

## Downtown Camas Infrastructure Analysis

May 2020



Prepared for:  
**City of Camas Public Works Department**

Prepared by:  
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## 1. Overview

### 1.1. Background / Purpose

Mackay Sposito was selected by the City of Camas to complete an infrastructure analysis within the boundaries of Historic Downtown Camas. Topics included in this analysis are:

- Street Pavement Condition
- Sidewalk and Curb Ramp ADA Compliance
- Street Tree Replacement
- Pedestrian / Vehicular Conflicts and Connectivity
- Public Utilities (Potable Water, Sanitary Sewer, Storm Sewer)
- Event/Festival Electrical Service

The purpose of the analysis is to identify and develop a prioritized list of recommended upgrade projects for the study area, supported by project descriptions and rough order of magnitude budget estimates. The information is intended as a high-level planning tool to inform the City's overall Capital Improvement Plan. In addition to specific upgrade projects, there are recommendations for additional studies and data collection to supplement the City's existing infrastructure data and documentation.

### 1.2. Study Area

For purposes of this study the Historic Downtown Camas area is defined as NE Adams St. to NE Garfield St., and NE 3<sup>rd</sup> Ave. to NE 7th Avenue, including both sides of the bordering streets. For the prioritization purposes of this study the downtown area has been divided into two regions: 1) areas inside the Core which exhibit higher levels of activity and character representative of the Downtown Design Manual Standards 2) areas outside the Core. For purposes of this study the Downtown Core area is defined as NE 4<sup>th</sup> Ave. from Adams to Everett, NE 3<sup>rd</sup> Ave. from Adams to Birch, NE 5<sup>th</sup> Ave. from Adams to Dallas, and NE Birch, Cedar and Dallas St. from NE 3<sup>rd</sup> Ave. to NE 5<sup>th</sup> Ave. See the analysis area map included in Section 3.4 CIP Project Sheets.

## 2. Inventory / Analysis

### 2.1. Introduction

The infrastructure's age, coupled with periodic upgrades and replacements since its original construction, means it is currently made up of a wide variety of material types. This includes a mix of standard and exposed aggregate sidewalks, old brittle steel water mains, and a sanitary sewer system that includes a mix of brick and concrete manholes, clay pipe, and some PVC and CIPP repairs and rehabilitation. Although the City has been diligent in mapping the most recent improvements, there are gaps in information as to the means, methods, location and condition of much of the utility infrastructure. Therefore, the level of inventory and subsequent analysis and recommendations provided in this study are presented for high-level planning purposes. The process for the inventory and analysis for this study consists of the following basic steps:  
Inventory

- Collect and review existing as-builts and other documentation (provided by City);
- Conduct interviews with City engineering and operations and maintenance staff;

- Conduct site reconnaissance to supplement and update existing data provided and assess visible infrastructure such as pavement condition and ADA compliance.

#### Analysis

- Establish prioritization and assessment criteria;
- Evaluate inventory data against the assessment criteria;
- Identifying and prioritizing projects;
- Review findings, finalize prioritization criteria, and develop a project list with City staff prior to proceeding with the Capital Improvement Plan.

## 2.2. Inventory

### 2.2.1. Existing Document Review

The following documents were reviewed:

- Water System Plan Update (2019)
- ADA Transition Plan for the Public Right of Way (2015)
- Pavement Management Program Budget Options Report (2016)
- Six Year Street Priorities 2016-2021 (2015)
- Tree Inventory – Downtown Camas (2017)
- Downtown Stormwater Maps and As-builts (varied dates)
- General Sewer Plan (2007, Amended 2010)
- Downtown Design Manual (2008)
- City Engineering Standards

### 2.2.2. Staff Interviews

MacKay Sposito conducted two back-to-back interviews with City Staff on October 25<sup>th</sup>, 2019 to gather relevant information regarding current downtown challenges, concerns and priorities. The first interview was with staff responsible for streets and stormwater systems. The second was with sanitary sewer and water supply systems staff.

### 2.2.3. Site Reconnaissance

MacKay Sposito staff conducted a site reconnaissance visit in early December 2019 to assess sidewalk paving, potential pedestrian/vehicular conflicts, connectivity, curb ramps, and street trees. With regard to ADA accessibility, we did not conduct a detailed assessment of each curb ramp as they have already been addressed in the ADA Transition Plan for the Public Right of Way, completed by the City in 2015. However, we did complete a general assessment as to whether ramps needed repair or replacement. A number of ramps have been replaced in recent years and based on site observations, were considered generally compliant.

