcas:	9	Botperfcas:	19
Yield:	0		
Staticwl:	0		
Applicantn:	LAFAYETTE CITY OF		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	491144.7		
Disputmy:	4427715.9		
Latitude:	39.9995812992		
Longitude:	-105.10374035		
Site id:	CO6000000355338		

S93
SSE
1/2 - 1 Mile
Higher

CO WELLS **CO6000000039569**

Fid:	39568	Objectid:	39569
Moreinfo:	http://www.dwr.state.co.us/WellPermitSearch/View.aspx?receipt=3662494F		
Receipt:	3662494F	Permit:	292982-
Wdid:	Not Reported	Currstatus:	Well Constructed
Wellname:	EW-6	Caseno:	Not Reported
Div:	1	Wd:	6
County:	BOULDER	Mgmtdist:	Not Reported
Desigbasin:	Not Reported		
Subdivname:	Not Reported		
Filing:	Not Reported	Lot:	Not Reported

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Block:	Not Reported	Ctyparclid:	Not Reported
Parcelsize:	0		
Pm:	S	Township:	1.0 N
Range:	69.0 W	Section :	34
Q160:	SE	Q40:	SE
Q10:	Not Reported	Coordew:	97
Coordewdir:	E	Coordns:	32
Coordnsdir:	S		
Utmx:	492009.3		
Utmy:	4427803.5		
Locaccurac:	Spotted from section lines		
Latdecdeg:	40.000379		
Longdecdeg:	-105.093613		
Use1:	OTHER	Use2:	Not Reported
Specialuse:	MONITORING WELL	Aquifer1:	QUATERNARY ALLUVIUM
Aquifer2:	Not Reported		
Permitarea:	0		
Permitunit:	Not Reported		
Annappropr:	0		
Permissued:	2013-11-25		
Permexpire:	Not Reported		
Wellconstr:	2013-10-10		
Firstbenef:	Not Reported		
Pumpinstal:	Not Reported		
Wellplugge:	Not Reported		
Comment :	Not Reported		
Elev:	0	Welldepth:	32
Topperfcas:	15	Botperfcas:	32
Yield:	0		
Staticwl:	24		
Applicantn:	SILCO OIL		
Completewe:	1	Ogcc api:	Not Reported
Ogjobbatch:	0		
Disputmx:	492009.3		
Disputmy:	4427803.5		
Latitude:	40.0003791805		
Longitude:	-105.093612602		
Site id:	CO6000000039569		

Map ID
Direction
Distance

Database EDR ID Number

1
ESE
1/8 - 1/4 Mile

OIL_GAS **COOG10000007554**

Link fld:	01306205	Attrib 1:	05-013-06205
Attrib 2:	RICHARDSON OPERATING COMPANY	Attrib 3:	1-34 PRINCE LAKE
Sdf key:	01306205&TYPE=WELL		
Facility id:	206710		
Facility type:	WELL	Facility s:	PA
Operator name:	60523		
Well num:	1-34	Well name:	PRINCE LAKE
Field code:	90750		
Dist n s:	720		
Dir n s:	N		
Dist e w:	1400		
Dir e w:	E	Qtrqtr:	NWNE
Sec:	34	Twp:	1N
Meridian:	6		
Lat:	40.012717		
Ground ele:	5264		
Utm x:	491617		
Utm y:	4429173		
Locqual:	Planned Footage	Field name:	WATTENBERG
Name:	RICHARDSON OPERATING COMPANY	Api seq nu:	06205
Api county:	013		
Location id:	379786		
Loc name n:	PRINCE LAKE-61N69W 34NWNE		
Site id:	COOG10000007554	Symbol :	LO_XX
Lon:	-105.098229		
Range :	69W		

A2
WSW
1/4 - 1/2 Mile

OIL_GAS **COOG10000007535**

Link fld:	01306186	Attrib 1:	05-013-06186
Attrib 2:	CDM OIL & GAS	Attrib 3:	1 ADAMS
Sdf key:	01306186&TYPE=WELL		
Facility id:	206691		
Facility type:	WELL	Facility s:	PR
Operator name:	14740		
Well num:	1	Well name:	ADAMS
Field code:	90750		
Dist n s:	833		
Dir n s:	N		
Dist e w:	1953		
Dir e w:	W	Qtrqtr:	NENW
Sec:	34	Twp:	1N
Meridian:	6		
Lat:	40.01241		
Ground ele:	5287		
Utm x:	491011		
Utm y:	4429140		
Locqual:	Actual LatLong	Field name:	WATTENBERG
Name:	CDM OIL & GAS	Api seq nu:	06186

Api county:	013		
Location id:	321328		
Loc name n:	ADAM-61N69W 34NENW		
Site id:	COOG10000007535	Symbol :	LO_XX
Lon:	-105.10533		
Range :	69W		

A3
WSW **OIL_GAS** **COOG10000007526**
1/4 - 1/2 Mile

Link fld:	01306177	Attrib 1:	05-013-06177
Attrib 2:	CDM OIL & GAS	Attrib 3:	1 ADAM
Sdf key:	01306177&TYPE=WELL		
Facility id:	206682		
Facility type:	WELL	Facility s:	AL
Operator name:	14740		
Well num:	1	Well name:	ADAM
Field code:	90750		
Dist n s:	833		
Dir n s:	N		
Dist e w:	1953		
Dir e w:	W	Qtrqtr:	NENW
Sec:	34	Twp:	1N
Meridian:	6		
Lat:	40.01243		
Ground ele:	0		
Utm x:	491010		
Utm y:	4429142		
Locqual:	Planned Footage	Field name:	WATTENBERG
Name:	CDM OIL & GAS	Api seq nu:	06177
Api county:	013		
Location id:	321328		
Loc name n:	ADAM-61N69W 34NENW		
Site id:	COOG10000007526	Symbol :	LO_XX
Lon:	-105.105342		
Range :	69W		

4
NE **OIL_GAS** **COOG10000007518**
1/4 - 1/2 Mile

Link fld:	01306169	Attrib 1:	05-013-06169
Attrib 2:	NOBLE ENERGY INC	Attrib 3:	1-27 MORRIS
Sdf key:	01306169&TYPE=WELL		
Facility id:	206674		
Facility type:	WELL	Facility s:	PR
Operator name:	100322		
Well num:	1-27	Well name:	MORRIS
Field code:	90750		
Dist n s:	1400		
Dir n s:	S		

Dist e w:	600		
Dir e w:	E	Qtrqtr:	NESE
Sec:	27	Twp:	1N
Meridian:	6		
Lat:	40.018219		
Ground ele:	5216		
Utm x:	491853		
Utm y:	4429784		
Locqual:	ACTUAL LatLong	Field name:	WATTENBERG
Name:	NOBLE ENERGY INC	Api seq nu:	06169
Api county:	013		
Location id:	321322		
Loc name n:	MORRIS-61N69W 27NESE		
Site id:	COOG10000007518	Symbol :	LO_XX
Lon:	-105.09547		
Range :	69W		

5
South **OIL_GAS** **COOG10000007500**
1/2 - 1 Mile

Link fld:	01306151	Attrib 1:	05-013-06151
Attrib 2:	CDM OIL & GAS	Attrib 3:	1 NUOCI
Sdf key:	01306151&TYPE=WELL		
Facility id:	206656		
Facility type:	WELL	Facility s:	PR
Operator name:	14740		
Well num:	1	Well name:	NUOCI
Field code:	90750		
Dist n s:	1980		
Dir n s:	S		
Dist e w:	1980		
Dir e w:	E	Qtrqtr:	NWSE
Sec:	34	Twp:	1N
Meridian:	6		
Lat:	40.00566		
Ground ele:	5278		
Utm x:	491422		
Utm y:	4428390		
Locqual:	Actual LatLong	Field name:	WATTENBERG
Name:	CDM OIL & GAS	Api seq nu:	06151
Api county:	013		
Location id:	321315		
Loc name n:	NUOCI-61N69W 34NWSE		
Site id:	COOG10000007500	Symbol :	LO_XX
Lon:	-105.1005		
Range :	69W		

6
WSW **OIL_GAS** **COOG10000007514**
1/2 - 1 Mile

Link fld:	01306165	Attrib 1:	05-013-06165
Attrib 2:	CDM OIL & GAS	Attrib 3:	1-34 WEEMS
Sdf key:	01306165&TYPE=WELL		
Facility id:	206670		
Facility type:	WELL	Facility s:	PR
Operator name:	14740		
Well num:	1-34	Well name:	WEEMS
Field code:	90750		
Dist n s:	1989		
Dir n s:	N		
Dist e w:	660		
Dir e w:	W	Qtrqtr:	SWNW
Sec:	34	Twp:	1N
Meridian:	6		
Lat:	40.00924		
Ground ele:	5301		
Utm x:	490604		
Utm y:	4428789		
Locqual:	Actual LatLong	Field name:	WATTENBERG
Name:	CDM OIL & GAS	Api seq nu:	06165
Api county:	013		
Location id:	321320		
Loc name n:	WEEMS-61N69W 34SWNW		
Site id:	COOG10000007514	Symbol :	LO_XX
Lon:	-105.11009		
Range :	69W		

7
SSE **OIL_GAS** **COOG10000007515**
1/2 - 1 Mile

Link fld:	01306166	Attrib 1:	05-013-06166
Attrib 2:	CDM OIL & GAS	Attrib 3:	2 NUOCI
Sdf key:	01306166&TYPE=WELL		
Facility id:	206671		
Facility type:	WELL	Facility s:	PR
Operator name:	14740		
Well num:	2	Well name:	NUOCI
Field code:	90750		
Dist n s:	1977		
Dir n s:	S		
Dist e w:	660		
Dir e w:	E	Qtrqtr:	NESE
Sec:	34	Twp:	1N
Meridian:	6		
Lat:	40.00568		
Ground ele:	5254		
Utm x:	491833		
Utm y:	4428392		
Locqual:	Actual LatLong	Field name:	WATTENBERG
Name:	CDM OIL & GAS	Api seq nu:	06166
Api county:	013		
Location id:	321321		
Loc name n:	NUOCI-61N69W 34NESE		
Site id:	COOG10000007515	Symbol :	LO_XX
Lon:	-105.09568		
Range :	69W		

Map ID
Direction
Distance

Database EDR ID Number

8
NNW **OIL_GAS** **COOG10000007608**
1/2 - 1 Mile

Link fld:	01306259	Attrib 1:	05-013-06259
Attrib 2:	NOBLE ENERGY INC	Attrib 3:	2-27 HOLDERBY
Sdf key:	01306259&TYPE=WELL		
Facility id:	206764		
Facility type:	WELL	Facility s:	PR
Operator name:	100322		
Well num:	2-27	Well name:	HOLDERBY
Field code:	90750		
Dist n s:	1980		
Dir n s:	N		
Dist e w:	1980		
Dir e w:	W	Qtrqtr:	SENW
Sec:	27	Twp:	1N
Meridian:	6		
Lat:	40.02384		
Ground ele:	5180		
Utm x:	491018		
Utm y:	4430409		
Locqual:	ACTUAL LatLong	Field name:	WATTENBERG
Name:	NOBLE ENERGY INC	Api seq nu:	06259
Api county:	013		
Location id:	321355		
Loc name n:	HOLDERBY-61N69W 27SENW		
Site id:	COOG10000007608	Symbol :	LO_XX
Lon:	-105.10526		
Range :	69W		

B9
NNE **OIL_GAS** **COOG10000007770**
1/2 - 1 Mile

Link fld:	01306421	Attrib 1:	05-013-06421
Attrib 2:	NOBLE ENERGY INC	Attrib 3:	27-8 MORRIS MC
Sdf key:	01306421&TYPE=WELL		
Facility id:	206926		
Facility type:	WELL	Facility s:	PR
Operator name:	100322		
Well num:	27-8	Well name:	MORRIS MC
Field code:	90750		
Dist n s:	1872		
Dir n s:	N		
Dist e w:	502		
Dir e w:	E	Qtrqtr:	SENE
Sec:	27	Twp:	1N
Meridian:	6		
Lat:	40.02409		
Ground ele:	5183		
Utm x:	491883		
Utm y:	4430435		
Locqual:	ACTUAL LatLong	Field name:	WATTENBERG
Name:	NOBLE ENERGY INC	Api seq nu:	06421

Api county:	013		
Location id:	321426		
Loc name n:	MORRIS MC-61N69W 27SENE		
Site id:	COOG10000007770	Symbol :	LO_XX
Lon:	-105.09513		
Range :	69W		

B10
NNE
1/2 - 1 Mile

OIL_GAS **COOG10000007607**

Link fld:	01306258	Attrib 1:	05-013-06258
Attrib 2:	MARTIN EXPLORATION MANAGEMENT CO	Attrib 3:	2-27 MORRIS
Sdf key:	01306258&TYPE=WELL		
Facility id:	206763		
Facility type:	WELL	Facility s:	AL
Operator name:	53985		
Well num:	2-27	Well name:	MORRIS
Field code:	90750		
Dist n s:	1780		
Dir n s:	N		
Dist e w:	710		
Dir e w:	E	Qtrqtr:	SENE
Sec:	27	Twp:	1N
Meridian:	6		
Lat:	40.024287		
Ground ele:	5182		
Utm x:	491833		
Utm y:	4430457		
Locqual:	Planned Footage	Field name:	WATTENBERG
Name:	MARTIN EXPLORATION MANAGEMENT CO	Epmsetno:	06258
Api county:	013		
Location id:	379818		
Loc name n:	MORRIS-61N69W 27SENE		
Site id:	COOG10000007607	Symbol :	LO_XX
Lon:	-105.095709		
Range :	69W		

