



# TOWN OF ERIE

## OLD TOWN ERIE INFRASTRUCTURE IMPROVEMENTS RECOMMENDATIONS

APRIL 14, 2020



**Old Town Erie Infrastructure Improvements  
Project No. P19-053**

**April 14, 2020**



*Prepared for:*

**Town of Erie  
645 Holbrook Street  
Erie, Colorado 80516**

**Wendi Palmer, P.E.  
Project Manager**

*Prepared by:*

**RockSol Consulting Group, Inc.**

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(Concept 1: Best)

## Executive Summary

The Town of Erie, in response to recent and anticipated residential and commercial growth, has studied infrastructure improvements for Old Town Erie to accommodate this influx of residents and businesses.

The infrastructure items analyzed for this report are:

- Xcel Energy - gas main
- Water lines
- Storm drainage improvements
- Permeable pavement system
- Roadway pavement improvements
- Residential alley surface improvements
- Curb, gutter, and sidewalks
- Landscaping
- Extended curbs
- Parking

The existing conditions and proposed improvements to the Old Town infrastructure system are described in detail in the report, and this executive summary provides a quick reference for the Town Board of Trustees and staff to easily identify costs associated with specific improvements, whether immediate work is recommended or can be deferred, and a comparison of the costs of different options.

The cost estimates below include the following items, as appropriate for the improvement:

- Materials, labor, and equipment for key work elements
- Percentage allowances for known items such as removals, erosion control, earthwork and grading, mobilization, construction survey, traffic control, and permanent signing and striping
- Percentage allowances for design engineering and construction management
- Contingency amount for unforeseen conditions and complexity of the work

<b>Estimated cost of infrastructure needs in next five years</b>	
<b>2.0 Utilities</b>	
Gas Main Extension to Cheesman St.	\$ 461,300
<b>3.0 Permeable Paver System</b>	
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Provide underground detention to offset additional drainage impacts of future development and eliminating need for on-site detention provided by private properties	
Estimated Cost for 4 Downtown Zone Alleys	\$ 2,496,000
<b>4.0 Roadway Pavement Improvements</b>	
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Briggs Street - South of Downtown (3 Intersections)	\$ 909,000
Briggs Street - North of Downtown (1 Intersections)	\$ 303,000
<b>Estimated cost of infrastructure needs in next five years:</b>	<b>\$ 9,794,300</b>

Estimate of all infrastructure costs	Estimated Cost	Time Frame
<b>2.0 Utilities</b>		
<b>2.1 Xcel Energy</b>		
Gas Main Extension to Cheesman St.	\$ 461,300	Short-term
<b>2.2 Broadband</b>	TBD	
<b>2.3 Water Lines</b>		
Service Line/Fire Line Installation (pg. 9)		
Install 1-1/2-Inch Service Line	\$ 10,000/each	
Install Fire Line	\$ 15,000/each	
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Underground Pipe Detention along Wells Street and Cheesman Street (pg. 20)	\$ 2,401,000	Long-term
Pond at High Street and Moffat Street (pg. 21)	\$ 780,000	Long-term
Outfall System to Coal Creek from Evans Street (pg. 21)	\$ 3,868,000	Long-term
Lagoon Pond (pg. 22)	\$ 2,300,000	Long-term
	\$ 9,349,000	
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Provide underground detention to offset additional drainage impacts of future development and eliminating need for on-site detention provided by private properties		
Estimated Cost per Alley	\$ 624,000/alley	
Estimated Cost for 4 Downtown Zone Alleys	\$ 2,496,000	Short-term
Estimated Cost for 10 N-MU Zone Alleys	\$ 6,240,000	Long-term
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Provide underground detention to offset additional drainage impacts of future development and eliminating need for on-site detention provided by private properties		
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Estimated Cost for 4 Downtown Zone Alleys	\$ 2,920,000	Not recommended
Estimated Cost for 10 N-MU Zone Alleys	\$ 7,300,000	Not recommended
Table 3.2 Standard Concrete Alley		
No Detention provided in alley, adjacent developing properties provide on-site detention		
Estimated Cost per Alley - Alternative to Underground Detention Options	\$ 262,000/alley	
Estimated Cost for 4 Downtown Zone Alleys	\$ 1,048,000	Not recommended
Estimated Cost for 10 N-MU Zone Alleys	\$ 2,620,000	
<b>4.0 Roadway Pavement Improvements</b>		
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Table 4.4 Cost Estimate for Old Town Cape Seal and ADA Ramp Upgrades	<u>\$ 896,000</u>	
Estimated Pavement System Cost Summary (2020 Dollars)	\$ 4,329,000	Short-term
<b>Conceptual 5 Year Implementation Plan</b> (in 2020 Dollars)		
Year 1 - Crack Seal/Cape Seal All Recommended Streets	\$ 896,000	
Year 2 - Overlay Approx. 25% of Old Town Streets Each Year	\$ 858,000	
Year 3 - Overlay Approx. 25% of Old Town Streets Each Year	\$ 858,000	
Year 4 - Overlay Approx. 25% of Old Town Streets Each Year	\$ 858,000	
Year 5 - Overlay Approx. 25% of Old Town Streets Each Year	<u>\$ 859,000</u>	
	\$ 4,329,000	
<b>5.0 Residential Alley Surface Improvements</b>		
<b>5.1 Cost Estimate for Residential Asphalt Alley (Block)</b>	\$ 78,000/block	
Estimated Asphalt Cost for 22 Old Town Residential Alleys	\$ 1,716,000	Long-term
<b>5.2 Cost Estimate for Residential Concrete Alley (Block)</b>	\$ 159,000/block	

Estimated Concrete Cost for 22 Old Town Residential Alleys	\$ 3,498,000	Long-term
<b>6.0 Curb, Gutter and Sidewalks</b>		
Table 6.1 - Cost Estimate for Pedestrian Ramp Replacement (Included in 4.0 Roadway Pavement Improvements)	\$ 11,000/corner	
<b>7.0 Landscaping</b>		
<b>7.1 Streetscape</b>		
Table 7.1A - Downtown Streetscape Zone Options (per block frontage - one side of street)		
"Good" Concept \$150/Linear ft. (\$11.76/sq. ft.)	\$ 53,000	
"Better" Concept \$360/Linear ft. (\$27.84/sq. ft.)	\$ 125,000	Short-term
"Best" Concept \$930/Linear ft. (\$72.62/sq. ft.)	\$ 327,000	
Table 7.1B - Neighborhood Mixed Use Streetscape Zone Options		
"Good" Concept \$110/Linear ft. (\$8.42/sq. ft.)	\$ 38,000	
"Better" Concept \$210/Linear ft. (\$16.24/sq. ft.)	\$ 73,000	
"Best" Concept \$335/Linear ft. (\$26.04/sq. ft.)	\$ 117,000	
<b>7.2 Extended Curbs</b>		
Table 7.2A Curb Extension Costs by Area		
Cheesman Street - Downtown (2 Intersections)	\$ 606,000	
Briggs St. - South of Downtown (3 Intersections)	\$ 909,000	Short-term
Briggs St. - North of Downtown (1 Intersections)	\$ 303,000	Short-term
Erie Middle School Connection (5 Intersections)	\$ <u>1,277,000</u>	
Total	\$ 3,095,000	
Table 7.2B Cost Estimate for Curb Extension Requiring Storm Sewer Modifications	\$ 303,000/ intersection	
Table 7.2C Cost Estimate for Curb Extension without Storm Sewer Modifications	\$ 184,000/ intersection	
<b>7.5 Trees</b>		
Figure 7.5B - Tree Planting Options for Streetscapes		
Type 1 - Topsoil/Planter	\$ 2,130	
Type 2 - CU Structural Soil	\$ 7,961	
Type 3 - Silva Cells	\$ 9,145	
<b>8.0 Parking</b>		
Parking Structure (approx. 100 Spaces at \$20,000 per space)	\$1.8 to \$2 Million	Long-term
Table 8-1 Cost Estimate for Parking Lot Alternative A (75' Lot, 28 Spaces)	\$ 161,000	Long-term
Table 8-2 Cost Estimate for Parking Lot Alternative B (125' Lot, 42 Spaces)	\$ 281,000	Long-term

# OVERVIEW



## 1.0 PROJECT OVERVIEW

Erie is situated in the heart of Colorado's major economic and population centers and in close proximity to first-rate research and academic institutions. The town offers 1,300 acres of parks and open space and is within easy access of several ski resorts and many recreational opportunities. In addition, there is convenient access to Denver International Airport and three general aviation airports. Erie is a desirable place to live and raise a family, and according to the U.S. Census, the population has grown from approximately 6,300 in 2000 to over 25,000 in 2018.

Old Town Erie is the heart of town, and the increase in growth and development in this sector has increased demand on the existing infrastructure. The Town of Erie is proactively researching potential infrastructure improvements to ensure that Old Town Erie continues to be a desired destination for services and entertainment. The Town's economic development strategy is to create an environment to foster growth and attract new businesses within the Town of Erie, and providing up-to-date and workable infrastructure solutions is key to attracting and supporting businesses, residents, and visitors.

This document makes a comprehensive review of potential improvements for the infrastructure challenges in Old Town Erie to serve currently proposed and anticipated future development. The infrastructure items analyzed for this report are:

- Utilities
  - Xcel Energy
  - Broadband
  - Water Lines
  - Storm Drainage Improvements
- Permeable Pavement System - Downtown Alleys
- Roadway Pavement Improvements
- Residential Alley Surface Improvements
- Curb, Gutter, and Sidewalks
- Landscaping
  - Streetscapes
  - Extended Curbs
  - Alley Pedestrian Improvements
  - Bike Facilities
  - Trees
- Parking

This report is basically a "shopping list" of infrastructure maintenance and improvements to be implemented on a stand-alone basis or bundled with adjacent or similar elements for construction in the short- and long-term. A funding chapter is also included, providing the Town of Erie with some grant opportunities and other avenues for pursuing the means to help finance their infrastructure improvements.

The study area is generally bounded by Evans Street on the north, County Line Road to the west, Perry Street on the south, and Coal Creek on the east, as shown on the aerial map on the next page.



Figure 1.1: Project Limits

# UTILITIES



## **2.0 UTILITIES**

- 2.1 Xcel Energy**
- 2.2 Broadband**
- 2.3 Water System**
- 2.4 Storm Drainage Improvements**

### **2.1 XCEL ENERGY**

The estimated cost to install a gas main extension to Cheesman Street is \$461,300 (see Appendices).

Xcel Energy costs are being coordinated by the Town of Erie.

### **2.2 BROADBAND**

Broadband costs are being coordinated by the Town of Erie.

### **2.3 WATER SYSTEM**

#### **Existing Water System**

This section addresses the existing system's capacity in terms of service lines, meter sizes, and fire flow capability. Figure 2-1 shows the water main sizes, locations and meter sizes in Old Town Erie.

#### Project Area

Old Town is generally bounded by Evans Road to the North, Coal Creek to the East, a Railroad Right-Of-Way to the South, and County Line Road to the West. The land use is mostly residential, with commercial parcels in the Downtown area and a few open space areas. The Town of Erie is currently working to revitalize the Old Town area through its "Historic Old Town Erie Renewal Plan". Once the Plan is implemented, the land uses will be different from historic land uses in some areas, impacting the water usage and water infrastructure requirements.

#### Existing System Layout

The system primarily consists of 6-inch and 8-inch diameter water mains, with several 12-inch and 18-inch transmission mains. The area is generally well gridded, with few service lines longer than the width of the street fronting the property. The area is within Pressure Zone 2 and is fed by gravity from the 2.2-MG clearwells at the Lynn R. Morgan Water Treatment Plant.

### ERIE OLD TOWN POTABLE WATER MAIN AND SERVICE SIZES

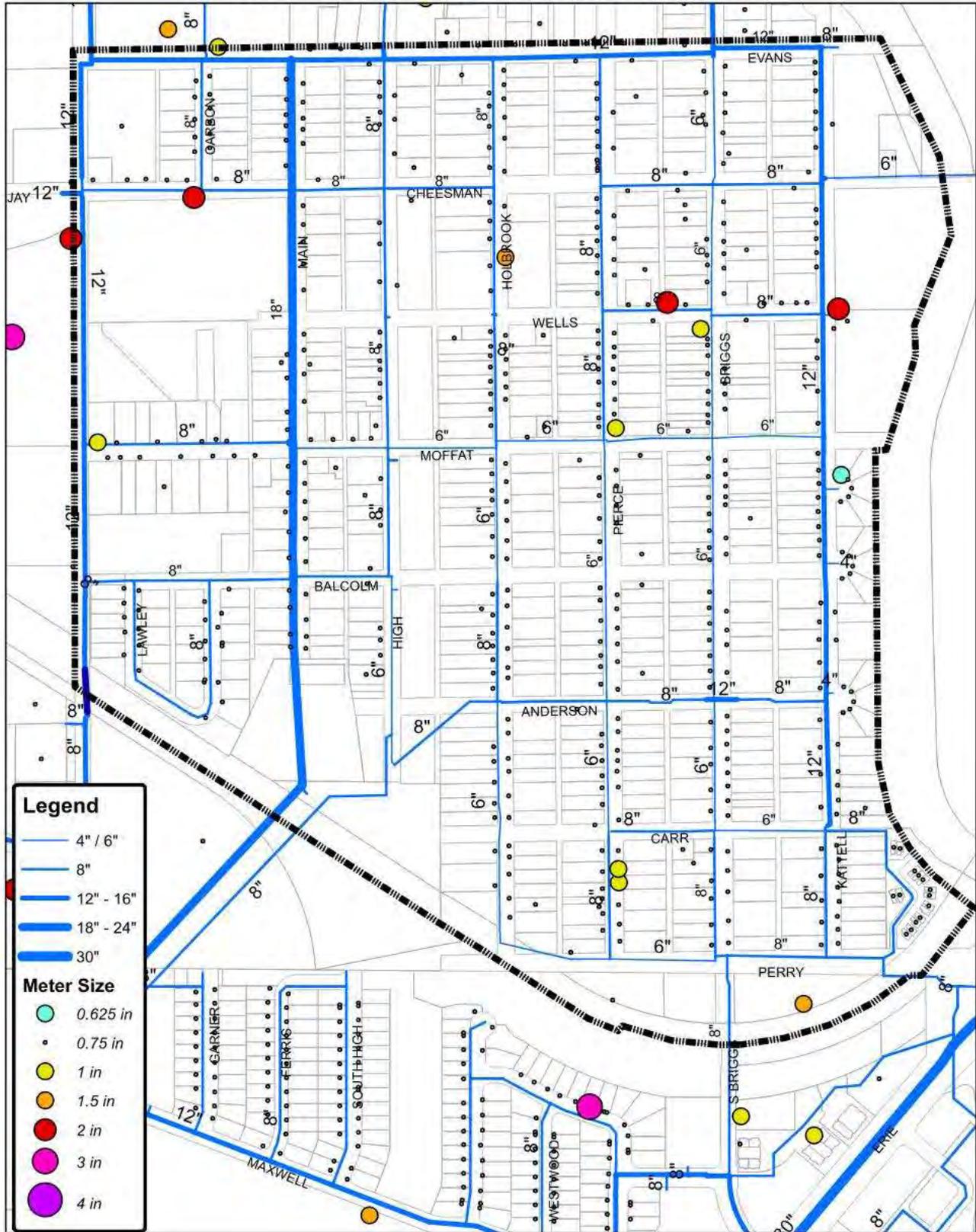


Figure 2.3A: Erie Old Town Potable Water Main and Service Sizes

## Service and Meter Capacity

The existing service lines (laterals) and meters create constraints on the level of development that can occur without infrastructure replacement. Both the laterals and meters have maximum flow limits that will correspond to the maximum allowable demand for development occurring on each property without meter and/or lateral replacement.

### Meter Capacity

As illustrated on Figure 2.3A, most of the services have 3/4-inch meters, with several 1- to 2-inch meters scattered throughout the area, as well as one 5/8-inch meter. There are 15 domestic meters of unknown sizes.

Table 2.3A shows the meter sizes in Old Town Erie along with the high normal flow rate and maximum flow rate for each size. For new development, meters should be sized for the high normal flow rate intermittently and to never exceed the maximum flow rate. As shown, most properties in Old Town have 3/4-inch meters and, therefore, are limited by their meters to a high normal flow of 15 gpm.

Meter Size (in)	Approx. Quantity in Old Town Erie	High Normal Flow Rate (gpm)	Maximum Flow Rate (gpm)
5/8	1	10	20
3/4	512	15	30
1	6	25	50
1.5	2	50	100
2	4	80	160

**Table 2.3A:** Meter Sizes vs Flow Rates for Old Town Erie.

Note: 15 psi head loss occurs at maximum flow.

### Service Line Capacity

Along with the meter capacity, the service line capacity should also be considered when planning new developments. It is assumed that in Old Town, the service line diameters match the meter sizes (with the exception of the 5/8-inch meter) and that the laterals are Type K copper. If there are any galvanized steel laterals, it is recommended that they be replaced with Type K copper lines upon new development. AWWA recommends not exceeding 14 gpm in 3/4-inch Type K copper pipe, to prevent velocity in the pipe from exceeding ten feet/second and causing issues such as water hammer and cavitation. The high normal flow rate limit for 3/4-inch services is thus recommended to be 14 gpm.

### Head Loss and Pressure Limitations

Head loss through the lateral and meter was also considered. Head loss was calculated for the 3/4-inch laterals and meters to ensure adequate pressure would be maintained under high normal flow conditions. Because Old Town has generally well-gridded water mains, the length of the service lines will probably not exceed about 60 feet for most properties. According to AWWA manuals, head loss in a 60-foot long 3/4-inch copper service line at 14 gpm is 18.3 psi, and head loss through a 3/4-inch meter at 14 gpm is about 2.2 psi. Throughout Old Town, the pressure in the water main under maximum day demand conditions ranges from about 58 to 70 psi. Therefore, most customers (those with 3/4-inch

services) will experience pressures ranging from 37.5 to 49.5 psi at their tap under high normal flow conditions. Typical service line design criteria recommend a maximum velocity of ten fps at peak demand and pressure drop of less than 25 psi. Based on the above analyses, the service pressure was found to be acceptable for most customer needs.

### **Fire Flow Capacity**

A fire flow analysis was performed as part of the 2019 update to the Water Master Plan. A flow rate of 3,500 gpm was chosen to allow for a wide range of future development and construction materials based on Insurance Services Office and Uniform Fire Code regulations. It was found that under a fire flow of 3,500 gpm, all locations in Old Town maintained a residual pressure of at least 20 psi.

### **Conclusion**

Future development within the Old Town area must consider the water infrastructure limitations. By analyzing meter and service limitations, it is recommended to limit high normal flows to 14 gpm to prevent high velocities in the service lines. This is expected to be adequate for most residential development, but will need to be analyzed for commercial development, which will need individual meter and service sizing calculations. Existing fire flow capacity also appears to be adequate for the expected land uses but should be re-analyzed if any fire flow requirements exceed a total of 3,500 gpm.

## **2.3.2 FUTURE WATER SYSTEM**

### **Summary**

An analysis was completed to determine what improvements to the water system in Old Town might be needed to serve planned future developments in the area. Much of the water system infrastructure in Old Town Erie is adequate for the planned level of new development. Per the Town's GIS, the infrastructure is predominantly less than 30 years old and PVC pipe, therefore should not require replacement. The Town also confirmed that all the service lines were replaced at this time. However, the Town's GIS shows cast iron mains (CIP) on: Main Street between Moffat and Balcolm streets; Moffat Street from Kattell Street west to the alley between Briggs and Pierce streets; two short mains in cul-de-sacs east of Kattell Street; and a short connection in the intersection of Anderson and Pierce streets. In addition, there has been some corrosion on service lines at the tap and added anodes in Kattell Street. The Town has confirmed that this information appears to be correct, except that the existing 18-inch in Main Street is ductile iron pipe (DIP), not CIP.

Because of this, there are few improvements needed. It is recommended that potholing be completed to verify if there are CIP mains and, if so, replacing them prior to completing street improvements. Services and meters should be upgraded on an individual basis as new developments are planned. For currently planned developments, service lines should be installed or replaced as soon as the size is confirmed by the developer's engineer. Fire flow demands were also considered for the future developments. As noted above, the Town's hydraulic model shows the water mains throughout the Old Town area can provide approximately 3,500 gpm fire flow, exceeding typical development requirements. Improvements are therefore not required for fire flow purposes.

## **General Expected Development**

The zoning map for the Old Town Area includes the following general land uses: Old Town Residential, Downtown District, Neighborhood Mixed use, and Public Lands & Institutions. Each of these zones is expected to have a different impact on water demands and may require different water system improvements prior to development. A general analysis of the impacts of each land use type is presented below:

### Old Town Residential (OTR)

Existing infrastructure is expected to be adequate for the existing single-family homes that this land use comprises. The existing  $\frac{3}{4}$ -inch services and meters should be sufficient for any improvements to the single-family residences and the water mains have more than enough capacity to meet domestic demands. Service and meter sizes should be re-evaluated if any multi-family developments are proposed.

### Downtown District (DT)

The commercial and mixed-use developments that make up the Downtown District should be considered on an individual basis for service line and meter sizing. Existing services and meters may need to be replaced to meet the new development demand. Fire lines may also be required. The water mains have enough capacity to meet typical commercial and mixed-use demand.

### Neighborhood Mixed Use (NMU)

The commercial, multifamily, and mixed-use developments in this zone should be considered on an individual basis for service and meter sizing. Some of the existing services and meters may need to be replaced to meet the new development demand. Fire lines may be required for commercial and mixed-use developments. For single-family properties in this zone the existing  $\frac{3}{4}$ -inch services and meters should have sufficient capacity for any residential improvements. The water mains have enough capacity to meet typical commercial, multifamily, and mixed-use demand.

### Public Lands & Institutions (PLI)

The developments in this zone are assumed to be primarily open space park-type areas, with the exceptions of Erie Middle School and Erie Town Hall. These institutions are expected to have adequate capacity in their existing infrastructure to serve future water needs of the properties.

## **Known Planned Developments**

Several developments in the Old Town area have already submitted site plans, enabling a review to determine the required service and meter sizing for these sites. Based on current developer submittals, and experience with developments of similar size and use, water services may be undersized. Final design and approval of these developments should pay close attention to water service sizes. In all cases, final service line sizing should be determined by the developer's engineer based on the proposed fixture counts using either the International Plumbing Code (IPC) or AWWA Manual of Water Supply Practices M22. In addition, proposed commercial and multi-use developments will likely require the addition of fire lines.

## **Recommended System Improvements**

Generally, the existing system is expected to be able to serve the Old Town Erie redevelopment. Individual water services and meters will need to be upsized for developments according to their projected demands. Also, if potholing verifies CIP mains, these should be replaced.

## **Cost Estimates**

New or replacement service lines, fire lines and water mains for proposed developments would typically be paid for by the developers. It is recommended to install services lines and fire lines prior to completing street improvements. Preliminary cost estimates are presented below.

### **Assumptions:**

- Costs are in 2020 dollars.
- Installation or replacement to extend from the main to the property line.
- Surface restoration (paving) costs are not included; final paving to be completed as part of overall improvements.
- Trenching assumed to be in typical soil conditions (no rock excavation).
- Removal of original pipe not required.
- Assumed to be straight run of pipe with no offsets or special construction required.

The cost for an assumed 1-1/2-inch service line is approximately \$10,000. The cost for installation of a fire line is approximately \$15,000.

## 2.4 STORM DRAINAGE IMPROVEMENTS

### 2.4.1 Existing Storm Drainage System

The existing storm drainage system within the Erie Old Town area has been investigated to determine the existing capacities and loads on the system. The existing storm drainage system generally drains north and northeast and is tributary to Coal Creek. For this evaluation, an as-built survey of the existing storm drainage system was obtained from the Town of Erie. The survey was completed by Ehrhart Griffin & Associates in December of 2000. The as-built survey includes data on inlet and manhole locations with invert elevations, pipe lengths, and pipe sizes. Several drainage systems were constructed after the as-built survey was completed. The Town provided construction plans for these improvements, including:

- As-Built Record Drawings of Calvary Bible Church Askel Subdivision Lot 1A, TJB Consulting Group, 2013
- Erie Senior Housing, Ehrhart Griffin & Associates, 2000
- As-Builts of Coal Creek Flood Control Project, WRC Engineering Inc., 1993
- As-Builts of Town of Erie Storm Sewer & Waterline Replacement, Peak Civil Consultants, 2009

The as-built data and construction plans were utilized to calculate the capacity of each pipe segment in the system using the Bentley FlowMaster V8i software. For the analysis, the storm drainage system has been divided into five main laterals, including:

- County Line Road Lateral
- High Street Lateral
- Pierce Street Lateral and 54-inch Outfall to Coal Creek
- WCR 1.5 Outfall to Coal Creek
- 36-Inch Outfall to Coal Creek.

The tributary drainage basins to these five main laterals are shown on Figures 2.4A and 2.4B. The drainage basins were subdivided to determine the two-year, five-year, and 100-year storm event flows at the key drainage points shown on the figures. The flows were based on the hydrology analysis from the *Town of Erie Outfall Systems Plan (West of Coal Creek)*, dated January 2014. The flows for Basins 483, 484, 485, and 486 for the Old Town area were converted to an average cfs/acre for the two-year, five-year, and 100-year storm events. The average cfs/acre values were then multiplied by the subbasin areas to determine the approximate flows at each key drainage point. The detailed analysis of each storm pipe capacity and the flows at each key drainage point are provided in the Appendices of this report. The findings of the investigation are summarized below and are also shown on Figures 2.4A and 2.4B, including key drainage points, peak flows, and pipe capacities for the Old Town existing storm drainage system.

#### County Line Road Lateral

The County Line Road Lateral is shaded yellow on the figures and drains generally north. This lateral also receives runoff from area west of County Line Road, outside the Old Town area, and is denoted as Basin 483 in the *Town of Erie Outfall Systems Plan (West of Coal Creek)*, dated January 2014. The upstream portion of the County Line Road Lateral (south of Evans Street and upstream of Key Drainage Point A3) has capacity for less than the two-year storm event. At the downstream end, at Key Drainage Point A5 shown on Figure 2.4A,

the lateral is a 30-inch RCP and the system has between a two-year and five-year capacity. No curb and gutter exists along County Line Road so the street capacity in County Line Road is inadequate, and it is possible that the 100-year runoff would not reach the north end of the lateral at Evans Street due to spilling onto adjacent properties along County Line Road.

#### High Street Lateral

The High Street Lateral is shaded pink on the figures and drains north to Evans Street. The upstream portion of the High Street Lateral (upstream of Key Drainage Point B4) has capacity for approximately the five-year storm event. There is a low point located at key drainage point B4 shown on Figure 2.4B, where water in storm events greater than the 5-year would pond. At the downstream end of the High Street Lateral at Key Drainage Point B6, the lateral is a 30-inch RCP, and the system has between a two-year and a five-year capacity. At the intersection of Evans Street and High Street (Key Drainage Point B7), the 36-inch RCP lateral has capacity for greater than the five-year storm event for runoff from the County Line Road Lateral and High Street Lateral combined.

#### Pierce Street Lateral and 54-Inch Outfall to Coal Creek

The Pierce Street Lateral and 54-Inch Outfall to Coal Creek system consists of the largest drainage basin area in Erie Old Town and is shaded blue on the figures. This lateral generally drains north, beginning at Perry Street and outfalls to Coal Creek north of Evans Street. Generally, the upstream portion of the system along Pierce Street (south of Evans Street) has capacity for the two-year storm event or less. Downstream of Evans Street and Pierce Street (Point C14), the 54-Inch Outfall to Coal Creek has slightly greater than a two-year capacity for runoff from the County Line Road Lateral, High Street Lateral, and Pierce Street Lateral and 54-Inch Outfall combined.

#### WCR 1.5 Outfall to Coal Creek

WCR 1.5 Outfall to Coal Creek is shaded purple on Figure 2.4A and drains north under the Lower Boulder Ditch (just north of Key Drainage Point D1), then to Coal Creek. This lateral is an 18-inch RCP at the Lower Boulder Ditch crossing, then connects to the Lower Boulder Ditch overflow structure and 72-inch RCP outfall pipe to Coal Creek and has about a five-year capacity.

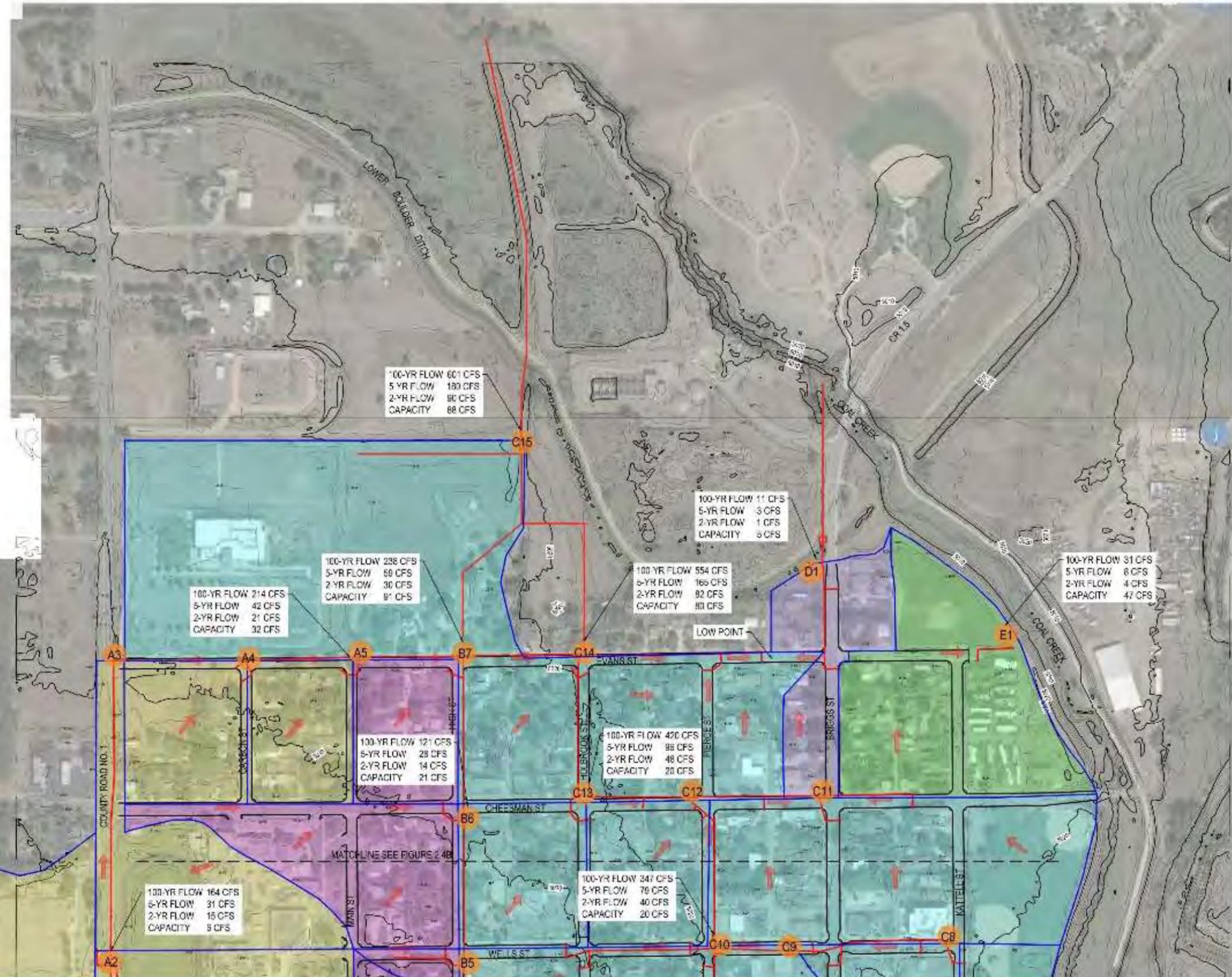
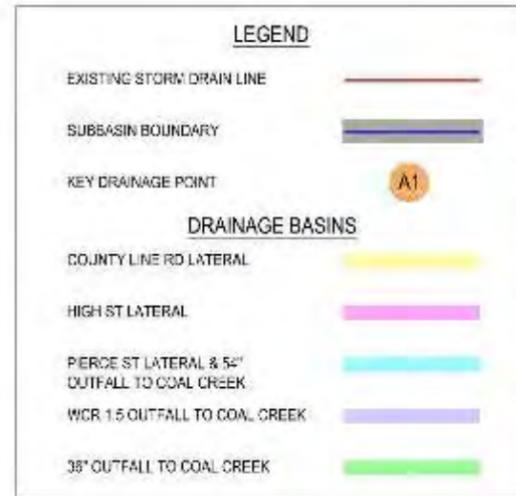
#### 36-Inch Outfall to Coal Creek

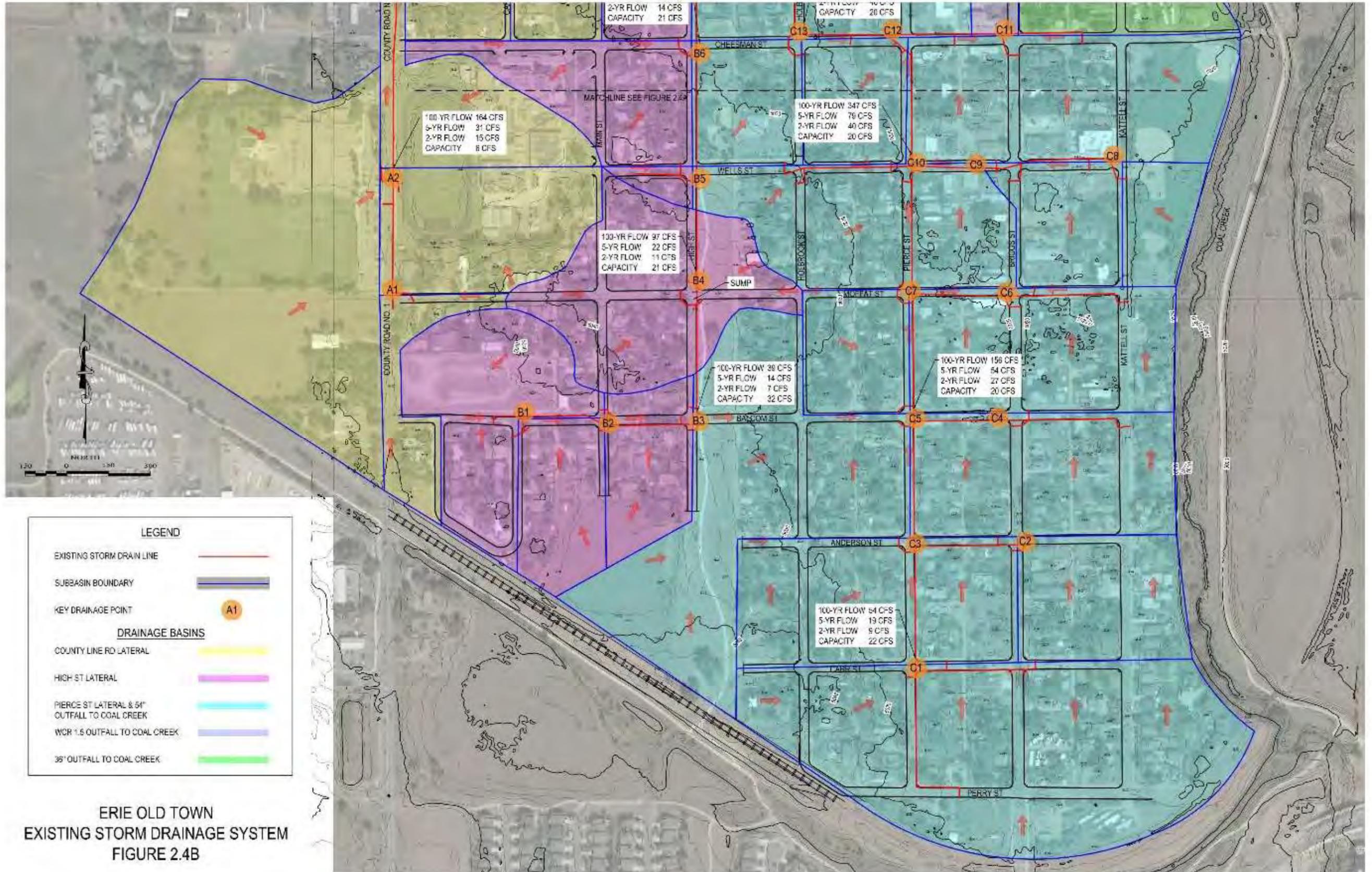
The 36-inch Outfall to Coal Creek is shaded green on Figure 2.4A and drains east through the existing levee to Coal Creek (Key Drainage Point E1). A flapgate is installed at the outfall to prevent Coal Creek flow from backing up into Evans Street during large storm events. This outfall has capacity for greater than the 100-year storm event but will not drain when water levels are high in Coal Creek. When this happens, water will pond in Evans Street and then drain after the water in Coal Creek has receded.