Primary attributes inventoried during the visit were:

- Surface Quality and Types
  - Excessive or severe cracking and/or spalling
  - Exposed Aggregate Paving
- Public Risk

- Tripping and Slipping Hazards
- Pedestrian / Vehicular Conflicts
- Connectivity
  - Architectural Barriers such as planters, furnishings or fenced seating areas that encroach into accessible routes
  - Areas that are missing sidewalks
- ADA Compliance
  - Ramps that are obviously out of compliance and need replacement
  - Sidewalks that have heaved or settled, resulting in abrupt vertical changes greater than ¼"
  - Excessive cross slopes
- Downtown Design Manual Compliance

The findings of the Site Reconnaissance visit consist of field notes with rough quantities, hand marked base maps, and corresponding photos. The data collected serves as the basis for the analysis summary and the CIP projects identified later in this study.

## 2.3. Analysis Summary

### 2.3.1. Prioritization Criteria

The information gathered and reviewed during the inventory effort was weighed and analyzed against the following prioritized criteria:

#### Priority 1: Public Safety

- High pedestrian/vehicular incident locations
- Sidewalk slipping and tripping hazards
- Hazardous trees

#### Priority 2: Property Damage

- Basement flooding and causes
- Street ponding and causes
- Sewer main/lateral flow restrictions or backups and causes

#### Priority 3: Downtown Core Improvements

- Aesthetics/accessibility/ADA compliance
- Project phasing and impacts to businesses
- Curb to curb roadway and utility reconstruction

#### Priority 4: ADA compliance

#### Priority 5: Pavement preservation

#### Priority 6: Utilities replacement

#### Priority 7: Pavement reconstruction

### 2.3.2. Findings

The following is a general summary of the analysis findings and recommendations.

#### Priority 1: Public Safety

- Downtown perimeter streets, Adams St., 3<sup>rd</sup> Ave., and Garfield St., experience higher traffic volumes, which conflict with pedestrian walking access to downtown. The addition of pedestrian crossing safety improvements would improve pedestrian safety and access beyond the current standard crosswalk striping.
- The flashing light at 6<sup>th</sup> and Dallas has been identified as a safety concern. This intersection is under review by the City and is not included in this analysis.
- The most predominant public safety hazards we observed are tripping and slipping hazards. Tripping hazards consist of sidewalk panels that have either settled and/or heaved, creating abrupt grade differences or severe cracking and spalling, resulting in uneven surfaces. Slipping hazards are attributed mainly to exposed aggregate paving that is slick when wet.
- Hazardous trees are contributing to public safety risk in two ways; first, as a common cause for sidewalk heaving, and second, as a risk for sudden branch drop (particularly along 4<sup>th</sup> Ave.) that can injure people and property. Hazardous trees inventory and recommendations are further discussed in the 2017 Downtown Tree Inventory.

#### Priority 2: Property Damage

- Based on information obtained during City staff interviews, there are several basements that periodically flood. One potential flooding cause is cross connections between downspouts and floor drains into sanitary sewer lines. Several unmapped lines were discovered during previous street light construction work. It is recommended that smoke testing and video inspection be completed to verify the specific cause, and measures be taken to connect downspouts to the storm system. Areas identified with flooding basements include:
  - Mill City Brewery
  - Vicinity of Adams and 4<sup>th</sup>
- Based on interviews with the City staff, several streets were identified as having ponding issues. One cause described was root intrusion into many sanitary sewer lines, especially along 4<sup>th</sup> Ave. It is recommended that the lines be video inspected to gain a better understanding of repairs needed. The following areas were identified:
  - 6<sup>th</sup> and Adams ponding – usually due to clogged drains from leaves etc.
  - Dallas from 7<sup>th</sup> to 6<sup>th</sup> – bubble up issues
  - 4<sup>th</sup> and Birch periodic street flooding
  - 5<sup>th</sup> and Dallas floods frequently
  - Lots of root encroachment into lines, particularly on 4<sup>th</sup>

- 5<sup>th</sup> and Cedar bubble-ups
- Everett and 3<sup>rd</sup> street flooding
- The following information was shared during the City Staff interviews regarding sewer main/lateral flow restrictions or backups:
  - There are many downspouts connected to the sanitary sewer that need to be redirected to the storm sewer;
  - Most of the Sewer is comprised of clay or concrete. Manholes are a mix of brick and concrete.
  - Recurring maintenance is primarily root intrusion, particularly with clay pipes, with the worst conditions on 4<sup>th</sup> Ave near large street trees.
  - No odor issues have been detected downtown.
  - Estimated that only 50% of existing sanitary sewer laterals have cleanouts. Some are only accessible from basements.
- Basements encroaching into right-of-way
  - It was noted that in some locations, existing basements have been found to encroach into the public right of way. This appears to be most prominent along 4<sup>th</sup> Avenue in the Downtown Core. Identifying or assessing these locations is not included in this analysis. Further research is recommended prior to proceeding with major sidewalk, roadway or utility reconstruction work that may encounter basement encroachments.