11
North
1/2 - 1 Mile

OIL_GAS **COOG10000007771**

Link fld:	01306422	Attrib 1:	05-013-06422
Attrib 2:	NOBLE ENERGY INC	Attrib 3:	27-7 MORRIS MC
Sdf key:	01306422&TYPE=WELL		
Facility id:	206927		
Facility type:	WELL	Facility s:	PR
Operator name:	100322		
Well num:	27-7	Well name:	MORRIS MC
Field code:	90750		
Dist n s:	1527		
Dir n s:	N		

Dist e w:	1850		
Dir e w:	E	Qtrqtr:	SWNE
Sec:	27	Twp:	1N
Meridian:	6		
Lat:	40.02506		
Ground ele:	5174		
Utm x:	491476		
Utm y:	4430543		
Locqual:	ACTUAL LatLong	Field name:	WATTENBERG
Name:	NOBLE ENERGY INC	Api seq nu:	06422
Api county:	013		
Location id:	321427		
Loc name n:	MORRIS MC-61N69W 27SWNE		
Site id:	COOG10000007771	Symbol :	LO_XX
Lon:	-105.0999		
Range :	69W		

C12
ENE
1/2 - 1 Mile

OIL_GAS **COOG10000007484**

Link fld:	01306135	Attrib 1:	05-013-06135
Attrib 2:	NOBLE ENERGY INC	Attrib 3:	2-26 ARAPAHOE
Sdf key:	01306135&TYPE=WELL		
Facility id:	206640		
Facility type:	WELL	Facility s:	PR
Operator name:	100322		
Well num:	2-26	Well name:	ARAPAHOE
Field code:	90750		
Dist n s:	990		
Dir n s:	S		
Dist e w:	1980		
Dir e w:	W	Qtrqtr:	SESW
Sec:	26	Twp:	1N
Meridian:	6		
Lat:	40.016544		
Ground ele:	5223		
Utm x:	492643		
Utm y:	4429597		
Locqual:	ACTUAL LatLong	Field name:	WATTENBERG
Name:	NOBLE ENERGY INC	Api seq nu:	06135
Api county:	013		
Location id:	321311		
Loc name n:	ARAPAHOE-61N69W 26SESW		
Site id:	COOG10000007484	Symbol :	LO_XX
Lon:	-105.086209		
Range :	69W		

C13
ENE
1/2 - 1 Mile

OIL_GAS **COOG10000070568**

Link fld:	01306528	Attrib 1:	05-013-06528
Attrib 2:	NOBLE ENERGY INC	Attrib 3:	26-13JI ARAPAHOE MC
Sdf key:	01306528&TYPE=WELL		
Facility id:	283094		
Facility type:	WELL	Facility s:	AL
Operator name:	100322		
Well num:	26-13JI	Well name:	ARAPAHOE MC
Field code:	7468		
Dist n s:	568		
Dir n s:	S		
Dist e w:	1988		
Dir e w:	W	Qtrqtr:	SESW
Sec:	26	Twp:	1N
Meridian:	6		
Lat:	40.01631		
Ground ele:	5224		
Utm x:	492690		
Utm y:	4429571		
Locqual:	PLANNED LatLong	Field name:	BOULDER VALLEY
Name:	NOBLE ENERGY INC	Api seq nu:	06528
Api county:	013		
Location id:	379935		
Loc name n:	ARAPAHOE MC-61N69W 26SESW		
Site id:	COOG10000070568	Symbol :	LO_XX
Lon:	-105.08566		
Range :	69W		

C14
ENE
1/2 - 1 Mile

OIL_GAS **COOG10000070570**

Link fld:	01306530	Attrib 1:	05-013-06530
Attrib 2:	NOBLE ENERGY INC	Attrib 3:	26-12JI ARAPAHOE MC
Sdf key:	01306530&TYPE=WELL		
Facility id:	283096		
Facility type:	WELL	Facility s:	AL
Operator name:	100322		
Well num:	26-12JI	Well name:	ARAPAHOE MC
Field code:	7468		
Dist n s:	608		
Dir n s:	S		
Dist e w:	1986		
Dir e w:	W	Qtrqtr:	SESW
Sec:	26	Twp:	1N
Meridian:	6		
Lat:	40.01636		
Ground ele:	5224		
Utm x:	492690		
Utm y:	4429577		
Locqual:	PLANNED LatLong	Field name:	BOULDER VALLEY
Name:	NOBLE ENERGY INC	Api seq nu:	06530
Api county:	013		
Location id:	379935		
Loc name n:	ARAPAHOE MC-61N69W 26SESW		
Site id:	COOG10000070570	Symbol :	LO_XX
Lon:	-105.08566		
Range :	69W		

Map ID
Direction
Distance

Database EDR ID Number

C15
ENE
1/2 - 1 Mile

OIL_GAS **COOG10000070569**

Link fld:	01306529	Attrib 1:	05-013-06529
Attrib 2:	NOBLE ENERGY INC	Attrib 3:	26-25JI ARAPAHOE MC
Sdf key:	01306529&TYPE=WELL		
Facility id:	283095		
Facility type:	WELL	Facility s:	AL
Operator name:	100322		
Well num:	26-25JI	Well name:	ARAPAHOE MC
Field code:	7468		
Dist n s:	588		
Dir n s:	S		
Dist e w:	1987		
Dir e w:	W	Qtrqtr:	SESW
Sec:	26	Twp:	1N
Meridian:	6		
Lat:	40.01642		
Ground ele:	5224		
Utm x:	492690		
Utm y:	4429583		
Locqual:	PLANNED LatLong	Field name:	BOULDER VALLEY
Name:	NOBLE ENERGY INC	Api seq nu:	06529
Api county:	013		
Location id:	379935		
Loc name n:	ARAPAHOE MC-61N69W 26SESW		
Site id:	COOG10000070569	Symbol :	LO_XX
Lon:	-105.08566		
Range :	69W		

C16
ENE
1/2 - 1 Mile

OIL_GAS **COOG10000070567**

Link fld:	01306527	Attrib 1:	05-013-06527
Attrib 2:	NOBLE ENERGY INC	Attrib 3:	26-11JI ARAPAHOE MC
Sdf key:	01306527&TYPE=WELL		
Facility id:	283093		
Facility type:	WELL	Facility s:	AL
Operator name:	100322		
Well num:	26-11JI	Well name:	ARAPAHOE MC
Field code:	7468		
Dist n s:	628		
Dir n s:	S		
Dist e w:	1985		
Dir e w:	W	Qtrqtr:	SESW
Sec:	26	Twp:	1N
Meridian:	6		
Lat:	40.01647		
Ground ele:	5224		
Utm x:	492690		
Utm y:	4429589		
Locqual:	PLANNED LatLong	Field name:	BOULDER VALLEY
Name:	NOBLE ENERGY INC	Api seq nu:	06527

Api county:	013		
Location id:	379935		
Loc name n:	ARAPAHOE MC-61N69W 26SESW		
Site id:	COOG10000070567	Symbol :	LO_XX
Lon:	-105.08566		
Range :	69W		

17
NW
1/2 - 1 Mile

OIL_GAS **COOG10000007704**

Link fld:	01306355	Attrib 1:	05-013-06355
Attrib 2:	NOBLE ENERGY INC	Attrib 3:	27-5 HOLDERBY MC
Sdf key:	01306355&TYPE=WELL		
Facility id:	206860		
Facility type:	WELL	Facility s:	PR
Operator name:	100322		
Well num:	27-5	Well name:	HOLDERBY MC
Field code:	90750		
Dist n s:	1980		
Dir n s:	N		
Dist e w:	660		
Dir e w:	W	Qtrqtr:	SWNW
Sec:	27	Twp:	1N
Meridian:	6		
Lat:	40.0237		
Ground ele:	5151		
Utm x:	490578		
Utm y:	4430394		
Locqual:	ACTUAL LatLong	Field name:	WATTENBERG
Name:	NOBLE ENERGY INC	Api seq nu:	06355
Api county:	013		
Location id:	321401		
Loc name n:	HOLDERBY MC-61N69W 27SWNW		
Site id:	COOG10000007704	Symbol :	LO_XX
Lon:	-105.11042		
Range :	69W		

18
NE
1/2 - 1 Mile

OIL_GAS **COOG10000088515**

Link fld:	01306621	Attrib 1:	05-013-06621
Attrib 2:	NOBLE ENERGY INC	Attrib 3:	26-05D YOUNG MC
Sdf key:	01306621&TYPE=WELL		
Facility id:	412564		
Facility type:	WELL	Facility s:	PR
Operator name:	100322		
Well num:	26-05D	Well name:	YOUNG MC
Field code:	90750		
Dist n s:	2353		
Dir n s:	N		

Dist e w:	1257		
Dir e w:	W	Qtrqtr:	SWNW
Sec:	26	Twp:	1N
Meridian:	6		
Lat:	40.0228		
Ground ele:	5172		
Utm x:	492424		
Utm y:	4430292		
Locqual:	ACTUAL LatLong	Field name:	WATTENBERG
Name:	NOBLE ENERGY INC	Api seq nu:	06621
Api county:	013		
Location id:	413634		
Loc name n:	YOUNG MC 26-05D		
Site id:	COOG10000088515	Symbol :	LO_XX
Lon:	-105.088786		
Range :	69W		

19
SW
1/2 - 1 Mile

OIL_GAS **COOG10000007809**

Link fld:	01306460	Attrib 1:	05-013-06460
Attrib 2:	NOBLE ENERGY INC	Attrib 3:	33-9 DOMENICO MC
Sdf key:	01306460&TYPE=WELL		
Facility id:	206965		
Facility type:	WELL	Facility s:	PR
Operator name:	100322		
Well num:	33-9	Well name:	DOMENICO MC
Field code:	90750		
Dist n s:	2114		
Dir n s:	S		
Dist e w:	542		
Dir e w:	E	Qtrqtr:	NESE
Sec:	33	Twp:	1N
Meridian:	6		
Lat:	40.00603		
Ground ele:	5317		
Utm x:	490253		
Utm y:	4428433		
Locqual:	ACTUAL LatLong	Field name:	WATTENBERG
Name:	NOBLE ENERGY INC	Api seq nu:	06460
Api county:	013		
Location id:	321446		
Loc name n:	DOMENICO MC-61N69W 33NESE		
Site id:	COOG10000007809	Symbol :	LO_XX
Lon:	-105.1142		
Range :	69W		

20
North
1/2 - 1 Mile

OIL_GAS **COOG10000007791**

Link fld:	01306442	Attrib 1:	05-013-06442
Attrib 2:	NOBLE ENERGY INC	Attrib 3:	27-2 MORRIS MC
Sdf key:	01306442&TYPE=WELL		
Facility id:	206947		
Facility type:	WELL	Facility s:	PR
Operator name:	100322		
Well num:	27-2	Well name:	MORRIS MC
Field code:	90750		
Dist n s:	605		
Dir n s:	N		
Dist e w:	1999		
Dir e w:	E	Qtrqtr:	NWNE
Sec:	27	Twp:	1N
Meridian:	6		
Lat:	40.02758		
Ground ele:	5143		
Utm x:	491433		
Utm y:	4430823		
Locqual:	ACTUAL LatLong	Field name:	WATTENBERG
Name:	NOBLE ENERGY INC	Api seq nu:	06442
Api county:	013		
Location id:	321437		
Loc name n:	MORRIS MC-61N69W 27NWNE		
Site id:	COOG10000007791	Symbol :	LO_XX
Lon:	-105.1004		
Range :	69W		

21
NNW
1/2 - 1 Mile

OIL_GAS **COOG10000007703**

Link fld:	01306354	Attrib 1:	05-013-06354
Attrib 2:	NOBLE ENERGY INC	Attrib 3:	27-3 HOLDERBY MC
Sdf key:	01306354&TYPE=WELL		
Facility id:	206859		
Facility type:	WELL	Facility s:	PR
Operator name:	100322		
Well num:	27-3	Well name:	HOLDERBY MC
Field code:	90750		
Dist n s:	660		
Dir n s:	N		
Dist e w:	1980		
Dir e w:	W	Qtrqtr:	NENW
Sec:	27	Twp:	1N
Meridian:	6		
Lat:	40.0272		
Ground ele:	5140		
Utm x:	490996		
Utm y:	4430781		
Locqual:	ACTUAL LatLong	Field name:	WATTENBERG
Name:	NOBLE ENERGY INC	Api seq nu:	06354
Api county:	013		
Location id:	321400		
Loc name n:	HOLDERBY MC-61N69W 27NENW		
Site id:	COOG10000007703	Symbol :	LO_XX
Lon:	-105.10552		
Range :	69W		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS
RADON

AREA RADON INFORMATION

State Database: CO Radon

Radon Test Results

Zip	Total Sites	Avg	% sites<=4 pCi/L	% sites>4&<10 pCi/L	% sites>=10&<20 pCi/L	% sites>20 pCi/L
80026	5	3.00	80.00	20.00	0.00	0.00

Federal EPA Radon Zone for BOULDER County: 1

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for Zip Code: 80026

Number of sites tested: 4

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	4.700 pCi/L	0%	100%	0%
Living Area - 2nd Floor	Not Reported	Not Reported	Not Reported	Not Reported
Basement	2.575 pCi/L	100%	0%	0%

PHYSICAL SETTING SOURCE RECORDS SEARCHED

TOPOGRAPHIC INFORMATION

USGS 7.5' Digital Elevation Model (DEM)
Source: United States Geologic Survey
EDR acquired the USGS 7.5' Digital Elevation Model in 2002 and updated it in 2006. The 7.5 minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

Current USGS 7.5 Minute Topographic Map
Source: U.S. Geological Survey

HYDROLOGIC INFORMATION

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2011 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005 and 2010 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Riparian Vegetation Data
Source: Division of Wildlife
Telephone: 970-416-3360

HYDROGEOLOGIC INFORMATION

AQUIFLOW^{R} Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit
Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Service (NRCS)
The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Service (NRCS)
Telephone: 800-672-5559
SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Service, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

LOCAL / REGIONAL WATER AGENCY RECORDS

FEDERAL WATER WELLS

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

STATE RECORDS

Colorado GIS Well Database
Source: Office of State Engineer, Division of Water Resources
Telephone: 303-866-3581
The GIS Well database includes all wells that the Division of Water Resources permits.