#### Local Street Stormwater Capacity

In addition to the storm drainage system, streets are also used for conveyance of storm water. In general, it appears that the streets within the Old Town area will only be able to convey storm water up to the curb depth since the adjacent properties appear to be graded relatively flat or lower than the street grades. In addition, the street longitudinal slopes are also relatively flat and range from about 0.4% to 2.0%. Assuming the local streets can flow about six inches deep, the available street capacity would range from about 8 cfs to 30 cfs. Note that there may be some streets with less than six inches available to contain the street flow, such as at driveways or where there are no curbs, such as along County Line Road.

ERIE OLD TOWN  
EXISTING STORM DRAINAGE SYSTEM  
FIGURE 2.4A





## 2.4.2 Proposed Storm Drainage System

The proposed conceptual design for the Erie Old Town storm drainage system consists of various methods of stormwater detention and conveyance. The objectives of the proposed conceptual design include mitigating additional runoff due to development and ensuring that runoff from the Old Town area makes its way to Coal Creek without creating excess ponding and flooding within the town. The existing system generally has capacity for small storm events, but in large storm events there is the potential for excessive volumes of surface runoff that can accumulate at the low point in Evans Street between Pierce and Briggs Streets, at a sump at High and Moffat Street, and at a sump at the east end of Evans Street. The proposed conceptual design is presented on Figures 2.4C and 2.4D.

### On-Site Detention for Large Lot Development Areas

The conceptual design proposes to provide on-site stormwater detention for large lot development areas as required per the Town standards that will include detention storage for water quality, excess urban runoff volume (EURV), and the 100-year storm event. See Figures 2.4C and 2.4D for the location of large lots identified for on-site detention. By providing on-site detention, runoff from these development areas will be released at historic flow rates to maintain existing flow conditions through the Old Town area.

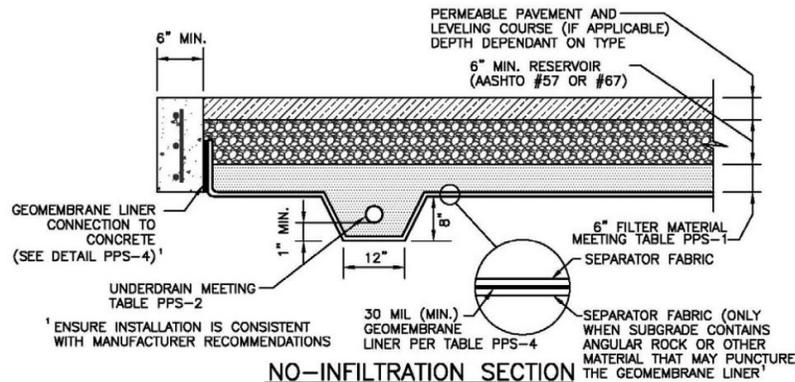
### Underground Detention for Neighborhood Mixed Use and Downtown Areas

The single lots within the Neighborhood Mixed Use and Downtown Areas are small, and it is difficult to construct efficient stormwater detention ponds on each lot. Therefore, the conceptual design proposes to provide underground detention within the alleys or streets that will serve each block. We conceptually assumed the required detention storage volumes for the Neighborhood Mixed-Use and Downtown development areas to be the excess 100-year developed condition runoff compared to the existing condition 100-year runoff. The percent impervious for the Neighborhood Mixed-Use development areas are assumed to be 75% and the Downtown area is assumed to be 85%, compared to percent impervious values between 27.4% and 35.2% for existing conditions. MHFD-Detention was used to determine the runoff volume for each condition.

Along both sides of Briggs Street, comparing the developed conditions runoff volume to existing conditions resulted in approximately 4,400 cubic feet for the Neighborhood Mixed-Use and 5,800 cubic feet for the Downtown development corridors per half block, where one side of the alley consists of new development and the other side consists of existing development. To obtain the storage volume, about 2.5-to-3 feet deep by 10' wide infiltration media reservoirs below permeable pavement systems are proposed within the alleys along each block. For a typical cross section, see the Permeable Pavement Systems detail (Detail T-10 on next page) from Mile High Flood District Volume 3, dated April 2018. The depth of infiltration media required is based on an assumed void ratio of 40% and not infiltration into the subgrade. For the Downtown area, the same is recommended, but where both sides of the alley are proposed to be developed, such as east of Briggs Street from Cheesman to Moffat streets, there would be twice the excess runoff and the infiltration media reservoirs would need to be six feet deep, which is likely not constructible within the alleys, due to the limited space and existing sanitary sewer lines. Therefore, it is proposed to construct a similar depth for the infiltration media reservoirs in the Downtown area,

which will have some excess runoff in larger storm events compared to existing conditions.

## **T-10** Permeable Pavement Systems



In addition to infiltration media reservoirs, underground pipe storage was considered as an alternative. It was determined that 48-inch RCP, or equivalent, would be needed to provide the required storage volumes. Since existing sanitary sewer pipes and service lines are located along the alleys, underground pipe storage may have construction conflicts and would limit access for maintenance of the sewer lines. Therefore, using infiltration media reservoirs for underground storage within the alleys is preferred.

Along Cheesman and Wells Streets, we performed a similar analysis for the proposed Neighborhood Mixed-Use development areas. Since the detention storage would be installed below the streets and permeable pavers are not desired for these streets, we assumed only underground pipe storage would be considered. It was determined that 42-inch or 48-inch RCP, or equivalent, would be needed to provide the required conceptual storage volumes of approximately 7,100 CF to 11,600 CF.

### Detention for Sump at High Street and Moffat Street

To alleviate excess ponding during large storm events at the sump identified for the existing storm drainage system at Key Drainage Point B4 (intersection of High and Moffat Streets, a detention pond is proposed for the conceptual design. The existing storm sewer along High Street only has capacity for about the 5-year storm event, so it was assumed that during large storm events water would pond and flood this intersection at a depth that would exceed criteria. The area that is expected to drain to this location and to the detention pond is shaded in orange on Figures 2.4C and 2.4D. The proposed pond is located within the Town of Erie open space along High Street and can provide approximately 4 acre-feet of storage. The pond is shown on both the north and south sides of Moffat Street since it appears that small sump areas exist in these open space areas and it may be more efficient to provide storage in both areas. At the intersection, the sidewalks may need to be lowered to allow water to spill into the detention pond areas at a reduced ponding depth. The proposed pond would discharge to the existing storm sewer system along High Street at about the 5-year existing flow rate during the 100-year storm event. The benefit of this pond location is that it would eliminate excess ponding at this intersection and adjacent properties that is expected during storm events greater than the 5-year.

### Sump at East End of Evans Street

As identified for the existing storm drainage system at Key Drainage Point E1, this 36-inch storm sewer outfall with a flapgate has capacity for greater than the 100-year storm event but will not drain when water levels are high in Coal Creek due to the flapgate. When this happens, water will pond at the sump in Evans Street then drain after the water in Coal Creek has receded. Based on observations during the September 2013 flood event, water ponding at this sump was not excessive. Therefore, no improvements are proposed at this location.

### Proposed Outfall System to Coal Creek at Evans Street Low Point

The existing 54-inch RCP Outfall to Coal Creek has capacity for about 88 cfs, which can carry only a two-year storm event or less. The conceptual design proposes a 100-year storm sewer outfall to carry the additional 100-year flow to Coal Creek. All of the proposed conceptual design improvements were accounted for to reduce the 100-year design flow as follows:

- Proposed on-site detention ponds will reduce developed condition runoff to existing rates; therefore, there will be no increase in the developed condition runoff.
- Proposed underground detention will reduce developed condition runoff to existing rates except for the Downtown area; therefore, there will be a slight increase in the developed condition runoff.
- Proposed detention pond at High and Moffat Streets is proposed to reduce the 100-year discharge to the five-year flow.
- The assumption is that the tributary area located west of County Line Road will drain to the north instead of being routed to the low point in Evans Street.
- The existing 54-inch RCP outfall is flowing full at 88cfs.
- Resulting 100-year design flow is calculated to be approximately 300 cfs of surface runoff that is routed to the low point in Evans Street at the alley between Briggs Street and Pierce Street.

The low point is relatively wide between Briggs Street and Pierce Street, and a significant amount of ponding and flooding is expected to occur in this area during large storm events. Type R inlets are proposed at the low point on Evans Street on both sides of the street, which include four 55-foot long inlets, or equivalent, with a total interception capacity of approximately 200 cfs. Four additional 35-foot long Type R inlets are proposed at the intersection of Pierce Street and Evans Street, with a total interception capacity of approximately 100 cfs. Although it is not shown in Figure 2.4C, it is recommended that the Town install inlets along the alley between Cheesman Street and Evans Street, since it appears that a significant amount of surface runoff will drain to the low point of each east/west street, such as Cheesman and Wells Streets, and flow down the alleys. For this conceptual design, upsizing for the existing storm sewer system was not included, except at the low point in Evans Street, since to date the Town has only received a few complaints related to drainage issues, indicating that local flooding is not a concern.

The intercepted runoff would be directed to a Town-owned right-of-way area located north of the Pierce Street and Evans Street intersection. The right-of-way area is proposed to be graded as a channel to convey flow off the street to a proposed storm sewer. This area may provide some detention storage, but no detention has been accounted for as part of this proposed conceptual design. The 300 cfs is directed to the north end of the right-of-way area to a proposed 10' x 4' RCB. The proposed box

has a slope of 0.4% and would convey 300 cfs to a proposed water quality and detention pond. This pond is located at the site of the abandoned lagoons adjacent to the decommissioned wastewater treatment facility. An outlet structure would control the discharge from the proposed pond to Coal Creek to the historic flowrate of about 140 cfs, which is based on a discharge rate of 1 cfs per tributary acre. The proposed outfall pipe is a 66-inch RCP with an invert elevation at Coal Creek at approximately elevation 4998 feet. An emergency overflow spillway would be provided to direct overflows to Coal Creek in case of plugging or larger storm events.

### Water Quality Treatment

The conceptual design proposed to provide water quality treatment as follows:

- Included with the on-site detention ponds to serve large lot development
- Included with the permeable pavement infiltration media reservoirs to serve the Neighborhood Mixed Use and Downtown Areas along Briggs Street
- Included in the lagoon site detention pond to serve both existing and proposed development as described below
- For the WCR 1.5 Outfall and 36-Inch Outfall, it is recommended that the Town install prefabricated trash removal devices in the existing inlets or manholes to collect and remove sediment and debris from stormwater prior to being discharged to Coal Creek.

To intercept runoff from the existing 54-Inch RCP Outfall, the bottom of the existing lagoons will need to be lowered and graded to drain to the north, similar to the proposed design per the 2018 Conceptual Water Quality Facility design by ICON Engineering, Inc. (see Coal Creek Channel Restoration Exhibit 1 in Appendices). With this regrading, the lagoons would have a volume of approximately 26 acre-feet available for water quality and detention storage for the 100-year storm event. A junction box is proposed at the upstream end of the pond to route at least the initial storm event runoff from the 54-Inch RCP Outfall and proposed 10-foot by 4-foot CBC to the pond for water quality treatment. The existing 54-Inch RCP Outfall could be used to bypass a portion of the larger storm event runoff to minimize the storage volume required and the size of inlet and outlet pipes for the pond. A detailed analysis to size the required pond volume was not completed, but it appears that the regraded lagoons can provide the required volume for both water quality and 100-year detention storage even if the entirety of the flow were to be directed into the pond. To provide the required storage volume, the pond embankment height to the emergency spillway elevation would be slightly less than the maximum allowed of ten feet to avoid State jurisdictional dam requirements.

### Cost Estimate

The detailed cost estimates for the proposed conceptual design of the storm drainage system for Erie Old Town is presented in the tables at the end of this section. The costs are broken down into major categories including the Underground Detention, the High Street Pond, the Outfall System, and the Lagoon Pond. Since the on-site detention would be constructed by the developers, no costs were included for on-site detention. Costs for mobilization, removals, construction survey, erosion control, traffic control, earthwork, signing and striping, and a general contingency are included as percentages of the subtotal costs, as needed.

For the Underground Detention, two options (Permeable Pavement System and RCP) are provided for the detention located in alleys, which provides costs per alley assuming one block is approximately 400 feet in length. The underground detention costs in alleys are in addition to the permeable paver costs provided in Section 3.0 of

this report. For the underground detention that is proposed within streets (Cheesman and Wells), only a total cost for RCP is provided for both streets. It was assumed that street repaving would not be performed when underground detention in streets is installed. Therefore, costs to remove and repave asphalt were included to patch the trench sections.

The cost summaries below give the total conceptual design cost for the proposed storm drainage system for the two options – underground detention using permeable pavement systems within the alleys and underground detention using RCP within the alleys. The advantage of using permeable pavement systems within the alleys is to reduce potential construction and maintenance conflicts with the existing sanitary sewer pipes and service lines that run north south in the alleys compared to installing 48” RCP. The advantage of using the RCP is that it is easier to maintain than the permeable pavement systems.

**Conceptual Storm Drainage System Cost Summary**

**OPTION 1  
UNDERGROUND DETENTION PERMEABLE PAVEMENT SYSTEM IN ALLEYS ALONG  
BRIGGS STREET**

Underground Detention in Alleys –	\$2,782,000
Underground Detention in Streets –	\$2,401,000
Pond at High St. and Moffat St.	\$780,000
Outfall System to Coal Cr from Evans St.	\$3,868,000
Lagoon Pond	\$2,330,000
<b>TOTAL COST</b>	<b>\$12,161,000</b>

**OPTION 2  
UNDERGROUND DETENTION RCP IN ALLEYS ALONG BRIGGS STREET**

Underground Detention in Alleys –	\$5,291,000
Underground Detention in Streets –	\$2,401,000
Pond at High St. and Moffat St.	\$780,000
Outfall System to Coal Cr from Evans St.	\$3,868,000
Lagoon Pond	\$2,330,000
<b>TOTAL COST</b>	<b>\$14,670,000</b>

**Table 2.4.2A**

OPTION 1	Item Number	Item Description	Unit	Estimated Quantity	Unit Cost	Estimated Cost
Underground Detention Permeable Pavement System in Alleys along Briggs St (Add-on Cost to Per Alley Cost for Pervious Pavers)	1	EXCAVATION	CY	450	\$ 40	\$ 18,000
	2	AGGREGATE INFILTRATION BED	CY	450	\$ 60	\$ 27,000
	3	IMPERMEABLE GEOMEMBRANE LINER	SF	4000	\$ 3	\$ 12,000
	4	PERIMETER BARRIER (CONCRETE WALL)	CY	63	\$ 767	\$ 48,000
	5	OUTLET STRUCTURE	EA	1	\$ 10,000	\$ 10,000
<b>ITEM SUBTOTAL</b>						<b>\$ 115,000</b>
		MOBILIZATION	LS	10%	\$ 12,000	\$ 12,000
		REMOVALS	LS	5%	\$ 6,000	\$ 6,000
		CONSTRUCTION SURVEY	LS	2%	\$ 2,000	\$ 2,000
		EROSION CONTROL	LS	3%	\$ 3,000	\$ 3,000
<b>CONSTRUCTION SUBTOTAL</b>						<b>\$ 138,000</b>
		DESIGN ENGINEERING	LS	10%	\$ 14,000	\$ 14,000
		CONSTRUCTION MANAGEMENT	LS	10%	\$ 14,000	\$ 14,000
		CONTINGENCY	LS	35%	\$ 48,000	\$ 48,000
<b>ESTIMATED UNDERGROUND DETENTION PERMEABLE PAVEMENT SYSTEM</b>						<b>TOTAL \$ 214,000</b>

OPTION 2	Item Number	Item Description	Unit	Estimated Quantity	Unit Cost	Estimated Cost
Underground Detention RCP in Alleys along Briggs St (Add-on Cost to Per Alley Cost for Pervious Pavers)	1	48" RCP (OR EQUIVALENT)	LF	400	\$ 184	\$ 74,000
	2	GRATED INLET	EA	10	\$ 6,000	\$ 60,000
	3	OUTLET STRUCTURE	EA	1	\$ 10,000	\$ 10,000
	4	MANHOLE	EA	5	\$ 15,000	\$ 75,000
<b>ITEM SUBTOTAL</b>						<b>\$ 219,000</b>
		MOBILIZATION	LS	10%	\$ 22,000	\$ 22,000
		REMOVALS	LS	5%	\$ 11,000	\$ 11,000
		CONSTRUCTION SURVEY	LS	2%	\$ 4,000	\$ 4,000
		EROSION CONTROL	LS	3%	\$ 7,000	\$ 7,000
<b>CONSTRUCTION SUBTOTAL</b>						<b>\$ 263,000</b>
		DESIGN ENGINEERING	LS	10%	\$ 26,000	\$ 26,000
		CONSTRUCTION MANAGEMENT	LS	10%	\$ 26,000	\$ 26,000
		CONTINGENCY	LS	35%	\$ 92,000	\$ 92,000
<b>ESTIMATED UNDERGROUND DETENTION RCP</b>						<b>TOTAL \$ 407,000</b>

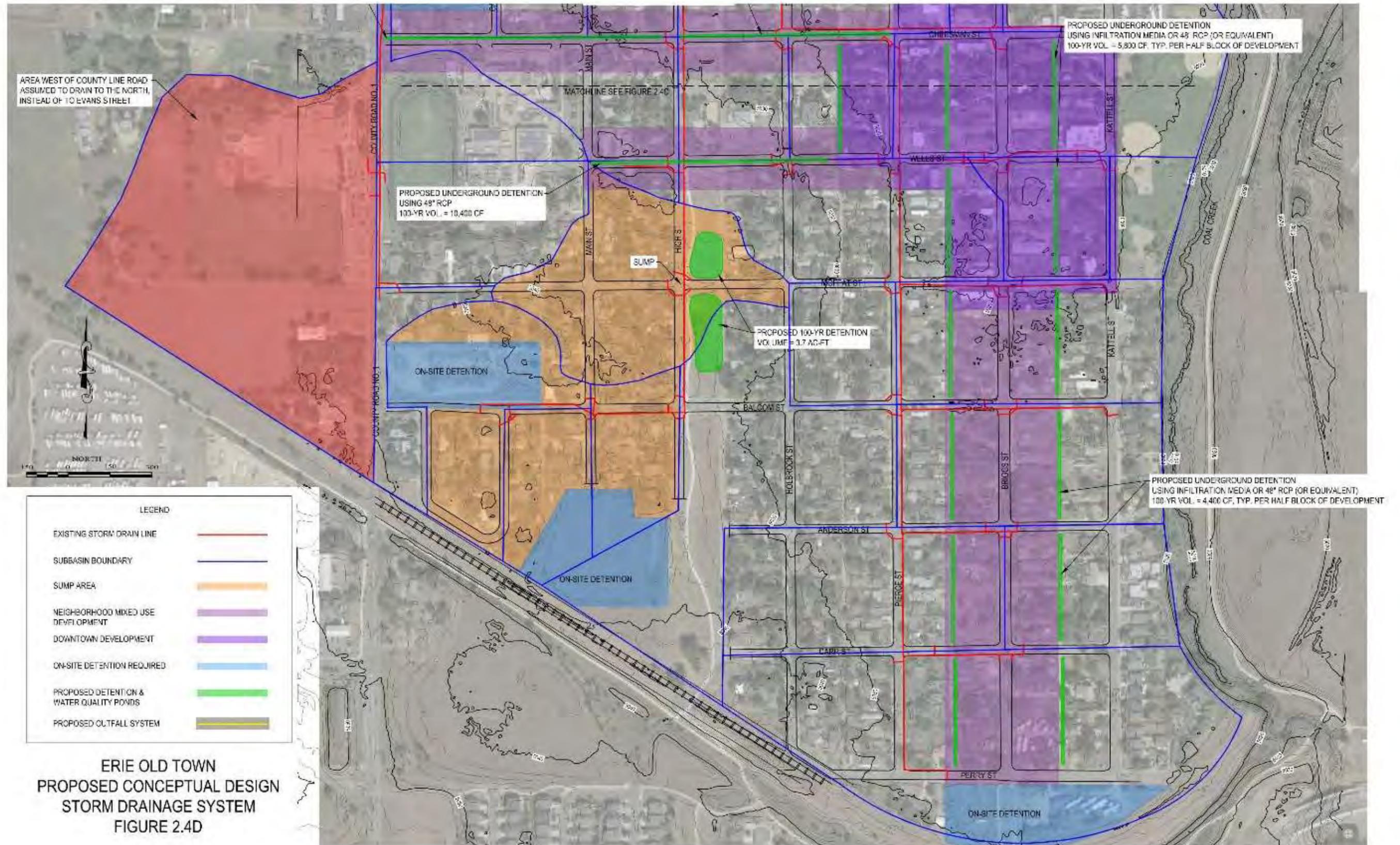
	Item Number	Item Description	Unit	Estimated Quantity	Unit Cost	Estimated Cost
Underground Detention RCP along Cheesman Street and Wells Street	1	HOT MIX ASPHALT PATCHING (REMOVE & REPLACE)	SY	2500	\$ 70	\$ 175,000
	2	42" RCP	LF	750	\$ 161	\$ 121,000
	3	48" RCP	LF	1850	\$ 184	\$ 340,000
	4	TYPE R INLET, 5-FOOT, 10-FOOT DEEP AVG	EA	40	\$ 5,878	\$ 235,000
	5	OUTLET STRUCTURE	EA	3	\$ 10,000	\$ 30,000
	6	MANHOLE	EA	20	\$ 15,000	\$ 300,000
<b>ITEM SUBTOTAL</b>						<b>\$ 1,201,000</b>
		MOBILIZATION	LS	10%	\$ 120,000	\$ 120,000
		REMOVALS	LS	5%	\$ 60,000	\$ 60,000
		CONSTRUCTION SURVEY	LS	2%	\$ 24,000	\$ 24,000
		EROSION CONTROL	LS	3%	\$ 36,000	\$ 36,000
		TRAFFIC CONTROL	LS	8%	\$ 96,000	\$ 96,000
		SIGNING & STRIPING	LS	1%	\$ 12,000	\$ 12,000
<b>CONSTRUCTION SUBTOTAL</b>						<b>\$ 1,549,000</b>
		DESIGN ENGINEERING	LS	10%	\$ 155,000	\$ 155,000
		CONSTRUCTION MANAGEMENT	LS	10%	\$ 155,000	\$ 155,000
		CONTINGENCY	LS	35%	\$ 542,000	\$ 542,000
<b>ESTIMATED UNDERGROUND DETENTION RCP FOR CHEESMAN ST AND WELLS ST</b>						<b>TOTAL \$ 2,401,000</b>

	Item Number	Item Description	Unit	Estimated Quantity	Unit Cost	Estimated Cost
Pond at High Street and Moffat Street	1	CLEARING AND GRUBBING	LS	1	\$ 12,000	\$ 12,000
	2	TOPSOIL	CY	1145	\$ 10	\$ 11,000
	3	EXCAVATION AND HAUL OFFSITE	CY	9000	\$ 40	\$ 360,000
	4	TYPE M RIPRAP FOR OVERFLOW PROTECTION	CY	100	\$ 77	\$ 8,000
	5	RECLAMATION AND SEEDING	AC	1.42	\$ 1,278	\$ 2,000
	6	OUTLET STRUCTURE	EA	2	\$ 25,000	\$ 50,000
<b>ITEM SUBTOTAL</b>						<b>\$ 420,000</b>
		MOBILIZATION	LS	10%	\$ 42,000	\$ 42,000
		REMOVALS	LS	5%	\$ 21,000	\$ 21,000
		CONSTRUCTION SURVEY	LS	2%	\$ 8,000	\$ 8,000
		EROSION CONTROL	LS	3%	\$ 13,000	\$ 13,000
<b>CONSTRUCTION SUBTOTAL</b>						<b>\$ 504,000</b>
		DESIGN ENGINEERING	LS	10%	\$ 50,000	\$ 50,000
		CONSTRUCTION MANAGEMENT	LS	10%	\$ 50,000	\$ 50,000
		CONTINGENCY	LS	35%	\$ 176,000	\$ 176,000
<b>ESTIMATED HIGH STREET POND</b>						<b>TOTAL \$ 780,000</b>

	Item Number	Item Description	Unit	Estimated Quantity	Unit Cost	Estimated Cost
Outfall System to Coal Creek from Evans Street Low Point	1	CLEARING AND GRUBBING FOR OPEN CHANNEL	LS	1	\$ 5,000	\$ 5,000
	2	TOPSOIL FOR OPEN CHANNEL	CY	200	\$ 10	\$ 2,000
	3	EXCAVATION & HAUL OFFSITE FOR OPEN CHANNEL	CY	1560	\$ 40	\$ 62,000
	4	TYPE R INLET, 5-FOOT, 10-FOOT DEEP AVG	EA	64	\$ 5,878	\$ 376,000
	5	24" RCP	LF	68	\$ 92	\$ 6,000
	6	30" RCP	LF	140	\$ 115	\$ 16,000
	7	36" RCP	LF	58	\$ 138	\$ 8,000
	8	48" RCP	LF	140	\$ 161	\$ 23,000
	9	66" RCP	LF	200	\$ 337	\$ 67,000
	10	HEADWALL/WINGWALL	EA	3	\$ 15,000	\$ 45,000
	11	TYPE M RIPRAP	CY	300	\$ 77	\$ 23,000
	12	10x4 RCB	LF	1140	\$ 1,000	\$ 1,140,000
	13	MANHOLE	EA	5	\$ 15,000	\$ 75,000
	14	JUNCTION BOX	EA	1	\$ 25,000	\$ 25,000
	15	SEEDING FOR OPEN CHANNEL	AC	0.22	\$ 1,278	\$ 1,000
<b>ITEM SUBTOTAL</b>						<b>\$ 1,874,000</b>
		MOBILIZATION	LS	10%	\$ 187,000	\$ 187,000
		REMOVALS	LS	5%	\$ 94,000	\$ 94,000
		CONSTRUCTION SURVEY	LS	2%	\$ 37,000	\$ 37,000
		EROSION CONTROL	LS	3%	\$ 56,000	\$ 56,000
		TRAFFIC CONTROL	LS	8%	\$ 150,000	\$ 150,000
		SIGNING & STRIPING	LS	1%	\$ 19,000	\$ 19,000
<b>CONSTRUCTION SUBTOTAL</b>						<b>\$ 2,417,000</b>
		DESIGN ENGINEERING	LS	15%	\$ 363,000	\$ 363,000
		CONSTRUCTION MANAGEMENT	LS	10%	\$ 242,000	\$ 242,000
		CONTINGENCY	LS	35%	\$ 846,000	\$ 846,000
<b>ESTIMATED OUTFALL SYSTEM</b>						<b>TOTAL \$ 3,868,000</b>

	Item Number	Item Description	Unit	Estimated Quantity	Unit Cost	Estimated Cost
Lagoon Pond	1	WATER CONTROL AND DEWATERING	LS	1	\$ 12,000	\$ 12,000
	2	CLEARING AND GRUBBING	LS	1	\$ 40,000	\$ 40,000
	3	6-INCH PVC	LF	188	\$ 40	\$ 8,000
	4	18-INCH RCP	LF	90	\$ 70	\$ 6,000
	5	24-INCH RCP	LF	135	\$ 100	\$ 14,000
	6	FOREBAY	LS	1	\$ 5,000	\$ 5,000
	7	MODIFY EXISTING MANHOLE (DIVERSION)	LS	1	\$ 8,000	\$ 8,000
	8	OUTLET STRUCTURE	LS	1	\$ 20,000	\$ 20,000
	9	EMERGENCY SPILLWAY	LS	1	\$ 30,000	\$ 30,000
	10	EXCAVATION AND HAUL OFFSITE	CY	12768	\$ 40	\$ 511,000
	11	LANDSCAPING AND AMENITIES	LS	1	\$ 459,233	\$ 459,000
	12	IMPORTED TOPSOIL	CY	4033	\$ 25	\$ 101,000
					<b>ITEM SUBTOTAL</b>	<b>\$ 1,214,000</b>
		MOBILIZATION	LS	10%	\$ 121,000	\$ 121,000
		REMOVALS	LS	5%	\$ 61,000	\$ 61,000
		CONSTRUCTION SURVEY	LS	2%	\$ 24,000	\$ 24,000
		EROSION CONTROL	LS	3%	\$ 36,000	\$ 36,000
					<b>CONSTRUCTION SUBTOTAL</b>	<b>\$ 1,456,000</b>
		DESIGN ENGINEERING	LS	15%	\$ 218,000	\$ 218,000
		CONSTRUCTION MANAGEMENT	LS	10%	\$ 146,000	\$ 146,000
		CONTINGENCY	LS	35%	\$ 510,000	\$ 510,000
<b>ESTIMATED OUTFALL SYSTEM</b>					<b>TOTAL</b>	<b>\$ 2,330,000</b>





# PERMEABLE PAVEMENT SYSTEMS - DOWNTOWN ALLEYS



### 3.0 PERMEABLE PAVEMENT SYSTEMS – DOWNTOWN ALLEYS

Permeable pavement systems are recognized as a best management practice for providing first-flush pollution control and stormwater management. The permeable pavement system being evaluated would utilize brick pavers separated by gaps filled with small aggregate over the detention and filtration system as discussed in Section 2.4.2 and shown below in Figure 3.1. The infiltration media reservoir would provide underground stormwater detention along the alleys located in the downtown and neighborhood mixed use area in Old Town. Further discussion and examples of the use of pavers to provide pedestrian enhancements is provided in Section 7.3 Pedestrian Improvements for Alleys.