#### Priority 3: Downtown Core

- Aesthetically, the Downtown Core (see map Section 3.4) best exemplifies the application of the Downtown Design Manual guidelines and standards. The streets have been narrowed to emphasize pedestrian circulation, landscape improvements, and site furnishings and amenities. Storefront parking has been maintained and street trees are present throughout. However, hazardous street trees remain an issue and contribute to degradation of paving and public safety.
- Project phasing and business impact considerations are critical for downtown reconstruction projects. This is particularly true for projects within the Downtown Core which have access challenges and higher density of businesses and uses.

#### Priority 4: ADA Compliance

- The City of Camas has an ADA Transition Plan in place, which includes Self Evaluations that have been completed throughout the study area. This analysis builds upon that effort, and provides a generalized review of surface and ramp conditions. This includes identifying obstructions and/or damaged sidewalks that disrupt continuous accessible routes. The obstruction and damage reviewed include rough surfaces, lips that exceed ¼", and unimproved ramps that do not meet current ADA standards.

- A key point to consider when planning street upgrades is that The Department of Justice (DOJ) provides precedence with the “Safe Harbor” (§ 35.150(b)(2)(i)) provision, which does not require upgrade of any substandard ramps built before 2012, as long as they meet 1991 standards and are not part of a planned alteration. However, any street pavement restoration project, or other physical alteration after 2012 that affects a pedestrian crossing is required to be upgraded by the US Department of Justice. Therefore, any upgrades resulting from this study will most likely require associated ADA upgrades.
- The following are the prioritized hierarchy of ramp replacement needs based on the City’s adopted ADA Transition Plan:
  - High need for replacement consisting of curb ramps that create a barrier to mobility with the following characteristics:
    - Lack of level landing;
    - Obstructions or damaged sidewalks;
    - Steep grade on ramp throat or ramp wings; or
    - 1/2” or more lip at the curb gutter.
  - Medium need for replacement consisting of borderline sidewalk ramps that may be accessibility barriers. In some cases, these may be upgraded with minor improvements, such as a retrofit warning pattern or curb grinding to eliminate an excessive lip. These have the following characteristics:
    - Level landing near ramp;
    - No obstructions or tripping hazards;
    - Less than 1/4” lip at curb gutter;
    - No detectable warning patterns
  - Low need for replacement have the following characteristics:
    - Ramps with detectable warning patterns;
    - Level landing behind ramp;
    - No obstructions such as utility poles or tripping hazards (one half of an inch high uplifted sidewalk panel);
    - Less than 1/4” lip at curb; and
    - The ramp throat is less than three feet wide.

#### Priority 5: Pavement Preservation

- The 2016 pavement management report classifies pavement conditions ranging from very poor to very good. The vast majority of downtown streets are in good to very good condition and only require periodic pavement preservation maintenance (crack sealing, slurry seal, etc.).

#### Priority 6: Utilities replacement

- Water
  - Static pressures are high, in the 100-115 psi range
  - Leak testing done several years ago.

- Most services are galvanized and need replacement
- There are several old water lines that are out of commission.
- Water lines are brittle
- Unmetered services were installed in the past for irrigation and for spigots. City would like these to be metered and have backflow prevention installed.
- Sewer
  - There are many downspouts connected to the sewer that will need to be disconnected. Video inspection and smoke testing may be needed to locate cross connections.
  - Sewer that has been replaced via pipe bursting from Adams to Garfield within the past 20 years.
  - General Sewer plan is in process of update right now.
  - Most of the Sewer is comprised of clay or concrete. Some brick MH's. Some brick cones. Very little PVC.
  - Recurring maintenance is primarily root intrusion, particularly with clay pipes. Worst condition on 4th.
  - Need to TV lines and get a condition assessment.
  - No odor issues downtown.
  - No known corrosion
  - Estimated 50% of existing sewer laterals have cleanouts. Some are only accessible from basements.
- Electrical Outlets and Lighting
  - The downtown area hosts a number of annual events, including the 4<sup>th</sup> Ave Farmers Market between Franklin and Everett, and Camas Days which covers a wide downtown area.
  - Existing electrical service for street events is insufficient to support current and future needs.
  - Roadway illumination receptacles, designed for holiday lighting, are currently being utilized for high energy items (e.g. cooking appliances), causing frequent breaker tripping.
  - One existing electrical vehicle charging station is located on the west side of Franklin, north of 4<sup>th</sup>. This station is not operating due to maintenance issues. Additional charging stations may be desired downtown.