OTHER STATE DATABASE INFORMATION

Oil and Gas Well Locations
Source: Department of Natural Resources
Telephone: 303-894-2100

RADON

State Database: CO Radon
Source: Department of Public Health & Environment
Telephone: 303-692-3090
Radon Study in Colorado

Area Radon Information
Source: USGS
Telephone: 703-356-4020
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

EPA Radon Zones
Source: EPA
Telephone: 703-356-4020
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

OTHER

Airport Landing Facilities: Private and public use landing facilities
Source: Federal Aviation Administration, 800-457-6656

Epicenters: World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

Earthquake Fault Lines: The fault lines displayed on EDR's Topographic map are digitized quaternary faultlines, prepared in 1975 by the United State Geological Survey

PHYSICAL SETTING SOURCE RECORDS SEARCHED

STREET AND ADDRESS INFORMATION

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APPENDIX

H

MARIA G. RUVALCABA

Environmental Project Manager

REGISTRATION

California Registered Environmental Assessor

CERTIFICATION

OSHA 40-Hour Hazardous Waste Operations and Emergency Response Training (29 CFR 110.120) (HAZWOPER) and 8-Hour Refresher Courses
Certified Hazardous Materials Manager
Certified Hazardous Waste Operator and Emergency Response Worker
EPA/AHERA Accredited Asbestos Project Manager
EPA/AHERA Accredited Asbestos Building Inspector

EDUCATION

Certificate of Hazardous Materials Management, University of California, Riverside, CA
Bachelor of Science in Environmental Science (in progress), California State University, San Bernardino, California

EXPERIENCE

2007 to Present – Environmental Project Manager, Salem Engineering Group, Inc., Rancho Cucamonga, California
2002 to 2007 – Environmental Project Manager, Krazan & Associates, Inc., Ontario, California

PROFESSIONAL BACKGROUND

Environmental Engineering: Responsible for managing and conducting Phase I Environmental Site Assessments of commercial and multi-tenant properties located throughout the United States; responsible for conducting numerous asbestos and lead-based paint surveys of commercial and multi-tenant residential buildings located throughout California; Management of Phase II Environmental Site Assessment projects located in Southern California.

Specializes in managing and conducting large portfolios of Phase I Environmental Site Assessments located throughout the United States. Her expertise extends to assisting large commercial lending institutions and industrial clients with a wide range of regulatory issues regarding hazardous material storage and handling.

PROFESSIONAL ORGANIZATIONS

American Society of Civil Engineers (ASCE)

CLARENCE JIANG

Senior Geotechnical Engineer

REGISTRATION

Registered Geotechnical Engineer – California
Registered Civil Engineer - California
Registered Grading Inspector – Los Angeles

CERTIFICATION

OSHA 40-Hour Hazardous Waste Operations and Emergency Response Training (29 CFR 110.120) (HAZWOPER)
Certified Hazardous Materials Manager

EDUCATION

Masters of Science in Geotechnical Engineering, Utah State University, Logan, Utah
Bachelor of Science in Civil Engineering, Chung-Yuan University, Chung-Li, Taiwan

EXPERIENCE

2007 to Present – Senior Geotechnical Engineer, Salem Engineering Group, Inc., Rancho Cucamonga, California
2003 to 2007 – Senior Engineer, Krazan & Associates, Inc., Ontario, California
1994 to 2003 – Senior Engineer/Vice President, Morhol, Inc., Anaheim, California
1988 to 1994 – Project Engineer, Leighton & Associates, Inc., Irvine, California

PROFESSIONAL BACKGROUND

Geotechnical Investigations: Responsible for staff supervision, client relations, technical review, budget preparations, and profit/loss statements. Provided project management for geotechnical engineering projects for industrial plants, school and hospital sites, wastewater treatment plants, bridges and culverts, sewer lines, stadiums, embankments, service stations, commercial developments, industrial facilities, and landfills. Experienced in a broad range of geotechnical engineering applications such as shallow and deep foundation investigation, slope stability, pavement design, liquefaction potential, ground improvement, soil suitability and availability assessment, soil-cement treatment, soil-lime stabilization, erosion control, landfill construction, septic system design, as well as field and laboratory soil testing.

Construction Testing & Inspection Services: Responsible for overseeing Special Inspectors, testing laboratory personnel and procedures, client relations, technical review of reports, and insure conscientious cost management. Oversee the testing of concrete, post-tension cables, soil, welding, and construction materials to insure conformance to current building standards and codes. Report the results of materials tested to the appropriate agencies and companies.

Environmental Engineering: Provide detailed Phase I investigative site reports. Conduct environmental audits and provide recommendations for corrective measures. Extensive experience in lithologic logging and sampling in consolidated and unconsolidated material for environmental exploration. Provide recommendations for the management of underground storage tanks and hazardous waste.

PROFESSIONAL ORGANIZATIONS

American Society of Civil Engineers (ASCE)

Storm Water Management Plan (SWMP)
For Construction Activities

EVERGREEN DEVCO, INC.
NINE MILE CORNER
SEC ARAPAHOE ROAD AND HIGHWAY 287
ERIE, CO

Prepared for:
Evergreen Devco, Inc.
2390 E. Camel Back Road, Suite 410
Phoenix, AZ 85016
Phone (303) 920-9400
Attn: Russ Perkins
rperkins@evgre.com

Prepared by:
Galloway & Company, Inc.
6162 S. Willow Drive, Suite 320
Greenwood Village, CO 80111
Phone (303) 770-8884
Fax (303) 770-3636
Attn: Brandon McCrary, PE
BrandonMcCrary@GallowayUS.com

Prepared: April 2017

Galloway
Planning. Architecture. Engineering.

STORMWATER MANAGEMENT PLAN (SWMP)
FOR CONSTRUCTION ACTIVITIES
AT

Nine Mile Corner

SEC Arapahoe Road and Highway 287
Erie, Colorado

Prepared For:	Evergreen Devco, Inc. 2390 E. Camel Back Road, Suite 410 Phoenix, AZ 85016	
Preparation Date:	April 27, 2017	
Prepared by (Civil Eng. Firm):	Galloway & Company, Inc. 6162 Willow Drive, Suite 320 Greenwood Village, CO 80111	
Estimated Project Dates:	Construction Start:	Fall 2017
	Construction Complete:	Summer 2018
Owner Name and Address:	Town of Erie Urban Renewal Authority 645 Holbrook St Erie, CO 80516	
Developer:	Evergreen Devco, Inc. 2390 E. Camel Back Road, Suite 410 Phoenix, AZ 85016	
General Contractor:	TBD	
SWMP Administrator:	TBD	

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X. Attachments

- *General Permit Application* (State) and *Stormwater Construction Permit Application* (Local)
- *Final Permit, Colorado Discharge Permit System – Stormwater Certification* (State)
- *CDPS General Permit – Stormwater Discharges Associated with Construction Activity*

I. Introduction

The objective of this Stormwater Management Plan (SWMP) is to identify, design, construct, and implement Best Management Practices (BMP's) to reduce to the greatest extent practical pollutants in storm water discharges during the construction of this project.

This SWMP includes all Erosion and Sediment Control Plans in the Contract Drawings including location maps, phasing drawings, detail sheets, and all applicable attachments: General Permit Application, Inspection Checklists, Logs, and Inactivation Notice. This SWMP is a living, breathing document with all updates and modifications during construction made part of the overall plan as they occur.

The EPA and local government agencies that oversee this project are:

Colorado Department of Public Health and Environment
Water Quality Control Division
WQCD-Permits
4300 Cherry Creek Drive South
Denver, Colorado 80246-1560
Ph. (303) 692-3517

Town of Erie
645 Holbrook St
Erie, CO 80516
Ph. 303.926.2870

II. Contact List of Operators

Prior to the commencement of earth disturbing activities a Pre-Construction Meeting is to be held and the attached Pre-Construction Meeting Form will be fully executed listing all required contact names and numbers. Any subcontractor(s) required to be a co-permittee by local jurisdictions must be listed and provide a copy of their General Permit Application or co-permit to the owner and attach to this SWMP.

III. Project Description

A. Project Scope: The proposed project includes the import of approximately 26,555 cubic yards of fill material. Pad sites will not be developed as part of this project, and will be developed individually in the future. The proposed site is approximately 47.2 acres in size.

B. Location Maps:



C. Site Area: Total Disturbed Area= 49.37 Acres ±

D. Impervious Area: Before Development: 5%
(% to total) Post Development: 90%

E. Runoff Coefficient: Before Development: 0.17 (100-Year)
Post Development: 0.89 (100-Year)

F. Existing Site Topography/Use:

The subject property is currently vacant and consists of a dried up lake bed. Native vegetation includes brush and grasses but the majority of the surface consists of exposed soil. Currently, the site slopes from the outer edges of the property towards the center at slopes ranging from 0.5%-18%. Stormwater runoff flows overland toward the center of the site. During high volume storm events, a 24" culvert running under Highway 287 connects the drainage to another, yet smaller, dried up lake bed to the west.

The grading operations for this project will disturb approximately 49.37 acres. Fills up to 20 feet are expected during grading operations with essentially no cuts. The final grading could see a net fill of 376,000 cubic yards. These quantities are approximate and do not include over-excavation or shrink/swell factors. The contractor is responsible for performing their own calculations for the earthwork. The Contractor is responsible for hauling and disposing of any excess cut in an appropriate manner. Once the grading is complete, the site will be stabilized with permanent landscaping as well as seeding and mulching. Refer to the project construction plans for location and limits of the grading operations.

G. Site Soils: According to the NRCA National Cooperative Soil Survey – Web Soil Survey 2.0, site soils are made up Ascalon sandy loam which is classified as Hydrologic Soil Groups B. This soil is defined as having moderate infiltration rate when thoroughly wet.

H. Rainfall information:

	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
Average rainfall in inches	.5	.4	1.4	1.9	2.2	1.8	1.1	1.6	1.1	0.8	0.7	.6	14.1

- The total average annual rainfall for the project area is: 14.1 inches

I. Name of Receiving Waters: Currently the existing property is its own receiving waters destination. All storm runoff remains onsite with excess storm water potentially flowing through a 24" culvert to the dried up lake bed on the west side of Highway 287.

J. Off-Site Borrow Location (If applicable):

<Location to be Determined, Contractor to Insert Location information below once determined.>

*This can be filled in at anytime during the life of this SWMP. An off-site borrow location for imported soil material that is solely designated to this project must be monitored under this SWMP. If the off-site borrow location services multiple locations it should have its own NOI and SWMP by the owner/operator of the borrow location. The general contractor is responsible for verifying any and all sources of imported material to be within this SWMP.

K. Endangered Species: The CDPS General Permit does not require evaluation for Threatened and Endangered Species

L. Other Industrial Activities: None.

IV. Erosion and Sediment Controls

A. Sequence of Major Activities**:** The order of activities will be as follows:

Phase 1

Implementation and installation of the following areas: trailer, parking, lay down, porta-potty, wheel wash, concrete washout, fuel and material storage containers, solid waste containers, etc., immediately denote them on the site maps and note any changes in location as they occur throughout the construction phases.

1. *Install stabilized construction exit(s) and SWMP entrance sign.*
2. *Install silt fences on the site (clear only those areas necessary to install silt fence).*
3. *Prepare temporary parking and storage area.*
4. *Construct and stabilize sediment/retention basins and sediment traps with appropriate outfall.*
5. *Install and stabilize hydraulic control structures (dikes, swales, etc.).*

Halt all activities and contact the civil engineering consultant to perform inspection and certification of BMPs. General Contractor shall schedule and conduct storm water pre-construction meeting with engineer and all ground-disturbing contractors before proceeding with construction.

6. Clear and grub the site as construction activities require.
7. Begin grading the site.
8. Start construction of building pad and structures.

Phase II

1. Temporarily seed, or apply erosion control blanket throughout construction, any denuded areas that will be inactive for 14 days or more.
2. Maintain silt fence, inlet protection and stabilized construction exits installed during Phase 1.
3. Install utilities, underdrains and storm sewers.
4. Install rip-rap around outlet structures as each structure is installed.
5. Install inlet protection around all storm sewer structures as each inlet structure is installed.
6. Permanently stabilize areas to be vegetated as they are brought to final grade.
7. Prepare site for paving.
8. Pave site.
9. Install appropriate inlet protection devices for paved areas as work progresses.
10. Complete grading and installation of permanent stabilization over all areas including out lots.
11. Contact civil engineering consultant after the site appears to be fully stabilized for an inspection.
12. Remove all temporary erosion and sediment control devices after approval of the civil engineering consultant and stabilize any areas disturbed by the removal of the BMP.
13. Continue daily inspection reports until the final daily inspection is signed off by the construction manager that the site is fully stabilized and the permit may be terminated.

Note: the general contractor may complete construction-related activities concurrently only if all preceding BMPs have been completely installed. BMP-related steps in the above sequence are italicized for clarity.

B. Temporary Stabilization: Soil stockpiles and disturbed portions of the site where construction activity temporarily ceases are to be stabilized within **seven** days. Stabilization as defined in the above "Sequence of Major Activities." Straw mulch is to be tracked into place by machine, disked, or tackified to prevent blowing and washing away of the straw.

C. Dewatering: The area between check dams will not be allowed to discharge except through infiltration or by construction dewatering practices. Dewatering may also be necessary for on-site utility installations and foundation construction. Therefore, construction dewatering is anticipated and the General Contractor will be required to obtain a construction dewatering permit from Colorado Department of Health and Environment. The General Contractor will be required to submit a construction dewatering application at least 30 days prior to the anticipated date of discharge and pay the associated fees.