#### T-10 Permeable Pavement Systems

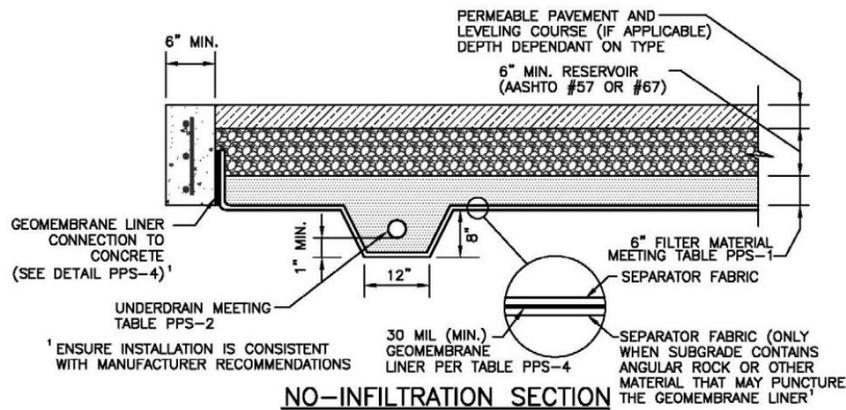


Figure 3.1: Permeable Pavement System

A cost estimate (Table 3.1) for paving the downtown alley in the 600 block between Pierce Street and Briggs Street (Figure 3.1) has been developed as representative of other downtown alleys. The combined cost for the permeable paver system (surface pavers plus underground detention) is estimated to be \$624,000 per block. Permeable pavement systems could be implemented as development progresses through the downtown area and along the neighborhood mixed-use zoning area along Briggs Street, Cheesman Street, and Wells Street.

Alley Permeable Pavement System With Underground Detention ( Sec. 2.4.2 Option 1)	Item Number	Item Description	Unit	Estimated Quantity	Unit Cost	Estimated Cost
	1	CONCRETE PAVEMENT (8 INCH)	SY	75	\$ 90	\$ 7,000
	2	PERMEABLE BRICK PAVERS	SF	8000	\$ 18	\$ 144,000
	3	CURB TYPE 2 (SECTION IIB)	LF	24	\$ 30	\$ 1,000
	4	CURB TYPE 2 (SECTION B)	LF	840	\$ 30	\$ 25,000
	5	UNDERGROUND DETENTION (OPTION 1 SEC 2.4.2)	LS	1	\$ 115,000	\$ 115,000
					<b>ITEM SUBTOTAL</b>	<b>\$ 292,000</b>
		ADJACENT GRADING/ TIE-INS/ ENCROACHMENTS	LS	10%	\$ 29,000	\$ 29,000
		MOBILIZATION	LS	10%	\$ 29,000	\$ 29,000
		REMOVALS	LS	5%	\$ 15,000	\$ 15,000
		CONSTRUCTION SURVEY	LS	2%	\$ 6,000	\$ 6,000
		EROSION CONTROL	LS	3%	\$ 9,000	\$ 9,000
		TRAFFIC CONTROL	LS	8%	\$ 23,000	\$ 23,000
					<b>CONSTRUCTION SUBTOTAL</b>	<b>\$ 403,000</b>
		DESIGN ENGINEERING	LS	10%	\$ 40,000	\$ 40,000
		CONSTRUCTION MANAGEMENT	LS	10%	\$ 40,000	\$ 40,000
		CONTINGENCY	LS	35%	\$ 141,000	\$ 141,000
		<b>ESTIMATED PERMEABLE PAVEMENT SYSTEM COST</b>			<b>TOTAL</b>	<b>\$ 624,000</b>

Table 3.1: Permeable Pavement Cost Estimate for the 600 Block Alley West of Briggs Street



Figure 3.2 600 Block Alley Between Pierce Street and Briggs Street

Additional construction is recommended to include concrete pavement on the parking spaces on the adjacent properties. Concrete pavement will improve the quality of stormwater and allow the water to drain to the permeable surface. Existing surface drainage conditions are shown in Figure 3.2. in the 500 block west of Briggs Street. Leaving the parking areas in the current condition will cause the system to be ineffective, becoming clogged with dirt and debris more often, resulting in the need for increased maintenance of the pervious pavement. Vegetated lawn and other areas can also be used to control amount and quality of drainage areas adjacent to newly installed pervious alley paving. Maintenance of pavers should include periodic sweeping and inspection. Periodic regenerative maintenance will be needed to remove clogged joint material and replace with washed aggregate to restore the infiltration rate.



**Figure 3.3:** Existing Conditions on 500 Block Demonstrate Issues with Adjacent Unpaved Areas

Existing and proposed utilities should be included as part of the evaluation process for implementing a permeable paver system. Underground systems should be in optimum condition and provide for future expansion, as modifications to the permeable paver system will be costly and potentially harmful to the operation of the paver system. Undergrounding of existing overhead facilities should also be prioritized when considering a permeable pavement.

### Alley Pavement and Detention Alternatives

A conventional concrete alley with a center drainage pan could be considered in the downtown and neighborhood mixed-use area without the benefit of detention. The estimated cost for a concrete alley is provided below in Table 3.2.

	Item Number	Item Description	Unit	Estimated Quantity	Unit Cost	Estimated Cost
Downtown Concrete Alley Estimate	1	UNCLASSIFIED EXCAVATION	CY	320	\$ 30.00	\$ 10,000
	2	AGGREGATE BASE COURSE	TON	200	\$ 50.00	\$ 10,000
	3	SUBGRADE RECONDITIONING	SY	950	\$ 5.00	\$ 5,000
	4	CONCRETE PAVEMENT (8 INCH)	SY	1025	\$ 95.00	\$ 97,000
	5	CURB TYPE 2 (SECTION IIB)	LF	24	\$ 30.00	\$ 1,000
<b>ITEM SUBTOTAL</b>						<b>\$ 123,000</b>
		ADJACENT GRADING/ TIE-INS/ ENCROACHMENTS	LS	10%	\$ 12,000	\$ 12,000
		MOBILIZATION	LS	10%	\$ 12,000	\$ 12,000
		REMOVALS	LS	5%	\$ 6,000	\$ 6,000
		CONSTRUCTION SURVEY	LS	2%	\$ 2,000	\$ 2,000
		EROSION CONTROL	LS	3%	\$ 4,000	\$ 4,000
		TRAFFIC CONTROL	LS	8%	\$ 10,000	\$ 10,000
<b>CONSTRUCTION SUBTOTAL</b>						<b>\$ 169,000</b>
		DESIGN ENGINEERING	LS	10%	\$ 17,000	\$ 17,000
		CONSTRUCTION MANAGEMENT	LS	10%	\$ 17,000	\$ 17,000
		CONTINGENCY	LS	35%	\$ 59,000	\$ 59,000
<b>ESTIMATED DOWNTOWN CONCRETE ALLEY PAVING COST PER BLOCK</b>						<b>TOTAL \$ 262,000</b>

**Table 3.2: Cost Estimate for Concrete Alley**

Underground storm water detention could possibly be incorporated with the installation of underground pipe storage as discussed in Section 2.4.2. Existing utilities in the alley, including a sanitary sewer with service lateral and private utilities, would require further study to determine feasibility. The estimated cost for a concrete alley with underground pipe detention is provided below in Table 3.3.

	Item Number	Item Description	Unit	Estimated Quantity	Unit Cost	Estimated Cost
Concrete Alley with Underground RCP Pipe Detention ( Sec. 2.4.2 Option 2)	1	UNCLASSIFIED EXCAVATION	CY	320	\$ 30	\$ 10,000
	2	AGGREGATE BASE COURSE	TON	200	\$ 50	\$ 10,000
	3	SUBGRADE RECONDITIONING	SY	950	\$ 5	\$ 5,000
	4	CONCRETE PAVEMENT (8 INCH)	SY	1025	\$ 95	\$ 97,000
	5	CURB TYPE 2 (SECTION IIB)	LF	24	\$ 30	\$ 1,000
	6	UNDERGROUND RCP PIPE DETENTION	LS	1	\$ 219,000	\$ 219,000
<b>ITEM SUBTOTAL</b>						<b>\$ 342,000</b>
		ADJACENT GRADING/ TIE-INS/ ENCROACHMENTS	LS	10%	\$ 34,000	\$ 34,000
		MOBILIZATION	LS	10%	\$ 34,000	\$ 34,000
		REMOVALS	LS	5%	\$ 17,000	\$ 17,000
		CONSTRUCTION SURVEY	LS	2%	\$ 7,000	\$ 7,000
		EROSION CONTROL	LS	3%	\$ 10,000	\$ 10,000
		TRAFFIC CONTROL	LS	8%	\$ 27,000	\$ 27,000
<b>CONSTRUCTION SUBTOTAL</b>						<b>\$ 471,000</b>
		DESIGN ENGINEERING	LS	10%	\$ 47,000	\$ 47,000
		CONSTRUCTION MANAGEMENT	LS	10%	\$ 47,000	\$ 47,000
		CONTINGENCY	LS	35%	\$ 165,000	\$ 165,000
<b>ESTIMATED DOWNTOWN CONCRETE ALLEY PAVING COST PER BLOCK</b>						<b>TOTAL \$ 730,000</b>

**Table 3.3: Cost Estimate for Concrete Alley with Underground Pipe Detention**

# ROADWAY PAVEMENT CONDITIONS



## 4.0 ROADWAY PAVEMENT CONDITIONS

The current streets in Old Town were originally constructed in 1999 and 2000 as part of the Erie Roadway Improvement project. The project also included curb, gutter, and sidewalk and installed storm sewer through the area. The Old Town streets account for about seven centerline miles or 14 lane-miles of the town's current 240 lane-mile system.

The Town's consultant conducted a condition review of the estimated 120,000 square yards of existing pavement in Old Town Erie in March of 2020. Existing distresses primarily consist of non-structural, environmental block and transverse cracking that has been well maintained through routine crack sealing throughout the Old Town area. The original pavement was placed directly on the existing underlying soils. This results in varied soil and drainage properties that yield variable pavement surface distress by city block location. The consultant also reviewed pavement inspection data from June 2017 for the Old Town streets.

### Recommendations and Cost Analysis

As a street deteriorates over time due to exposure to traffic and the environment, a successful pavement management program must balance preventative maintenance such as crack seals, surface seals (chip seals, slurry seals and cape seals), rehabilitation (asphalt overlays) and reconstruction when necessary to optimize funding. A best first approach prioritizes lower cost treatments to maintain streets while they are in still relatively good condition, extending their life and prolonging the time until more expensive treatments are needed. The Town has maintained the Old Town streets well with periodic cracks seals to this point within budget constraints.

The consultant recommends two primary pavement treatments for the streets, a combination of crack seal and a cape seal for streets in lower distress areas and partial-depth asphalt milling and repaving in areas of higher distress. Approximately 65% of total pavement is recommended to receive asphalt milling and repaving and the balance being treated with the preservation surface chip seal/cape seal. The recommended milling and paving would consist of milling 1.5 inches of for the full street width and adding 2.5 inches of new asphalt. Most of the streets recommended for milling and paving did not receive a final asphalt lift as designed during their original street construction. The additional depth will improve cross section drainage and provide additional pavement structure to prolong the life of the street. The cape seal will consist of a chip seal covered by a slurry seal or micro-surfacing top layer. A map identifying recommended pavement treatments has been included below in Figure 4.1. The proposed recommendations were reviewed with Town of Erie Operations and Maintenance (O&M) Manager Jody Lambert, and Assistant O&M Division Manager, George Hubert, for concurrence.

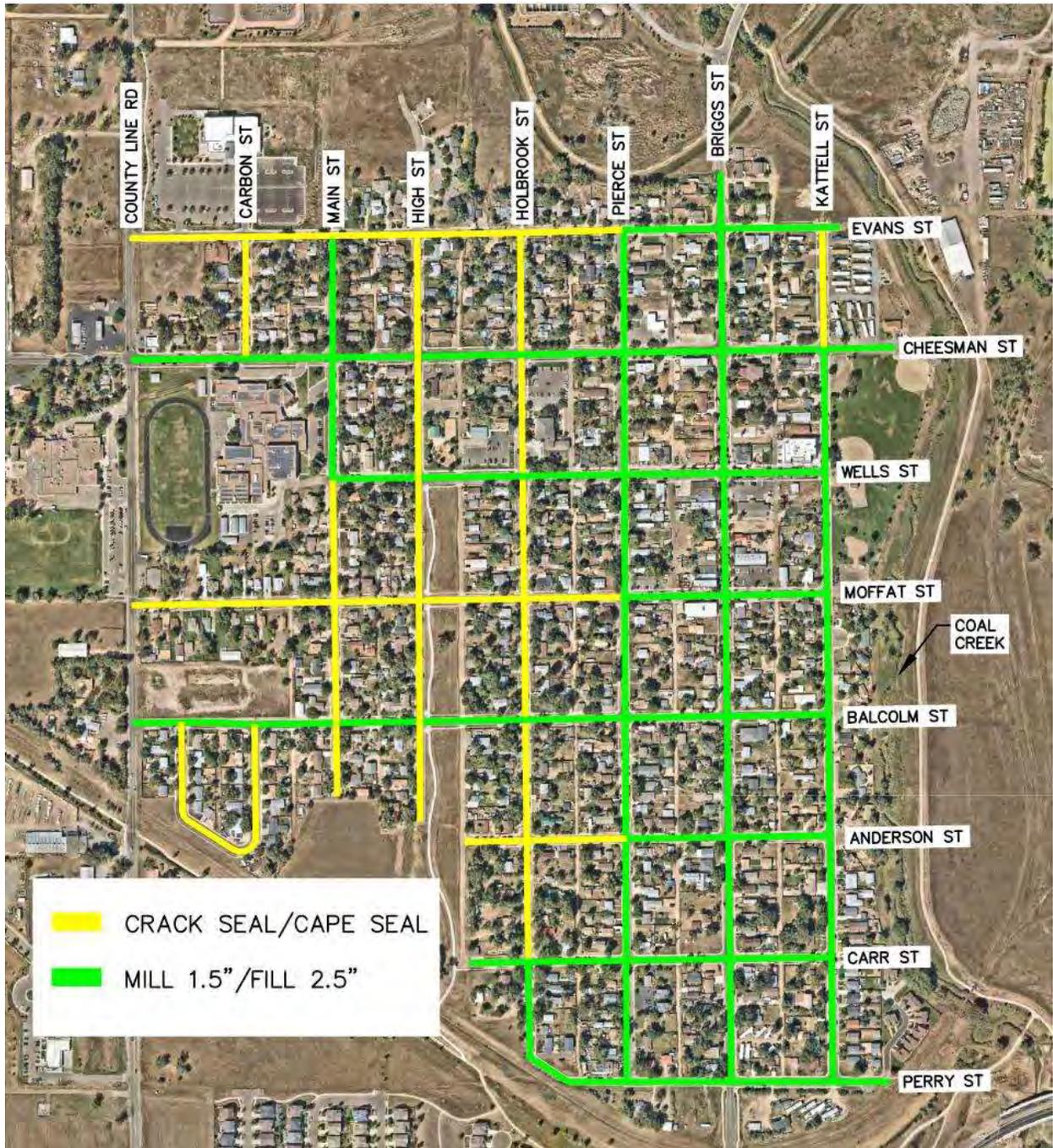


Figure 4.1: Recommended Pavement Treatments for Old Town Erie

**Probable Cost Estimates/Implementation Discussion**

Cost estimates have been provided in tables below for both recommended pavement treatments for cost per block and total cost for Old Town Erie. All estimates include add-on costs for upgrading pedestrian ramps to meet Americans with Disabilities Act (ADA) requirements. Costs have been included for minimal curb and gutter repairs that may be required, but the curb and gutter overall is still in very good condition. Isolated deep pavement

repairs will be required at some locations, but existing conditions do not indicate significant areas that need this treatment.

Completion of the asphalt overlay would likely be phased over several years to accommodate phased implementation of other improvements such as private utility projects, storm sewer improvements or streetscape improvements and to phase impacts over time if desired. Unit prices may be impacted somewhat for smaller yearly project sizes, but less significant if included within the larger yearly Town of Erie pavement program. The smaller size and cost of the recommended cape seal project would likely best be accomplished in a single year to receive best contract pricing.

A summary of estimated costs to complete all pavement improvements by treatment types is provided below.

Asphalt Overlay Streets	\$2,102,000
ADA Ramps (Asphalt Overlay Streets)	\$1,331,000
Cape Seal Streets	\$ 522,000
ADA Ramps (Cape Seal Streets)	\$ 374,000
<b>TOTAL COST</b>	<b>\$4,329,000</b>

**Table 4.1: Pavement System Cost Summary**

	Item Number	Item Description	Unit	Estimated Quantity	Unit Cost	Estimated Cost
Old Town Asphalt Overlay Estimate Typical Block	1	REMOVE ASPHALT MAT (PLANING)	SY	1,425	\$ 3	\$ 4,300
	2	ADJUST MANHOLE	EA	2	\$ 100	\$ 200
	3	ADJUST VALVE BOX	EA	4	\$ 50	\$ 200
	4	HOT MIX ASPHALT (PATCHING)	TON	10	\$ 200	\$ 2,000
	5	HOT MIX ASPHALT (Gr SX)(75)(PG 64-22)	TON	200	\$ 90	\$ 18,000
	6	EMUSLIFIED ASPHALT (CSS-1H)	GAL	143	\$ 4	\$ 600
	7	FLAGGING	HRS	48	\$ 32	\$ 1,500
	8	TRAFFIC CONTROL SUPERVISOR	DAYS	1	\$ 850	\$ 900
	9	CURB AND GUTTER REPLACEMENT	LF	25	\$ 50	\$ 1,300
<b>ITEM SUBTOTAL</b>						<b>\$ 29,000</b>
		MOBILIZATION	LS	5%	\$ 1,000	\$ 1,000
		ADDITIONAL TRAFFIC CONTROL	LS	2%	\$ 1,000	\$ 1,000
		SIGNING AND STRIPING	LS	2%	\$ 1,000	\$ 1,000
<b>CONSTRUCTION SUBTOTAL</b>						<b>\$ 32,000</b>
		DESIGN ENGINEERING	LS	5%	\$ 2,000	\$ 2,000
		CONSTRUCTION MANAGEMENT	LS	5%	\$ 2,000	\$ 2,000
		CONTINGENCY	LS	15%	\$ 5,000	\$ 5,000
		<b>ESTIMATED ASPHALT OVERLAY COST PER BLOCK</b>			<b>TOTAL</b>	<b>\$ 41,000</b>
		ADA CURB RAMP UPGRADES (PER CORNER)	EACH	2	\$ 11,000	\$ 22,000
<b>ESTIMATED ASPHALT OVERLAY WITH ADA RAMP UPGRADES</b>						<b>\$ 63,000</b>
						<b>/PER BLOCK</b>

**Table 4.2: Cost estimate for Typical Block Asphalt Overlay and ADA Ramp Upgrades**

	Item Number	Item Description	Unit	Estimated Quantity	Unit Cost	Estimated Cost
Old Town Asphalt Overlay Estimate	1	REMOVE ASPHALT MAT (PLANING)	SY	80,000	\$ 3	\$ 240,000
	2	ADJUST MANHOLE	EA	40	\$ 100	\$ 4,000
	3	ADJUST VALVE BOX	EA	110	\$ 50	\$ 6,000
	4	HOT MIX ASPHALT (PATCHING)	TON	200	\$ 200	\$ 40,000
	5	HOT MIX ASPHALT (Gr SX)(75)(PG 64-22)	TON	11,500	\$ 90	\$ 1,035,000
	6	EMUSLIFIED ASPHALT (CSS-1H)	GAL	8,000	\$ 4	\$ 32,000
	7	FLAGGING	HRS	1,200	\$ 32	\$ 38,000
	8	TRAFFIC CONTROL SUPERVISOR	DAYS	30	\$ 900	\$ 27,000
	9	CURB AND GUTTER REPLACEMENT	LF	810	\$ 50	\$ 41,000
<b>ITEM SUBTOTAL</b>						<b>\$ 1,463,000</b>
		MOBILIZATION	LS	8%	\$ 117,000	\$ 117,000
		ADDITIONAL TRAFFIC CONTROL	LS	2%	\$ 29,000	\$ 29,000
		SIGNING AND STRIPING	LS	2%	\$ 29,000	\$ 29,000
		EROSION CONTROL	LS	3%	\$ 44,000	\$ 44,000
<b>CONSTRUCTION SUBTOTAL</b>						<b>\$ 1,682,000</b>
		DESIGN ENGINEERING	LS	5%	\$ 84,000	\$ 84,000
		CONSTRUCTION MANAGEMENT	LS	5%	\$ 84,000	\$ 84,000
		CONTINGENCY	LS	15%	\$ 252,000	\$ 252,000
		<b>ESTIMATED HMA OVERLAY</b>			<b>TOTAL</b>	<b>\$ 2,102,000</b>
		ADA CURB RAMP UPGRADES (PER CORNER)	EACH	121	\$ 11,000	\$ 1,331,000
<b>TOTAL OVERLAY PROJECT WITH ADA RAMP UPGRADES</b>						<b>\$ 3,433,000</b>

**Table 4.3: Cost Estimate for Old Town Asphalt Overlay and ADA Ramp Upgrades**

	Item Number	Item Description	Unit	Estimated Quantity	Unit Cost	Estimated Cost
<b>Old Town Cape Seal Estimate Typical Block</b>	1	ADJUST MANHOLE	EA	2	\$ 120	\$ 200
	2	ADJUST VALVE BOX	EA	4	\$ 60	\$ 200
	3	HOT MIX ASPHALT (PATCHING)	TON	10	\$ 200	\$ 2,000
	4	CRACK SEAL	SY	1,600	\$ 0.30	\$ 500
	5	CAPE SEAL	SY	1,600	\$ 7	\$ 11,200
	6	EMULSIFIED ASPHALT (CSS-1H)	GAL	80	\$ 4	\$ 300
	7	CURB AND GUTTER REPLACEMENT	LF	25	\$ 50	\$ 1,300
					<b>ITEM SUBTOTAL</b>	<b>\$ 15,700</b>
		MOBILIZATION	LS	5%	\$ 800	\$ 800
		TRAFFIC CONTROL	LS	2%	\$ 300	\$ 300
		SIGNING AND STRIPING	LS	1%	\$ 200	\$ 200
					<b>CONSTRUCTION SUBTOTAL</b>	<b>\$ 17,000</b>
		DESIGN ENGINEERING	LS	5%	\$ 900	\$ 900
		CONSTRUCTION MANAGEMENT	LS	5%	\$ 900	\$ 900
		CONTINGENCY	LS	15%	\$ 2,600	\$ 2,600
		<b>ESTIMATED CRACK SEAL/CAPE SEAL COST PER BLOCK</b>			<b>TOTAL</b>	<b>\$ 19,000</b>
		ADA CURB RAMP UPGRADES (PER CORNER)	EACH	1.5	\$ 11,000	\$ 17,000
					<b>ESTIMATED CAPE SEAL WITH ADA RAMP UPGRADES</b>	<b>\$ 36,000</b>
						<b>/PER BLOCK</b>

**Table 4.4: Cost Estimate for Typical Block Cape Seal and ADA Ramp Upgrades**

	Item Number	Item Description	Unit	Estimated Quantity	Unit Cost	Estimated Cost
<b>Old Town Cape Seal Estimate</b>	1	ADJUST MANHOLE	EA	5	\$ 200	\$ 1,000
	2	ADJUST VALVE BOX	EA	21	\$ 100	\$ 2,000
	3	HOT MIX ASPHALT (PATCHING)	TON	200	\$ 200	\$ 40,000
	4	CRACK SEAL	SY	41,450	\$ 0.30	\$ 12,000
	5	CAPE SEAL	SY	41,450	\$ 7	\$ 290,000
	6	EMULSIFIED ASPHALT (CSS-1H)	GAL	2,073	\$ 4	\$ 8,000
	7	CURB AND GUTTER REPLACEMENT	LF	650	\$ 50	\$ 33,000
					<b>ITEM SUBTOTAL</b>	<b>\$ 386,000</b>
		MOBILIZATION	LS	5%	\$ 19,000	\$ 19,000
		TRAFFIC CONTROL	LS	2%	\$ 8,000	\$ 8,000
		SIGNING AND STRIPING	LS	1%	\$ 4,000	\$ 4,000
					<b>CONSTRUCTION SUBTOTAL</b>	<b>\$ 417,000</b>
		DESIGN ENGINEERING	LS	5%	\$ 21,000	\$ 21,000
		CONSTRUCTION MANAGEMENT	LS	5%	\$ 21,000	\$ 21,000
		CONTINGENCY	LS	15%	\$ 63,000	\$ 63,000
		<b>ESTIMATED CRACK SEAL/CAPE SEAL COST</b>			<b>TOTAL</b>	<b>\$ 522,000</b>
		ADA CURB RAMP UPGRADES (PER CORNER)	EACH	34	\$ 11,000	\$ 374,000
					<b>TOTAL CAPE SEAL PROJECT WITH ADA RAMP UPGRADES</b>	<b>\$ 896,000</b>

**Table 4.5: Cost Estimate for Old Town Cape Seal and ADA Ramp Upgrades**

# RESIDENTIAL ALLEY SURFACE IMPROVEMENTS



## 5.0 RESIDENTIAL ALLEY SURFACE IMPROVEMENTS

The existing residential alleys consist of approximately 2.7 miles of unpaved gravel surface and 0.1 mile of paved surfaces. The alleys currently are maintained only by citizen request. Encroachments into the alley right-of way are common and obstructed by tree limbs. Traffic in the alleys is primarily limited to smaller vehicles as trash service is provided curbside in the residential areas. Cost estimates have been provided for asphalt and concrete pavement options in Tables 5.1 and 5.2. A width of 16 feet in the 20-foot alley right-of way has been assumed for the alley construction which would still likely be constrained by existing encroachments or vegetation in some alleys.

Drainage along alleys is typically directed to a swale along the center of the alley away from properties but could be evaluated for existing conditions.

	Item Number	Item Description	Unit	Estimated Quantity	Unit Cost	Estimated Cost
Residential HMA Alley Estimate	1	UNCLASSIFIED EXCAVATION	CY	170	\$ 30	\$ 5,000
	2	AGGREGATE BASE COURSE (4 INCH)	TON	160	\$ 50	\$ 8,000
	3	SUBGRADE RECONDITIONING	SY	760	\$ 5	\$ 4,000
	4	HMA PAVEMENT (4 INCH)	TON	175	\$ 95	\$ 17,000
	5	CONCRETE PAVEMENT (8 INCH)	SY	75	\$ 90	\$ 7,000
	6	CURB TYPE 2 (SECTION IIB)	LF	24	\$ 30	\$ 1,000
					<b>ITEM SUBTOTAL</b>	<b>\$ 42,000</b>
		ADJACENT GRADING/ TIE-INS/ ENCROACHMENTS	LS	10%	\$ 4,000	\$ 4,000
		MOBILIZATION	LS	5%	\$ 2,000	\$ 2,000
		REMOVALS	LS	5%	\$ 2,000	\$ 2,000
		CONSTRUCTION SURVEY	LS	2%	\$ 1,000	\$ 1,000
		EROSION CONTROL	LS	3%	\$ 1,000	\$ 1,000
		TRAFFIC CONTROL	LS	8%	\$ 3,000	\$ 3,000
					<b>CONSTRUCTION SUBTOTAL</b>	<b>\$ 55,000</b>
		DESIGN ENGINEERING	LS	10%	\$ 6,000	\$ 6,000
		CONSTRUCTION MANAGEMENT	LS	10%	\$ 6,000	\$ 6,000
		CONTINGENCY	LS	20%	\$ 11,000	\$ 11,000
					<b>ESTIMATED RESIDENTIAL ASPHALT ALLEY PAVING COST PER BLOCK</b>	<b>TOTAL \$ 78,000</b>

**Table 5.1 – Cost Estimate for Residential Asphalt Alley**

	Item Number	Item Description	Unit	Estimated Quantity	Unit Cost	Estimated Cost
Residential Concrete Alley Estimate	1	UNCLASSIFIED EXCAVATION	CY	320	\$ 30	\$ 10,000
	2	AGGREGATE BASE COURSE (4 INCH)	TON	200	\$ 50	\$ 10,000
	3	SUBGRADE RECONDITIONING	SY	760	\$ 5	\$ 4,000
	4	CONCRETE PAVEMENT (6 INCH)	SY	760	\$ 70	\$ 53,000
	5	CONCRETE PAVEMENT (8 INCH)	SY	75	\$ 90	\$ 7,000
	6	CURB TYPE 2 (SECTION IIB)	LF	24	\$ 30	\$ 1,000
					<b>ITEM SUBTOTAL</b>	<b>\$ 85,000</b>
		ADJACENT GRADING/ TIE-INS/ ENCROACHMENTS	LS	10%	\$ 9,000	\$ 9,000
		MOBILIZATION	LS	5%	\$ 4,000	\$ 4,000
		REMOVALS	LS	5%	\$ 4,000	\$ 4,000
		CONSTRUCTION SURVEY	LS	2%	\$ 2,000	\$ 2,000
		EROSION CONTROL	LS	3%	\$ 3,000	\$ 3,000
		TRAFFIC CONTROL	LS	8%	\$ 7,000	\$ 7,000
					<b>CONSTRUCTION SUBTOTAL</b>	<b>\$ 114,000</b>
		DESIGN ENGINEERING	LS	10%	\$ 11,000	\$ 11,000
		CONSTRUCTION MANAGEMENT	LS	10%	\$ 11,000	\$ 11,000
		CONTINGENCY	LS	20%	\$ 23,000	\$ 23,000
					<b>ESTIMATED RESIDENTIAL CONCRETE ALLEY PAVING COST PER BLOCK</b>	<b>TOTAL \$ 159,000</b>

**Table 5.2 – Cost Estimate for Residential Concrete Alley**

# CURB, GUTTER, AND SIDEWALKS



## 6.0 CURB, GUTTER, AND SIDEWALKS

There are over 42,000 square yards of existing concrete sidewalk, gutter pan and driveway infrastructure and over 61,000 linear feet of concrete curb and gutter in Old Town Erie. The condition of these existing items is generally excellent throughout town. Minor repair estimates have been included in pavement treatment estimates.

Any pavement treatments that are more substantial than single layer surface treatments (chip seal, slurry seal) will require all adjacent pedestrian ramps be brought to ADA standards. Pedestrian ramps were installed with the original street construction, but typically do not fully meet current ADA standards. Most do not have a detectable warning surface (truncated domes) and some do not meet turning space and adjacent access width requirements. Costs for ramp upgrades are included in cost estimates as required for pavement recommendations. Visual review of existing ramps within Old Town estimates that 121 intersection corners would need to be reconstructed on streets recommended for an asphalt overlay and 34 corners for streets recommended for a cape seal. The approximate cost to upgrade each corner is \$11,000, as shown in Table 6.1.

The predominant ramp style throughout Old Town is a single or apex ramp located near the mid-point of corner radius. While not typically preferred to two-directional ramps at each corner, apex ramps often offer advantages over directional ramps, particularly in locations where snow and ice are more common. Directional ramps require more space and can require the ramp to be lowered to near street grade and are more susceptible to collection of ice and sediment. Curb extensions can help address some of these issues, allowing for more space to construct the ramps and allow adequate space around the ramp as required by ADA, but would require costly storm sewer modifications in most cases in Old Town. Further discussion of curb discussions is provided in Section 7.2

Implementation of ADA-compliant pedestrian ramp improvements in advance of pavement projects could be adapted to the Town's preference and needs. The ramp construction could be completed as a separate project, phased over several years or completed as part of each pavement improvement project. Future implementation of curb extensions along Briggs Street, Cheesman Street and Wells Street would include providing ADA-compliant ramps as well.