Priority 7: Pavement reconstruction

- Streets classified as poor or very poor generally have severe alligator cracking which indicates base failure and the need for full depth reconstruction. These areas include:
  - Adams - 6<sup>th</sup> to 7<sup>th</sup>
  - 7<sup>th</sup> - Adams to Birch
  - Franklin - 4<sup>th</sup> to 5<sup>th</sup>



- Franklin - 6<sup>th</sup> to 7<sup>th</sup>
- Birch – 6<sup>th</sup> to 7<sup>th</sup>
- 4<sup>th</sup> from Adams to Everett shows signs of wear and cracking due to age, frequent street sweeping, and significant utility pavement cuts. Surface conditions indicate the subbase and subgrade are likely in fair condition and that a grind and inlay would suffice. That being said, we do not recommend investments to improve pavement condition, other than pavement preservation, without first rehabilitating or replacing underground utilities. Trenching for utility replacements would likely drive the need for full street section reconstruction due to the significant amount of pavement cuts required.

### 2.3.3. Additional Studies Needed

Additional studies and investigations that are likely need to support infrastructure improvements include:

- Street Tree Replacement Master Plan;
- Sanitary and Storm Smoke Testing/Video Inspection (see project P-6);
- Water System Leak Testing (note: City staff noted previous leak testing was completed but the results/reports were not readily available at the time of this study)
- Traffic Study to warrant signalized crossings or other pedestrian crossing safety upgrades;
- Geotechnical investigations

## 3. Capital Improvement Plan

### 3.1. Introduction

Based on inventory and analysis findings, MacKay Sposito has categorized and prioritized recommended projects to be completed in the downtown study area. Each project identified is accompanied by a rough order of magnitude cost estimate, project description, and a map depicting project locations where applicable. This information is intended for use as a planning tool, and is organized to serve as an extension of the overall City of Camas CIP that is specific to upgrades within the downtown area.

### 3.2. Project Categorization

The recommended projects identified within this study are general in nature. They are designed to represent typical or standard examples of projects and costs that can be applied at multiple locations. For example, Pedestrian Crossing Safety Upgrades may occur in multiple locations within the downtown, but the same project description and cost applies to a single location. The following is a list that makes up the project categorization:

- P-1 Isolated Sidewalk, ADA Ramp, Tripping Hazards Replacement – Downtown Core
- P-2 Isolated Sidewalk, ADA Ramp, Tripping Hazards Replacement – Outside Core

- Full Block Sidewalk and ADA Ramp Replacement - Downtown Core
- Full Block Sidewalk and ADA Ramp Replacement – Outside Core
- Pedestrian Crossing Safety Upgrades
- Smoke Testing/Video Inspection – Sanitary and Storm Sewer Systems
- Downspout Separation
- Event/Festival Electrical Upgrades
- Hazard Tree Removal and Replacement Program
- Curb to Curb Pavement and Utilities Reconstruction – Downtown Core
- Curb to Curb Pavement and Utilities Reconstruction – Outside Core
- Pavement Preservation

### 3.3. Cost Estimating Assumptions

High-level cost estimates were developed for each project utilizing average unit prices from recent publicly-bid projects, and through discussions with engineers and construction contractors. All costs are in April 2020 dollars and each estimate includes contingency factors, general conditions and overhead, engineering & planning, and City administration. Given the planning-level nature of this analysis, additional, more detailed design and cost estimating will be needed for project implementation.

### 3.4. CIP Project Sheets (description, map, estimate)

The following project sheets describe each project and provide a rough order of magnitude cost estimate, and map depicting the project locations where applicable.

## 4. Summary

In summary, the historic downtown Camas area is a vibrant, unique, and valuable community asset. While the downtown has a storied history and bright future, substantial public infrastructure investments are needed to improve safety, avoid future property damage (flooding, danger trees, utility failure), and upgrade existing roads and utilities to maintain access and reliability.