Discharges from dewatering operations must be directed through an appropriate pollution prevention/treatment measure, such as a pump discharge filter bag, sediment trap or sediment basin prior to being discharged from the site. Locations of pollution prevention/treatment measures shall be shown on the Site Maps once they are determined. Under no circumstances are discharges from dewatering

operations to be discharged directly into streams, rivers, lakes or other areas off-site. Likewise, discharges into storm sewer systems that do not drain to a suitable on-site treatment facility, such as a basin, are also prohibited. Discharges from dewatering operations must also be conducted in a manner sufficient to prevent erosion from the discharge runoff.

D. Permanent Stabilization: Disturbed portions of the site where construction activities permanently cease are to be stabilized with permanent seed, mulch, sod, etc. per the final landscaping plan in the Construction Drawings. This permanent stabilization must occur within **seven** days of an area reaching final grade.

E. Structural Practices: The structural practices for this project include, but are not limited to, those specific items shown of the erosion and sediment control drawings listed in Section III. B. Other BMP's may be required or added with Owner's Civil Engineering Consultant's approval letter. All structural BMPS must meet with Urban Drainage and Flood Control District Standards.
   1. General Best Method Practices (BMP's) are below:

      a. Diversion Ditches/Berms – They consist of temporary or permanent swales or dikes made of soil material, sometimes with impermeable liners, to control the flow of sediment laden surface water. Most of these BMP's will be coupled with check dams, sediment traps, and or basins.

      b. Check Dam – (Also known as Ditch Checks) Consists of rock, riprap, or other material designed to control concentrated flows of water in a ditch or swale. Water moving at a higher velocity will be pooled by a check dam to allow sediment to settle out before the surface water continues through the device.

      c. Construction Entrance – All access to and from the site will require the appropriately constructed access drive usually consisting of stone on top of a geotextile fabric. When conditions require, a truck wash station will also be utilized to prevent the tracking of sediment off site.

      d. Inlet protection – These devices may consist of a wood frame with silt fence fabric, straw bales, large rock or other pre-manufactured products designed to keep sediment-laden water from entering storm drain inlets.

      e. Sediment Basins / Traps – Consist of a depression created in the earth to collect sediment-laden surface water to allow settlement of suspended soil particles before storm water is allowed to exit the site. The size and construction of these devices are to be shown on the site-specific drawings. Accumulated sediment must be removed to maintain effectiveness.

      f. Silt Fence – This BMP consists of a synthetic permeable woven fabric that must only be used to control small surface water flows within this product's design capability. Silt fence must also be inspected and cleaned per the weekly checklist to maintain its effectiveness.

V. Other Pollutant Controls

A. The following items are pollutant issues (outside of storm water sediment) during the construction process:

   1. Dust Control - The general contractor will employ the use of water trucks or other dust control agents to reduce dust generated during construction to levels acceptable by local authorities and

the owner's agent. Water trucks or other dust control agents will be used as needed during construction to minimize dust generated on the site. Tackifiers may be used to hold soil in place and prevent dust. Manufacturer recommendations for application locations and rates must be used for dust control applications.

2. Concrete Waste (Washout from Ready Mix Trucks) - All concrete washouts will be in designated locations, noted by the general contractor on the job site erosion control plan. The concrete washout will be isolated and contained from storm water run-off. Excess liquid may be allowed to percolate into the ground on-site; it may not be discharged off site as runoff in any storm drainage conveyance. Off-site disposal, solids or liquids, only allowed to an appropriately licensed facility.

3. Equipment/Vehicle Maintenance – All on-site equipment shall receive regular maintenance by the contractors using the equipment to help prevent leaking of fluids or other pollutant discharges. The general contractor is responsible for overseeing that any onsite vehicle maintenance is handled appropriately and that all fluids and materials are disposed of properly.

4. Fuel Tanks – All onsite fuel tanks must meet all government standards including proper barriers for safety and containment of potential spills. The general contractor must note the location of any fuel tanks on the job site erosion control plan.

5. Hazardous Waste Management and Spill Reporting – Any hazardous or potentially hazardous material that is brought onto the construction site will be handled properly in order to reduce the potential for storm water pollution. All materials used on this construction site will be properly stored, handled, dispensed and disposed of following all applicable label directions. Flammable and combustible liquids will be stored and handled according to 29 CFR 1926.152. Only approved containers and portable tanks shall be used for storage and handling of flammable and combustible liquids.

   Material Safety Data Sheets (MSDS) information will be kept on site for any and all applicable materials.

   In the event of an accidental spill, immediate action will be undertaken by the General Contractor to contain and remove the spilled material. All hazardous materials will be disposed of by the Contractor in the manner specified by federal, state and local regulations and by the manufacturer of such products. As soon as possible, the spill will be reported to the appropriate agencies. As required under the provisions of the Clean Water Act, any spill or discharge entering waters of the United States will be properly reported. The General Contractor will prepare a written record of any spill and associated clean-up activities of petroleum products or hazardous materials in excess of 1 gallon or reportable quantities, which ever is less. The General Contractor will provide notice to Owner immediately upon identification of a reportable spill.

   Any spills of petroleum products or hazardous materials in excess of Reportable Quantities as defined by EPA or the state or local agency regulations, shall be immediately reported to the EPA National Response Center (1-800-424-8802) and the Colorado Department of Public Health and Environment (CDPHE) (1-877-518-5608).

   The State reportable quantity for petroleum products is 25 gallons or more (or that cause a sheen on nearby surface waters). Spills from regulated aboveground and underground fuel storage tanks must be reported to the State Oil Inspector within 24 hours (after-hours contact CDPHE Emergency Spill Reporting Line). This includes spills from fuel pumps. Spills or releases of hazard-

ous substances from regulated storage tanks in excess of the reportable quantity (40 CFR Part 302.6) must be reported to the National Response Center and the local fire authority immediately and to the State Oil Inspector within 24 hours

The reportable quantity for hazardous materials can be found in 40 CFR 302 and http://a257.g.akamaitech.net/7/257/2422/08aug20031600/edocket.access.gpo.gov/cfr_2003/julqtr/pdf/40cfr302.6.pdf

In order to minimize the potential for a spill of petroleum product or hazardous materials to come in contact with storm water, the following steps will be implemented:

a) All materials with hazardous properties (such as pesticides, petroleum products, fertilizers, detergents, construction chemicals, acids, paints, paint solvents, additives for soil stabilization, concrete, curing compounds and additives, etc.) will be stored in a secure location, under cover, when not in use.

b) The minimum practical quantity of all such materials will be kept on the job site and scheduled for delivery as close to time of use as practical.

c) A spill control and containment kit (containing for example, absorbent material such as kitty litter or sawdust, acid neutralizing agent, brooms, dust pans, mops, rags, gloves, goggles, plastic and metal trash containers, etc.) will be provided on the construction site and location(s) shown on Site Maps.

d) All of the product in a container will be used before the container is disposed of. All such containers will be triple rinsed, with water prior to disposal. The rinse water used in these containers will be disposed of in a manner in compliance with state and federal regulations and will not be allowed to mix with storm water discharges.

e) All products will be stored in and used from the original container with the original product label.

f) All products will be used in strict compliance with instructions on the product label.

g) The disposal of excess or used products will be in strict compliance with instructions on the products label.

6. Misc. Building Materials or Supplies – All materials that will become part of the permanent improvements are to be kept in sealed containers and maintained in an orderly fashion until installed. The general contractor will be responsible for monitoring any and all stockpiles of material and equipment on site.

7. Offsite Vehicle Tracking – Per the Structural Practices section, a stabilized construction entrance will be provided to help reduce vehicle tracking of sediments. The paved streets adjacent to the site are to be swept as necessary to remove any excess mud, dirt or rock tracked from the site. Dump trucks hauling loose material from the construction site are to be covered with a tarpaulin.

8. Sanitary Waste – All on site personnel are to utilize the temporary or permanent sanitary facilities provided on site by the general contractor. Sanitary waste is to be collected from the temporary/portable units a minimum of one time per week by a licensed sanitary waste management

contractor, or as required by local regulation. The location of sanitary units is to be noted on the job site erosion control plan by the general contractor.

9. Solid Waste Material (Construction Debris) - No solid waste is to be allowed in storm water discharges. *On site burning or burying of waste material is prohibited.* All trash and construction debris from the site is to be deposited in dumpsters or proper hauling equipment. The dumpsters are to meet local and state solid waste management regulations and emptied as deemed necessary to an approved off site dump. The location of dumpsters is to be noted on the job site erosion control plan by the general contractor. All construction companies working on site will be responsible for the correct procedure in their waste disposal.

10. Non Stormwater Discharges - The General Permit for Storm Water Discharges Associated with Construction Activities prohibits most non-storm water discharges during the construction phase. Allowable non-storm water discharges that occur during construction on this project, which are covered by the General Permit, include:

    1. Emergency fire fighting activities;

    2. Un-contaminated springs;

    3. Landscape irrigation return flows.

    Construction dewatering water can not be discharged to surface waters or to storm sewer systems without separate permit coverage. The discharge of construction dewatering water to the ground, under specific conditions, may be allowed by the Stormwater Construction Permit when appropriate BMPs are implemented. Refer to section 4C for more information on dewatering.

    No other non-stormwater discharges are anticipated, or allowed by coverage of the CDPS General Permit.

11. Asphalt and Concrete Batch Plants – Shall not be permitted on-site.

VI. Inspection and Maintenance Procedures for Construction

A. The cornerstone of the maintenance procedure is the Inspection Report. Qualified owners representatives and general contractor site superintendents will be trained in the inspection and maintenance practices necessary for keeping the pollutant controls used in this SWMP in good working order. The site superintendent will be responsible for the daily oversight of the pollution controls along with the execution of the site inspection report in accordance with this SWMP. The owner's representative will also have periodic inspection requirements to ensure proper execution of site inspections and maintenance.

VII. Certification of Compliance with Federal, State, and Local Requirements

A. This Stormwater Management Plan reflects State of Colorado and Town of Erie requirements for storm water management and erosion and sediments control. This plan was prepared in accordance with the attached permit text. There are no other known applicable State or Federal requirements for sediment and erosion site plans (or permits); or storm water management site plans (or permits).

VIII. Post Construction Practices

A. Structures and Pollutants

1. The proposed development includes the construction of the site infrastructure to support future pad sites within the Vista Ridge Commercial development. Storm runoff from the future buildings, parking, and drive areas will be conveyed through a permanent underground storm drain system. Piping will route runoff flows to an on-site stormwater detention pond.

2. The expected pollutants to be generated by this site should be typical of a Commercial/Retail center. Some of those sources include fluids from automobiles and trucks like oil, grease, fuel, antifreeze, and brake fluid, plus particulates created by or carried on vehicles and deposited on the site such as brake dust, rubber fragments from tires, and dirt picked up from or carried onto the site. In addition, trash generated by building occupants or blown onto the site may be found at times. Thermal pollution may also occur during rainfall events when the building roof or asphalt pavement is hot from significant sunlight prior to the rainfall.

3. The post construction measures used to minimize pollutants in waterways include regular monitoring and collection of trash and debris, and good housekeeping of delivered and stored operating and retail goods.

B. Maintenance Guidelines for Post Construction Operation

1. Maintenance of all storm water pollution prevention measures will be the responsibility of the on-site management staff. The maintenance guidelines consist mostly of good housekeeping measures. Any grassed or vegetated areas that experience erosion from rainfall events should be repaired and revegetated as soon as possible. Trash or litter should be picked up and properly disposed to prevent it from getting into the storm drainage system and downstream waterways. The detention and retention ponds will be monitored for sediment build up. Periodic removal of sediment should be done to keep the structures effective. Pavement areas should also be monitored for pollutants. Any large quantity of fluids such as oil, antifreeze, brake fluid, etc. found on the pavement should be reported to the office and the source determined, if possible, and removed from the site for maintenance or repair. Pavements should also be monitored for sediment coming from vegetated areas that drain onto the pavement. If sediment is found it should be cleaned off the pavement, and the source of the soil found and repaired as discussed above.

X. Attachments

- *General Permit Application* (State) and *Stormwater Construction Permit Application* (Local)
  Contractor to Add
- *Final Permit, Colorado Discharge Permit System – Stormwater Certification* (State)
  Contractor to Add
- *CDPS General Permit – Stormwater Discharges Associated with Construction Activity*
  Contractor to Add

CONSTRUCTION ACTIVITIES STORMWATER MANAGEMENT PLAN

FOR

OUTLOOK NINE MILE

April 27, 2017

Prepared for:

Evergreen Devco Inc.
1873 South Bellaire St.
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Prepared by:

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Harris Kocher Smith Project No.: 160602

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I. Location

The proposed project is located at the corner of HWY 287 & Arapahoe Rd in the Town of Erie, County of Boulder, Colorado. More specifically is at Block 2, Nine Mile Subdivision Filing No. 1, a Portion of the Northeast Quarter of Section 34, Township 1 North, Range 69 West, and the Southeast Quarter of Section 27, Township 1 North, Range 69 West of the 6th Principal Meridian, Town of Erie, County of Boulder, State of Colorado. A Vicinity Map is attached in Appendix A.

II. Nature of Construction Activity

Outlook Nine Mile is a multi-family development consisting of 15 multifamily buildings, 1 clubhouse and amenity area, 7 detached garages and associated access drives, hardscaping, landscaping, and utility installations. A detention pond will also be constructed on the property.

III. Sequence of Major Activities

See section X. Stormwater Management Considerations for a sequence of major activities.

IV. Estimates of Site Area

The Site is approximately 15.15 acres. The entire Site will be disturbed by demolition, excavation, grading, utility installation and other construction activities. The exact limits of disturbance are shown on the Construction Activities Stormwater Management Plan (CASWMP) located in Appendix D.

V. Summary of Existing Data

Currently the Site is primarily undeveloped land with a gravel access drive for the old location of Prince Lake to the west and an irrigation ditch. There are three small buildings at the northeast corner of the Site that are planned to be removed.