	Item Number	Item Description	Unit	Estimated Quantity	Unit Cost	Estimated Cost
Pedestrian Ramp Replacement Cost Per Corner	1	REMOVAL OF SIDEWALK	SY	34	\$ 30	\$ 1,000
	2	REMOVAL OF CURB AND GUTTER	LF	25	\$ 20	\$ 500
	3	AGGREGATE BASE COURSE (CLASS 6)	TON	12	\$ 35	\$ 420
	4	HOT MIX ASPHALT (PATCHING) (ASPHALT)	SY	6	\$ 85	\$ 510
	5	CONCRETE SIDEWALK (6 INCH)	SY	20	\$ 70	\$ 1,400
	6	CURB AND GUTTER TYPE 2 (SECTION 11-B)	LF	25	\$ 40	\$ 1,000
	7	CONCRETE CURB RAMP	SY	14	\$ 185	\$ 2,600
				<b>ITEM SUBTOTAL</b>		<b>\$ 7,400</b>
		MOBILIZATION	LS	8%	\$ 600	\$ 600
		CONSTRUCTION SURVEY	LS	2%	\$ 100	\$ 100
		EROSION CONTROL	LS	3%	\$ 200	\$ 200
		TRAFFIC CONTROL	LS	5%	\$ 400	\$ 400
				<b>CONSTRUCTION SUBTOTAL</b>		<b>\$ 9,000</b>
		DESIGN ENGINEERING	LS	5%	\$ 400	\$ 400
		CONSTRUCTION MANAGEMENT	LS	5%	\$ 400	\$ 400
		CONTINGENCY	LS	20%	\$ 1,500	\$ 1,500
		<b>ESTIMATED PEDESTRIAN RAMP REPLACEMENT COST PER CORNER</b>			<b>TOTAL</b>	<b>\$ 11,000</b>

**Table 6.1 – Cost estimate for Pedestrian Ramp Replacement**

# LANDSCAPING



## 7.0 LANDSCAPING

### 7.1 STREETSCAPES

#### Streetscape Zones

Recommendations for streetscape improvements are based on breaking Old Town into three “Streetscape Zones”, generally based on Old Town zoning, with the exception of Wells Street (see Figure 7.1A).

- *Downtown Streetscape Zone:*
  - The Downtown Streetscape Zone focuses on the 500 and 600 blocks of Briggs Street and extends one block both east and west, and two blocks west in the case of Cheesman Street to connect to Town Hall.
  - The Downtown Streetscape Zone also includes Wells Street, because Wells Street provides a critical east-west connection through the downtown area, from Coal Creek Park to Erie Middle School. Also, the recently completed Linear Connection Trail brings residents from the south, as well as Erie Community Park, directly to Downtown via Wells Street. Treating Wells Street as a special streetscape was recommended in the *Downtown Redevelopment Framework Plan (DHM, 2016)*, and this document supports treating Wells Street streetscapes similar to Briggs Street.
  - Character:
    - The Downtown Streetscape Zone will have heavy use with high levels of pedestrian activity.
    - Traditional tree lawns and planter beds in ROWS in this zone will be inappropriate for pedestrian circulation and use, and will be difficult to maintain.
    - Using areas of the tree lawn as an “amenity zone” for items such as bike parking, benches, art, or wayfinding is recommended.
  - See Table 7.1A for a range of options and levels of improvement for Downtown Streetscape Zone improvements.
  
- *Neighborhood Mixed Use Streetscape Zone:*
  - The Neighborhood Mixed Use Streetscape Zone focuses on the transitional areas from the Downtown Zone to more residential zones. This zone includes key gateways into Old Town including Briggs Street north of Moffat Street and Cheesman Street.
  - Character:
    - High levels of both pedestrian and vehicular use.

- See Table 7.1B for a range of options for Neighborhood Mixed Use Streetscape Zone improvements.
  - Streetscape improvements should prioritize the pedestrian experience, pedestrian safety, and aesthetically announce an arrival to Old Town Erie.
  - A blend of traditional tree lawns or plantings with harder, pedestrian oriented materials is recommended.
- *Old Town Residential Streetscape Zones:*
  - The Old Town Residential Streetscape Zone includes the rest of Old Town, on residential, mostly single-family streets.
  - Character:
    - Low pedestrian activity, extensions of the “front yards” of residences and some businesses.
    - Streetscape should be low maintenance, low water use, and maximize tree health/longevity. Low-mid water use tree lawns or plantings are recommended.
  - Improvements should be made by property owners, with guidance from an Old Town Streetscape Design Guidelines document and potential assistance from the Town of Erie’s existing Tree Incentive Program.

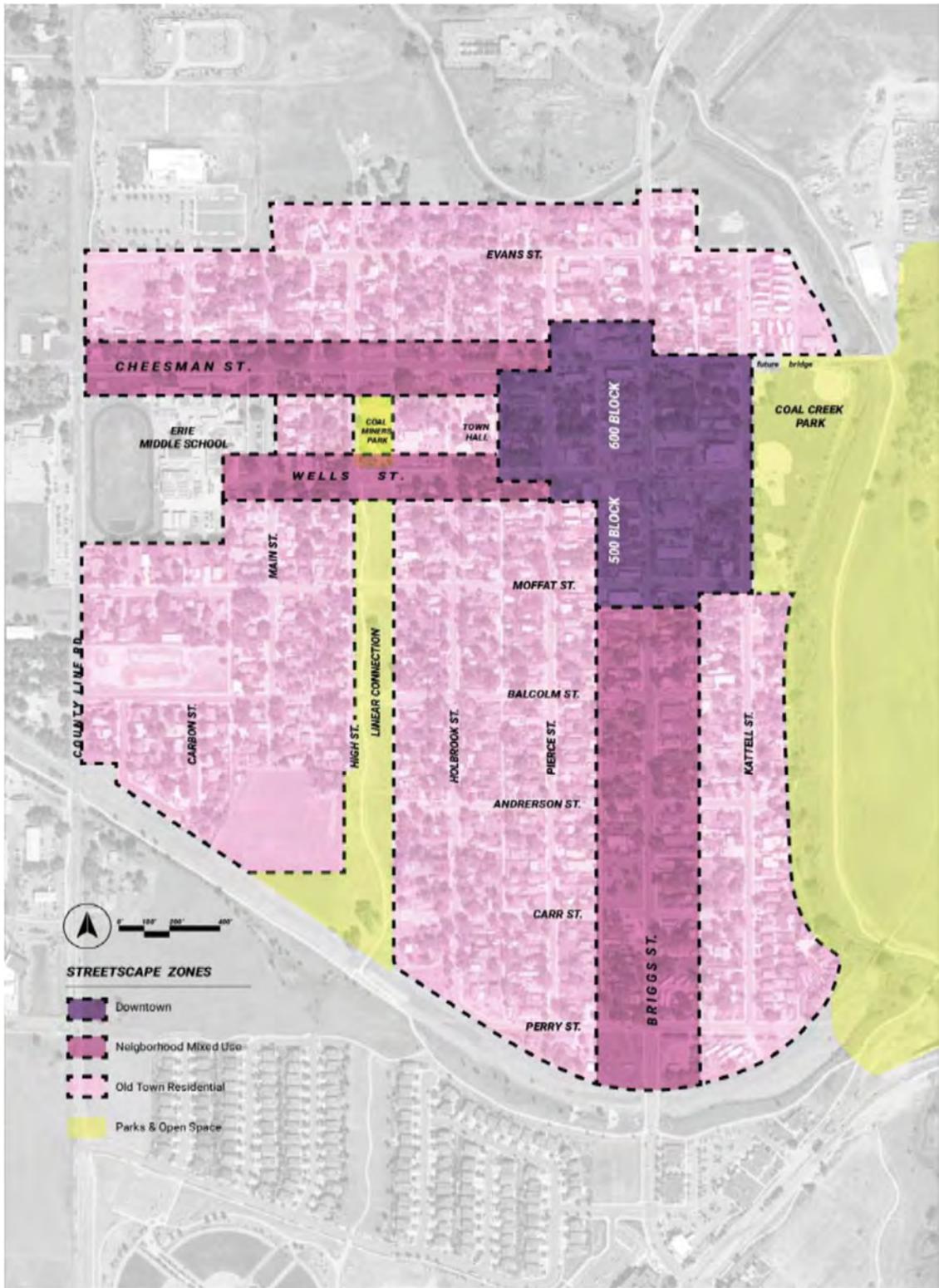


Figure 7.1A: Streetscape Zones

## STREETSCAPE DESIGN

Each of Old Town Erie's streets play an important role in the local network. Old Town currently has a unique and authentic character that should be enhanced and preserved as lots re-develop. The streetscape treatment should honor that character as well, while solving current maintenance and/or circulation issues and enhancing the pedestrian experience and functionality of the frontage.

The following tables and figures present prototypical conditions for each of the Streetscape Zones, as "good, better, and best" alternatives for improvements. These prototypes are a starting point and acknowledge that alternatives within the prototypes exist, such as mixing and matching from each column as dictated by budget, timeline, and adjacent conditions. For more information on how the square foot cost for each prototype in each zone was calculated, reference the Appendices. Design for Neighborhood Mixed Use and Old Town Residential Zones should be particularly adaptable based on adjacent land use and existing tree health.

Each Streetscape Zone receives a different treatment to create a diverse experience that signifies one's location in Old Town. Similar materials should be used throughout Old Town to create a consistent character and sense of place, while holding the Old Town area to a high level of visual and experiential quality.

<b>Downtown Zone Streetscape Improvements</b> Downtown - Briggs St. and Wells St. (66' R.O.W.)			
<b>Element Type</b>	<b>Concept 1 - 'Good'</b>	<b>Concept 2 - 'Better'</b>	<b>Concept 3 - 'Best'</b>
<b>Walkway Treatment</b>	New gray, broom-finished concrete as required for repairs/consistency.	Scored, colored, broom-finished or stamped concrete .	Permeable Concrete Unit Pavers.
<b>Tree Lawn Treatment</b>	Crusher Fines over amended topsoil.	Permeable concrete pavers over CU structural soil.	Permeable concrete pavers over Silva Cells.
<b>Tree Grates</b>	None.	Paver grates (expandable to 24"min)	Paver grates (expandable to 24"min)
<b>Amenity Zone Improvements</b>	None.	Allow/incentivize private businesses/residences to install benches, bike racks, tables/chairs, trash receptacles, etc.	Install benches, bike racks, tables/chairs, trash receptacles, etc.
<b>Pedestrian Crossing Improvements</b>	Thermoplastic graphics at pedestrian crossings.	Scored/colored concrete at pedestrian crossings.	Raised intersections with scored/colored concrete at pedestrian crossings.
<b>Parallel Parking Improvements</b>	None	Scored/colored concrete at parallel parking areas.	Permeable concrete unit pavers at parallel parking areas.
<b>Lighting</b>	Upgrade existing street light fixtures to LED (Xcel).	Upgrade existing street light fixtures to LED (Xcel), add additional pedestrian lighting at intersections (Xcel or Custom).	Upgrade existing street light fixtures to LED(Xcel), add additional pedestrian lighting at intersections (Xcel or Custom), include signature lighting elements such as up lights at trees, in grade lights at walkways, lit bollards, and GFC receptacles for holiday/event lighting (Custom).
<b>Trees</b>	Keep existing, fill in missing, damaged, or unhealthy trees.	Replace with trees from TOE's preferred list of street trees, meeting species diversity goals, and selected for aesthetic enhancements/identity in the downtown as well as performance/longevity in the streetscape environment. Plant in CU Structural Soil.	Replace with trees from TOE's preferred list of street trees, meeting species diversity goals, and selected for aesthetic enhancements/identity in the downtown as well as performance/longevity in the streetscape environment. Plant in Silva Cells.
<b>Landscape at Intersections &amp; Crossings</b>	Maintain/supplement existing plants and groundcover (mulch/gravel).	Enhanced container planting: pollinator friendly, xeric, with showy perennial flowers, shrubs & grasses. Includes new irrigation.	Enhanced Pollinator friendly, Xeric planting with showy perennial flowers, shrubs & grasses. Add branding elements. Includes new irrigation.
<b>Probable Cost (per lf)</b>	<b>\$150.00</b>	<b>\$360.00</b>	<b>\$930.00</b>

**Table 7.1A: Downtown Streetscape Zone Options**

**NOTES:**

- The TOE currently owns and maintains irrigation in Briggs Street ROWs in the 500 and 600 blocks of Briggs Street. All other tree lawns/ROW landscapes in Old Town are owned, maintained, and irrigated by individual property owners.*
- Lights provided by Xcel Energy, from their list of standard lighting, are metered through the Town's agreement with Xcel. Installation, maintenance, upgrades, etc. are the responsibility of Xcel. Custom lights, including pedestrian and signature lighting, will be metered separately, and installation, maintenance, and replacement will be the responsibility of the TOE or the property owner.*

<b>Neighborhood Mixed Use Zone Streetscape Improvements</b> (60' & 66' R.O.W.)			
<b>Element Type</b>	<b>Concept 1 - Good</b>	<b>Concept 2 - 'Better'</b>	<b>Concept 3 - 'Best'</b>
<b>Walkway Treatment</b>	New gray, broom-finished concrete as required for repairs/consistency.	Scored, colored, broom-finished or stamped concrete .	Concrete Unit Pavers.
<b>Tree Lawn Treatment</b>	Crusher Fines	Fescue Blend Sod (low water use). Irrigation repair/upgrade.	Enhanced container planting; pollinator friendly, xeric, with showy perennial flowers, shrubs & grasses. New irrigation/irrigation retrofits.
<b>Pedestrian Crossing Improvements</b>	Thermoplastic graphics at pedestrian crossings.	Scored/colored concrete at pedestrian crossings.	Raised intersections with scored/colored concrete at pedestrian crossings.
<b>Parallel Parking Improvements</b>	None.	Scored/colored concrete at parallel parking areas.	Permeable concrete unit pavers at parallel parking areas.
<b>Lighting</b>	None.	Upgrade existing street light fixtures to LED (Xcel).	Upgrade existing street light fixtures to LED, (Xcel) add additional pedestrian lighting at intersections (Xcel or Custom).
<b>Trees</b>	None.	Provide incentive for private property owner's to add/replace trees based on recommendations from TOE Forestry.	Replace with trees from TOE's preferred list of street trees, meeting species diversity goals, and selected for aesthetic enhancements/identity in the downtown as well as performance/longevity in the streetscape environment.
<b>Landscape at Intersections &amp; Crossings</b>	Maintain/supplement existing plants and groundcover (mulch/gravel).	Xeric planting with showy perennial flowers shrubs & grasses. Includes irrigation.	Water-wise perennial flowers shrubs & grasses. Planters & pots provided for installation of annuals (seasonal). Includes irrigation.
<b>Probable Costs (per lf)</b>	<b>\$110.00</b>	<b>\$210.00</b>	<b>\$335.00</b>

**TABLE 7.1B:** Neighborhood Mixed Use Streetscape Zone Options

**NOTES:**

3. The TOE's current standard for new tree lawns is 7-foot minimum width.
4. When retrofitting existing tree lawns, do not include new tree planting in tree lawns less than 5-foot width. Spray irrigation is not recommended for landscape areas less than 5-foot width. Narrow areas should be drip irrigated, which limits the use of sod in areas less than 5-foot width as well.
5. In areas less than 3-foot width, using paving, rock mulch, or crusher fines is recommended; installing new vegetation and irrigation is not recommended.
6. If an irrigation source is not available, installing landscape improvements requiring irrigation is not recommended. Irrigation in the Neighborhood Mixed Use zone will need to be coordinated with and provided by adjacent property owners.
7. Concepts 2 and 3 include connecting to a TOE irrigation supply, including bringing the system to the tree lawn(s).

**STREETSCAPE MATERIALS**

The materials used in Old Town should be authentic and timeless. What's considered modern or trendy today could leave improvements feeling outdated in a relatively short time period. In general, the architecture and hardscape elements that exist in Old Town Erie do an excellent job of fitting into their historic context while providing modern usability. Recommended improvements focus on reducing maintenance and water use, while increasing tree health, stormwater infiltration, and pedestrian usability/experience. Materials such as concrete, unit pavers, wood, and metal are timeless elements that can be applied in both traditional and contemporary ways that will feel relevant long into the future.

Creating a special district, as described in Section 9.0 of this report, is one method to allow or incentivize private property owners to make improvements to streetscapes on their own, or as

properties redevelop. Amenity zone improvements could be made by private investment but should adhere to a set of guidelines to ensure the character and pedestrian friendliness of downtown is preserved. Phasing decisions could be made based on development plans and implemented over time as blocks change.

As a next step, Streetscape Design Guidelines for Old Town Erie would be helpful to ensure various participants or phases adhere to the same vision for high quality, timeless streetscape elements. This guiding document will be especially useful to coordinate improvements when lots get re-developed, and in residential zones where streetscapes are the responsibility of property owners.

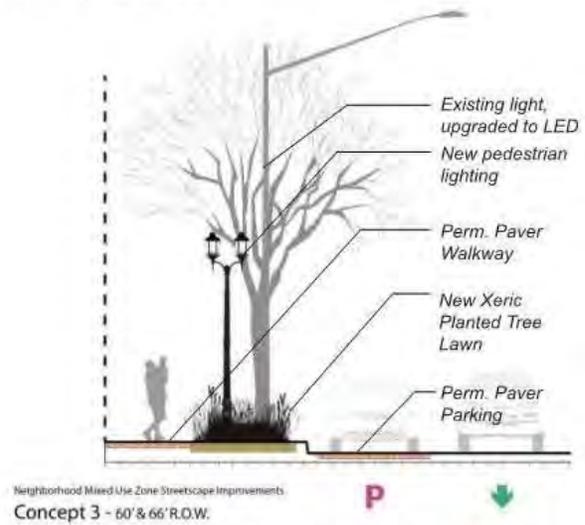
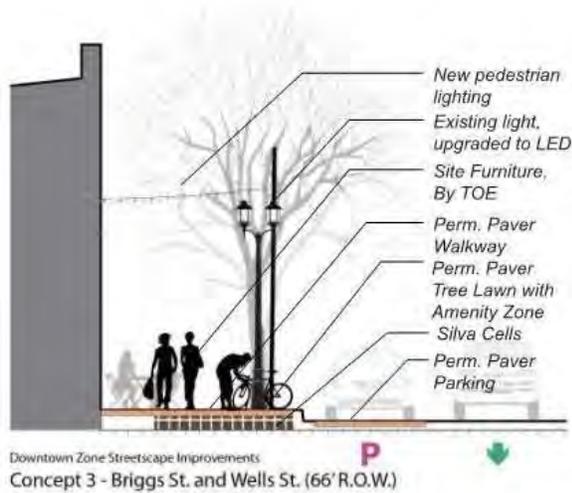
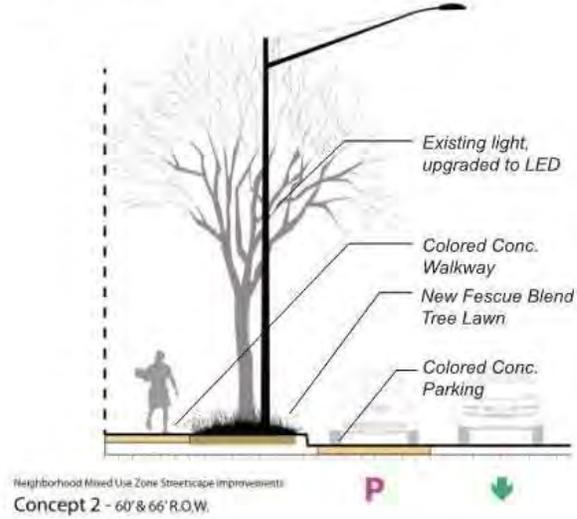
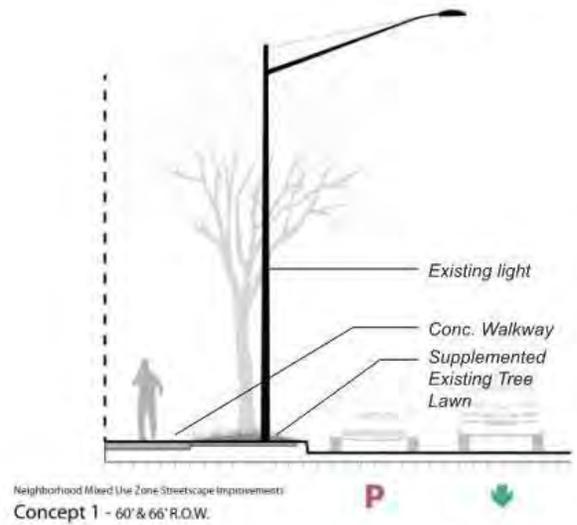
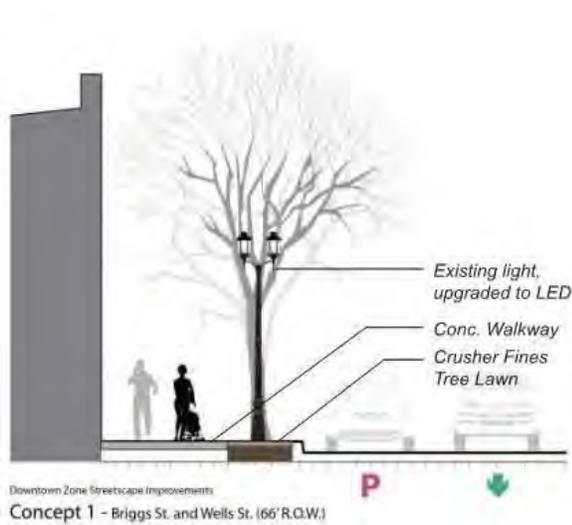


FIGURE 7.1B: DOWNTOWN ZONE

FIGURE 7.1C: NEIGHBORHOOD MIXED USE ZONE

## 7.2 EXTENDED CURBS

### ROLE OF EXTENDED CURBS IN OLD TOWN

Based on the findings and recommendations of the *Erie Downtown Parking and Circulation Study (Kimley-Horn, 2019)*, and building on the recommendations described in Section 8.0 of this report, the community doesn't have a parking deficit, but rather a distribution challenge. Section 8.0 notes that extending the range of pedestrians is one important way to alleviate the perceived parking distribution issues. The *Downtown Parking and Circulation Study* also noted a tendency for people in vehicles to speed on Briggs Street. Extended curbs, or "bump outs", are recommended to increase pedestrian safety by creating buffered pedestrian refuge, slow traffic speeds by creating "friction" on roadways and enhance the aesthetic character of the street.

### RECOMMENDATIONS:

Figure 7.2A illustrates existing and recommended bump outs in Old Town.

Bump outs exist at key intersections in the 500 block of Briggs Street, on Wells Street west of Coal Creek Park, and on Wells Street between Briggs and Town Hall. There is an existing mid-block bump out on Briggs Street, between Moffat Street and Wells Street, that does not include ADA ramps.

Recommendations include two types of Extended Curb Treatments:

- Type 1- Downtown Bump Outs: Type 1 bump outs are proposed in the 500 and 600 blocks of Briggs Street. Type 1 bump outs prioritize pedestrian refuge and feature hardscape and hardy plant materials that can stand up to heavy pedestrian use. Visual permeability is emphasized, and ground plane materials match that of adjacent streetscapes. Amenities such as art, signage, special lighting, etc. may be placed on Type 1 bump outs.
- Type 2 - Neighborhood Bump Outs: Type 2 bump outs are proposed on Briggs Street south of Moffat Street, on Cheesman Street west of Pierce Street, and on Wells Street west of Pierce Street. Type 2 bump outs contain more plant material than Type 1 bump outs and may be more ornamental in nature. Site triangle criteria must still be adhered to. On streets such as Wells and Cheesman, some pedestrian amenities could be included. On the south section of Briggs Street, adding trees could add an additional sense of friction to help calm traffic. Adding some pedestrian amenities and ground plane materials that match Type 1 bump outs on Briggs Street would tie the area together. Ornamental planting is encouraged to highlight the gateway to downtown.

Plant material should be low-maintenance and low water use. Use of pollinator-friendly native plants is encouraged. Rock mulch is preferred over wood mulch to reduce maintenance. Seasonal color should be considered to give each block unique identity and year-round interest.

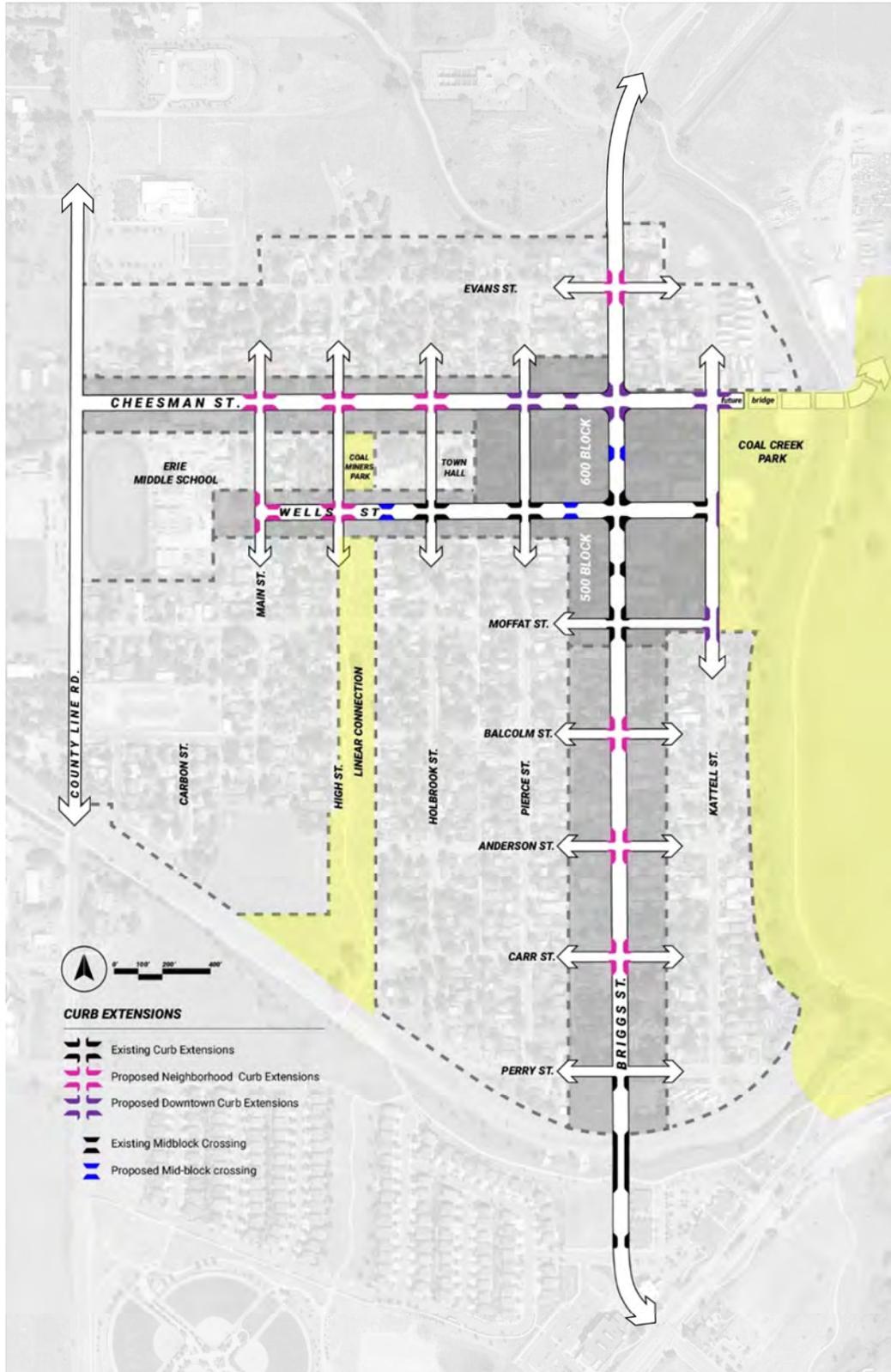
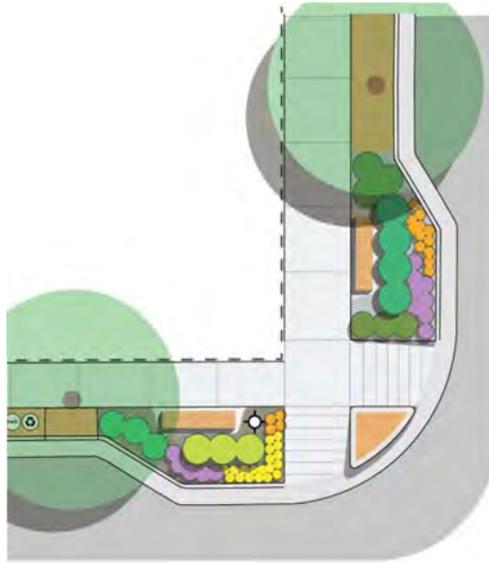
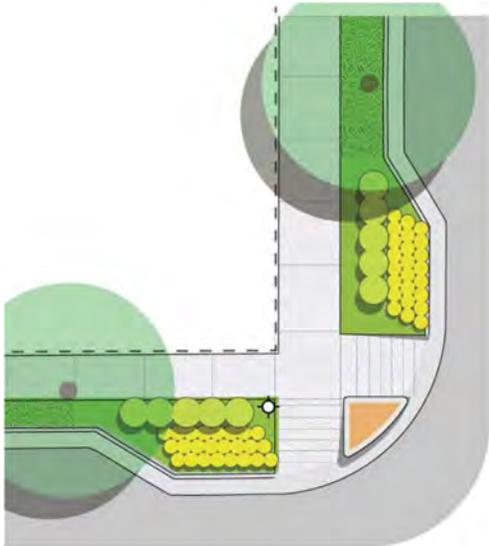


Figure 7.2A: Recommended Extended Curbs



Extended Curb Landscape Improvements  
Type 1- Downtown Zone

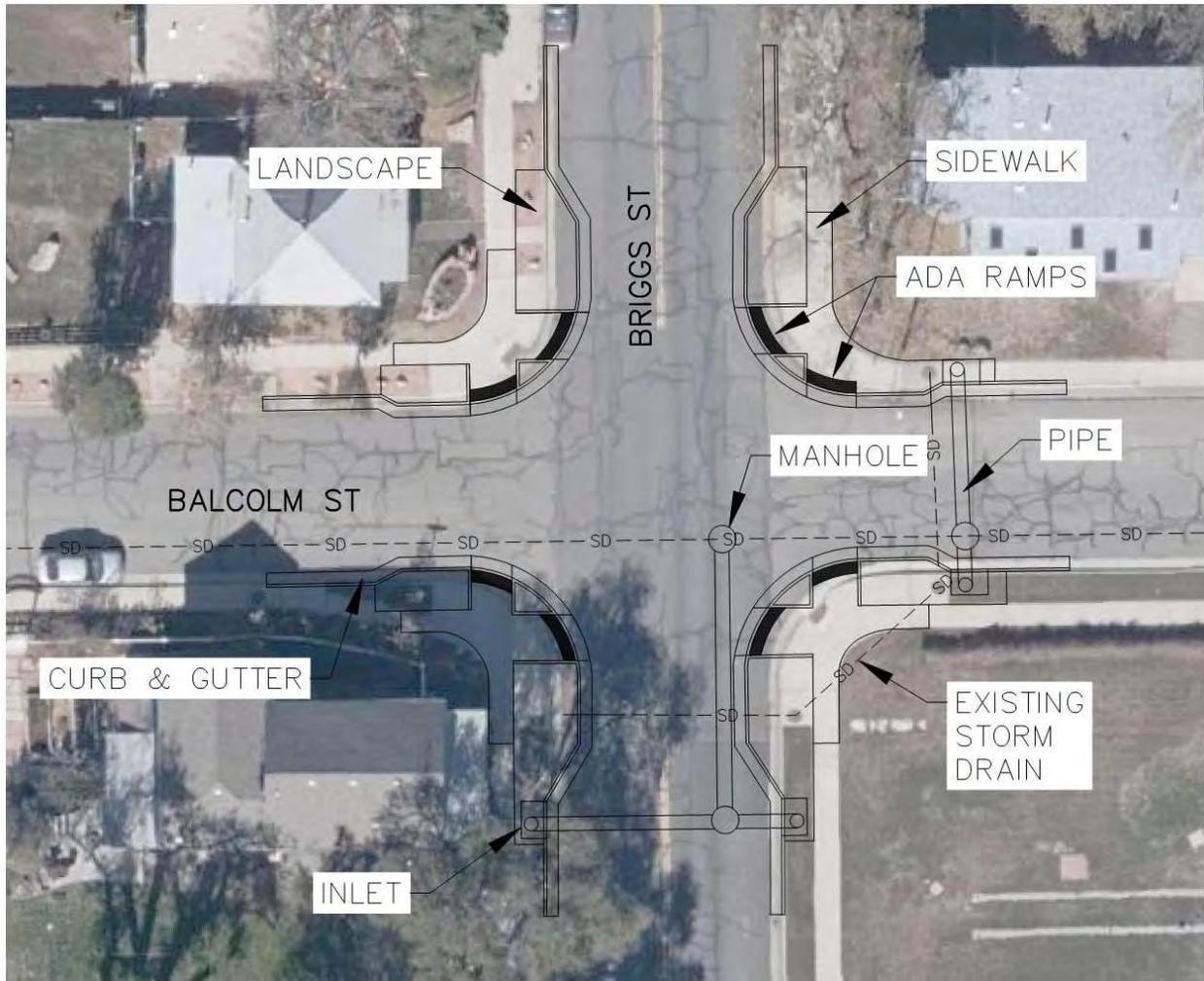


Extended Curb Landscape Improvements  
Type 2 - Mixed Use & Residential Zones

Figure 7.2B: Type 1 and Type 2 Bump Out Prototypes

### Curb Extension Costs

Intersection curb extensions or bump outs have been recommended in locations as shown in Figure 7.2A to improve pedestrian connectivity and safety. A proposed curb extension at the intersection of Balcolm Street and Briggs Street in Figure 7.2C shows a typical layout for a new curb extension.