The Site is shown to be in a Zone X (unshaded) Flood Area according to FIRM Map 08013C0438J Boulder County, Colorado December 18, 2012 (See FIRM map in Appendix A). Zone X (unshaded), as depicted on the aforementioned Map, is described by FEMA as “Areas determined to be outside 500-year flood plain”.

According to a NRCS Soil Resource Report for the Site, it is underlain by almost entirely sandy loam and sandy clay loam soils. See the Soils Report in Appendix B.

VI. Existing Vegetation

The existing vegetation consists of natural grasses and shrubs.

VII. Potential Non-Stormwater Discharges

Groundwater was encountered at depths of about 18 to 22 feet and is not anticipated to impact the planned construction.

Other non-stormwater components of discharge, such as underground springs and landscape irrigation return flow are not anticipated to occur with this development; however, the contractor shall be responsible to monitor for such discharges, and notify the engineer in such an event.

VIII. Receiving Water(s)

All runoff within the adjacent streets will drain as historically occurs to existing inlets. The Site will drain to the proposed on-site stormwater management system and into the existing storm sewer network. The runoff from the Site will be conveyed along the existing storm sewer network to the Bullhead Gulch and will ultimately drain to Boulder Creek.

IX. Construction Schedule

Construction on this Project is scheduled to commence in the Spring of 2018 with an anticipated completion date of in the Fall of 2019. Construction BMP's for the entire Site shall be installed according to the CASWMP in Appendix D.

X. Stormwater Management Considerations

Stormwater management for the Site will be accomplished in the following Phases:

Phase 1 - Prior to earth disturbances

Vehicle tracking control (VTC)

Silt Fence (SF) installation

Construction Fence (CF) installation
Inlet Protection (IP) at the existing inlets (Refer to Stormwater Management Plan)
Stabilized Staging Area installation

Phase 2 - During and immediately after earth disturbances
Maintenance of the previously installed measures
Roadway inspection and any necessary cleanup each day
Concrete washout (CWA) area installation
Surface roughening where necessary
Temporary Soil Stockpile (SP) area installation

Phase 3 - After paving, foundation construction and underground utility construction
Maintenance of the previously installed measures
Removal of concrete washout area

Phase 4 - Final
Maintenance of the previously installed measures
Installation of formal landscaping
Request for final inspection
Upon inspection approval, removal of temporary measures

XI. Erosion and Sediment Control Measures (BMP's)

The following BMP's shall be implemented as indicated, prior to and during construction activities on the Site. This plan indicates the purpose of and estimated timing of implementation of such BMP's. The contractor's representative shall be vigilant in ensuring that additional BMP placement is implemented immediately in the event of deficiencies of any unforeseen erosion conditions.

Silt Fence

Silt fence is to be utilized along the perimeter of the Site and around designated stabilized staging areas as shown on the CASWMP. Silt fence shall be placed along the contour, at the base of any disturbed area, as shown on the Stormwater Management Plan. When silt fence is not installed along the contour, a "J-Hook" installation may be appropriate to

ensure that the BMP does not create concentrated flow parallel to the silt fence. Rock socks may be substituted for silt fence as perimeter control on hard surface areas.

Inlet Protection

All storm sewer inlets that are made operable during construction or previously exist adjacent to, or located within the Site, must be protected to prevent sediment-laden runoff from entering the storm sewer system. Inlet protection locations are indicated on the CASWMP. Inlet protection measures may be removed after upstream areas are stabilized.

Vehicle Tracking Control

A vehicle tracking control area will be installed at the location shown on the CASWMP. All construction traffic will be required to pass through this area in order to limit the amount of sediment transported to public roadways. Whenever sediment is transported onto a public road, the road shall be cleaned immediately. Sediment shall be removed by shoveling, sweeping, or other approved methods. Street washing is not allowed.

Dust Mitigation

The contractor shall have measures on site during grading to mitigate airborne dust pollutants. Water trucks shall be on Site during all earth disturbing activities and used to moisten soil access drives to reduce the amount of dust particles created by wind and on site construction traffic.

Concrete Washout Area

A concrete washout area is identified on the CASWMP. The concrete washout can be earth built or portable. The concrete washouts shall be maintained in effective operational condition and built to specifications per the Urban Drainage and Flood Control District (UDFCD).

Stabilized Staging Area

A Stabilized Staging Area (used for equipment storage, parking, and a loading/unloading zone) is identified on the CASWMP.

Seeding and Mulching

All disturbed areas shall be seeded and mulched within 30 days of initial exposure, or 7 days after grading is substantially complete in a given area. All disturbed areas shall be seeded and mulched per UDFCD or as described in the approved landscape plans.

Surface Roughening

Surface roughening provides temporary stabilization of disturbed areas from water and wind erosion. The soil surface is considered to be roughened if depressions are created two to six inches deep and are spaced approximately six inches apart. Surface roughening shall be performed on all disturbed and graded areas of the Site (except in areas where buildings, pavement, or sod are to be placed within 7 days). Surface Roughening should follow along the contours of the slope. Care should be taken not to allow vehicles on treated slopes, as tire tracks will smooth the roughened surface and encourage runoff to collect into channels.

XII. SWMP Administrator

The stormwater management plan (SWMP) administrator shall be the Construction Site Superintendent.

- The Site superintendent is responsible for implementing and maintaining the Stormwater Management Plan.
- The SWMP administrator shall contact the engineer of record for development and revisions of the SWMP.
- The SWMP administrator shall be responsible for reporting spills.
- The SWMP administrator shall conduct Site inspections and shall verify that repairs to the BMPs have been completed and certify corrections.
- The SWMP administrator shall conduct BMP training.

XIII. Potential Pollution Sources

Disturbed and Stored Soils

Disturbed and stored soils are a potential pollution source for the Site. Implementing dust mitigation, rock socks, and silt fence will control the disturbed and stored soils.

Vehicle Tracking of Sediments

Vehicle tracking of sediments is a potential pollution source for the Site and will be controlled by a vehicle tracking control pad located at the construction entrance.

Management of Contaminated Soils

The contractor shall be responsible to monitor for contaminated soils, and notify the engineer and The Town of Erie if discovered.

Loading and Unloading Operations

Loading and unloading operations is a potential pollution source for the Site. Loading and unloading operations shall take place within the stabilized staging area.

Outdoor Storage Activities

Outdoor storage activities are a potential pollution source for the Site. Materials sometimes used at a construction site present a potential for contamination of stormwater runoff. These may include, but are not limited to: building materials, fuel, oil, lubricants, paints, solvents, concrete curing compounds, pesticides, fertilizers, chemicals, herbicides, etc. The contractor shall designate an area where these products should be stored in an enclosure, container, or lined earthen dike, constructed to prevent discharge of these materials in runoff from the Site. These barriers will also function to contain spilled materials from contact with surface runoff. Standard Operating Procedures for material spill containment and clean-up are provided in Appendix C.

Vehicle and Equipment Maintenance and Fueling

Vehicle and equipment maintenance and fueling is a potential pollution source for the Site. Measures shall also be taken to prevent spills or leaks of fuel, oils, lubricants, antifreeze, and other contaminant fluids from construction vehicles to protect groundwater and stormwater runoff. All equipment maintenance shall be performed in a designated area, and measures such as drip pans shall be used to contain petroleum products. Spills of construction materials should be cleaned up immediately and disposed of properly. The contractor shall routinely inspect equipment for leaks that could lead to discharge of petroleum products into surface runoff.

Dust or Particulate Generating Processes

Significant dust or particulate generating processes are not a potential pollution source for the Site; however minor dust or particulate may be generated during the grading process. Dust mitigation, surface roughening, and seeding and mulching shall be implemented to mitigate airborne dust pollutants.

Routine Maintenance Activities

Routine maintenance activities are a potential pollution source for the Site. The contractor shall designate an area where these practices occur and shall routinely inspect and maintain areas to eliminate the pollution source.

On-Site Waste Management Practices

On-site waste management practices (waste piles, liquid wastes, dumpsters, etc.) are a potential pollution source for the Site. The contractor shall designate an area where these practices occur and shall routinely inspect and maintain the areas to eliminate the pollution source.

Concrete Truck/Equipment Washing

Concrete truck and equipment washing is a potential pollution source for the Site and should only occur at the designated Concrete Washout Area shown on the CASWMP.

Dedicated Asphalt and Concrete Batch Plants

Dedicated asphalt and concrete batch plants are not a potential pollution source for the Site. There will not be any dedicated concrete or asphalt batch plants on site.

Non-Industrial Waste Sources

Non-industrial waste sources such as worker trash and portable toilets are a potential pollution source for the Site. The contractor shall designate an area where these practices occur and shall routinely inspect and maintain the areas to eliminate the pollution source.

Other Areas or Procedures Where Potential Spills Can Occur

Other areas or procedures where potential spills can occur are not a potential pollution source for the Site.

Training

All contractor's employees and subcontractor's employees shall receive orientation training in "Spill Prevention and Response Procedures". Training will cover responsibilities and procedures to be followed in the event of an on-site material spill. Periodic training shall be conducted during weekly or monthly safety meetings. All training records shall be maintained in the construction trailer. The contractor is responsible for preparing and training site personnel for procedures on potential spills.

XIV. Final Stabilization and Long-Term Stormwater Management

Upon the completion of construction, open space areas of the development will have permanent vegetation installed in conformance with the approved landscaped plan. Final stabilization is reached when all soil-disturbing activities at the Site have been completed, and uniform vegetative cover has been established with a density of at least 70% of pre-disturbance levels or equivalent permanent, physical erosion reduction methods have been employed.

XV. Inspection and Maintenance

At a minimum, the contractor or his agent shall produce and retain weekly written inspection records for all BMP's and after significant precipitation events. All necessary maintenance and repair shall be completed immediately. However, street sweeping is to be completed by the close of the business day or on an as needed basis. It is the responsibility of the contractor to have all erosion control devices in place and effective, prior to a storm event. The SWMP administrator must maintain a record of the inspection results for a period of three years following expiration or inactivation of permit coverage.

Record Keeping and Documenting Inspections

The following items (at a minimum) must be documented as part of the Site inspections:

i. The inspection date;
ii. Name(s) and title(s) of personnel making the inspection;
iii. Location(s) of discharges of sediment or other pollutants from the Site;
iv. Location(s) of BMPs that need to be maintained;

v. Location(s) of BMPs that failed to operate as designed or proved inadequate for a particular location;
vi. Location(s) where additional BMPs are needed that were not in place at the time of inspection;
vii. Deviations from the minimum inspection schedule as provided in Section IX above;
viii. Description of corrective action for items iii, iv, v, and vi, above, dates corrective action(s) taken, and measures taken to prevent future violations, including requisite changes to the SWMP, as necessary; and
ix. After adequate corrective action(s) has been taken, or where a report does not identify and incidents requiring corrective action, the report shall contain a signed statement indicating the Site is in compliance with the permit to the best of the signer's knowledge and belief.

XVI. Conclusion

This Stormwater Management Plan is in conformance with the State of Colorado Stormwater Management Plan Preparation Guidance. Additional grading, erosion and sediment control measures may be required of the owner or his/her agents, due to unforeseen erosion problems or if the submitted plan does not function as intended. The requirements of this plan shall be the obligation of the land owner and/or his successors or heirs; until such time as the plan is properly completed, modified, or voided.

XVII. References

1. Urban Drainage and Flood Control District (UDFCD). Nov 2010. Urban Storm Drainage Criteria Manual Volume 3. Updated and maintained by UDFCD. Denver, CO.

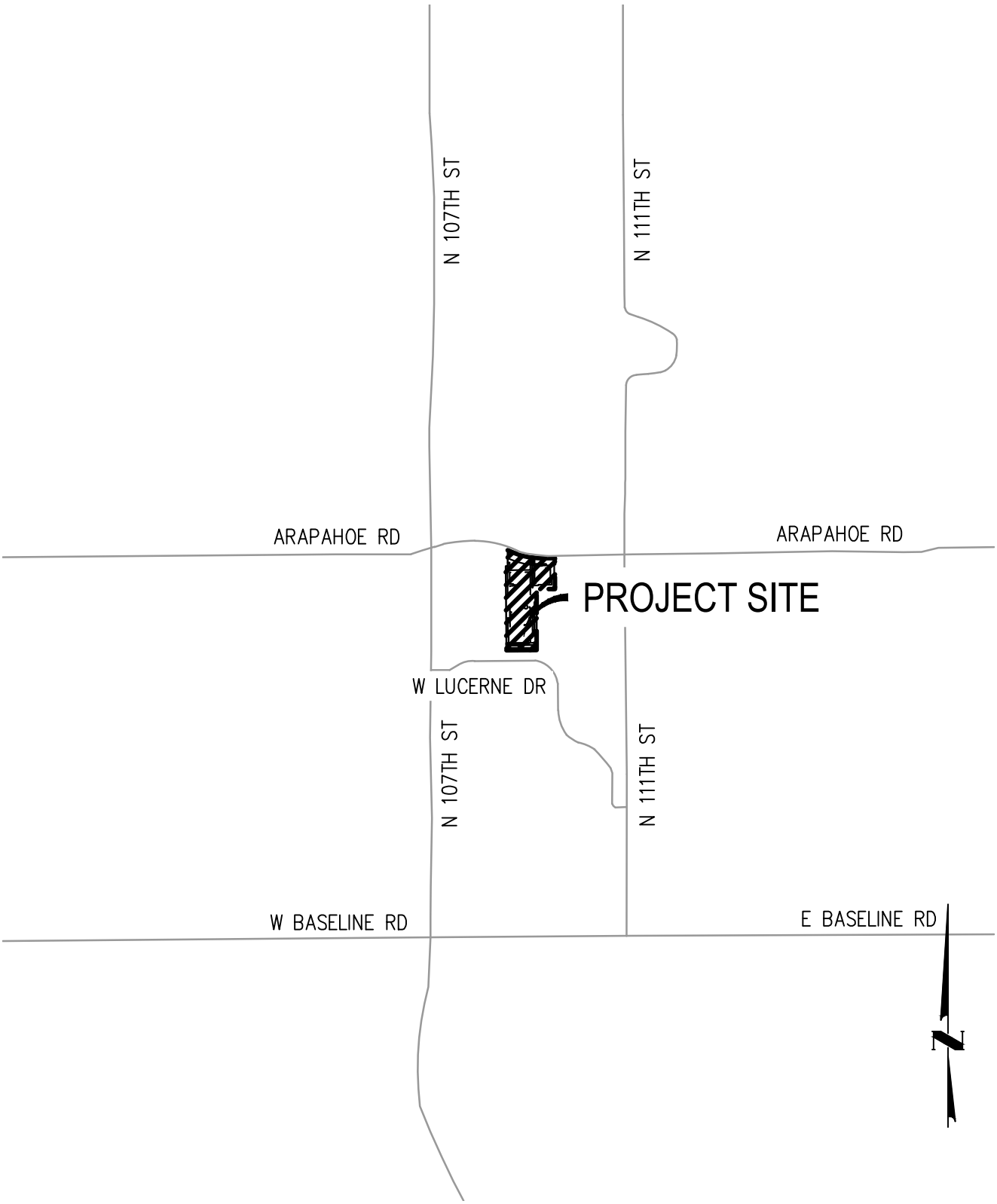
2. Preliminary Geotechnical Investigation - Nine Mile Corner. CTL Thompson, Inc. February, 2017.

3. Custom Soil Resource Report for Boulder County Area, Colorado. July 16, 2016. United States Department of Agriculture Natural Resources Conservation Service (NRCS).

4. Outlook Nine Mile Drainage Report. Harris Kocher Smith; April, 2017.

5. Stormwater Management Plan Preparation Guidance; Colorado Department of Public Health and Environment; Revised April, 2011.

APPENDIX A – Vicinity Map and FIRM Map



Plotted: THU 04/27/17 3:47:19P By: Derrik Mills Filepath: p:\160602\engineering\xref\vicmap.dwg Layout: layout1

NO CHANGES ARE TO BE MADE TO THIS DRAWING WITHOUT WRITTEN PERMISSION OF HARRIS KOCHER SMITH.

ISSUE DATE: 09/19/2016	PROJECT #: 160602
DATE	REVISION COMMENTS

EVERGREEN

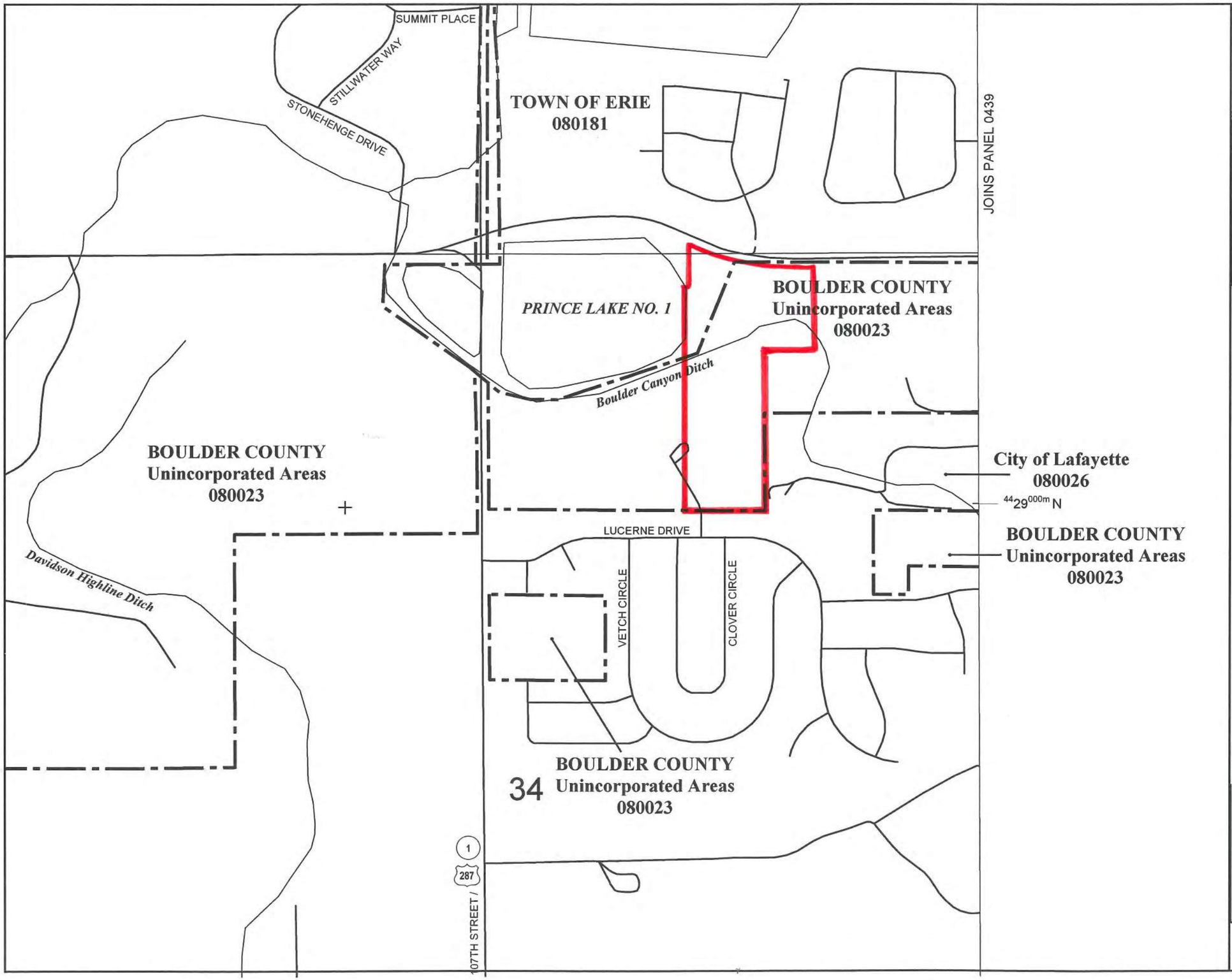
OUTLOOK AT NINE MILE
VICINITY MAP

HARRIS KOCHER SMITH
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P: 303.623.6300 F: 303.623.6311
HarrisKocherSmith.com

DSN'D BY: MEG
CHK'D BY: TEG
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SHEET NO.
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1 OF 1

urance Program at 1-800-638-6620.



MAP SCALE 1" = 500'

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MET

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0438J

FIRM

FLOOD INSURANCE RATE MAP

BOULDER COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 438 OF 615

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BOULDER COUNTY	080023	0438	J
ERIE, TOWN OF	080181	0438	J
LAFAYETTE, CITY OF	080026	0438	J

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
08013C0438J

MAP REVISED
DECEMBER 18, 2012

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

APPENDIX B – NCRS Soils Report

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Boulder County Area, Colorado



July 18, 2016

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

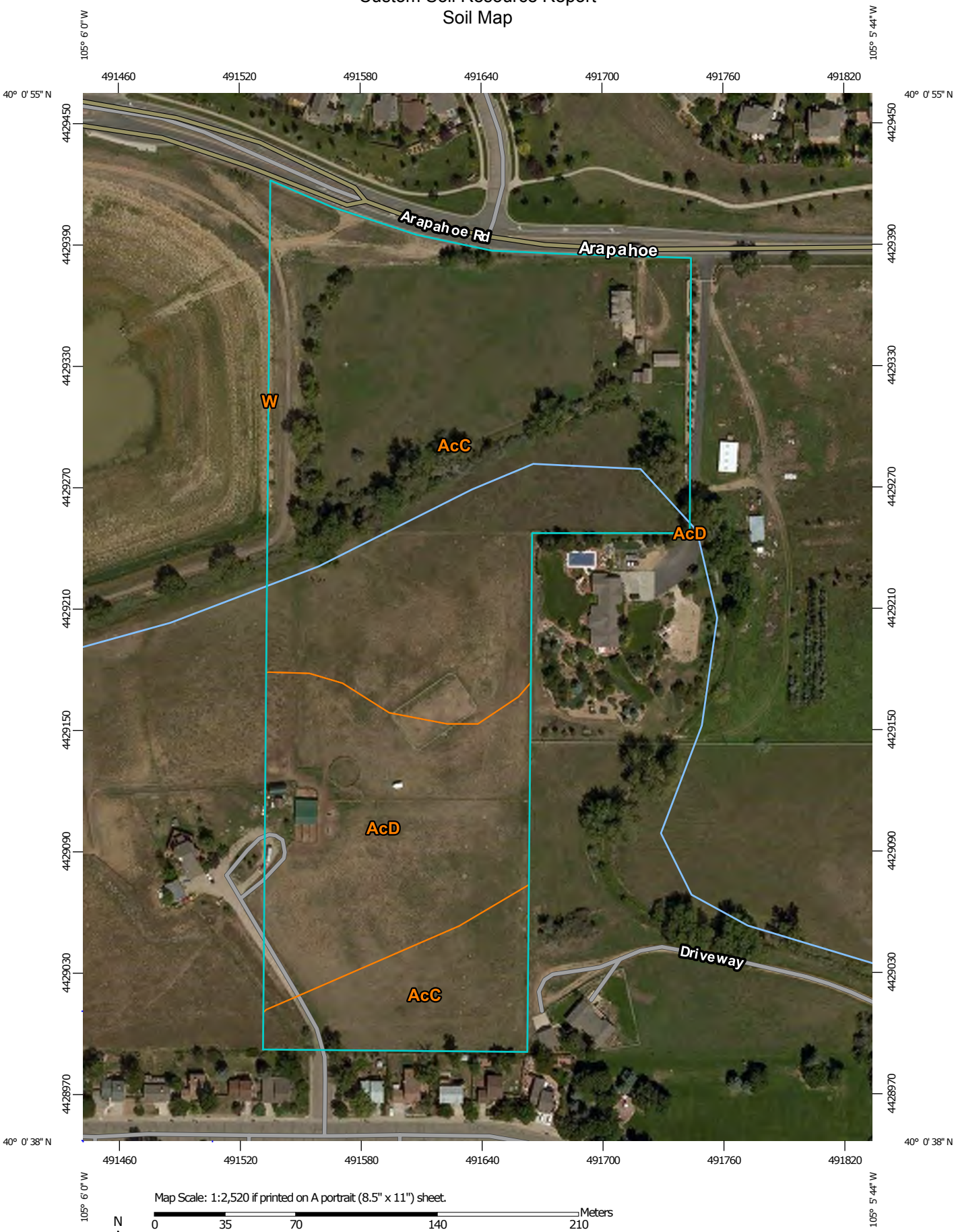
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:2,520 if printed on A portrait (8.5" x 11") sheet.

N

0 35 70 140 210 Meters

0 100 200 400 600 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Boulder County Area, Colorado
Survey Area Data: Version 12, Sep 22, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 30, 2014—Sep 18, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Boulder County Area, Colorado (CO643)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
AcC	Ascalon sandy loam, 3 to 5 percent slopes	11.9	74.6%
AcD	Ascalon sandy loam, 5 to 9 percent slopes	4.1	25.4%
W	Water	0.0	0.0%
Totals for Area of Interest		**15.9**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If

intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Boulder County Area, Colorado

AcC—Ascalon sandy loam, 3 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2tlnt
Elevation: 3,550 to 5,970 feet
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 46 to 57 degrees F
Frost-free period: 135 to 160 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Ascalon and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ascalon

Setting

Landform: Interfluves
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Wind-reworked alluvium and/or calcareous sandy eolian deposits

Typical profile

Ap - 0 to 6 inches: sandy loam
Bt1 - 6 to 12 inches: sandy clay loam
Bt2 - 12 to 19 inches: sandy clay loam
Bk - 19 to 35 inches: sandy clay loam
C - 35 to 80 inches: sandy loam

Properties and qualities

Slope: 3 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline (0.1 to 1.9 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 1.0
Available water storage in profile: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4c
Hydrologic Soil Group: B
Ecological site: Sandy Plains (R067BY024CO), Sandy (North) Draft (April 2010) (PE 16-20) (R072XA022KS)

Minor Components

Stoneham

Percent of map unit: 10 percent
Landform: Interfluves
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Loamy Plains (R067BY002CO), Loamy Upland (North) (PE 16-20) (R072XA015KS)

Vona

Percent of map unit: 8 percent
Landform: Interfluves
Landform position (two-dimensional): Backslope, footslope, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Sandy Plains (R067BY024CO), Sandy (North) Draft (April 2010) (PE 16-20) (R072XA022KS)

Platner

Percent of map unit: 2 percent
Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Loamy Plains (R067BY002CO), Loamy Upland (North) (PE 16-20) (R072XA015KS)

AcD—Ascalon sandy loam, 5 to 9 percent slopes

Map Unit Setting

National map unit symbol: jpr4
Elevation: 4,900 to 5,500 feet
Mean annual precipitation: 12 to 18 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 140 to 155 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Ascalon and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ascalon

Setting

Landform: Terraces
Landform position (three-dimensional): Side slope, tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed loamy alluvium and/or eolian deposits

Typical profile

H1 - 0 to 5 inches: sandy loam
H2 - 5 to 16 inches: sandy clay loam, sandy loam
H2 - 5 to 16 inches: fine sandy loam, loamy fine sand, sandy loam
H3 - 16 to 60 inches:
H3 - 16 to 60 inches:
H3 - 16 to 60 inches:

Properties and qualities

Slope: 5 to 9 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very high (about 16.9 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: Sandy (R067XB026CO)

Minor Components

Olney

Percent of map unit: 10 percent

Otero

Percent of map unit: 5 percent

Terry

Percent of map unit: 5 percent

W—Water

Map Unit Composition

Water: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Minor Components

Aquolls

Percent of map unit: 5 percent
Landform: Marshes

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APPENDIX C – Standard Operating Procedures

Standard Operating Procedure (SOP)

Minor Spill of Material (Paint, Stain, Solvent, Glue) (Less than Reportable Quantity)

A. Purpose

The purpose of this Standard Operating Procedure is to establish uniform procedures for cleanup and disposal of material from a minor accidental spill of paint, stain solvent or glue. The procedures outlined in this SOP are applicable to all personnel working on the Outlook Nine Mile construction site. Cleanup and proper disposal of spilled material into the soil or onto the ground surface is required to ensure the material or contaminated soil does not enter or impact the waters of the State or the sanitary sewer system.