**Figure 7.2C** – Typical curb extension intersection with storm sewer modifications

The curb extensions would reconstruct the intersection corners to narrow the street width at pedestrian crossings, decreasing pedestrian crossing widths and increasing pedestrian visibility, providing ADA compliant directional curb ramps perpendicular to the adjacent streets and possible landscaping aesthetics as described above. Maintaining street drainage is key to successful implementation of curb extensions. All but two of the proposed intersection locations are adjacent to existing storm sewer and have storm inlets. However, construction of the curb extensions does result in significant costs to rebuild the inlets and pipe connections to match the new intersection layout.

The curb extensions on Main Street at Well Street and Cheesman Street intersections near Erie Middle School do not have adjacent storm sewer and are not anticipated to require that storm sewer be extended to those locations.

Implementation costs by area are provided below in Table 7.3A. Cost estimates for typical intersections are shown in Tables 7.3B and 7.3C.

Location	Number of Intersections	Intersection Cost	Location Cost
Cheesman St - Downtown	2	\$303,000	\$606,000
Briggs Street - South of Downtown	3	\$303,000	\$909,000
Briggs Street - North of Downtown	1	\$303,000	\$303,000
Erie Middle School Connection			
Intersection with Storm Sewer	3	\$303,000	\$909,000
Intersection without Storm Sewer	2	\$184,000	\$368,000
	<b>Total Cost</b>		<b>\$3,095,000</b>

**Table 7.2A – Curb Extension costs by Area**

	Item Number	Item Description	Unit	Estimated Quantity	Unit Cost	Estimated Cost
	<b>Curb Extension Estimate with Existing Storm Sewer</b>	1	REMOVAL OF ASPHALT	SY	380	\$ 30
2		REMOVAL OF CONCRETE CURB RAMP	SY	120	\$ 30	\$ 4,000
3		REMOVAL OF CURB AND GUTTER	LF	420	\$ 20	\$ 8,000
4		REMOVAL OF SIDEWALK	SY	25	\$ 30	\$ 1,000
5		REMOVAL OF INLET	EACH	4	\$ 1,500	\$ 6,000
6		RESET FIRE HYDRANT	EACH	1	\$ 2,000	\$ 2,000
7		LANDSCAPE	SF	2000	\$ 10	\$ 20,000
8		HOT MIX ASPHALT (PATCHING) (ASPHALT)	SY	242	\$ 85	\$ 21,000
9		18 INCH REINFORCED CONCRETE PIPE	LF	134	\$ 100	\$ 13,000
10		INLET TYPE R L 5 (5 FOOT)	EACH	4	\$ 6,000	\$ 24,000
11		MANHOLE SLAB BASE	EACH	3	\$ 10,000	\$ 30,000
12		CONCRETE SIDEWALK (6 INCH)	SY	70	\$ 70	\$ 5,000
13		CONCRETE CURB RAMP	SY	120	\$ 185	\$ 22,000
14		CURB AND GUTTER TYPE 2 (SECTION II-B)	LF	455	\$ 40	\$ 18,000
				<b>ITEM SUBTOTAL</b>	<b>\$</b>	<b>185,000</b>
		MOBILIZATION	LS	5%	\$ 9,000	\$ 9,000
		CONSTRUCTION SURVEY	LS	2%	\$ 4,000	\$ 4,000
		EROSION CONTROL	LS	3%	\$ 6,000	\$ 6,000
		TRAFFIC CONTROL	LS	3%	\$ 6,000	\$ 6,000
		EARTHWORK	LS	2%	\$ 4,000	\$ 4,000
		SIGNING & STRIPING	LS	1%	\$ 2,000	\$ 2,000
				<b>CONSTRUCTION SUBTOTAL</b>	<b>\$</b>	<b>216,000</b>
		DESIGN ENGINEERING	LS	10%	\$ 22,000	\$ 22,000
		CONSTRUCTION MANAGEMENT	LS	10%	\$ 22,000	\$ 22,000
		CONTINGENCY	LS	20%	\$ 43,000	\$ 43,000
		<b>ESTIMATED CURB EXTENSION WITH STORM SEWER MODIFICATION</b>			<b>TOTAL</b>	<b>\$ 303,000</b>

**Table 7.2B Cost Estimate for Curb Extension Requiring Storm Sewer Modifications**

	Item Number	Item Description	Unit	Estimated Quantity	Unit Cost	Estimated Cost
<b>Curb Extension Estimate without Storm Sewer Modifications</b>	1	REMOVAL OF ASPHALT	SY	430	\$30	\$ 13,000
	2	REMOVAL OF CONCRETE CURB RAMP	SY	120	\$30	\$ 4,000
	3	REMOVAL OF CURB AND GUTTER	LF	420	\$20	\$ 8,000
	4	REMOVAL OF SIDEWALK	SY	25	\$30	\$ 1,000
	5	RESET FIRE HYDRANT	EACH	1	\$2,000	\$ 2,000
	6	LANDSCAPE	SF	2000	\$10	\$ 20,000
	7	HOT MIX ASPHALT (PATCHING) (ASPHALT)	SY	242	\$85	\$ 21,000
	8	CONCRETE PAVEMENT (8 INCH) - CROSSPAN	SY	50	\$95	\$ 5,000
	9	CONCRETE SIDEWALK (6 INCH)	SY	70	\$70	\$ 5,000
	10	CONCRETE CURB RAMP	SY	120	\$185	\$ 22,000
	11	CURB AND GUTTER TYPE 2 (SECTION II-B)	LF	455	\$40	\$ 18,000
	12	GUTTER TYPE 2 (8 FOOT)	LF	120	\$75	\$ 9,000
				<b>ITEM SUBTOTAL</b>		<b>\$ 115,000</b>
		MOBILIZATION	LS	5%	\$ 6,000	\$ 6,000
		CONSTRUCTION SURVEY	LS	2%	\$ 2,000	\$ 2,000
		EROSION CONTROL	LS	3%	\$ 3,000	\$ 3,000
		TRAFFIC CONTROL	LS	3%	\$ 3,000	\$ 3,000
		EARTHWORK	LS	2%	\$ 2,000	\$ 2,000
		SIGNING & STRIPING	LS	1%	\$ 1,000	\$ 1,000
				<b>CONSTRUCTION SUBTOTAL</b>		<b>\$ 132,000</b>
		DESIGN ENGINEERING	LS	10%	\$ 13,000	\$ 13,000
		CONSTRUCTION MANAGEMENT	LS	10%	\$ 13,000	\$ 13,000
		CONTINGENCY	LS	20%	\$ 26,000	\$ 26,000
		<b>ESTIMATED CURB EXTENSION WITHOUT STORM SEWER MODIFICATION</b>			<b>TOTAL</b>	<b>\$ 184,000</b>

**Table 7.2C Cost Estimate for Curb Extension Without Storm Sewer Modifications**

## 7.3 PEDESTRIAN IMPROVEMENTS FOR ALLEYS

### ALLEYS AS USABLE SPACE

Sections 3.0 and 5.0 describe potential surface improvements to alleys for increased function/decreased maintenance, as well as improving stormwater conditions in Old Town. This section focuses on alleys in the Downtown Zone that may receive the surface improvements described in Sections 3.0 and 5.0 as they relate to the walkability, aesthetics, and day-to-day living of the downtown.

#### *RANGES OF IMPROVEMENTS:*

Even minimal improvements to alley surfacing can make them feel safer and more inviting to pedestrians. The Green Alley, behind the Denver Central Market in Denver (next page), utilized donated permeable pavers to capture and infiltrate stormwater runoff from downspouts and surface flows. Traffic is still allowed in the alley, including garbage trucks, deliveries, and other heavy users. Most times, however, the alley is full of pedestrians enjoying the lively murals and using open back doors to access bars, breweries, and shops that back to the alley. No amenities were added other than the permeable pavers.

Likewise, in Loveland, an alley was paved with scored colored concrete, and narrowed so that only critical vehicles can access the alley. Moveable furniture is provided by business that back onto the alley, which can be moved to the side to allow garbage trucks through. Lighting was provided by the city, but other facilities, such as tables/chairs, benches, and trash receptacles are provided by adjacent properties.

Examples of more enhanced pedestrian alleys exist in Longmont. In instances where vehicular access is still a priority, a blend of concrete and pavers are used, and site amenities are kept to a minimum. In alleys where vehicular traffic is closed or limited, amenities such as art, planter pots, lighting, and benches are provided. Businesses have accessible back entrances, and in some cases, their front doors are on the pedestrian friendly alley.

Fort Collins has high-finish pedestrian alleys in their Old Town, including plants, bollards, benches, and a variety of lighting. Where space allows, landscape strips have been added, some even containing trees, to soften the hardscape and buffer parking areas. These highly pedestrian alleys are well used days and nights, feel safe, and provide color and activity to the downtown area.

Alleys closest to Briggs Street could be the highest level of refinement, where business may desire to have back door access or provide amenities in the alley. Additional pedestrian connectivity via alleys could further relieve the sense of parking deficit/pedestrian disconnect to the downtown at busy times. Alleys that get further away from Briggs could receive less

refined levels of treatment, perhaps surface only for stormwater benefit, while alleys in Old Town Residential zones may be a lower priority for immediate improvement.

## **ALLEY ZONES**

Figure 7.3B breaks Old Town into three Alley Zones, similar to the Streetscape Zones described in Section 7.1:

- Downtown Alleys would be the highest priority for pedestrian enhancements given the density of the zone, amount of pedestrian traffic, and number of businesses that could utilize and benefit from alleys as an amenity.
- Neighborhood Mixed Use Alleys could be the second priority for improvements, with a focus on surface materials. Stormwater improvements could be implemented, as well as focused areas for pedestrian amenities similar to the Downtown Alleys depending on adjacent uses.
- Residential Alleys may be a lower priority, with improvements that focus on stormwater and general surface improvements for functionality and reduced maintenance.



Loveland Alley: Concrete Paving, amenities by businesses.



RiNo (Denver) Green Alley: Permeable Pavers.



Longmont Alley: Pavers and concrete.



Longmont Alley: Pavers, amenities, and lighting.



Fort Collins Alley: Pavers, amenities, planting, and lighting.



Fort Collins Alley: Pavers, amenities, planting strips trees, and lighting.

Figure 7.3A: Alley Prototypes



Figure 7.3B: Alley Zones

## 7.4 BIKE FACILITIES

As noted in Sections 8.0 and 7.1 of this report, as well as in the *Erie Downtown Parking and Circulation Study (Kimley-Horn, 2019)*, the community doesn't have a parking deficit, but rather a distribution challenge. One way to reduce the sense that driving/parking nearby downtown destinations is necessary is to expand and enhance the bicycle network. Many Erie residents bike to Old Town currently for events, markets, and festivals. Enhancing the cycling experience and making parking bikes more convenient could add to the number and frequency of people's trips by bike versus trips by car.

*The Downtown Redevelopment Framework Plan (DHM, 2016)*, makes several recommendations for improvements for bike facilities. This report builds on that plan, and recommends:

- Provide adequate bike parking in convenient locations to Downtown destinations, in order to:
  - Reduce congestion from haphazardly-parked bikes.
  - Reduce tree damage from bikes chained to trees.
  - Encourage biking to and around Old Town.
  - Recognize that bike corrals or bike parking lots function well for large events, but people on bikes typically want to ride as close to their destination as possible.
- Extend existing multi-use trail connections into the downtown
- Consider an off-street multi-use trail on Wells Street (this recommendation is a departure from cycle-track recommend in the *Downtown Redevelopment Plan*)
- Consider sharrows, or other lane sharing strategy, on Briggs Street.

Amenity Zones, described in Section 7.1, are opportunities for adding bike parking adjacent to destinations in Old Town. Bike parking facilities could be provided by the Town as an overall streetscape improvement project, or provided by property owners/businesses on an incentivized basis, to attract customers to their establishments. If installed by property owners, an Old Town Streetscape Design Guidelines document would be helpful to ensure consistent facilities and appropriate styles for the Downtown Zone.

Figure 7.4A recommends equitably spaced bike facilities in the Old Town Zone, as well as at other key destinations, such as at parks and at Town Hall.



FIGURE 7.4A: POTENTIAL BIKE FACILITIES

## 7.5 TREES

### Challenges Faced by Urban Trees

Trees in tree lawns and urban streetscapes face several key challenges, including:

- **Lack of adequate soil:** studies have shown that a lack of adequate topsoil in most typical urban tree planting is the leading cause of diminished canopies and shortened life spans. Typically, trees in tree grates have very limited access to good soils, as all the soil immediately below the grate is the only suitable growing media, and is such a low volume that the tree quickly uses up all available nutrients.
- **Soil Compaction:** In addition to a lack of nutrients, soil around typical tree grates, or even trees in crusher fines or tree lawns in areas with high pedestrian volumes, becomes so compacted that roots cannot continue to grow/spread to obtain nutrients. Often in urban settings, soil is highly compacted below sidewalks and roadways around the tree, severely limiting root growth. This can create an anaerobic soil condition that is detrimental to the health and longevity of the tree.
- **Girdling by tree grates:** As trunks grow, tree grates must have removable rings to accommodate the increased size of the trunk. Tree grates without adequate removable rings will be engulfed by the trunk, leaving the tree more susceptible to disease, and eventually killing the tree.
- **Lack of space for canopy growth between traffic and building faces:** urban trees are often squeezed between building faces and traffic lanes, both of which either naturally or through intentional pruning keep the canopy from achieving its full spread, limiting the intake of sunlight and prohibiting the tree from reaching its full potential for shade and aesthetic value.
- **Irrigation that is difficult to monitor/maintain:** Trees that are not planted in the presence of other plants, such as in a tree grate, often don't demonstrate stress as readily as other vegetation, such as lawn or perennials. Therefore, the tree may be extremely stressed from a malfunctioning irrigation system by the time it shows signs, where a 'signal' species would have alerted maintenance staff to an issue. Irrigation is often out of sight in tree grates, so that bubblers or drip emitters are not easily observed. If above grade, bubblers or drip emitters are easily damaged by pedestrian traffic, snowplows, etc.
- **Vandalism:** Urban trees often face both intentional and unintentional vandalism. Common elements that damage trees in streetscapes include bicycle locks, being stapled/nailed to, carving, limb breaking, and miscellaneous abrasions.

### Existing Trees

The Town of Erie recently completed an Old Town Tree Assessment, which documents species, heights, tree health, and any outstanding concerns or characteristics of trees in rights

of ways and public areas in Old Town. Figure 7.5A translates that data into a basic tree health diagram to inform:

- Potential phasing of tree lawn improvements based on existing tree health.
- Potential phasing of tree lawn improvements based on tree diversity goals, and “gap analysis” (where there are not currently any street trees).
- Potential zones where tree replacement is unnecessary or undesirable due to presence of healthy trees with adequate lifespan remaining. Tree lawn improvements to these zones may be modified to preserve/protect existing trees.

Concerns discussed with Town staff include:

- A lack of tree diversity, making areas of Old Town more susceptible to disease and eventual die off of a significant portion of existing canopy.
- Ornamental trees, especially pears, are heavily planted in the Downtown Zone, but are not well suited to urban environments and are not performing well.
- Roots of mature trees heaving flagstone paving, with no suitable way to accommodate both root growth and the desire for smooth pedestrian surfaces with the current paving design.
- Existing tree grates are girdling trees and require significant effort to remove.



FIGURE 7.5A CURRENT TREE HEALTH

## Recommendations:

This report recommends a comprehensive tree planting strategy to combat the issues described on the previous pages. These recommendations can be implemented in phases based on existing tree health (Figure 7.5A) and prioritized needs to improve or supplement existing tree canopies, based on planned redevelopment, or block by block or zone by zone as funding and schedules allow.

One of the most significant keys to promoting tree health is the soil. The best strategies for appropriate soils for trees include:

- Tree Planting in open planting or lawn areas: Includes an optimal mix of compost-infused native and/or imported topsoils to support healthy trees as well as ground-level planting. Reference the Town of Erie's Parks and Recreation Standards for approved soil/compost ratios.
- Tree Planting in CU Structural Soil: CU Structural Soil is a proprietary blend of topsoil and gravel that acts as suitable structural fill for sidewalks and other hard improvements, such as permeable pavers, while also increasing the amount of nutrients and aerobic activity in the soil. The volume of soil is critical to the success of CU structural soil, since it does not contain as many nutrients as typical topsoil. Since it can structurally support sidewalks, plazas, etc., the depth, length, and width of the soil placement can be factored into other improvements.
- Tree Planting in Silva Cells: Silva Cells are structures made from recycled plastic, placed below grade and filled with topsoil/amended soil. These maximize root health because the tree is growing in natural/native soil, and roots can grow mostly unimpeded. Cells can be stacked to increase the depth of the soil and can be used to bridge areas below grade to maximize connected soil volume. The structures can support pedestrian and vehicular traffic, including concrete paving and pavers. Silva Cell systems can also be designed to detain stormwater runoff and increase infiltration.
- See Figure 7.5B for more information.

Tree species and spacing can vary between the Streetscape Zones described in Section 7.1:

- In the Downtown zone, generous spacing of 30-35' on center is appropriate to accommodate pedestrian circulation through/around the trees, and to maintain site lines to building frontages/signage for commercial viability. Species should be high branching to avoid pedestrian conflicts. The downtown zone is a prime opportunity to employ modern tree planting technologies such as Silva cells.
- In the Neighborhood mixed use zones, spacing should again be 30-35' on center to accommodate a high level of pedestrian permeability. These zones could be a combination of CU Structural Soil/Silva cells and traditional planting depending on adjacent uses and circulation patterns.

- In Old Town Residential zones, a denser tree spacing could be used to promote shade, privacy, a unique feel to the street. Minimum tree spacing could be reduced to 15 to 20 feet, dependent on species. Traditional tree lawns or planting areas over native/amended soil would be appropriate.

See Section 7.1 for more information regarding potential placement of the different types of tree treatments.

**Tree Planting Methods**

Cost per (1) Tree

Element Type	Type 1- Topsoil/Planter	Type 2 - CU Structural Soil	Type 3- Silva Cells
Deciduous Tree, 2.5" Cal.	\$600	\$600	\$600
Tree Grate (1)	n/a	\$950	\$950
Irrigation (EA)	\$50	\$50	\$50
Imported Topsoil/Compost	\$1,480	n/a	\$1,480
CU Structural Soil	n/a	\$6,296	n/a
Silva Cells (excludes soil)	n/a	n/a	\$6,000
Subsurface Tree Anchoring System	n/a	\$65	\$65
Aeration System	n/a	optional	optional
<b>Probable Costs (per tree)</b>	<b>\$2,130</b>	<b>\$7,961</b>	<b>\$9,145</b>

Silva Cells assume 100 sf at 2x depth for Silva Cells at \$60/sf.

All costs assume pavers, landscaping, etc. are costed with other streetscape items.

CU Structural Soil assumes 74 CY (2,000 cf) per tree for CU Structural Soil at \$85/CY.

All costs assume bubblers for irrigating trees, regardless of adjacent treatment.

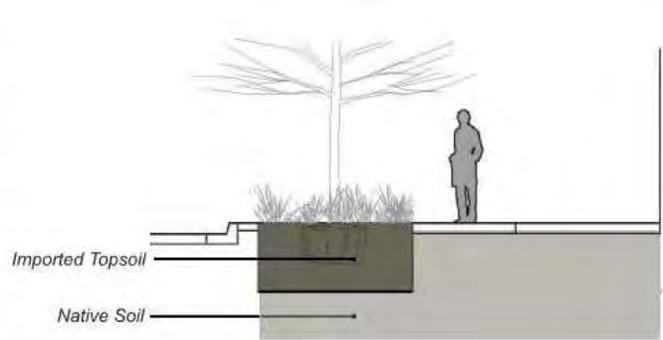
Topsoil assumes 37 CY (1,000 cf) of topsoil per tree, at \$40/CY.

\*Note that continuous Silva Cells allow reducing CY of topsoil per tree to 500 CY/each, since the soil would be connected. Not factored above.

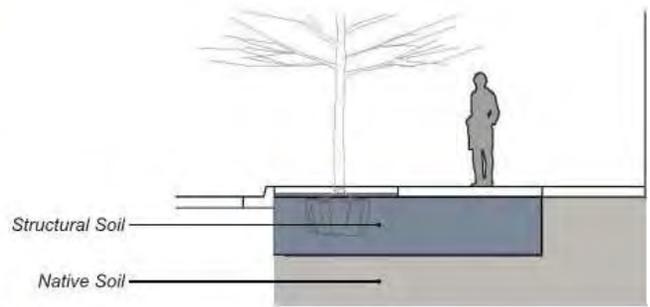
**TABLE 7.5A: Tree Planting Options**



Topsoil



CU Structural Soil



Silva Cells

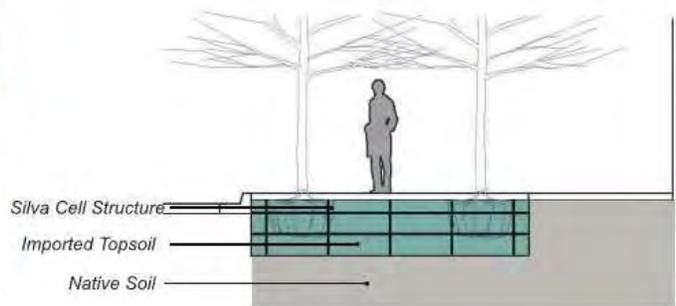


FIGURE 7.5B: TREE PLANTING OPTIONS FOR STREETSCAPES

# PARKING



## 8.0 PARKING

Rapid changes are occurring in downtown Erie, both in its physical landscape and its mobility needs. New businesses, a growing residential base, and an increasing number of visitors are beginning to impact the town's traditional transportation and parking systems.

The Town recently conducted a parking and circulation study ("parking study" to improve parking availability and traffic flow downtown while they explored building an extension of Moffat Street. The resulting Erie Downtown Parking and Circulation Study provides the Town a parking and multi-modal transportation action plan to minimize impacts and maximize the benefits to downtown Erie and the adjacent neighborhoods in a way that is safe, convenient, and compatible with the character of downtown. The five-year plan addresses the transportation and parking challenges facing downtown Erie in a strategic manner, while adhering to the Town's fiscal resources. The goal of the Town is to strike a balance between community livability, economic vitality, and convenient mobility.

### **Parking Study Area:**

The parking study examined downtown Erie and its surrounding neighborhoods. The overall area was generally bound by Evans Street on the north, County Line Road on the west, Balcolm Street on the south, and Coal Creek on the east. The core area of the downtown district analyzed in detail was bound by Evans Street on the north, Holbrook Street to the west, Balcolm Street to the south, and Kattell Street to the east.

The core area has 62% residential, 33% commercial, and 5% civic uses. The core area contains 256 public on-street spaces, 61 public off-street spaces, many in the Erie Town Hall lot, and 214 private off-street spaces, according to Town documents.

Following are key concerns identified by residents and stakeholders during the public outreach effort:

### **Parking and Circulation**

- Community events, such as the farmers' market, burden the public parking supply.
- Parking on Briggs Street is limited and difficult to find.
- New development is slowly consuming the public parking supply.
- Parking demand on Kattell Street is negatively impacting development opportunities.
- The non-mandated cost of parking is a burden to development opportunities in downtown.
- Traffic speeds on Briggs Street are endangering the neighborhood

### **Key findings from the parking study:**

- Downtown intersections operate at an acceptable level (above LOS D). By 2040, the intersection of Briggs Street and Wells Street will likely degrade to a LOS D.
- Parking on portions of Briggs Street exceeds 85 percent (on nights without a special event). However, the side street occupancies are below 55 percent. The data suggests that the community doesn't have a parking deficit, it has a distribution challenge.

Parking Methodology:

The analysis used license plate recognition software to document parking occupancy and durations in the parking study area. Data was collected on two Thursdays and two Saturdays at 8:00 a.m., 11:00 a.m., 2:00 p.m., 5:00 p.m., and 6:00 p.m.

Parking occupancy is the primary measurement in determining parking demand. For both on- and off-street facilities, 85% occupancy is considered at-capacity by the parking industry. Peak parking occurred during the parking study on a Thursday at 6:00 p.m. and exceeded 85% capacity of on-street parking spaces on Kattell, Moffat, Cheesman, and Wells streets. During this peak period, the Erie farmers' market and two baseball games in Coal Creek Park took place. However, neither the total on-street parking (37% occupancy) or the off-street (19 percent occupancy) were stressed during the peak period.

There are no parking time limits in downtown Erie. The parking study showed the average parking duration to be shorter on Thursdays than on Saturdays. Also, the average duration of parking on Briggs Street is under one hour, indicating that parking is used mainly by customers, not employees.

### **Key Findings:**

- There is no parking shortage on Briggs in downtown Erie (likely over-capacity on occasion).
- Special events, such as the farmers' market, create parking challenges.
- On-street spaces are used more than surface lots.
- Parking is a strategic resource that needs to be managed.
- Future development will slowly consume public supply. Current parking surplus allows up to 131,000 square feet of non-residential development (524 on-street spaces = 131,000 square feet at four spaces per 1,000 square feet)

### **Recommendations:**

- **Extend the reach of pedestrians:**  
The parking study recommends that the Town intentionally attempt to extend the reach of the pedestrian to access parking areas with lower occupancies that are less popular before investing in increasing the downtown supply.

Studies from across the U.S. have shown that customers are willing to walk between 300 and 600 feet from parking to their destinations (employees are willing to walk between 1,200 to 1,500 feet from parking). The studies also indicate that people are willing to nearly double the walking distance if they are walking in a high-quality walking environment. Therefore, the most productive parking improvement would be to extend the reach of pedestrians by improving the walking environment. Recommended improvements include streetscape improvements, landscaping, and converting radial crosswalks to directional crosswalks.

- **Introduce four-way stops.**  
Two four-way stops on Briggs Street, at Moffat Street and Wells Street, would address congestion concerns, pedestrian safety, and improving the accessibility of Briggs Street.

- **Manage the parking supply.**  
Two-hour time limits on Briggs Street between Wells Street and Moffat Street, plus a half-block of each of Briggs Street side streets, would increase distribution.
- **Update parking requirements.**  
The Town's current parking regulations do not require non-residential development to provide parking. Creating a parking requirement would increase the parking supply downtown. A performance-based regulation would reduce the parking requirement for new development through good design and use of the best transportation demand management tools, including shared parking, demonstrated community benefits (public spaces), historic preservation, and payment in lieu of parking.
- **Strategically increase parking supply.**  
There is no urgent need to invest in new parking. However, development is slowly consuming existing parking, so it is in the Town's best interest to make strategic investments as opportunities arise. One such example would be to develop lease agreements with private surface lots to secure additional parking for evening and weekend demands in strategic locations.

Downtown Erie's walkable environment contributes to the Town's quality of life and economic development. The parking study warns that, if done improperly, increasing the downtown parking supply through regulation or strategic partnerships could threaten the walkability of the town. Best practices that would minimize the potential impacts on the downtown environment are:

- Limit the size of parking facilities, placing multiple smaller parking lots throughout downtown, rather than a single larger facility.
- Do not allow private parking to front Briggs Street.
- Access all parking from alleys, not streets
- Avoid placing parking on corners
- Buffer parking with landscaping and/or decorative walls up to 30 inches high
- Ensure all parking facilities are properly lighted

### **Parking Structure:**

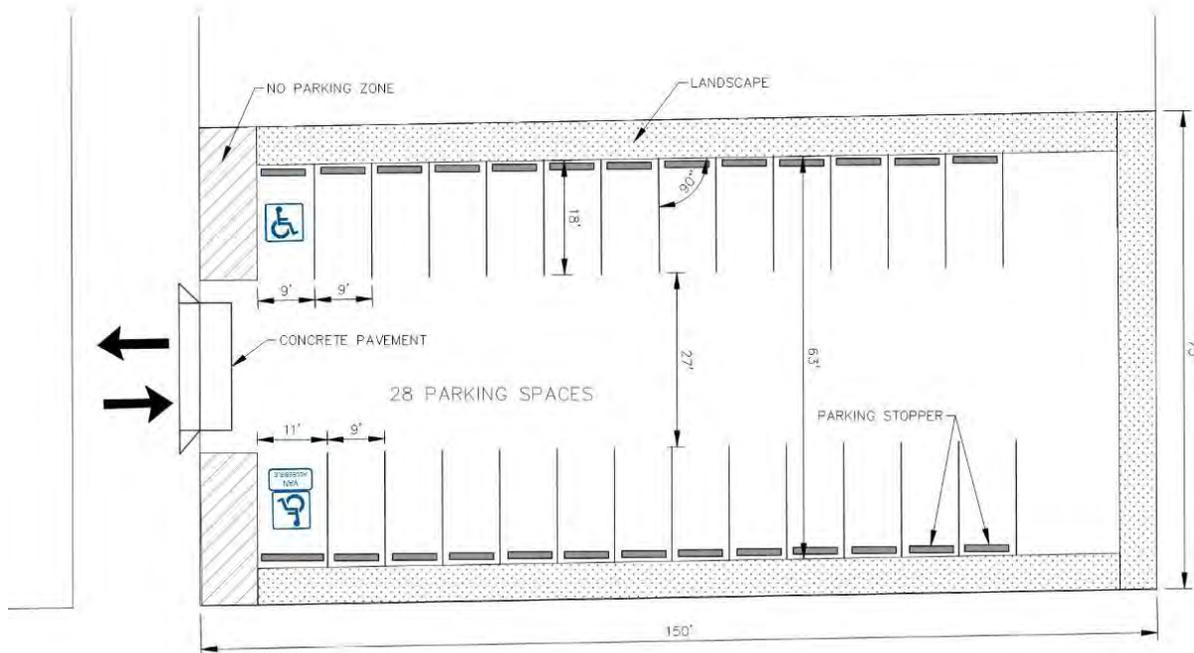
Parking structures can help lessen the load of on-street parking in areas with parking shortages and can provide a safer environment for getting in and out of the car. Although construction of a parking structure is not necessarily recommended for Old Town Erie, the question might arise in discussions about parking solutions. There are many variables to such a project.

Per informal consultation with a Denver regional agency, construction costs for a larger parking structure (approximately 500 spaces) is between \$9,000 and \$12,000 per parking space. Without the economy of having a larger structure, the unit cost would be higher. Determining the number of parking spaces needed would be a task for town planners, although Erie would probably need a smaller parking structure, with 100 spaces or less. In that case, the cost would be estimated to be \$18,000 to \$20,000 per parking space, translating

to \$1.8 million to \$2.0 million to construct a parking structure. This does not include the cost of land acquisition or demolition. Maintenance and rehabilitation costs would be close to five percent per year, and costs for major rehabilitation at the 20-year mark would be the same as the original costs to construct the parking structure (20 years x 5% = 100%).

**Alley Parking Lots:**

Another option is to construct parking lots that can be accessed by alleys. Shown below are two alternatives for parking lots in Old Town Erie. Parking lot area dimensions were taken from average parcel sizes in Old Town. Alternative A (Figure 8.1) shows an example of a parking lot on a smaller parcel in which 90-degree parking spaces are striped in a parcel area of 75 feet-by-150 feet. Vehicles enter the parking lot from the alley. Alternative A provides for 28 parking spaces. The total cost of alternative A parking lot is approximately \$161,000 (see Table 8.1), excluding land acquisition costs.

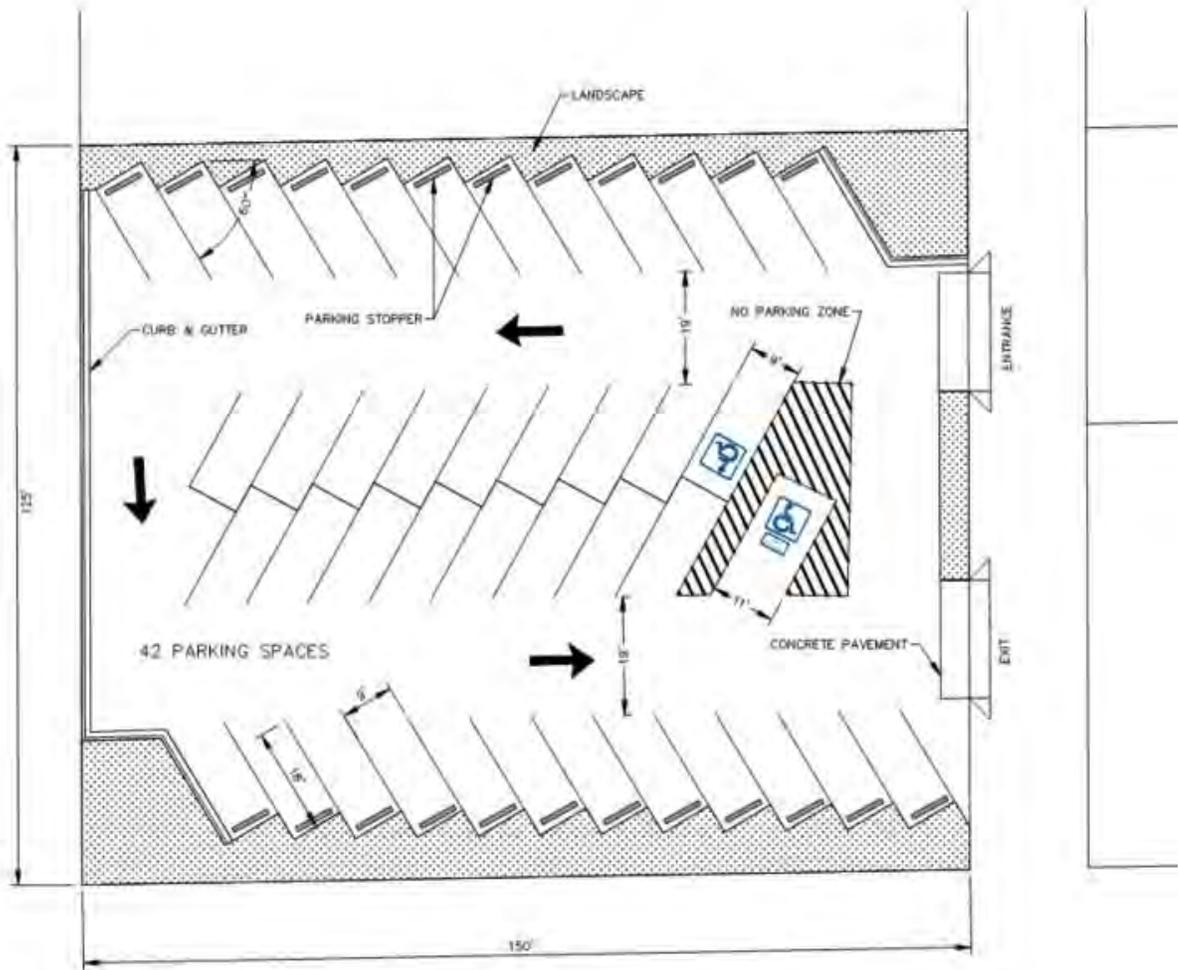


**Figure 8.1: Parking Lot Alternative A**

	Item Number	Item Description	Unit	Estimated Quantity	Unit Cost	Estimated Cost
Parking Lot A Estimate	1	LANDSCAPE	SF	2,050	\$ 10	\$ 21,000
	2	SUBGRADE RECONDITIONING	SY	980	\$ 5	\$ 5,000
	3	AGGREGATE BASE COURSE (4 INCH)	TON	200	\$ 50	\$ 10,000
	4	HOT MIX ASPHALT (6 INCH)	TON	338	\$ 100	\$ 34,000
	5	CONCRETE PAVEMENT (6 INCH)	SY	19	\$ 80	\$ 2,000
	6	PAVEMENT MARKING PAINT	GAL	105	\$ 65	\$ 7,000
	7	PARKING BLOCK	EACH	30	\$ 50	\$ 2,000
<b>SUBTOTAL</b>						<b>\$ 81,000</b>
		MOBILIZATION	LS	10%	\$ 8,000	\$ 8,000
		REMOVALS	LS	5%	\$ 4,000	\$ 4,000
		CONSTRUCTION SURVEY	LS	2%	\$ 2,000	\$ 2,000
		EROSION CONTROL	LS	3%	\$ 2,000	\$ 2,000
		TRAFFIC CONTROL	LS	8%	\$ 6,000	\$ 6,000
		EARTHWORK	LS	2%	\$ 2,000	\$ 2,000
		SIGNING & STRIPING	LS	2%	\$ 2,000	\$ 2,000
<b>CONSTRUCTION SUBTOTAL</b>						<b>\$ 107,000</b>
		DESIGN ENGINEERING	LS	10%	\$ 11,000	\$ 11,000
		CONSTRUCTION MANAGEMENT	LS	10%	\$ 11,000	\$ 11,000
		CONTINGENCY	LS	30%	\$ 32,100	\$ 32,100
<b>TOTAL</b>						<b>\$ 161,000</b>

**Table 8.1: Cost Estimate for Parking Lot Alternative A**

Alternative B (Figure 8.2) illustrates an example of a parking lot located on a larger parcel. This alternative shows one-way angled parking at 60 degrees in a parcel area of 125 feet by 15 feet. Vehicles enter the parking lot from the alley and loop around the parking lot to exit back out into the alley. Angled parking allows parking spaces to fit in a confined area. Another benefit of angled parking is the easy maneuvering of driving into and backing out of a parking spot. This also increases safety for drivers. The total cost of alternative B parking lot is a \$281,000 (see Table 8.2), excluding land acquisition costs.



**Figure 8.2:** Parking Lot Alternative B

	Item Number	Item Description	Unit	Estimated Quantity	Unit Cost	Estimated Cost
Parking Lot B Estimate	1	LANDSCAPE	SF	2880	\$ 10	\$ 29,000
	2	SUBGRADE RECONDITIONING	SY	720	\$ 5	\$ 4,000
	3	AGGREGATE BASE COURSE (4 INCH)	TON	416	\$ 50	\$ 21,000
	4	HOT MIX ASPHALT (6 INCH)	TON	720	\$ 100	\$ 72,000
	5	CONCRETE PAVEMENT (6 INCH)	SY	41	\$ 80	\$ 3,000
	6	PAVEMENT MARKING PAINT	GAL	105	\$ 65	\$ 7,000
	7	CURB AND GUTTER TYPE 2 (SECTION I-B)	LF	163	\$ 30	\$ 5,000
	8	PARKING BLOCK	EACH	24	\$ 50	\$ 1,000
<b>SUBTOTAL</b>						<b>\$ 142,000</b>
		MOBILIZATION	LS	10%	\$ 14,000	\$ 14,000
		REMOVALS	LS	5%	\$ 7,000	\$ 7,000
		CONSTRUCTION SURVEY	LS	2%	\$ 3,000	\$ 3,000
		EROSION CONTROL	LS	3%	\$ 4,000	\$ 4,000
		TRAFFIC CONTROL	LS	8%	\$ 11,000	\$ 11,000
		EARTHWORK	LS	2%	\$ 3,000	\$ 3,000
		SIGNING & STRIPING	LS	2%	\$ 3,000	\$ 3,000
<b>CONSTRUCTION SUBTOTAL</b>						<b>\$ 187,000</b>
		DESIGN ENGINEERING	LS	10%	\$ 19,000	\$ 19,000
		CONSTRUCTION MANAGEMENT	LS	10%	\$ 19,000	\$ 19,000
		CONTINGENCY	LS	30%	\$ 56,000	\$ 56,000
<b>TOTAL</b>						<b>\$ 281,000</b>

**Table 8.2: Cost Estimate for Parking Lot Alternative B**

# FUNDING



## 9.0 FUNDING

### Potential Funding Options

Reliable and resilient infrastructure is often key for economic development and community health. Most local governments fund improvements through local revenues and local government general funds, with supplements from a variety of local, State and Federal programs. The Town requested identification of funds, grants and other avenues for both responding to and preparing for growth and development.

The following table shows identified grant opportunities and associated potential qualifying improvements:

Grant	Brief Description	Potential Improvements
<a href="#"><u>Colorado Renewable and Clean Energy Challenge</u></a>	\$12 million available to fund planning or implementation projects to achieve renewable energy, energy conservation and efficiency goals.	Conversion of street lighting to LED lights.  Installing renewable energy technology on municipal buildings.
<a href="#"><u>Colorado Safe Routes to School Grants</u></a>	Millions available to fund capital projects improvements such as sidewalks, bicycle lane striping, bicycle racks and other amenities making it safer for students to walk and bike to and from school.	Extended curbs and associated landscaping street intersections.  Mobility connections.
<a href="#"><u>Colorado State Historical Fund Grants</u></a>	Thousands of dollars available to fund projects in the areas of acquisition and development, historic structure assessment, surveying, planning and promoting heritage tourism.	Landscape updates.  Building rehabilitation.
<a href="#"><u>Colorado Transportation Alternatives Grants</u></a>	Millions available to fund on- and off-road pedestrian and bicycle facilities, infrastructure projects improving non-driver access to public transportation and community improvement activities.	Roadway pavement improvements.  Recreational trail and mobility connections.
<a href="#"><u>Colorado Water Plan Grants</u></a>	\$1.75 million available to fund projects implementing long-term strategies for conservation, land use, and drought planning.	Water line sizes to buildings or manifolds.  Assessing tap sizes, types, fees and land uses.

<a href="#"><u>Colorado Water Quality Improvement Fund Awards</u></a>	<p>\$1 million available to fund projects improving water quality including planning and/or construction of stormwater or wastewater improvement projects.</p>	<p>Permeable paving. Low impact development (LID) features.</p>
<a href="#"><u>Colorado Water Quality Nonpoint Source Funds</u></a>	<p>\$1 million available to fund projects consistent with 2012 Colorado Nonpoint Source Management Plan and restoring or protecting waterbodies from nonpoint source pollution like pathogens, sediment and/or nutrients.</p>	<p>Storm drainage improvements. Permeable paving.</p>
<a href="#"><u>Community Development Block Grant</u></a>	<p>Millions available to fund non-entitlement municipalities (pop. &lt; 50,000) to carry out community development activities.</p>	<p>Water system improvements. Street trees in Town approved grates.</p>
<a href="#"><u>Energy Efficiency and Conservation Block Grants</u></a>	<p>Billions available to fund a variety of energy conservation and efficiency projects.</p>	<p>Conversion of street lighting to LED lights. Installing renewable energy technology on municipal buildings.</p>
<a href="#"><u>Environmental Protection Agency 319 Grants</u></a>	<p>\$165 million available to fund projects focusing on state and local nonpoint source pollution issues including technical assistance, financial assistance, training, technology transfer and demonstration projects.</p>	<p>Storm drainage improvements. LID features having trees.</p>
<a href="#"><u>Green Infrastructure Federal Funds</u></a>	<p>Millions available to fund many types of green infrastructure projects, that often generate so many benefits they can compete for a variety of diverse funding sources.</p>	<p>Rain gardens. LID features having trees.</p>
<a href="#"><u>Infrastructure for Rebuilding America Grants</u></a>	<p>\$900 million available from US Department of Transportation to fund projects improving transportation infrastructure, economic productivity and quality of life.</p>	<p>Roadway pavement improvements. Extended curbs and associated landscaping street intersections.</p>
<a href="#"><u>US Forest Service Urban and</u></a>	<p>\$9 million available to fund projects strengthening urban tree canopy and</p>	<p>Street trees in Town approved grates.</p>

<a href="#">Community Forestry Challenge Cost Share Grants</a>	goals in the National Ten Year Urban and Community Forestry Action Plan 2016-2026.	LID features having trees.
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Table 9.1 Grant Opportunities and Associated Qualifying Improvements

The following table shows other funding opportunities and associated potential qualifying improvements:

Funding	Brief Description	Potential Improvements
<a href="#">Business Improvement District</a>	Forming a Town of Erie BID could potentially fund construction and maintenance of a variety of public improvement projects.	Extended curbs and associated landscaping street intersections.  Conversion of street lighting to LED lights.
<a href="#">Colorado Commercial Property Assessed Clean Energy Program</a>	C-PACE enables owners of eligible commercial and industrial buildings to finance up to 100% of energy efficiency, renewable energy and water conservation projects.	Water system improvements.  Conversion of street lighting to LED lights.
<a href="#">Grant Management Assistance</a>	eCIVIS assists state, local and tribal governments with grant administration processes and connecting clients to many opportunities including privately funded grants.	Stormwater drainage improvements.  Conversion of street lighting to LED lights.
<a href="#">Revenue Sharing Intergovernmental Agreement</a>	Establishing regional IGA with adjacent municipalities specifically for sharing sales tax generated to pool resources for large and regionally significant infrastructure improvements.	Stormwater drainage improvements.  Transportation system improvements.

Table 9.2 Other Funding Opportunities and Associated Potential

The above funding opportunities provide a variety of potential paths forward for the Town of Erie for grant opportunities. Note that federal grants can require specific procurement processes that might vary from preferred Town procurement policies. Grant opportunities frequently require significant levels of staff time for administration and project documentation. Town assessment of each funding option for contextual appropriateness, associated risks, and potential economic impact is recommended.

# APPENDICES



## APPENDICES

### 2.1 Xcel Energy

Email thread re: cost estimates to underground electric lines  
Agreement for Off-Site Distribution Main Extension for Cheesman Street

### 2.4 Storm Drainage

Erie Old Town Existing Storm Drainage Capacity System Capacity  
(4 Sheets)

Erie Old Town Storm Drainage System Flows (1 Sheet)  
WQ Pond Exhibit 1

### 7.1 Streetscape

#### Table 7.1A – Cost Estimates

Downtown Zone Streetscape Improvements – Cost Breakdown  
(Concept 1: Good)

Downtown Zone Streetscape Improvements – Cost Breakdown  
(Concept 1: Better)

Downtown Zone Streetscape Improvements – Cost Breakdown  
(Concept 1: Best)

#### Table 7.1B – Cost Estimates

NMU Zone Streetscape Improvements – Cost Breakdown  
(Concept 1: Good)

NMU Zone Streetscape Improvements – Cost Breakdown  
(Concept 1: Better)

NMU Zone Streetscape Improvements – Cost Breakdown  
(Concept 1: Best)

## XCEL ENERGY

### Email thread re: cost estimates to underground electric lines

**From:** Carabajal, Lawrence A [<mailto:Lawrence.Carabajal@XCELENERGY.COM>]

**Sent:** Wednesday, April 08, 2020 1:01 PM

**To:** Pietras, Tony <[Tony.Pietras@xcelenergy.com](mailto:Tony.Pietras@xcelenergy.com)>; Ben Pratt <[bpratt@erieco.gov](mailto:bpratt@erieco.gov)>; Wendi Palmer <[wpalmer@erieco.gov](mailto:wpalmer@erieco.gov)>; Todd Fessenden <[tfessenden@erieco.gov](mailto:tfessenden@erieco.gov)>

**Subject:** RE: Erie old Town gas reinforcement

Thanks Tony, that's a great expiation. One other thing is most of the service poles will have to be placed where we have a clear line of site to overhead meter weather head. Many of the property's will have one pole per property. Also the properties will have to be surveyed to determine boundaries this will help us with locating areas where we can set poles and underground equipment. Who will pay the upfront cost for this preliminary work? I have attached a couple of pictures of location where we underground parts of old town Lafayette you can see the service poles and the circled underground equipment . Also remember phone and cable will also have to be undergrounded. Hope this helps.

Thanks

*Lawrence Carabajal*

Xcel Energy | Responsible By Nature

Designer Boulder Design

2655 North 63rd St. Boulder, CO 80301

P: 303-245-2320 C: 303-888-0168 F: 303-245-2230

E: [lawrence.carabajal@xcelenergy.com](mailto:lawrence.carabajal@xcelenergy.com)





**From:** Pietras, Tony

**Sent:** Wednesday, April 08, 2020 9:43 AM

**To:** 'Ben Pratt'; Wendi Palmer; Todd Fessenden; Carabajal, Lawrence A

**Subject:** RE: Erie old Town gas reinforcement

Larry is working on the estimate. The issue you are going to run into is Larry is doing the estimate right now as if the residence and businesses will remain overhead. Simplified basic explanation think one pole per 2 yards or sometimes 4. If you plan on converting services, that quote won't be the same because you will no longer have poles for the services and transformers and you would now have pad mount (ground) transformers and pedestals. So the cost will no longer be accurate. Unless you want him to design it as if you were going to convert every building and if you aren't able to do that he can make some changes before taking payment.

The cost per building is a very rough guess of what I have heard from electricians. Our cost to run the wire goes by footage. Not counting the transformers, pedestals, or distribution wire, but just the wire from the ped to the house for yards those sizes is usually under 1k per house, but Larry may have a more accurate estimate for you. My best advice would be to call two electrician companies and have them ball park it for you. They work pretty closely with building departments and inspectors, so someone in Erie probably has a few good recommendations. We aren't allowed to give recommendations, but a quick google search would show which ones have a solid record.

The building department and inspectors of Erie would determine which buildings would need to be upgraded so they pass current code. If you speak to them, they would be able to tell you how many of those buildings would need to be brought up to code and roughly how much work it would be. For example: If they tell you the house just needs to upgrade their panel and turn it into an underground panel, that may only cost \$5k. If they tell you though that you need to replace all the wiring as it will not handle the new panel, you will be tearing out drywall, rewiring houses, etc... That may cost 20k

per building. I really have no idea as Xcel doesn't work on anything past the meter, but the building department should be able to lay that out for you.

Sorry for the extended email, but hopefully that helps explain it. Let Larry know how you want him to proceed. Thanks

**Tony Pietras**

**Xcel Energy | Responsible By Nature**

Builder Developer Representative

P: 303.628.2708 C: 303-981-6184

E: [BDRCO@XCELENERGY.com](mailto:BDRCO@XCELENERGY.com)

E: [Tony.Pietras@xcelenergy.com](mailto:Tony.Pietras@xcelenergy.com)

[xcelenergy.com/InstallAndConnect](http://xcelenergy.com/InstallAndConnect)

Visit our website for more information about installing and connecting service with Xcel Energy!

**From:** Ben Pratt [<mailto:bpratt@erieco.gov>]

**Sent:** Wednesday, April 08, 2020 8:46 AM

**To:** Wendi Palmer; Todd Fessenden; Pietras, Tony; Carabajal, Lawrence A

**Subject:** FW: Erie old Town gas reinforcement

Greetings All,

If we had a general estimate for each of the residential (I think we said about \$5k per household on average) would be the cost for undergrounding correct? We agree that if we don't underground the residents it would not be worth it, but if we could get a cost of all of it, it would go a long way with the discussions.

Todd, See Tony's comment below. Are there elements of electrical that the town would plan to do? Tony not sure what you mean by this comment regarding inspectors? Are you speaking from a residential connection standpoint?

Thanks everyone!



**Ben Pratt, CEcD**

Town of Erie | Economic Development Director  
645 Holbrook Street | PO Box 750 | Erie, CO 80516  
Phone: 303-926-2769 | Fax: 303-926-2706

***Erie, Colorado - the BEST place to raise a family!***

**From:** Pietras, Tony [<mailto:Tony.Pietras@xcelenergy.com>]

**Sent:** Tuesday, April 7, 2020 12:50 PM

**To:** Carabajal, Lawrence A <[Lawrence.Carabajal@XCELENERGY.COM](mailto:Lawrence.Carabajal@XCELENERGY.COM)>; Ben Pratt <[bpratt@erieco.gov](mailto:bpratt@erieco.gov)>

**Subject:** RE: Erie old Town gas reinforcement

Ben,

Has your group had a chance to look at converting private residence and business electric panels? Larry and I spoke a bit about how the electric was going. It seems that without converting the residence or businesses, the extra poles we would have to set would defeat much of the purpose of undergrounding. After looking more into it, there will be many lift poles that need installed in the alleys. In my personal opinion, I don't think you would be happy with the result of the alleys if we aren't able to convert each residence to underground. My other question would be if you were able to touch base with your building inspectors to see what exactly would need to be done or not by the city. That may help you all tremendously in moving the electric along. Thanks

**Tony Pietras**

**Xcel Energy | Responsible By Nature**

Builder Developer Representative

P: 303.628.2708 C: 303-981-6184

E: [BDRCO@XCELENERGY.com](mailto:BDRCO@XCELENERGY.com)

E: [Tony.Pietras@xcelenergy.com](mailto:Tony.Pietras@xcelenergy.com)

[xcelenergy.com/InstallAndConnect](http://xcelenergy.com/InstallAndConnect)

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**From:** Carabajal, Lawrence A

**Sent:** Tuesday, April 07, 2020 12:36 PM

**To:** [bpratt@erieco.gov](mailto:bpratt@erieco.gov)

**Cc:** Pietras, Tony

**Subject:** Erie old Town gas reinforcement

Ben, as we discussed we have 29 gas services lateral along the route of the new gas reinforcement that will need to be upgraded and tie to the new gas main. Quotes will be for each service lateral and will follow. I did speak to Tony Pietras and Xcel will award the 28% construction allowance for the gas main reinforcement. The documents should be returning back to me shortly. Once I have them I will email to you directly.

Thanks

*Larry Carabajal*

Xcel Energy | Responsible By Nature

Designer Boulder Design

2655 North 63rd St. Boulder, CO 80301

P: 303-245-2320 C: 303-888-0168 F: 303-245-2230

E: [lawrence.carabajal@xcelenergy.com](mailto:lawrence.carabajal@xcelenergy.com)

**OFF-SITE DISTRIBUTION MAIN EXTENSION AGREEMENT (GAS)**

This Off-Site Distribution Main Extension Agreement (the “Agreement”), is dated as of April 7, 2020 (“Contract Origination Date”), by and between Public Service Company of Colorado, a Colorado corporation, d/b/a Xcel Energy (the “Company”) and TOWN OF ERIE (the “Applicant”). Applicant and Company are hereinafter sometimes referred to individually as a “Party” and collectively as the “Parties.” This Agreement is subject to the Company’s Natural Gas Service Distribution Extension Policy (the “Policy”) within Company’s natural gas tariff (the “Tariff”) and to the entirety of Company’s Tariff, as amended from time to time, and such Policy and Tariff are each incorporated herein by reference. The Policy and Tariff are available for inspection at the Colorado Public Utilities Commission and on Company’s website. Any capitalized term in this Agreement that is not expressly defined herein shall have the meaning set forth in the Policy or Tariff.

**This Agreement sets forth the terms and conditions for the design, construction, installation, and payment for the Off-Site Distribution Main Extension (as defined herein), including without limitation the calculation of the Construction Payment to be paid by Applicant. Subject to the exceptions set forth herein and in the Policy and Tariff, the cost responsibility of Applicant will be based upon Company’s estimate of the cost of constructing and installing the facilities necessary to adequately supply the Off-Site Distribution Main Extension requested by Applicant, less an Off-Site Distribution Main Extension Credit. The Construction Payment shall be non-refundable as of the date that construction commences. For avoidance of doubt, this Agreement shall not be available for an applicant that is an LDC Customer.**

List of Exhibits	Included
Contingency List	Yes
Cost Estimate Worksheet	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Frost and Ground Thawing Agreement	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Non-LDC Customer Compressor Station Addendum	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

1. Service. Applicant has requested and Company has agreed that Company will design, construct, and install the necessary Off-Site Distribution Main Extension to provide natural gas service to serve CHEESEMAN in the City or Town of ERIE in the County of Boulder in the State of Colorado (“Service”). Such Service will have the following characteristics:

Category	Applicability
Type of Service	<input checked="" type="checkbox"/> Permanent <input type="checkbox"/> Indeterminate <input type="checkbox"/> Temporary

2. Service Class of Applicant. Applicant [ is /  is not] a Governmental Entity. In accordance with the Policy and the Tariff, the Applicant shall accept Service under the following Service Class(es):

SERVICE CLASS	APPLICABILITY
<b>RESIDENTIAL</b>	
Schedule RG	<input type="checkbox"/>
<b>COMMERCIAL</b>	
Schedule CSG	<input type="checkbox"/>
Schedule CLG	<input type="checkbox"/>
<b>INTERRUPTIBLE</b>	
Schedule IG	<input type="checkbox"/>
<b>TRANSPORTATION</b>	
Schedule TFS	<input type="checkbox"/>
Schedule TFL	<input type="checkbox"/>
Schedule TI	<input type="checkbox"/>

3. Associated Agreements. Except as expressly set forth in this Agreement, this Agreement does not encompass any engineering design, facilities, costs, or payments that may be specified in the associated On-Site Distribution Extension Agreement, the Residential Service Lateral Agreement, or the Commercial Service Lateral Agreement that may be entered into by the Parties and that are associated with the provisions of Service hereunder (collectively, the “Associated Agreements”). The Parties acknowledge that such additional engineering design, facilities, costs, or payments specified in the Associated Agreements may be necessary to fully effectuate the provision of Service contemplated herein, and the engineering design, facilities, costs, and payments with respect to those Associated Agreements will be calculated and contracted for separately from this Agreement.
  
4. Engineering Design of Off-Site Distribution Main Extension. Based on the information provided by Applicant, Company has completed an engineering design and cost estimate to construct and install the facilities necessary to adequately supply the requested Off-Site Distribution Main Extension. The facilities described below do not encompass any engineering design or facilities identified in the Associated Agreements. Company’s engineering design for the Off-Site Distribution Main Extension includes the following:

Category*	Project-Specific Information
Point of Interconnection between Off-Site Distribution Main Extension with Company’s system or, as applicable, system of other pipeline company	
Point of Interconnection between Off-Site Distribution Main Extension facilities and On-Site Distribution Extension facilities	
<b>ADDITIONAL CIRCUMSTANCES**</b>	
Reinforcements (if any)	
Excess Facilities (if any)	
Uneconomic Extensions (if any)	
New Compressor Station or Increased Pressure At An Existing Compressor Station	
Other Considerations/Special Items (if any)	
* An Off-Site Distribution Main Extension may include a Transmission Main as determined by Company in its reasonable discretion.	
** Additional considerations for the following special circumstances, including cost calculation requirements, are set forth in the Policy and Tariff: Reinforcements; Excess Facilities; Uneconomic Extensions; and new Compressor Station or increased pressure at an existing Compressor Station. Such additional circumstances may require execution of additional ancillary agreements.	

Applicant acknowledges that, in the event that other utilities or facilities will be installed jointly with the Off-Site Distribution Main Extension, Applicant shall arrange for the installation of and payment for any such facilities with the local telephone company, the local cable television company, or any other utility company, as applicable.

5. Construction Obligations; Permit Obligations. Applicant shall comply with all construction obligations, as those obligations are set forth in the Contingency List. The Agreement and all Associated Agreements are contingent upon acquisition of all required permits and approvals, as those permits and approvals are set forth in the Contingency List.

6. Estimated Construction Cost.
- a. In General. The estimated cost of all facilities necessary to construct and install the Off-Site Distribution Main Extension is calculated in accordance with the Policy and the Tariff (the “Estimated Construction Cost”). The Estimated Construction Cost may include, without limitation, the estimated cost of all materials, labor, rights-of-way, trench and backfill in non-rock conditions or in known rock conditions, and permitting, together with all incidental and overhead expenses connected therewith. “Trench and backfill in rock conditions” shall include any construction activities that require the use of special construction techniques or special equipment.
  - b. Special Provisions for Reinforcement. Any required Reinforcement other than for an LDC Customer shall generally recognize the provisions of the Policy in accordance with individual agreements between Applicant and Company based upon the amount, character, and permanency of the load. Where gas distribution system Reinforcement is required for serving an existing customer’s gas service from Company, Company shall make such Reinforcement of the distribution system as follows:
    - i. Residential/Small Commercial Customers. If Applicant is a residential or small commercial customer that receives service under a rate schedule for which the Construction Allowance is not based on the Peak Day Quantity (PDQ), related to its total load requirements (see Section 2 above), Company may make such Reinforcements at Company’s expense.
    - ii. Transportation Customers. If Applicant receives service under a rate schedule for which the Transportation Credit is based on PDQ, such Reinforcement shall be an Off-Site Distribution Main Extension where the Construction Cost shall include Company’s cost to reinforce the system, as well as the cost of new Distribution Extension Facilities necessary to serve the Customer’s total load, less the applicable Transportation Construction Allowance for the added load.
    - iii. New Residential or Commercial Development. For purposes of this section, all Reinforcement for new residential or commercial development shall be considered non-residential and Applicant shall be responsible for Reinforcement costs.
    - iv. New Residential Single Customer. In the event that the Reinforcement is required only to serve a new residential customer’s gas service for a single lot that is not part of a proposed new residential or commercial development, as shown on a final plat approved by Company, Company may make such Reinforcement at its expense, not including any applicable Residential Service Lateral costs.
  - c. Compressor Station. In the event that Company determines that Applicant (who is not an LDC Customer) requires either a new Compressor Station or increased pressure at an existing Compressor Station that requires the installation of one or more additional compressor(s) for Permanent Service, such incremental Compressor Station costs attributable to Applicant may be included in the Off-Site Distribution Main Extension or Reinforcement, less the Transportation Construction Allowance, as applicable. In such an event, the calculation of the Estimated Construction Cost, Construction Payment and the terms of payment shall be as set forth in the Non-LDC Customer Compressor Addendum.
  - d. Special cost calculation considerations affecting the total Estimated Construction Cost, including for any Reinforcement or Compressor Station (whether new or existing), Excess Facilities, or Uneconomic Extensions, may be included in the Cost Estimate Worksheet, or in the Non-LDC Customer Compressor Station Addendum, and additional terms and conditions are provided in the Policy and the Tariff.
  - e. The Estimated Construction Cost is: \$640,704.34

7. Calculation of Total Credit: Off-Site Distribution Main Extension Credit, Excess Construction Allowance, and Transportation Credit.

- a. Off-Site Distribution Main Extension Credit/Excess Construction Allowance. The Off-Site Distribution Main Extension Credit and the excess Construction Allowance are each calculated as provided by this Agreement, the Associated Agreements, the Policy, and the Tariff. The Off-Site Distribution Main Extension Credit is a twenty-eight percent (28%) credit applied to Applicant’s Estimated Construction Costs for the Off-Site Distribution Main Extension. **The Off-Site Distribution Main Extension Credit is available if Permanent Service or Indeterminate Service is designated, but is not available if Temporary Service is designated** (see Section 1 above).

To the extent there is excess Construction Allowance arising out of and pursuant to an associated On-Site Distribution Extension Agreement by and between the same Parties as this Agreement and for the purpose of effectuating the same Service as contemplated hereunder, then the Off-Site Distribution Main Extension Credit, as applicable, shall be applied only after the excess Construction Allowance has been first applied. In no event shall the total amount credited to Applicant exceed the total Construction Payment made by Applicant.

The calculation of the Off-Site Distribution Main Extension Credit is as follows:

Line	Calculation of Off-Site Distribution Main Extension Credit*	Amount
1	Estimated Construction Cost (see Section 6 above)	\$640,704.34
2	Excess Construction Allowance from On-Site Distribution Extension requested by the same Applicant (if applicable)** (as calculated in accordance with Applicant’s Associated On-Site Distribution Extension Agreement)	\$0.00
3	Subtract Line 2 from Line 1	\$640,704.34
4	Multiply Line 3 by 28%	(x 28%)
5	<b>Off-Site Distribution Main Extension Credit</b>	<b>\$179,397.22</b>
<p>* <b>The Off-Site Distribution Main Extension Credit is not available if Temporary Service is designated</b> (see Section 1 above).  ** <b>The Excess Construction Allowance is not available if Indeterminate Service or Temporary Service is designated</b> (see Section 1 above).</p>		

- b. Calculation of Total Credit. The calculation of the Total Credit for this Agreement is as follows:

Line	Calculation of Total Credit	Amount
1	Excess Construction Allowance as set forth in Line 2 above (if applicable)**	\$ 0.00
2	Off-Site Distribution Main Extension Credit as set forth in Line 5 above (if applicable)*	\$179,397.22
3	<b>TOTAL CREDIT (Sum of Lines 1 &amp; 2)</b>	<b>\$179,397.22</b>
<p>* <b>The Off-Site Distribution Main Extension Credit is not available if Temporary Service is designated</b> (see Section 1 above).  ** <b>The Excess Construction Allowance is not available if Indeterminate Service or Temporary Service is designated</b> (see Section 1 above).</p>		

8. Transportation Construction Allowance. The terms for the award of the Transportation Construction Allowance, if applicable, are as provided for by this Agreement, the Policy, and the Tariff. The Transportation Construction Allowance is calculated on a per dekatherm demand basis and such amounts for each of the various classes of service are listed in the Policy on the sheets entitled Construction Costs and Credits.

To the extent applicable, the calculation of the Transportation Construction Allowance is as follows:

A	B	C	D	E
Line	Service Class and Rate Schedule	Total Amount of Dekatherm Demand	Construction Allowance	Amount
1	Schedule TFS	0.0	\$4.52/Dth	\$ 0.00
2	Schedule TFL	0.0	\$3.43/Dth	\$ 0.00
3	Schedule TI	0.0	\$0.98/Dth	\$ 0.00
4	<b>TRANSPORTATION CONSTRUCTION ALLOWANCE (Sum of Lines 1 – 3)*</b>			<b>\$ 0.00</b>
*Note: The Distribution Main portion of the Construction Allowance will be reduced at the same percentage that the Transportation Charge is discounted.				