B. Summary of the Method

This procedure outlines the steps to be taken to prevent spilled material from impacting waters of the State and disposal of the resulting contaminated cleanup material.

C. Definitions

1. Material Safety Data Sheet (MSDS). The standard industry list for a product detailing the chemical makeup, safety hazards, first aid, firefighting and spill cleanup measures, handling, storage, and disposal methods.

D. Health and Safety Warnings

Many construction materials mat be flammable, cause skin and eye irritation, and may be harmful or fatal if swallowed. Caution should be used during cleanup operations. The MSDS for the spilled material should be consulted to ensure personnel safety during cleanup operations.

E. Equipment and Supplies

1. Absorbent pads and booms
2. Hand equipment (shovels, brooms)
3. Waste containers (5 gallon buckets, drums)
4. Personal Protective Equipment

F. Procedural Steps

1. Shut down all equipment operating in the area to prevent ignition of the spill.
2. Quickly control the spill by stopping or securing the spill source. This could be as simple as up-righting a tipped container or shutting down a piece of equipment producing the spill.
3. Contact the Responsible Person on site to enact the emergency response contact procedure.

a. Responsible Person shall consult the MSDS for proper spill procedures and determination of Reportable Quantity for a spill. In the event the spilled quantity exceeds the reportable quantity the Responsible Person shall contact:
    i. Call 911 for fire control if necessary.
    ii. Town of Erie: 303-926-2870

4. Prevent migration of the spill by using an absorbent. This could include absorbent pads or booms, floor dry, cat litter or dirt. The absorbent should be spread across the spill and along the downhill side to stop flow.
5. If necessary to prevent the material from entering a storm inlet or manhole a dam of absorbent material should be placed in the gutter upstream form the inlet.
6. Begin cleanup of the spilled material and absorbents by placing the materials in 5 gallon, plastic buckets with lids or into a provided drum.
7. Continue cleanup until all spilled material and contaminated absorbents are removed. On a hard surface this should include sweeping the area. Material spilled on the dirt should be removed down to a level where discoloration of the soil has been removed. Water shall never be used to flush a material off a surface.
8. All material shall be properly stored in a location designated by the Responsible Person on site.
9. The Responsible Person shall contact the Site Contracted Emergency Response and Disposal Co. to collect and properly dispose of the material.
10. Location of the spill will be documented on the Stormwater Maintenance Plan (SWMP) in the construction trailer.
11. Inspection of materials and equipment shall occur daily.

G. Record Management

All documentation from the incident, including incident report and incident disposal manifests, shall be maintained at 1873 South Bellaire St, Suite 1106, Denver, CO 80222 (Ph: 303-757-0469), for a period of 3 years from the date of the spill.

H. After Incident Briefing

All personnel involved in the incident shall attend a debriefing to determine the cause of the spill, procedures followed, and corrective actions to prevent future spills. All pertinent data shall be documented. All findings from the debriefing should be discussed at the next Safety Meeting. Town of Erie shall be notified.

Standard Operating Procedure (SOP)

Minor Fuel or Oil Spill (Less than 5 Gallons)

A. Purpose

The purpose of this Standard Operating Procedure is to establish a uniform procedure for cleanup and disposal of material from a minor accidental spill of fuel (gasoline or diesel) or oil (hydraulic or motor). The procedures outlined in this SOP are applicable to all personnel working on the Outlook Nine Mile construction site. Cleanup and proper disposal of spilled fuel or oil into the soil or onto the ground surface is required to ensure the material or contaminated soil does not enter or impact the water the State or the sanitary sewer system.

B. Summary of the Method

This procedure outlines the steps to be taken to prevent spilled fuel or oil from impacting waters of the State and disposal of the resulting contaminated cleanup material.

C. Definitions

1. Material Safety Data Sheet (MSDS). The standard industry list for a product detailing the chemical makeup, safety hazards, first aid, firefighting and spill cleanup measures, handling, storage, and disposal methods.

D. Health and Safety Warnings

Fuels and fuel oils may be extremely flammable, cause skin and eye irritation, and may be harmful or fatal if swallowed. Caution should be used during cleanup operations. The MSDS for the spilled material should be consulted to ensure personnel safety during cleanup operations.

E. Equipment and Supplies

1. Absorbent pads and booms
2. Hand equipment (shovels, brooms)
3. Waste containers (5 gallon buckets, drums)
4. Personal Protective Equipment

F. Procedural Steps

1. Shut down all equipment operating in the area to prevent ignition of the spill.
2. Quickly control the spill by stopping or securing the spill source. This could be as simple as up-righting a tipped container or shutting down a piece of equipment producing the spill.
3. Contact the Responsible Person on site to enact the emergency response contact procedure.

a. Responsible Person shall consult the MSDS for proper spill procedures and determination of Reportable Quantity for a spill. In the event the spilled quantity exceeds the reportable quantity the Responsible Person shall contact:
i. Call 911 for fire control if necessary.
ii. Town of Erie: 303-926-2870
4. Prevent migration of the spill by using an absorbent. This could include absorbent pads or booms, floor dry, cat litter, or dirt. The absorbent should be spread across the spill and long the downhill side to stop any flow.
5. If necessary to prevent the material from entering a storm inlet or manhole a dam of absorbent material should be placed in the gutter upstream from the inlet.
6. Begin cleanup of the spilled material and absorbents by placing the materials in 5 gallon, plastic buckets with lids or into a provided drum.
7. Continue cleanup until all spilled material and contaminated absorbents are removed. On a hard surface this should include sweeping the area. Material spilled on dirt should be removed down to a level where discoloration of the soil has been removed. Water shall never be used to flush material off a surface.
8. All material shall be properly stored in a location designated by the Responsible Person on site.
9. The Responsible Person shall contact the Site Contracted Emergency Response and Disposal Co to collect and properly dispose of the material.
10. Location of the spill will be documented on the Stormwater Maintenance Plan (SWMP) in the construction trailer.
11. Inspection of materials and equipment shall occur daily.

G. Record Management

All documentation from the incident including incident report and incident disposal manifests, shall be maintained at 1873 South Bellaire St, Suite 1106, Denver, CO 80222 (Ph: 303-757-0469), for a period of 3 years from the date of the spill.

H. After Incident Briefing

All personnel involved in the incident shall attend a debriefing to determine the cause of the spill, procedures followed, and corrective actions to prevent future spills. All pertinent data will be recorded. All findings from the debriefing should be discussed at the next Safety Meeting. Town of Erie shall be notified.

Standard Operating Procedure (SOP)

Small Fuel or Oil Spill (5 Gallons to Less than 25 Gallons)

A. Purpose

The purpose of this Standard Operating Procedure is to establish a uniform procedure for cleanup and disposal of material from a small accidental spill of fuel (gasoline or diesel) or oil (hydraulic or motor). The procedures outlined in this SOP are applicable to all personnel working on the Outlook Nine Mile construction site. Cleanup and proper disposal of spilled fuel or oil into the soil or onto the ground surface is required to ensure the material or contaminated soil do not enter or impact the waters of the State of the sanitary sewer system.

B. Summary of the Method

This procedure outlines the steps to be taken to prevent spilled fuel or oil from impacting waters of the State and disposal of the resulting contaminated cleanup material.

C. Definitions

1. Material Safety Data Sheet (MSDS). The standard industry list for a product detailing the chemical make-up, safety hazards, first aid, firefighting, and spill cleanup measures, handling, storage, and disposal methods.

D. Health and Safety Warnings

Fuels and fuel oils may be extremely flammable, cause skin irritation, and may be harmful or fatal if swallowed. Caution should be used during cleanup operations. The MSDS for the spilled material should be consulted to ensure personnel safety during cleanup operations.

E. Equipment and Supplies

1. Absorbent pads and booms
2. Hand equipment (shovel, brooms)
3. Waste containers (5 gallons buckets, drums)
4. Personal Protective Equipment

F. Procedural Steps

1. Shut down all equipment operating in the area to prevent ignition of the spill.
2. Contact the Responsible Person on site to enact the emergency response contact procedure.
    a. The Responsible Person begins contacting Emergency Response Agencies.
        i. For gasoline or diesel spill call 911 for fire control.

b. Responsible Person shall consult the MSDS for proper spill procedures and determination of Reportable Quantity for a spill. In the event the spilled quantity exceeds the reportable quantity the Responsible Person shall contact:
    i. Call 911 for fire control if necessary.
    ii. Colorado Environmental Release and Incident Reporting Hotline: (1-877) 518-5608.
    iii. Town of Erie: 303-926-2870

3. Attempt to control the spill by stopping or securing the spill source. This could be as simple as up-righting a tipped container or shutting down a piece of equipment producing the spill.
4. Prevent migration of the spill by using an absorbent. This could include absorbent pads or booms, floor dry, cat litter, or dirt. The absorbent should be spread across the spill and along the downhill side to stop any flow.
5. If necessary to prevent the material from entering a storm inlet or manhole a dam of absorbent material should be placed in the gutter upstream form the inlet.
6. Begin cleanup of the spilled material and absorbents by placing the materials in 5 gallon, plastic buckets with lids or into a provided drum.
7. Continue cleanup until all spilled material and contaminated absorbents are removed. On a hard surface, this should include sweeping of the area. Material spilled on dirt should be removed down to a level where discoloration of the soul has been removed. Water shall never be used to flush material off a surface.
8. All material shall be properly stored in a location designated by the Responsible Person on site.
9. The Responsible Person shall contact the Site Contracted Emergency Response and Disposal Co. to collect and properly dispose of the material.
10. Location of the spill will be documented on the Stormwater Maintenance Plan (SWMP) in the construction trailer.
11. Inspection of materials and equipment shall occur daily.

G. Record Management

All documentation from the incident, including incident report and incident disposal manifest, shall be maintained at 1873 South Bellaire St, Suite 1106, Denver, CO 80222 (Ph: 303-757-0469), for a period of 3 years from the date of the spill.

H. After Incident Briefing

All personnel involved in the incident shall attend a debriefing to determine the cause of the spill, procedures followed, and corrective actions to prevent future spills. All pertinent data will be recorded. The CDPHE shall be notified of a major

spill by a written follow up within five days of the incident. All finding form the debriefing should be discussed at the next Safety Meeting. Town of Erie shall be notified. Town of Erie will require on copy of any documents that are sent to the State.

Standard Operating Procedure (SOP)

Small Fuel or Oil Spill (5 Gallons to Less than 25 Gallons)

A. Purpose

The purpose of this Standard Operating Procedure is to establish a uniform procedure for cleanup and disposal of material from a small accidental spill of fuel (gasoline or diesel) or oil (hydraulic or motor). The procedures outlined in this SOP are applicable to all personnel working on the Outlook Nine Mile construction site. Cleanup and proper disposal of spilled fuel or oil into the soil or onto the ground surface is required to ensure the material or contaminated soil do not enter or impact the waters of the State of the sanitary sewer system.

B. Summary of the Method

This procedure outlines the steps to be taken to prevent spilled fuel or oil from impacting waters of the State and disposal of the resulting contaminated cleanup material.

C. Definitions

1. Material Safety Data Sheet (MSDS). The standard industry list for a product detailing the chemical make-up, safety hazards, first aid, firefighting, and spill cleanup measures, handling, storage, and disposal methods.

D. Health and Safety Warnings

Fuels and fuel oils may be extremely flammable, cause skin irritation, and may be harmful or fatal if swallowed. Caution should be used during cleanup operations. The MSDS for the spilled material should be consulted to ensure personnel safety during cleanup operations.

E. Equipment and Supplies

1. Absorbent pads and booms
2. Hand equipment (shovel, brooms)
3. Waste containers (5 gallons buckets, drums)
4. Personal Protective Equipment

F. Procedural Steps

1. Shut down all equipment operating in the area to prevent ignition of the spill.
2. Ensure the safety of personnel in the area. If necessary, evacuate the area and wait for Emergency Response Personnel.
3. Contact the Chain of Command on site to enact the emergency response contact procedure.
    a. The Responsible Person begins contacting Emergency Response Agencies.

i. Call 911 for fire control.
ii. Colorado Environmental Release and Incident Reporting Hotline: (1-877) 518-5608
iii. Town of Erie: 303-926-2870

b. Responsible Person shall consult the MSDS for spill procedure.

4. If it can be safely accomplished, attempt to prevent migration of the spill by using an absorbent. This could include absorbent pads or booms, floor dry, cat litter, or dirt. The absorbent should be spread along the downhill side to stop any flow.
5. If it can be safely accomplished, attempt to prevent the material from entering a storm inlet or manhole by constructing a damn of absorbent material in the gutter upstream from the inlet.
6. Emergency Response Personnel should handle stabilization of the spill and initial cleanup.
7. Final cleanup and disposal of contaminated material should be handled by the Site Contracted Emergency Response and Disposal Co.
8. Location of the spill will be documented on the Stormwater Maintenance Plan (SMWP0 in the construction trailer.
9. Inspection of materials and equipment shall occur daily.