9. Construction Payment.
- a. Permanent Service. If the Off-Site Distribution Main Extension is designated to provide Permanent Service (see Section 1 above), then Applicant shall pay to Company as a Construction Payment an amount equal to the Estimated Construction Cost (as set forth in Section 6 above), less the Total Credit, as applicable (as set forth in Section 7 above) and less the Transportation Construction Allowance, as applicable (as set forth in Section 8 above), such payment amount subject to Company’s approval, not to be unreasonably withheld.
  - b. Indeterminate Service. If the Off-Site Distribution Main Extension is designated to provide Indeterminate Service (see Section 1 above), then Applicant shall pay to Company as a Construction Payment an amount equal to the Estimated Construction Cost (as set forth in Section 6 above), less the Off-Site Distribution Main Extension Credit, as applicable (as set forth in Section 7 above), such payment amount subject to Company’s approval, not to be unreasonably withheld.
  - c. Temporary Service. If the Off-Site Distribution Main Extension is designated to provide Temporary Service (see Section 1 above), then Applicant shall pay to Company as a Construction Payment an amount equal to the estimated cost of installing and removing all necessary Off-Site Distribution Main Extension facilities, such payment amount subject to Company’s approval, not to be unreasonably withheld.
  - d. Calculation of Construction Payment. The Construction Payment under this Agreement is calculated as follows:

Line	Category	Amount
1	Total Estimated Construction Cost (see Section 6 above)	\$ 640,704.34
2	Total Credit (see Section 7 above) and	\$179,397.22
3	Transportation Construction Allowance (see Section 8 above)	\$ 0.00
4	Add Lines 2 and 3	\$179,397.22
5	<b>Line 1 minus Line 4: CONSTRUCTION PAYMENT (If value is a negative number, enter \$0.)</b>	<b>\$461,307.12</b>

- e. **For non-Governmental Entities** (see Section 2 above). Payment of the Construction Payment shall be made within sixty (60) days of the Contract Origination Date. The Construction Payment shall be non-refundable to Applicant as of the date that construction commences on the Off-Site Distribution Main Extension.
  - f. **For Governmental Entities** (see Section 2 above). To the extent allowable by law, payment may be made in accordance with Section 9.e, or governmental Applicant may elect to have Company advance the Construction Payment for the duration of the construction period as follows: Company shall charge the governmental Applicant interest applied to the Construction Payment amount for the applicable construction period at the Company's Allowance For Funds Used During Construction (AFUDC) rate. Company shall bill Applicant for the Construction Costs and the interest within thirty (30) days after the Extension Completion Date. Applicant shall pay Company within ninety (90) days after the Extension Completion Date.
10. **Surcharges.** Surcharges in excess of the Construction Payment may be assessed for items not otherwise accounted for or incorporated into the original Off-Site Distribution Main Extension or Construction Payment, including without limitation any Applicant-associated delays; obstructions; permit fees; or any special item required to meet construction conditions, including but not limited to Frost Conditions and rock conditions. Company shall separately invoice Applicant for any surcharges as a non-refundable contribution in aid of construction or in accordance with the terms of any separate ancillary agreement, and such invoice shall be paid by Applicant no later than thirty (30) days following the invoice date.
11. **Construction in Frost Conditions.** Applicant [ **authorizes** /  **does not authorize**] Company to perform construction activities in Frost Conditions.
- For the purpose of this Agreement, "Frost Conditions" exist if ground frost conditions deeper than six (6) inches are encountered at the time of installation of the Distribution Extension Facilities. Applicant is encouraged to have a representative present during Company's trenching operation to confirm frost depth.
- If Applicant authorizes Company to perform construction activities in Frost Conditions, then Applicant agrees to pay, as applicable, the Frost Condition Fees, Ground Thawing Fees, or additional fees, as set forth in the Frost and Ground Thawing Agreement, which shall be incorporated herein by reference.
- If Applicant does not authorize Company to perform construction activities in Frost Conditions, then Applicant acknowledges that Applicant's project may be delayed until Frost Conditions have ceased and there is no further chance of encountering frost.
12. **Circumstances Requiring a New Agreement.** If Company reasonably determines that design changes made either prior to construction or in the field exceed the scope of this Agreement, this Agreement shall be terminated and a new agreement may be entered into in accordance with the new project scope. If and only if a new agreement is executed by the Parties for a replacement project, any amounts already paid by Applicant as a Construction Payment, may, at Company's sole reasonable discretion, be either refunded to Applicant or carried over and netted against any newly calculated Construction Payment, less reasonable charges to account for the project scope change.

13. Right-of-Way Agreement. Applicant agrees to execute Company's standard right-of-way agreement granting, free of charge to Company, any rights-of-way upon, over, or under Applicant's property that may be required for Company to provide Service hereunder; and to obtain from other persons or entities as may be required such other rights-of-way, free of charge and on terms satisfactory to Company. Applicant acknowledges that Company's ability to perform under this Agreement is contingent upon obtaining any and all rights-of-way from Applicant and from other persons or entities, as necessary. Company shall not be required to expend more than commercially reasonable efforts to assist Applicant in the acquisition of any third-party rights-of-way. All necessary rights-of-way must be provided to Company at least ten (10) days prior to the commencement of construction.
14. Conditions to Company Work Order, Scheduling, and Construction Commencement. The Parties acknowledge that Company shall not be obligated to issue a work order, release for scheduling, or commence construction of the Off-Site Distribution Main Extension unless and until the following requirements have been satisfied:
- a. execution by Applicant of this Agreement and all Associated Agreements, and of any other Exhibits and ancillary agreements, as applicable;
  - b. receipt by Company of the applicable Construction Payment(s) under this Agreement, under all Associated Agreements, and under any ancillary agreements;
  - c. receipt of load information plats and any other information required by Company to calculate Company's estimate of Applicant's load and to determine the appropriate facilities necessary under this Agreement, the Associated Agreements, and any ancillary agreements;
  - d. receipt of confirmation from Applicant that Applicant has satisfied all construction obligations as set forth in Section 5 above, and in the Contingency List, such obligations subject to Company's approval, with such approval not to be unreasonably withheld.

Upon the acceptance of the terms and conditions of this Agreement, Applicant must return all applicable documents to Public Service Company of Colorado, at the address provided on the signature page of this Agreement.

15. Estimated Installation Timeframes.
- a. Time to Accept Agreement. The Estimated Construction Cost and Construction Payment set forth herein shall be effective for sixty (60) days from the Contract Origination Date. Should Applicant fail to execute and return this Agreement to Company and pay the Construction Payment within those sixty (60) days, Company's offer shall be deemed revoked and Applicant may request that Company re-calculate the Estimated Construction Cost and Construction Payment. Notwithstanding the foregoing, the Parties may agree to extend the time period for Applicant to execute the Agreement on a date subsequent to the sixty (60)-day period, such extension period not to exceed ninety (90) days from the Contract Origination Date.
  - b. Time to Complete Conditions. If Applicant fails to satisfy all conditions identified in Sections 5, 13, and 14 within sixty (60) days of Applicant's execution of the Agreement, Company reserves the right to re-calculate the Estimated Construction Cost and Construction Payment, and this Agreement may be terminated and may be replaced with a new agreement. Notwithstanding the foregoing, the sixty (60)-day period to complete the conditions identified in this subsection shall be tolled during any winter or other construction moratorium period implemented by a jurisdictional governmental entity.
  - c. Estimated Time to Complete Construction. Applicant shall be notified of which week construction is scheduled to begin. Company shall make all reasonable efforts to complete construction within one hundred twenty (120) days under normal circumstances and conditions. The one hundred twenty (120)-day construction period shall not commence until Company certifies that Applicant has complied with all conditions identified in Sections 5, 13, and 14 ("Company Certification"). Notwithstanding

the foregoing, the one hundred twenty (120)-day period to complete construction shall be tolled during any winter or other construction moratorium period implemented by a jurisdictional governmental entity, emergency system condition, extreme weather event, period of construction delay attributable to Frost Conditions, rock conditions, or other unanticipated construction condition, or unanticipated scheduling conflicts.

Any portion of this Off-Site Distribution Main Extension that is not completed in a normal manner, that is, by following accepted construction practices, within one hundred twenty (120) days after the Company Certification, shall be struck from this Agreement, and the Construction Payment shall be updated accordingly.

If the failure to complete construction within the one hundred twenty (120)-day construction period is caused solely by Company, the uncompleted portion of the Off-Site Distribution Main Extension shall not be struck from this Agreement; Applicant's Construction Payment shall become interest bearing; and Company shall pay interest to Applicant at the rate Company currently pays on residential security deposits. Notwithstanding the foregoing, Company shall not be required to pay interest to Applicant if Company's performance under this Agreement is delayed on account of circumstances that are outside of Company's reasonable control, including without limitation, construction moratoria; emergency system conditions; extreme weather events; periods of construction delay attributable to Frost Conditions, rock conditions, or other unanticipated construction condition; or unanticipated scheduling conflicts.

- d. Status Updates on Construction Progress. Company shall provide periodic status updates to Applicant throughout the construction process and shall promptly notify Applicant if Company is reasonably certain that Company will require an extension of the estimated installation timeframe. Applicant may direct any questions regarding the status of the Off-Site Distribution Main Extension to Company by contacting the Company representative by telephone or e-mail.
16. Ownership. The facilities constructed under the terms of this Agreement on the gas supply side of the Point of Delivery shall be, at all times, the property of Company. The Point of Delivery is the point where Company's gas facilities are first connected to the gas facilities of the customer. The location of the Point of Delivery will be determined by Company in accordance with standard practice or as individual circumstances may dictate as set forth by the Company.
17. Lien Waiver Prohibited. Applicant acknowledges that the Tariff prohibits Company from accepting payment with any sort of lien waiver. Accordingly, Applicant agrees that any attempt to create a lien waiver in such manner (including by any printed or stamped lien waiver on a check) shall be ineffective and void.
18. Insurance. Applicant shall purchase and maintain such insurance as shall protect Applicant and Company from claims that may in any way arise out of or be in any manner connected with the performance of the Agreement, whether such claims arise out of the act or failure to act of Applicant, Company, their respective contractors or subcontractors, or of the direct or indirect delegate, appointee, or employee of either.
19. Indemnification. This Section 19 applies only if Applicant is **not** a Governmental Entity. Each Party (the "Indemnifying Party") shall indemnify, defend, save, and hold harmless the other Party, its affiliates, and their respective directors, officers, employees, contractors, representatives and agents (each an "Indemnified Party") from any and all claims, demands, liabilities, damages, losses, actions, suits or judgments, fines, penalties, costs and expenses (including, without limitation, court costs, expert witness fees, and attorneys' fees) (collectively, "Losses") resulting from an injury to person or persons (including death) or damage to property arising out of or related to this Agreement to the extent caused by: a default under, or a failure to perform in accordance with the terms of, this Agreement by the Indemnifying Party; a violation or alleged violation of applicable laws by the Indemnifying Party; or the negligence, intentional acts or omissions, or other misconduct of the directors, officers, employees, contractors, representatives, agents or other person or entity acting on behalf of the Indemnifying Party. Applicant shall indemnify,

defend, and hold Company harmless from and against all Losses arising out of or related to environmental conditions at the project site or the on-site or off-site management, transportation, storage, disposal, or exacerbation of contaminated soils, water, groundwater, or vapors encountered by Company at the project site. In respect of an indemnity obligation of a Party hereunder resulting from an injury to person or persons (including death) or damage to property, no Party shall be liable hereunder for an amount greater than that represented by the degree or percentage of the negligence or fault attributable to such Party that produced the injury or damage giving rise to indemnity obligation.

The Parties agree that the foregoing indemnity obligations shall be in addition to any insurance obligations herein and shall not be limited in any way by the amount of any insurance required hereunder. Further, these indemnity obligations shall not be construed to relieve any insurer of its obligation to pay claims consistent with the provisions of a valid insurance policy. Nothing in this Section shall enlarge or relieve either Party of any liability or obligations to the other for any breach of this Agreement.

20. Limitation of Liability. Neither Party shall be liable to the other Party for any special, incidental, indirect, punitive, or consequential loss or damage whether or not such loss or damage is caused by the fault or negligence of the Party, its employees, agents, or subcontractors. This exclusion of liability for special, incidental, punitive, or consequential loss or damage applies to loss of profits or revenue, costs of capital, loss of use of equipment or facilities, cost of purchased or replacement power or claims of customers due to loss of service. This exclusion does not apply to indemnification claims arising out Section 19 above, or if the Agreement is terminated for default pursuant to the Agreement.
21. Disclaimer. Where natural gas service is to be supplied by Company from a transmission main that is not a Company-owned Transmission Main, all requests for such service are subject to the approval of the pipeline company owning the particular transmission main and to the rules of such pipeline company pertinent to the location of the transmission main, tap, etc. Company also reserves the right to limit the location and number of or to reject applications for service requiring transmission main taps. Company is not responsible for the continued delivery of gas to customers served therefrom should the pipeline company reroute, abandon, or otherwise discontinue use of the transmission main or should operating conditions be so changed as to make the supplying of service directly therefrom too hazardous, difficult or impractical, in opinion of Company, to be continued.
22. No Partnership or Agency. This Agreement shall not be interpreted to create an association, joint venture, or partnership between the Parties nor to impose any partnership obligation or liability upon either Party. Except as specifically provided for in this Agreement to the contrary, neither Party shall have any right, power, or authority to enter into any agreement or undertaking for, or act on behalf of, or to act as an agent or representative of, the other Party. In no way is this Agreement, or Company's actions pursuant to this Agreement, to be construed to deem Company an agent of Applicant in any manner whatsoever.
23. Assignment. Applicant may not assign this Agreement without the prior written consent of Company.
24. Governing Law. The interpretation and performance of this Agreement and each of its provisions will be governed and construed in accordance with the laws of the State of Colorado, exclusive of conflict of laws principles. The Parties submit to the exclusive jurisdiction of the state courts of the State of Colorado, and venue is hereby stipulated as Denver or such other city as mutually agreed to by the Parties.
25. Exhibits. The Exhibits to this Agreement are hereby incorporated in this Agreement by reference and constitute a part of this Agreement.
26. Merger. This Agreement and the exhibits attached hereto, constitute the entire agreement between the Parties relating to the subject matter herein. There are no other provisions, terms, or conditions to this Agreement, whether written or oral, and all prior or contemporaneous agreements with respect to the subject matter herein are superseded by this Agreement.
27. Binding Effect. This Agreement is binding upon and shall inure to the benefit of the Parties hereto and their respective successors, legal representatives, and assigns.

28. Third Party Beneficiaries. No provision of this Agreement shall in any way inure to the benefit of any third person so as to make any such person a third party beneficiary of this Agreement.
29. Severability. In the event any words, phrases, clauses, sentences, or other provisions hereof are invalid or violate any applicable law, such offending provision(s) shall be ineffective to the extent of such violation without invalidating the remainder of this Agreement, and the remaining provisions of this Agreement shall be construed consistent with the intent of the Parties hereto as closely as possible, and this Agreement, as reformed, shall be valid, enforceable, and in full force and effect.
30. Headings. The headings of Sections of this Agreement are for guidance and convenience of reference only and will not limit or otherwise affect any of the terms or provisions of this Agreement.
31. Counterparts. This Agreement may be executed in counterparts and each executed counterpart will have the same force and effect as an original instrument.
32. Amendment. This Agreement may not be amended except by written agreement between the Parties.
33. Term and Termination. This Agreement is effective on the Parties as of later of the Contract Origination Date or the date upon which both Parties execute the Agreement, and will terminate upon notice by Company to Applicant that (a) Applicant has failed to fulfill a condition precedent to Company's work as set forth in this Agreement; or (b) the Parties have satisfied all obligations as set forth in this Agreement. Sections 3, 16, 17, 18, 19, 20, 23, 24, 25, 26, 27, 28, 31, 32, 33 of this Agreement shall survive the termination of this Agreement.

**[SIGNATURE PAGE FOLLOWS]**

Applicant has reviewed and approved the terms and conditions of this Off-Site Distribution Main Extension Agreement (Gas) and accepts the cost of the Construction Payment of \$461,307.12 as calculated in Section 9. Applicant understands additional charges may arise in accordance with the Policy, Tariff, and Agreement. Applicant will send to Company an original signed copy of this Agreement together with any applicable ancillary agreements, Associated Agreements, or documents, as applicable.

Contract Origination Date: April 7, 2020

**IN WITNESS WHEREOF**, duly authorized representatives of the Parties have executed this Off-Site Distribution Main Extension Agreement (Gas).

Company Representative	
Print Name: <u>Lawrence Carabajal</u> Title: Designer Thereafter Signature: _____ Date: April 7, 2020	Mailing address: Xcel Energy 2655 NORTH 63RD STREET Boulder, CO 80301 Phone: <u>303-245-2320</u> Email address: <u>Lawrence.Carabajal@XCELENERGY.COM</u>
Applicant	
Print Name: _____ Title: _____ Signature: _____ Date: _____	Mailing address: TOWNOF ERIE _____ _____ Phone: _____ Email address: _____
Company Authorization	
Name: Paige Wagner-Maul Title: Director Design and Construction Signature: <u>Paige Wagner-Maul</u> Date: <u>4/7/20</u>	

**[SIGNATURE PAGE TO OFF-SITE DISTRIBUTION MAIN EXTENSION AGREEMENT (GAS)]**

## STORM WATER DRAINAGE

Erie Old Town Existing Storm Drainage System Capacity

Description/Location	Upstream Design Point	Downstream Design Point	Size (inches)	Invert Elevation (Upstream)	Invert Elevation (Downstream)	Length (ft)	Slope (ft/ft)	CAPACITY (cfs)
PERRY ST LATERAL TO PIERCE ST	INLET PY-14R	INLET PY-14L	15	5018.5	5018.18	33.3	0.010	6.33
	INLET PY-14L	MH PY-12L	18	5017.93	5016.44	150.9	0.010	10.92
PIERCE LATERAL FROM PERRY ST TO CARR ST	MH PY-12L	MH PR-703R	18	5014.74	5013.63	250.9	0.004	6.99
	MH PR-703R	INLET PR-704R	18	5013.26	5011	152.1	0.015	12.8
	INLET PR-704L	INLET PR-704R	15	5016.65	5016.4	33	0.008	5.62
	INLET PR-704R	MH I-4	18	5013.51	5013.3	17.9	0.012	11.38
CARR ST LATERAL FROM BRIGGS TO PIERCE ST	INLET CR-19L	INLET CR-19R	15	5017.33	5016.87	33	0.014	7.63
	INLET CR-19R	MH I-5	24	5013.97	5013.74	38.7	0.006	17.44
	INLET BG-804R	MH I-5	15	5016.82	5016.53	18.2	0.016	8.15
	MH I-5	INLET CR-18R	24	5013.6	5012.32	229.2	0.006	16.9
	INLET BG-804L	UNKNOWN	15	5015.18	-	18.7	-	-
	INLET CR-18L	INLET CR-18R	15	5015.7	5015.12	32.9	0.018	8.58
	INLET CR-18R	MH I-4	24	5012.32	5012.25	109.4	0.001	5.72
PIERCE ST LATERAL FROM CARR TO ANDERSON	MH I-4	INLET PR-708R	30	5012.15	5010.95	436.6	0.003	21.5
	INLET PR-708R	MH I-6	30	5011	5010.96	18.3	0.002	19.18
ANDERSON LATERAL TO PIERCE (WEST)	INLET AN-8L	INLET AN-8R	15	5016.9	5014.8	33	0.064	16.29
	INLET AN-8R	INLET PR-708L	15	5012.6	5012.15	21.5	0.021	9.35
	INLET PR-708L	INLET PR-708R	15	5012.1	5012.1	33.3	0.000	-
ANDERSON LATERAL FROM BRIGGS ST TO PIERCE ST	INLET AN-13L	INLET AN-13R	15	5015.43	5013.85	33.1	0.048	14.11
	INLET AN-13R	MH I-6A	24	5011.4	5011.36	16.3	0.002	11.21
	MH I-6A	INLET AN-12R	24	5011.3	5011.22	88.9	0.001	6.79
	INLET AN-12L	INLET AN-12R	15	5014.7	5013.57	33	0.034	11.95
	INLET AN-12R	MH I-6	24	5011.27	5010.96	298.1	0.001	7.29
BRIGGS LATERAL TO ANDERSON (SOUTH)	INLET BG-809L	INLET BG-809R	15	5015.82	5015.27	41.1	0.013	7.47
	INLET BG-809R	MH I-6A	15	5015.22	5014.51	18.5	0.038	12.65
PIERCE LATERAL FROM ANDERSON TO BALCOM	MH I-6	INLET PR-713R	30	5010.86	5009.3	438	0.004	24.48
	INLET BA-19R	INLET PR-713L	15	5013.86	5013.59	18.4	0.015	7.82
	INLET PR-713L	INLET PR-713R	15	5013.44	5012.9	33.7	0.016	8.18
	INLET PR-713R	MH I-8	30	5007.75	5007.68	20.8	0.003	23.79
KATTELL LATERAL TO BALCOM (SOUTH)	INLET KT-913R	MH I-132A	15	5016.59	5016.21	18	0.021	9.39
	MH I-132A	INLET KT-913L	15	5014.46	5014.15	18.3	0.017	8.41
	INLET KT-913L	MH I-132	15	5014.05	5013.72	32.9	0.010	6.47
BRIGGS LATERAL TO BALCOM (SOUTH)	INLET BG-813L		15	5013.66	5012.88	41	0.019	8.91
	INLET BG-813R		15	5012.73	5012.45	23.9	0.012	6.99
BALCOM LATERAL FROM KATTELL TO BRIGGS	MH I-132	INLET BA-24R	15	5013.62	5012.35	309.8	0.004	4.14
	INLET BA-24L	INLET BA-24R	15	5010.79	5010.85	33.4	-0.002	-
	INLET BA-24R	INLET BA-23R	15	5009.35	5008.8	109.6	0.005	4.58
BALCOM LATERAL FROM BRIGGS TO PIERCE	INLET BA-23L	INLET BA-23R	15	5012.26	5011.75	32.7	0.016	8.07
	INLET BA-23R	MH I-8	15	5008.75	5007.68	297.4	0.004	3.87
BALCOM LATERAL TO PIERCE (WEST)	INLET BA-19L	INLET PR-714L	12	5014.15	5013.96	21.6	0.009	3.34
	INLET PR-714L	INLET PR-714R	15	5013.56	5012.4	32.6	0.036	12.18
PIERCE LATERAL FROM BALCOM TO MOFFAT	MH I-8	INLET PR-714R	36	5007.58	5007.4	52.1	0.003	39.2
	INLET PR-714R	INLET PR-718R	36	5007.3	5006.96	375.7	0.001	20.06
	INLET PR-718R	MH I-10	36	5007.11	5005.7	29.6	0.048	145.56

Erie Old Town Existing Storm Drainage System Capacity

Description/Location	Upstream Design Point	Downstream Design Point	Size (inches)	Invert Elevation (Upstream)	Invert Elevation (Downstream)	Length (ft)	Slope (ft/ft)	CAPACITY (cfs)
MOFFAT STREET LATERAL TO PIERCE (WEST)	INLET PR-719L	INLET MT-28L	15	5012.37	5011.91	15.9	0.029	10.99
	INLET MT-28L	INLET MT-28R	15	5011.16	5010.89	32.7	0.008	5.87
	INLET MT-28R	INLET PR-718L	15	5010.89	5010.32	22.9	0.025	10.19
	INLET PR-718L	INLET PR-718R	15	5010.32	5009.96	32.7	0.011	6.78
KATTELL LATERAL TO MOFFAT (SOUTH)	INLET KT-918R	INLET KT-918L	12	5012.69	5012.31	33.4	0.011	3.8
	INLET KT-918L	MH I-131	15	5012.26	5011.83	30.8	0.014	7.63
MOFFAT LATERAL FROM KATTELL TO BRIGGS ST	MH I-131	INLET MT-33R	15	5011.83	5010.86	288.6	0.003	3.74
	INLET MT-33L	INLET MT-33R	15	5011.26	5010.71	34.1	0.016	8.2
	INLET MT-33R	MH I-11	24	5009.06	5007.15	95	0.020	32.08
BRIGGS LATERAL TO MOFFAT (SOUTH)	INLET BG-817R	INLET BG-817L	15	5011.9	5011.97	41.3	-0.002	-
	INLET BG-817L	MH I-11	15	5010.62	5009.9	38.4	0.019	8.84
MOFFAT LATERAL FROM BRIGGS TO PIERCE ST	MH I-11	INLET MT-32R	24	5007.1	5007	17.2	0.006	17.25
	INLET MT-32L	INLET MT-32R	15	5012.05	5011.2	33.2	0.026	10.34
	INLET MT-32R	MH I-10	24	5007	5005.8	314.8	0.004	13.97
PIERCE LATERAL FROM MOFFAT TO WELLS ST	MH I-10	INLET PR-722R	36	5005.65	5003.62	409	0.005	46.99
	INLET PR-722L	INLET PR-722R	15	5012.47	5011.07	33.3	0.042	13.24
	INLET PR-722R	MH WS-21R	36	5003.67	5003.44	57	0.004	42.37
KATTELL LATERAL TO WELLS ST (SOUTH)	INLET KT-923R	INLET KT-922L	15	5009.93	5009.64	33.5	0.009	6.01
	INLET KT-922L	MH WS-29	15	5008.64	5007.98	67.6	0.010	6.38
WELLS STREET LATERAL FROM KATTELL TO BRIGGS	MH WS-29	INLET WS-27L	30	5006.28	5005.05	70.4	0.017	54.21
	INLET WS-27R	INLET WS-27L	15	5009.98	5007.47	41	0.061	15.98
	INLET WS-27L	MH J-24B	30	5004.9	5004.64	208.8	0.001	14.47
	MH J-24B	MH J-24A	30	5004.54	5004.39	33.7	0.004	27.36
BRIGGS LATERAL TO WELLS (SOUTH)	INLET BG-821L	INLET BG-822R	15	5010.22	5009.46	37.8	0.020	9.16
	INLET BG-822R	MH J-24A	18	5007.91	5006.54	60.2	0.023	15.85
WELLS LATERAL FROM BRIGGS TO PIERCE	MH J-24A	MH J-24	30	5004.34	5004.06	66.2	0.004	26.67
	INLET WS-24L	INLET WS-24R	15	5010.07	5009.44	38.7	0.016	8.24
	INLET WS-24R	MH J-24	15	5008.94	5008.31	21.8	0.029	10.98
	MH J-24	MH J-23B	36	5004.06	5004.19	83.7	-0.002	-
	MH J-23B	MH J-23A	36	-	5004.11	15.6	-	-
	INLET WS-23R	MH J-23A	15	5007.98	5007.39	11.5	0.051	14.63
	INLET WS-23L	MH J-23A	15	5009.94	5009.62	29.4	0.011	6.74
	MH J-23A	MH WS-21R	36	5004.06	5003.34	230.5	0.003	37.28
HOLBROOK LATERAL TO WELLS STREET (SOUTH)	INLET HK-623L	INLET HK-623R	15	5021.63	5019.31	33.4	0.069	17.02
	INLET HK-623R	MH WS-17R	15	5019.13	5018.73	50.4	0.008	5.75
WELLS LATERAL FROM HOLBROOK TO PIERCE	INLET WS-16L	INLET WS-16R	15	5021.94	5018.96	41.2	0.072	17.37
	INLET WS-16R	MH WS-17R	15	5018.71	5017.43	71.9	0.018	8.62
	MH WS-17R	MH WS-20	15	5011.43	5007.46	313.8	0.013	7.27
	INLET WS-20R	MH WS-20	15	5013	5011.91	19.5	0.056	15.27
	INLET WS-20L	MH WS-20	15	5014.23	5012.81	21.5	0.066	16.6
	MH WS-20	MH WS-21R	15	5007.31	5003.34	75.1	0.053	14.85

Erie Old Town Existing Storm Drainage System Capacity

Description/Location	Upstream Design Point	Downstream Design Point	Size (inches)	Invert Elevation (Upstream)	Invert Elevation (Downstream)	Length (ft)	Slope (ft/ft)	CAPACITY (cfs)
PIERCE LATERAL FROM WELLS TO CHEESMAN	MH WS-21R	MH PR-726R	36	5003.24	5002.88	406.9	0.001	19.84
	INLET PR-727R	MH PR-726R	15	5008.12	5005.9	11.3	0.196	28.63
	INLET PR-727L	-	-	5008.67	-	21	-	-
	INLET CH-28R	-	-	5007.75	-	17.2	-	-
	MH PR-726R	MH CH-27L	36	5002.78	5002.67	117.1	0.001	20.44
CHEESMAN LATERAL FROM KATTELL TO BRIGGS	INLET CH-35R	INLET CH-35L	18	5007.75	5004.7	40.6	0.075	28.79
	INLET CH-35L	MH I-15	24	5004.25	5003.77	287.2	0.002	9.25
	INLET BG-827R	INLET BG-827L	18	5008.39	5007.89	39.3	0.013	11.85
	INLET BG-827L	MH I-15	18	5006.89	5006.07	78.3	0.010	10.75
CHEESMAN LATERAL FROM BRIGGS TO PIERCE	MH I-15	INLET CH-30L	24	5003.67	5003.13	166.3	0.003	12.89
	INLET CH-30R	INLET CH-30L	15	5006.44	5006.11	40.2	0.008	5.85
	INLET CH-30L	INLET CH-28L	24	5003.13	5002.82	206.6	0.002	8.76
CHEESMAN LATERAL FROM PIERCE TO HOLBROOK	INLET CH-28L	MH CH-27L	24	5002.82	5002.67	25.4	0.006	17.38
	MH CH-27L	MH CH-25L	48	5002.57	5001.98	335.3	0.002	60.25
	INLET HK-628R	INLET HK-628L	15	5015.99	5015.51	37.9	0.013	7.27
	INLET HK-628L	INLET CH-24R	15	5011.56	5011.3	29.9	0.009	6.02
	INLET CH-24R	INLET CH-24L	15	5010.1	5009.59	40.7	0.013	7.23
	INLET CH-24L	MH CH-25L	24	5009.65	5009.48	18.1	0.009	21.92
HOLBROOK LATERAL FROM CHEESMAN TO EVANS	MH CH-25L	INLET HK-631L	54	5001.88	-	375.5	-	-
	INLET HK-631R	INLET HK-631L	15	5012.4	5011.78	40.2	0.015	8.02
	INLET EV-24R	INLET HK-631L	15	5012.8	5011.88	37.3	0.025	10.14
	INLET HK-631L	MH I-34A	54	5001.48	5000.6	69.3	0.013	221.59
EVANS LATERAL FROM BRIGGS TO PIERCE	INLET EV-30R	INLET EV-30L	15	5006.73	5005.71	33.1	0.031	11.34
	INLET EV-30L	MH J-29	21	5002.06	5002.06	118.3	0.000	-
	INLET EV-29L	MH J-29	15	5002.77	5002.46	4.7	0.066	16.59
	INLET PR-732L	INLET PR-732R	15	5005.52	5004.84	33.1	0.021	9.26
	INLET PR-732R	INLET EV-29R	15	5002.94	5002.23	25.1	0.028	10.86
	INLET EV-29R	MH J-29	15	5001.91	5002.01	28	-0.004	-
EVANS LATERAL FROM PIERCE TO HOLBROOK	MH J-29	MH I-34A	21	5001.86	5000.45	438.2	0.003	8.99
MOFFAT LATERAL TO COUNTY LINE ROAD	INLET MT-11R	INLET MT-11L	15	5028.79	5027.99	41.8	0.019	8.94
	INLET MT-11L	MH CL-109R	24	5027.69	5026.39	61.1	0.021	33
COUNTY LINE ROAD LATERAL FROM MOFFAT STREET TO WELLS	INLET CL-108R	MH CL-109R	15	5030.58	5023.39	59.3	0.121	22.49
	MH CL-109R	INLET CL-112R	30	5026.39	5024.74	327	0.005	29.13
	INLET CL-112L	INLET CL-112R	15	5028.37	5027.78	39.9	0.015	7.85
	INLET CL-112R	MH CL-113R	30	5024.64	5024.09	87.3	0.006	32.55
	EX 12" PVC	INLET CL-113R-A	12	5028.58	5029.05	40.3	-0.012	-
	INLET CL-113R-A	MH CL-113R	15	5029.25	5028.9	16.8	0.021	9.32
	EX 12" PVC	INLET CL-113L	12	5030.73	5029.71	54.8	0.019	4.86
INLET CL-113L	MH CL-113R	12	5029.91	5028.8	41.9	0.026	5.8	
COUNTY LINE ROAD LATERAL FROM WELLS TO CHEESMAN	MH CL-113R	MH I-45	30	5023.99	5023.9	466.7	0.000	5.7
COUNTY LINE ROAD LATERAL FROM CHEESMAN .TO EVANS	MH I-45	MH I-45A	30	5023.8	5022.25	137.7	0.011	43.52
	MH I-45A	INLET CL-122R	30	5022.15	5021.1	317	0.003	23.61
	INLET CL-122R	MH I-44	30	5021	5020.85	55	0.003	21.42

Erie Old Town Existing Storm Drainage System Capacity

Description/Location	Upstream Design Point	Downstream Design Point	Size (inches)	Invert Elevation (Upstream)	Invert Elevation (Downstream)	Length (ft)	Slope (ft/ft)	CAPACITY (cfs)
EVANS LATERAL FROM COUNTY LINE ROAD TO CARBON STREET	MH I-44	MH I-43	30	5020.8	5018.65	407.3	0.005	29.8
	INLET EV-14R	MH I-43	15	5021.32	5020	41	0.032	11.59
	INLET CA-304L	INLET CA-304R	15	5021.53	5021.21	39.3	0.008	5.83
	INLET CA-304R	MH I-43	15	5021.06	5020	48	0.022	9.6
	INLET EV-14L	MH I-43	15	5020.8	5020.15	8.5	0.076	17.86
EVANS LATERAL FROM CARBON STREET TO MAIN STREET	MH I-43	INLET EV-16L	30	5018.55	5016.64	349.1	0.005	30.34
	INLET EV-16R	INLET MN-421L	15	5019.56	5019.15	22	0.019	8.82
	INLET MN-421L	INLET MN-421R	15	5019.1	5019.09	32.8	0.000	1.13
EVANS STREET LATERAL FROM MAIN STREET TO HIGH STREET	INLET EV-16L	INLET EV-20L	30	5015.94	5014.4	260.7	0.006	31.52
	INLET EV-20L	MH I-34	30	5014.4	5012.67	50.6	0.034	75.84
BALCOM STREET LATERAL FROM LAWLEY DRIVE TO MAIN STREET	Inlet BA-5R	Inlet BA-5L	15	5026.43	5025.13	29.6	0.044	13.54
	Inlet BA-5L	MH I-40	24	5023.58	5023.19	97.6	0.004	14.3
	Inlet LY-211L	Inlet LY-211R	15	5029.69	5028.27	52.3	0.027	10.64
	Inlet BA-6R	Inlet LY-211R	15	5031.25	5025.17	22.5	0.270	33.58
	Inlet LY-211R	MH I-40	15	5025.17	5024.99	56.6	0.003	3.64
	MH I-40	MH I-39A	24	5023.19	5022.62	233	0.002	11.19
	MH I-39A	MH I-39	24	5022.5	5022.41	79.4	0.001	7.62
MAIN ST LATERAL TO BALCOM (SOUTH)	Inlet MN-402L	INLET MN-402R	15	5029.15	5028.85	33	0.009	6.16
	INLET MN-402R	MH I-39	15	5028.85	5028.58	16.1	0.017	8.36
MAIN ST LATERAL TO BALCOM (NORTH)	INLET MN-403L	INLET MN-403R	15	5029.4	5028.35	33.3	0.032	11.47
	INLET MN-403R	MH I-39	15	5027.3	5026.89	57.3	0.007	5.46
BALCOM STREET LATERAL FROM MAIN STREET TO HIGH STREET	MH I-39	INLET BA-11R	24	5022.31	5021.58	266.6	0.003	11.84
	INLET BA-11L	INLET BA-11R	15	5025.49	5024.58	32.3	0.028	10.84
	INLET BA-11R	MH I-38	24	5021.53	5021.29	56.7	0.004	14.72
	INLET HI-506L	INLET HI-506R	15	5027.66	5027.32	32.1	0.011	6.65
	INLET HI-506R	MH I-38	15	5025.77	5025.04	18.7	0.039	12.76
	MH I-38	INLET HI-508R	30	5021.24	5020.82	53.9	0.008	36.21
	INLET HI-508L	INLET HI-508R	15	5026.98	5027.27	32.7	-0.009	-
HIGH STREET LATERAL FROM BALCOM STREET TO MOFFAT STREET	INLET HI-508R	INLET HI-511R	30	5020.67	5018.35	376.4	0.006	32.2
	INLET MT-20L	INLET MT-20R	15	5027.67	5026.9	33.2	0.023	9.84
	INLET MT-20R	INLET HI-511L	15	5026.85	5026.8	21.1	0.002	3.14
	INLET HI-511L	INLET HI-511R	15	5026.59	5025.45	33.7	0.034	11.88
	INLET MT-21R	INLET HI-511R	15	5025.25	5024.9	25.2	0.014	7.61
	INLET HI-511R	INLET HI-513R	30	5018.45	5018.17	71.1	0.004	25.74
HIGH STREET LATERAL FROM MOFFAT STREET TO WELLS STREET	INLET HI-513L	INLET HI-513R	15	5026.35	5025.97	34.5	0.011	6.78
	INLET MT-21L	INLET HI-513R	15	5025.42	5024.67	25.8	0.029	11.01
	INLET HI-513R	INLET HI-516R	30	5018.17	5017.22	375.3	0.003	20.64

Erie Old Town Existing Storm Drainage System Capacity

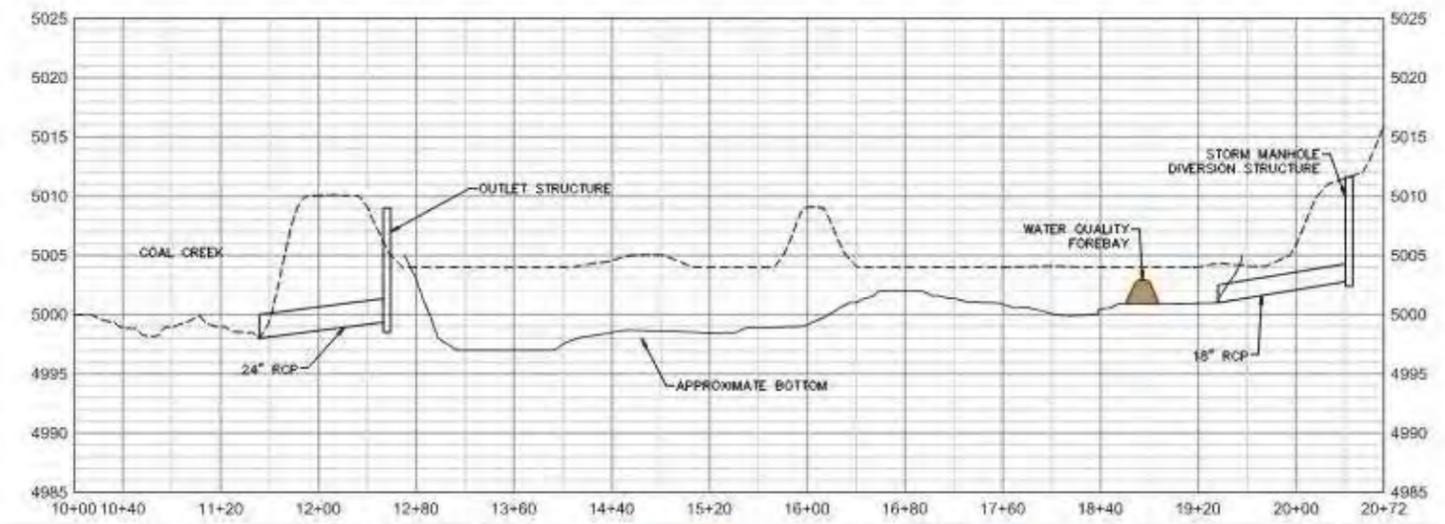
Description/Location	Upstream Design Point	Downstream Design Point	Size (inches)	Invert Elevation (Upstream)	Invert Elevation (Downstream)	Length (ft)	Slope (ft/ft)	CAPACITY (cfs)
WELLS STREET LATERAL FROM MAIN STREET TO HIGH STREET	MH (NO NAME)	INLET WS-12R	6	UNKNOWN	5029.59	160.3		
	INLET WS-12L	INLET WS-12R	15	5031.13	5029.59	41.4	0.037	12.46
	INLET WS-12R	INLET HI-516L	15	5029.39	5029.34	19.2	0.003	3.3
	INLET HI-516L	INLET HI-516R	15	5029.24	5027.92	33	0.040	12.92
HIGH STREET LATERAL FROM WELLS STREET TO CHEESMAN STREET	INLET HI-516R	MH HI-518R	30	5017.12	5016.77	236.5	0.001	15.78
	MH HI-518R	INLET HI-521R	30	5016.67	5015.81	221.9	0.004	25.53
	INLET CH-20L	INLET CH-20R	15	5021.47	5021.56	41.1	-0.002	-
	INLET CH-20R	INLET HI-521L	15	5020.86	5020.94	25.1	-0.003	-
	INLET HI-521L	INLET HI-521R	15	5020.49	5019.91	33.2	0.017	8.54
HIGH STREET LATERAL FROM CHEESMAN STREET TO EVANS STREET	INLET HI-521R	INLET HI-525R	30	5015.71	5014.5	450.1	0.003	21.27
	INLET EV-20R	INLET HI-525L	15	5016.3	5015.45	17.6	0.048	14.2
	INLET HI-525L	INLET HI-525R	15	5015	5014.15	34.5	0.025	10.14
	INLET HI-525R	MH I-34	30	5013.9	5013.92	66.9	0.000	-
EVANS STREET LATERAL FROM HIGH STREET TO HOLBROOK	MH I-34	INLET EV-24L	36	5012.47	5006.5	322.8	0.018	90.7
	INLET EV-24L	MH I-34A	36	5006.3	5001.4	30.3	0.162	268.21
BRIGGS ST LATERAL FROM EVANS STREET TO COAL CREEK	INLET BR-832R	INLET BR-832L	15	5006.76	5006.45	41.3	0.008	5.6
	INLET BR-832L	INLET BR-835L	21	5006.3	5005.59	249.3	0.003	8.46
	INLET BR-835R	INLET BR-835L	15	5006.84	5006.14	41.4	0.017	8.4
	INLET BR-835L	DOUBLE D GRATE INLET	15	5005.44	5005.31	65.2	0.002	2.88
54" OUTFALL TO COAL CREEK	MH	MH	54	5001	5000.2	400	0.002	87.94
	MH	MH	54	5000.2	4999.3	480	0.002	87.94
	MH	Outfall	54	4999.3	4999.1	70	0.003	107.7
CHEESMAN LATERAL FROM KATTELL TO BRIGGS, EXENTION	INLET #2	INLET #1	18	5012.72	5012.55	35	0.005	7.43
	INLET #1	MH	18	5012.33	5011.92	39	0.011	11.02
	MH	MH	18	5011.72	5011.11	122	0.005	7.43

**Erie Old Town Storm Drainage System Flows**

Key Drainage Point	100-yr Flow (cfs)	5-yr Flow (cfs)	2-yr Flow (cfs)
A1	7	3	1
A2	164	31	15
A3	188	36	18
A4	202	39	20
A5	214	42	21
B1	19	7	3
B2	30	10	5
B3	39	14	7
B4	97	22	11
B5	99	23	11
B6	121	28	14
B7	238	59	30
C1	54	19	9
C2	15	5	3
C3	93	32	16
C4	23	8	4
C5	156	54	27
C6	23	8	4
C7	188	65	33
C8	9	2	1
C9	24	6	3
C10	347	79	40
C11	44	10	5
C12	405	93	46
C13	420	96	48
C14	550	163	82
C15	597	179	90
D1	15	4	2
E1	31	8	4



Split Flow PROFILE  
HORIZ. SCALE: 1" = 20'  
VERT. SCALE: 1" = 2'



<table border="1"> <tr><th>NO.</th><th>DATE</th><th>REVISIONS</th></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> </table>		NO.	DATE	REVISIONS										<p>VERIFY SCALE BAR IS ONE INCH ON ORIGINAL DRAWING.</p> <p><b>811</b> Know what's below. Call before you dig.</p>	<p>PREPARED FOR:</p>	<p>PREPARED BY:</p> <p><b>ICON</b> ENGINEERING, INC.</p>	<p>TEAM DRAWN ACE DESIGNED ACE CHECKED AJB</p>	<p><b>COAL CREEK CHANNEL RESTORATION</b></p> <p>CONCEPTUAL WATER QUALITY FACILITY</p>	<p>DATE MAR 2018</p> <p>EXHIBIT 1</p>
NO.	DATE	REVISIONS																	

WQ Pond Exhibit 1

## LANDSCAPING

Downtown Zone Streetscape Improvements-Cost Breakdown					
Concept 1: Good					
Item #	Description	Quantity	Unit	Unit Price	Total
<b>1</b>	<b>Demolition</b>				
1.1	Demolition	4,356	SF	\$2.50	\$ 10,890
<b>2</b>	<b>Site Work-Pavements</b>				
2.1	Concrete Pavement: 6" gray, broom finish, pedestrian	3,065	SF	\$8.00	\$ 24,520
2.2	Concrete Pavement: 6" colored special finish, pedestrian	-	SF	\$14.00	\$ -
2.3	Permeable Concrete Unit Pavers: 60mm	-	SF	\$16.00	\$ -
2.4	Crusher Fines Paving 6" depth, stabilized	1,435	SF	\$3.50	\$ 5,023
<b>3</b>	<b>Site Work-Grading</b>				
3.1	Soil Amendment (5cy/1000sf in landscaped areas)	7	CY	\$32.00	\$ 229
3.2	Topsoil (6" depth in planting & turf areas)	27	CY	\$40.00	\$ 1,063
3.3	CU Structural Soil	-	CY	\$85.00	\$ -
3.4	Silva Cells	-	SF	\$60.00	\$ -
<b>4</b>	<b>Site Work-Irrigation</b>				
4.1	Irrigation Service	-	LS	\$0.00	\$ -
4.2	Irrigation for Sod Areas (Spray)	-	SF	\$1.30	\$ -
4.3	Irrigation for Shrub Areas (Drip)	-	SF	\$1.00	\$ -
4.4	Irrigation for Trees (Bubbler)	8	EA	\$50.00	\$ 400
<b>5</b>	<b>Site Work-Landscape</b>				
5.1	Turf grass (Fesuce Mix) Sod	-	SF	\$1.50	\$ -
5.2	Tree-Deciduous -2.5" Cal.	8	EA	\$600.00	\$ 4,800
5.3	Shrubs, Perennials, & Grasses	-	SF	\$7.00	\$ -
5.4	Subgrade Tree Anchoring System	-	EA	\$65.00	\$ -
<b>6</b>	<b>Site Furnishings</b>				
6.1	Tree Grates	-	EA	\$950.00	\$ -
6.2	Site furniture (Allowance)	-	EA	\$2,000.00	\$ -
<b>7</b>	<b>Lighting</b>				
7.1	Street Lights	-	EA	\$7,500.00	\$ -
7.2	Pedestrian Lights - LED Upgrades	6	EA	\$1,000.00	\$ 6,000
7.3	Feature Lights (Allowance)	-	EA	\$1,900.00	\$ -
<b>Hard Costs Total:</b>					<b>\$52,925</b>
<b>Landscape Total:</b>					<b>\$52,925</b>
<b>Cost Per SF:</b>					<b>\$ 11.76</b>
<b>Cost Per LF:</b>					<b>\$ 151.12</b>
<b>Notes:</b>					
General	Sample Area is 4500 sf				
3.1	Soil Ammendment: Assumes 5cy/1,000 sf planting areas, native areas, & sodded areas				
3.2	Topsoil: Assumemes 6" depth at Planting and Turf Areas.				
5.3	Shrubs, Perennials, & Grasses: Does not include planting in bump outs.				
7.2	Pedestrian Lights: Upgrades existing lighting to LED. Fixtures to remain.				
Cost per LF	Linear foot cost calculation: \$11.76/sq. ft. X 12.85' wide streetscape = \$152.88/linear ft.				

Downtown Zone Streetscape Improvements-Cost Breakdown					
Concept 1: Better					
Item #	Description	Quantity	Unit	Unit Price	Total
<b>1</b>	<b>Demolition</b>				
1.1	Demolition	4,356	SF	\$2.50	\$ 10,890
<b>2</b>	<b>Site Work-Pavements</b>				
2.1	Concrete Pavement: 6" gray, broom finish, pedestrian	-	SF	\$8.00	\$ -
2.2	Concrete Pavement: 6" colored special finish, pedestrian	3,065	SF	\$14.00	\$ 42,910
2.3	Permeable Concrete Unit Pavers: 60mm	1,435	SF	\$16.00	\$ 22,960
2.4	Crusher Fines Paving 6" depth, stabilized	-	SF	\$3.50	\$ -
<b>3</b>	<b>Site Work-Grading</b>				
3.1	Soil Amendment (5cy/1000sf in landscaped areas)	3	CY	\$32.00	\$ 105
3.2	Topsoil (6" depth in planting & turf areas)	12	CY	\$40.00	\$ 480
3.3	CU Structural Soil	160	CY	\$85.00	\$ 13,600
3.4	Silva Cells		SF	\$60.00	
<b>4</b>	<b>Site Work-Irrigation</b>				
4.1	Irrigation Service	-	LS	\$0.00	\$ -
4.2	Irrigation for Sod Areas (Spray)	-	SF	\$1.30	\$ -
4.3	Irrigation for Shrub Areas (Drip)	-	SF	\$1.00	\$ -
4.4	Irrigation for Trees (Bubbler)	8	EA	\$50.00	\$ 400
<b>5</b>	<b>Site Work-Landscape</b>				
5.1	Turf grass (Fesuce Mix) Sod	-	SF	\$1.50	\$ -
5.2	Tree-Deciduous -2.5" Cal.	8	EA	\$600.00	\$ 4,800
5.3	Shrubs, Perennials, & Grasses	-	SF	\$7.00	\$ -
5.4	Subgrade Tree Anchoring System	8	EA	\$65.00	\$ 520
<b>6</b>	<b>Site Furnishings</b>				
6.1	Tree Grates	8	EA	\$950.00	\$ 7,600
6.2	Site furniture (Allowance)	-	EA	\$2,000.00	\$ -
<b>7</b>	<b>Lighting</b>				
7.1	Street Lights	2	EA	\$7,500.00	\$ 15,000
7.2	Pedestrian Lights - LED Upgrades	6	EA	\$1,000.00	\$ 6,000
7.3	Feature Lights (Allowance)	-	EA	\$1,900.00	\$ -
				<b>Hard Costs Total:</b>	<b>\$125,265</b>
				<b>Landscape Total:</b>	<b>\$125,265</b>
				<b>Cost Per SF:</b>	<b>\$ 27.84</b>
				<b>Cost Per LF:</b>	<b>\$ 360.00</b>
<b>Notes:</b>					
General	Sample Area is 4500 sf				
2.3	Permeable Concrete Unit Pavers: Includes permeable subgrade profile				
3.1	Soil Ammendment: Assumes 5cy/1,000 sf planting areas, native areas, & sodded areas				
3.2	Topsoil: Assumemes 6" depth at Planting and Turf Areas.				
3.3	CU Structural Soil: Assumes 36" depth of CU Soil in planting areas				
5.3	Shrubs, Perennials, & Grasses: Does not include planting in bump outs.				
7.1	Street Lights: Assumes new lights, from Xcel's catalog				
7.2	Pedestrian Lights: Upgrades existing lighting to LED. Fixtures to remain.				
Cost per LF	Linear foot cost calculation: \$27.84/sq. ft. X 12.85' wide streetscape = \$357.74/linear ft.				

<b>Downtown Zone Streetscape Improvements-Cost Breakdown</b>					
<b>Concept 1: Best</b>					
<b>Item #</b>	<b>Description</b>	<b>Quantity</b>	<b>Unit</b>	<b>Unit Price</b>	<b>Total</b>
<b>1</b>	<b>Demolition</b>				
1.1	Demolition	4,356	SF	\$2.50	\$ 10,890
<b>2</b>	<b>Site Work-Pavements</b>				
2.1	Concrete Pavement: 6" gray, broom finish, pedestrian	-	SF	\$8.00	\$ -
2.2	Concrete Pavement: 6" colored special finish, pedestrian	-	SF	\$14.00	\$ -
2.3	Permeable Concrete Unit Pavers: 60mm	4,500	SF	\$16.00	\$ 72,000
2.4	Crusher Fines Paving 6" depth, stabilized	-	SF	\$3.50	\$ -
<b>3</b>	<b>Site Work-Grading</b>				
3.1	Soil Amendment (5cy/1000sf in landscaped areas)	3	CY	\$32.00	\$ 105
3.2	Topsoil (6" depth in planting & turf areas)	12	CY	\$40.00	\$ 480
3.3	CU Structural Soil	-	CY	\$85.00	\$ -
3.4	Silva Cells	3,220	SF	\$60.00	\$ 193,200
<b>4</b>	<b>Site Work-Irrigation</b>				
4.1	Irrigation Service	-	LS	\$0.00	\$ -
4.2	Irrigation for Sod Areas (Spray)	-	SF	\$1.30	\$ -
4.3	Irrigation for Shrub Areas (Drip)	-	SF	\$1.00	\$ -
4.4	Irrigation for Trees (Bubbler)	8	EA	\$50.00	\$ 400
<b>5</b>	<b>Site Work-Landscape</b>				
5.1	Turf grass (Fesuce Mix) Sod	-	SF	\$1.50	\$ -
5.2	Tree-Deciduous -2.5" Cal.	8	EA	\$600.00	\$ 4,800
5.3	Shrubs, Perennials, & Grasses	-	SF	\$7.00	\$ -
5.4	Subgrade Tree Anchoring System	8	EA	\$65.00	\$ 520
<b>6</b>	<b>Site Furnishings</b>				
6.1	Tree Grates	8	EA	\$950.00	\$ 7,600
6.2	Site furniture (Allowance)	6	EA	\$2,000.00	\$ 12,000
<b>7</b>	<b>Lighting</b>				
7.1	Street Lights	2	EA	\$7,500.00	\$ 15,000
7.2	Pedestrian Lights - LED Upgrades	6	EA	\$1,000.00	\$ 6,000
7.3	Feature Lights (Allowance)	2	EA	\$1,900.00	\$ 3,800
				<b>Hard Costs Total:</b>	<b>\$326,795</b>
				<b>Landscape Total:</b>	<b>\$326,795</b>
				<b>Cost Per SF:</b>	<b>\$ 72.62</b>
				<b>Cost Per LF:</b>	<b>\$ 930.00</b>
<b>Notes:</b>					
General	<i>Sample Area is 4500 sf</i>				
2.3	<i>Permeable Concrete Unit Pavers: Includes permeable subgrade profile</i>				
3.1	<i>Soil Ammendment: Assumes 5cy/1,000 sf planting areas, native areas, &amp; sodded areas</i>				
3.2	<i>Topsoil: Assumemes 6" depth at Planting and Turf Areas.</i>				
3.4	<i>Silva Cells: Assumes connected network of cells between street trees and underneath pedestrian walk</i>				
5.3	<i>Shrubs, Perennials, &amp; Grasses: Does not include planting in bump outs.</i>				
7.1	<i>Street Lights: Assumes new lights, from Xcel's catalog</i>				
7.2	<i>Pedestrian Lights: Upgrades existing lighting to LED. Fixtures to remain.</i>				
7.3	<i>Feature Lights: New lights, custom</i>				
Cost per LF	<i>Linear foot cost calculation: \$72.62/sq. ft. X 12.85' wide streetscape = \$933.17/linear ft.</i>				

<b>Neighborhood Mixed Use Zone Streetscape Improvements-Cost Breakdown</b>					
<b>Concept 1: Good</b>					
<b>Item #</b>	<b>Description</b>	<b>Quantity</b>	<b>Unit</b>	<b>Unit Price</b>	<b>Total</b>
<b>1</b>	<b>Demolition</b>				
1.1	Demolition	4,356	SF	\$2.50	\$ 10,890
<b>2</b>	<b>Site Work-Pavements</b>				
2.1	Concrete Pavement: 6" gray, broom finish, pedestrian	2,100	SF	\$8.00	\$ 16,800
2.2	Concrete Pavement: 6" colored special finish, pedestrian	-	SF	\$14.00	\$ -
2.3	Permeable Concrete Unit Pavers: 60mm	-	SF	\$16.00	\$ -
2.4	Crusher Fines Paving 6" depth, stabilized	2,400	SF	\$3.50	\$ 8,400
<b>3</b>	<b>Site Work-Grading</b>				
3.1	Soil Amendment (5cy/1000sf in landscaped areas)	-	CY	\$32.00	\$ -
3.2	Topsoil (6" depth in planting & turf areas)	45	CY	\$40.00	\$ 1,800
3.3	CU Structural Soil	-	CY	\$85.00	\$ -
3.4	Silva Cells	-	SF	\$60.00	\$ -
<b>4</b>	<b>Site Work-Irrigation</b>				
4.1	Irrigation Service	1	LS	\$0.00	\$ -
4.2	Irrigation for Sod Areas (Spray)	-	SF	\$1.30	\$ -
4.3	Irrigation for Shrub Areas (Drip)	-	SF	\$1.00	\$ -
4.4	Irrigation for Trees (Bubbler)	-	EA	\$50.00	\$ -
<b>5</b>	<b>Site Work-Landscape</b>				
5.1	Turf grass (Fesuce Mix) Sod	-	SF	\$1.50	\$ -
5.2	Tree-Deciduous -2.5" Cal.	-	EA	\$600.00	\$ -
5.3	Shrubs, Perennials, & Grasses	-	SF	\$7.00	\$ -
5.4	Subgrade Tree Anchoring System	-	EA	\$65.00	\$ -
<b>6</b>	<b>Site Furnishings</b>				
6.1	Tree Grates	-	EA	\$950.00	\$ -
6.2	Site furniture (Allowance)	-	EA	\$2,000.00	\$ -
<b>7</b>	<b>Lighting</b>				
7.1	Street Lights - LED Upgrades	-	EA	\$7,500.00	\$ -
7.2	Pedestrian Lights	-	EA	\$2,500.00	\$ -
7.3	Feature Lights (Allowance)	-	LS	\$1,900.00	\$ -
				<b>Hard Costs Total:</b>	<b>\$37,890</b>
				<b>Landscape Total:</b>	\$37,890
				<b>Cost Per SF:</b>	\$ 8.42
				<b>Cost Per LF:</b>	\$ 108.20
<b>Notes:</b>					
General	Sample Area is 4500 sf				
3.2	Topsoil: Assumemes 6" depth at Planting and Turf Areas.				
Cost per LF	Linear foot cost calculation: \$8.42/sq. ft. X 12.85' wide streetscape = \$108.20/linear ft.				

<b>Neighborhood Mixed Use Zone Streetscape Improvements-Cost Breakdown</b>					
<b>Concept 1: Better</b>					
<b>Item #</b>	<b>Description</b>	<b>Quantity</b>	<b>Unit</b>	<b>Unit Price</b>	<b>Total</b>
<b>1</b>	<b>Demolition</b>				
1.1	Demolition	4,356	SF	\$2.50	\$ 10,890
<b>2</b>	<b>Site Work-Pavements</b>				
2.1	Concrete Pavement: 6" gray, broom finish, pedestrian	-	SF	\$8.00	\$ -
2.2	Concrete Pavement: 6" colored special finish, pedestrian	2,100	SF	\$14.00	\$ 29,400
2.3	Permeable Concrete Unit Pavers: 60mm	-	SF	\$16.00	\$ -
2.4	Crusher Fines Paving 6" depth, stabilized	-	SF	\$3.50	\$ -
<b>3</b>	<b>Site Work-Grading</b>				
3.1	Soil Amendment (5cy/1000sf in landscaped areas)	12	CY	\$32.00	\$ 384
3.2	Topsoil (6" depth in planting & turf areas)	45	CY	\$40.00	\$ 1,800
3.3	CU Structural Soil	-	CY	\$85.00	\$ -
3.4	Silva Cells	-	SF	\$60.00	\$ -
<b>4</b>	<b>Site Work-Irrigation</b>				
4.1	Irrigation Service	1	LS	\$8,900.00	\$ 8,900
4.2	Irrigation for Sod Areas (Spray)	2,400	SF	\$1.30	\$ 3,120
4.3	Irrigation for Shrub Areas (Drip)	-	SF	\$1.00	\$ -
4.4	Irrigation for Trees (Bubbler)	-	EA	\$50.00	\$ -
<b>5</b>	<b>Site Work-Landscape</b>				
5.1	Turf grass (Fesuce Mix) Sod	2,400	SF	\$1.50	\$ 3,600
5.2	Tree-Deciduous -2.5" Cal.	-	EA	\$600.00	\$ -
5.3	Shrubs, Perennials, & Grasses	-	SF	\$7.00	\$ -
5.4	Subgrade Tree Anchoring System	-	EA	\$65.00	\$ -
<b>6</b>	<b>Site Furnishings</b>				
6.1	Tree Grates	-	EA	\$950.00	\$ -
6.2	Site furniture (Allowance)	-	EA	\$2,000.00	\$ -
	<b>Lighting</b>				
7.1	Street Lights - LED Upgrades	2	EA	\$7,500.00	\$ 15,000
7.2	Pedestrian Lights	-	EA	\$2,500.00	\$ -
7.3	Feature Lights (Allowance)	-	EA	\$1,900.00	\$ -
				<b>Hard Costs Total:</b>	<b>\$73,094</b>
				<b>Landscape Total:</b>	<b>\$73,094</b>
				<b>Cost Per SF:</b>	<b>\$ 16.24</b>
				<b>Cost Per LF:</b>	<b>\$ 208.68</b>
<b>Notes:</b>					
General	<i>Sample Area is 4500 sf</i>				
3.1	<i>Soil Ammendment: Assumes 5cy/1,000 sf planting areas, native areas, &amp; sodded areas</i>				
3.2	<i>Topsoil: Assumemes 6" depth at Planting and Turf Areas.</i>				
5.3	<i>Shrubs, Perennials, &amp; Grasses: Does not include planting in bump outs.</i>				
Cost per LF	<i>Linear foot cost calculation: \$16.24/sq. ft. X 12.85' wide streetscape = \$208.68/linear ft.</i>				

<b>Neighborhood Mixed Use Zone Streetscape Improvements-Cost Breakdown</b>					
<b>Concept 1: Best</b>					
<b>Item #</b>	<b>Description</b>	<b>Quantity</b>	<b>Unit</b>	<b>Unit Price</b>	<b>Total</b>
<b>1</b>	<b>Demolition</b>				
1.1	Demolition	4,356	SF	\$2.50	\$ 10,890
<b>2</b>	<b>Site Work-Pavements</b>				
2.1	Concrete Pavement: 6" gray, broom finish, pedestrian	-	SF	\$8.00	\$ -
2.2	Concrete Pavement: 6" colored special finish, pedestrian	-	SF	\$14.00	\$ -
2.3	Permeable Concrete Unit Pavers: 60mm	2,100	SF	\$16.00	\$ 33,600
2.4	Crusher Fines Paving 6" depth, stabilized	-	SF	\$3.50	\$ -
<b>3</b>	<b>Site Work-Grading</b>				
3.1	Soil Amendment (5cy/1000sf in landscaped areas)	12	CY	\$32.00	\$ 384
3.2	Topsoil (6" depth in planting & turf areas)	45	CY	\$40.00	\$ 1,800
3.3	CU Structural Soil	-	CY	\$85.00	\$ -
3.4	Silva Cells	-	SF	\$60.00	\$ -
<b>4</b>	<b>Site Work-Irrigation</b>				
4.1	Irrigation Service	1	LS	\$8,900.00	\$ 8,900
4.2	Irrigation for Sod Areas (Spray)	-	SF	\$1.30	\$ -
4.3	Irrigation for Shrub Areas (Drip)	2,400	SF	\$1.00	\$ 2,400
4.4	Irrigation for Trees (Bubbler)		EA	\$50.00	
<b>5</b>	<b>Site Work-Landscape</b>				
5.1	Turf grass (Fesuce Mix) Sod	-	SF	\$1.50	\$ -
5.2	Tree-Deciduous -2.5" Cal.	8	EA	\$600.00	\$ 4,800
5.3	Shrubs, Perennials, & Grasses	2,400	SF	\$7.00	\$ 16,800
5.4	Subgrade Tree Anchoring System	-	EA	\$65.00	\$ -
<b>6</b>	<b>Site Furnishings</b>				
6.1	Tree Grates	8	EA	\$950.00	\$ 7,600
6.2	Site furniture (Allowance)	-	EA	\$2,000.00	\$ -
<b>7</b>	<b>Lighting</b>				
7.1	Street Lights - LED Upgrades	2	EA	\$7,500.00	\$ 15,000
7.2	Pedestrian Lights	6	EA	\$2,500.00	\$ 15,000
7.3	Feature Lights (Allowance)	-	LS	\$1,900.00	\$ -
<b>Hard Costs Total:</b>					<b>\$117,174</b>
<b>Landscape Total:</b>					<b>\$117,174</b>
<b>Cost Per SF:</b>					<b>\$ 26.04</b>
<b>Cost Per LF:</b>					<b>\$ 334.61</b>
<b>Notes:</b>					
General	<i>Sample Area is 4500 sf</i>				
2.3	<i>Permeable Concrete Unit Pavers: Includes permeable subgrade profile</i>				
3.1	<i>Soil Ammendment: Assumes 5cy/1,000 sf planting areas, native areas, &amp; sodded areas</i>				
3.2	<i>Topsoil: Assumemes 6" depth at Planting and Turf Areas.</i>				
5.3	<i>Shrubs, Perennials, &amp; Grasses: Does not include planting in bump outs.</i>				
Cost per LF	<i>Linear foot cost calculation: \$26.04/sq. ft. X 12.85' wide streetscape = \$334.61/linear ft.</i>				