G. Record Management

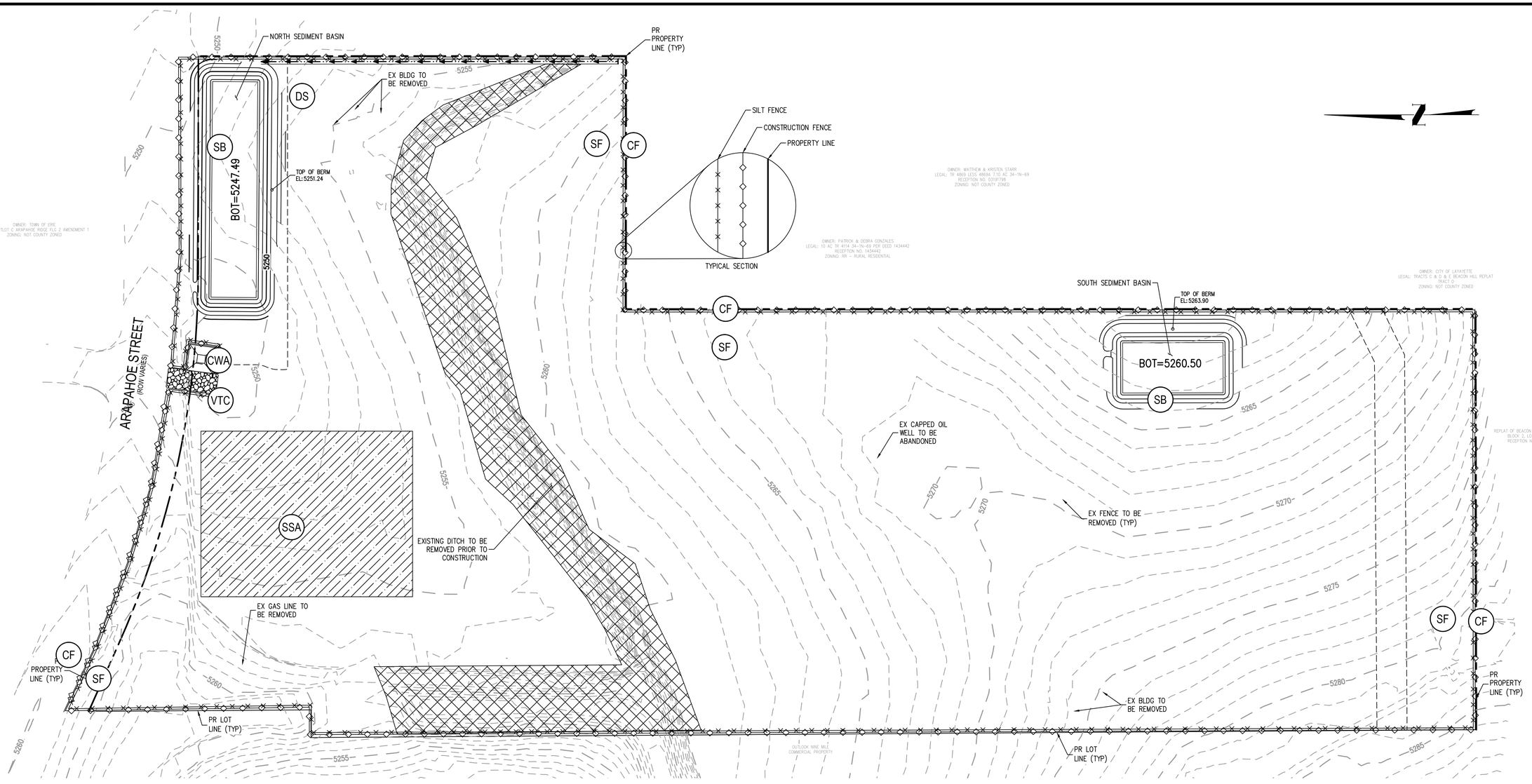
All documentation from the incident, including incident report and incident disposal manifests, shall be maintained at 1873 South Bellaire St, Suite 1106, Denver, CO 80222 (Ph: 303-757-0469), for a period of 3 years from the date of the spill.

H. After Incident Briefing

All personnel involved in the incident shall attend a debriefing to determine the cause of the spill, procedures followed, and corrective actions to prevent future spills. All pertinent data will be recorded. The CDPHE shall be notified of a major spill by a written follow up within five days of the incident. All findings from the debriefing should be discussed at the next Safety Meeting. Town of Erie shall be notified. Town of Erie will require one copy of any documents that are sent to the State.

APPENDIX D – Construction Activities Stormwater Management Plan

NO CHANGES ARE TO BE MADE TO THIS DRAWING WITHOUT WRITTEN PERMISSION OF HARRIS KOCHER SMITH



SF SILT FENCE

CF CONSTRUCTION FENCE

VTC VEHICLE TRACKING CONTROL

CWA CONCRETE WASHOUT AREA

DS DRAINAGE SWALE

SB SEDIMENT BASIN

SSA STABILIZED STAGING AREA

811 Know what's below. Call before you dig.

CALL 3 BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES.

50 0 50 100

SCALE: 1" = 50'

DESIGNED BY: RJH
CHECKED BY: MSM
DRAWN BY: RJH

HARRIS KOCHER SMITH
1120 Lincoln Street, Suite 1000
Denver, Colorado 80203
P: 303.623.6300 F: 303.623.6311
HarrisKocherSmith.com

EVERGREEN DEVCO, INC.

OUTLOOK AT NINE MILE
EROSION CONTROL PLAN INITIAL

ISSUE DATE: 04/27/2017 PROJECT #: 160602

DATE	REVISION COMMENTS

PRELIMINARY NOT FOR CONSTRUCTION

SHEET NO. 10

10 OF 70

FILEPATH: P:\160602\ENGINEERING\EROSION\CD - EROSION CONTROL PLAN INITIAL.DWG LAYOUT: EROSION CONTROL PLAN INITIAL
5 XREFs e-base_pyot, e-legal_byot(U), e-util_byot, p-base(U), p-legal
PLOTTED: THU 04/27/17 4:27:01P BY: RILEY HILLEN

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NORTH SEDIMENT BASIN

PR PROPERTY LINE (TYP)

EX BLDG TO BE REMOVED

SILT FENCE
CONSTRUCTION FENCE
PROPERTY LINE

TYPICAL SECTION

OWNER: MATTHEW & KRISTEN STARR
LEGAL: TR 4869 LESS 4869A 7.70 AC 34-1N-69
RECEPTION NO. 03597795
ZONING: NOT COUNTY ZONED

OWNER: PATRICK & DEBRA GONZALES
LEGAL: 10 AC TR 4114 34-1N-69 PER DEED 1434442
RECEPTION NO. 1434442
ZONING: RR – RURAL RESIDENTIAL

OWNER: CITY OF LAFAYETTE
LEGAL: OUTLOT A BEACON HILL SUBDIVISION FIRST FINAL REPLAT
TRACT A, B, C
ZONING: NOT COUNTY ZONED

SOUTH SEDIMENT BASIN

ARAPAHOE STREET
(ROW VARIES)

EX CAPPED OIL WELL TO BE ABANDONED

EX FENCE TO BE REMOVED (TYP)

EXISTING DITCH TO BE REMOVED PRIOR TO CONSTRUCTION

EX GAS LINE TO BE REMOVED

PR OPERTY E (TYP)

PR LOT LINE (TYP)

EX BLDG TO BE REMOVED

PR PROPERTY LINE (TYP)

PR LOT LINE (TYP)

OUTLOOK NINE MILE
COMMERCIAL PROPERTY

SF SILT FENCE
CF CONSTRUCTION FENCE
VTC VEHICLE TRACKING CONTROL
CWA CONCRETE WASHOUT AREA
DS DRAINAGE SWALE
SB SEDIMENT BASIN
SSA STABILIZED STAGING AREA
IPAN INLET PROTECTION
5173 5170 EXISTING CONTOURS
5173 5170 PROPOSED CONTOURS

811 Know what's below. Call before you dig.
CALL 3 BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES.

50 0 50 100
SCALE: 1" = 50'

DESIGNED BY: DESIGNER
CHECKED BY: REVIEWER
DRAWN BY: DRAFTER

HARRIS KOCHER SMITH
1120 Lincoln Street, Suite 1000
Denver, Colorado 80203
P: 303.623.6300 F: 303.623.6311
HarrisKocherSmith.com

EVERGREEN DEVCO, INC.

OUTLOOK AT NINE MILE
EROSION CONTROL PLAN INTERIM

ISSUE DATE: 04/27/2017 | PROJECT #: 160602

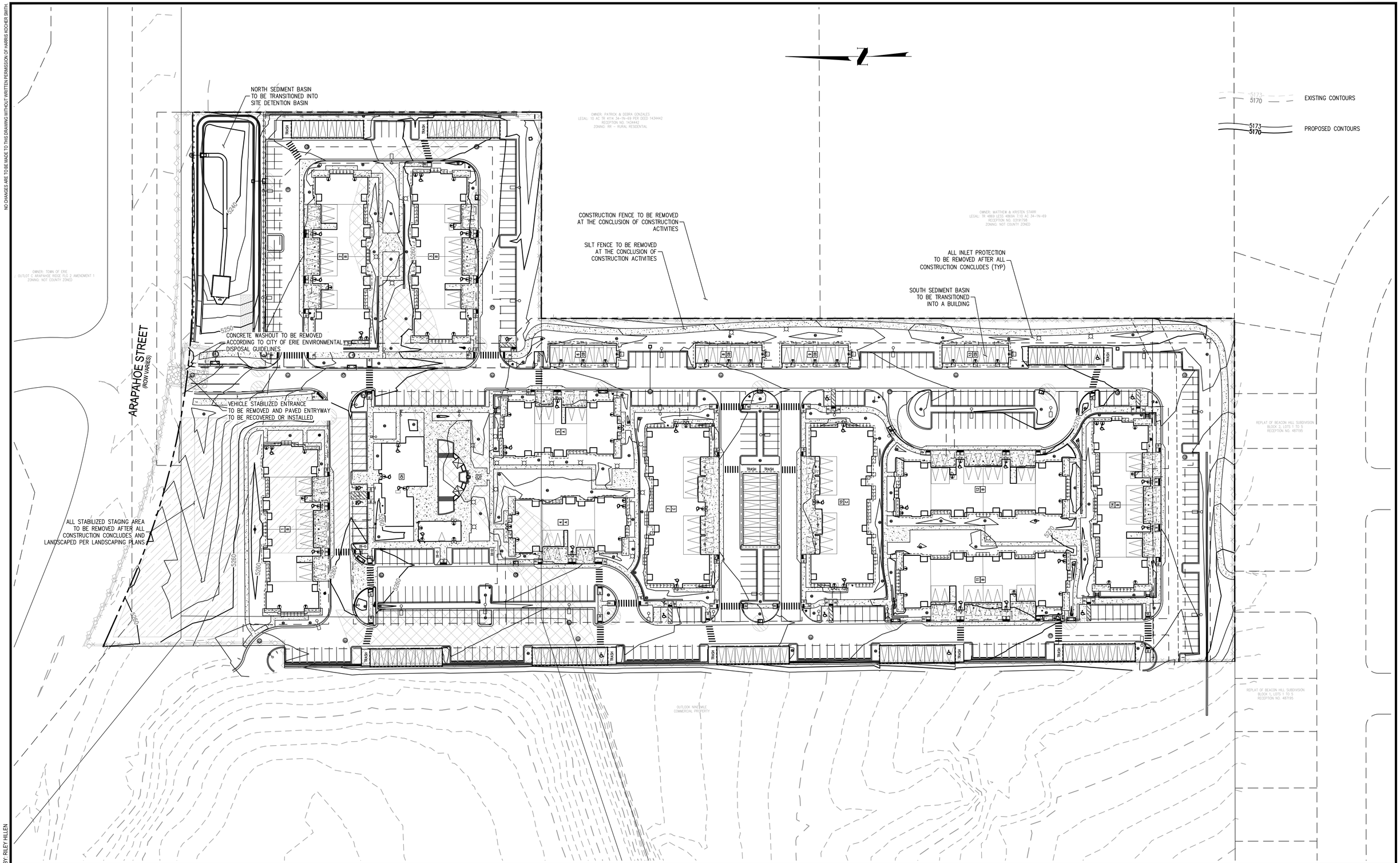
DATE	REVISION COMMENTS

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SHEET NO. 11
11 OF 70

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3 XREFS: p-base, p-hgpl, p-util[U]
PLOTTED: THU 04/27/17 4:30:12P BY: RILEY HILLEN

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FILEPATH: P:\160602\ENGINEERING\EROSION\CD - EROSION CONTROL PLAN FINAL.DWG LAYOUT: EROSION CONTROL PLAN FINAL
3 XREFs: p-base, p-legal, p-util(U)
PLOTTED: THU 04/27/17 4:34:16P BY: RILEY HILLEN

Know what's below. Call before you dig.

CALL 3 BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES.

50 0 50 100
SCALE: 1" = 50'

DESIGNED BY: RJH
CHECKED BY: MSM
DRAWN BY: RJH

HARRIS KOCHER SMITH
1120 Lincoln Street, Suite 1000
Denver, Colorado 80203
P: 303.623.6300 F: 303.623.6311
HarrisKocherSmith.com

EVERGREEN DEVCO, INC.

OUTLOOK AT NINE MILE
EROSION CONTROL PLAN FINAL

ISSUE DATE: 04/27/2017	PROJECT #: 160602
DATE	REVISION COMMENTS

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SHEET NO. 12

OUTLOOK NINE MILE

KEPHART
community ▪ planning ▪ architecture

TAMKO RUSTIC BROWN

BENJAMIN MOORE 1523 EMBASSY GREEN

BENJAMIN MOORE 1532 MAJESTIC SAGE

BENJAMIN MOORE HC-81 MANCHESTER TAN

BENJAMIN MOORE 1616 STORMY SKY

WOODTONE RUSTIC SERIES MOUNTAIN CEDAR

SUNSET STONE TELLURIDE DRY STACK LEDGE

ATRIUM VINYL WINDOWS ALMOND

METAL RAILING DARK BRONZE