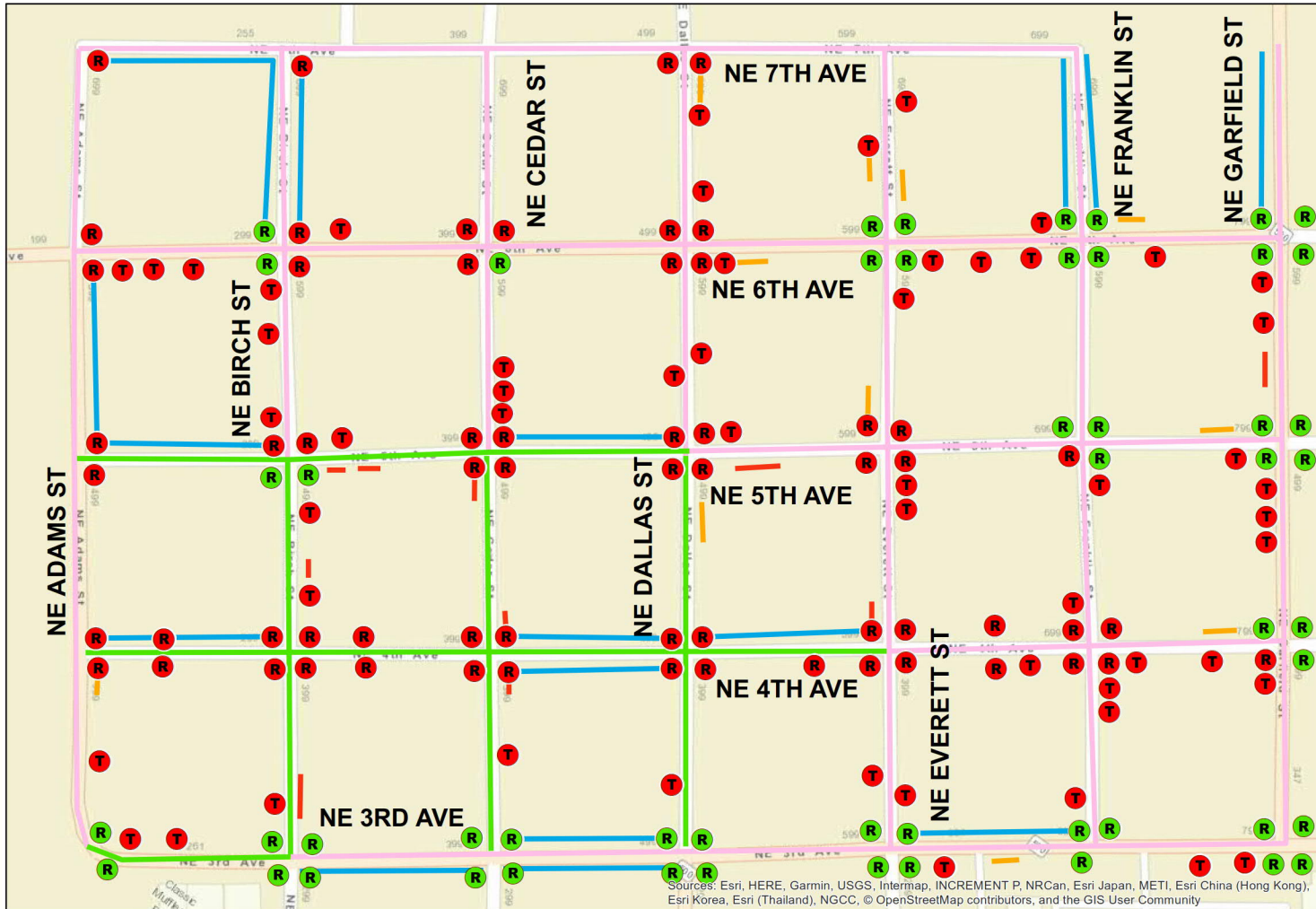
### Document References

- Water System Plan Update (2019)
- ADA Transition Plan for the Public Right of Way (2015)
- Pavement Management Program Budget Options Report (2016)
- Six Year Street Priorities 2016-2021 (2015)
- Tree Inventory – Downtown Camas (2017)
- Downtown Stormwater Maps and As-builts (varied dates)
- General Sewer Plan (2007, Amended 2010)
- Downtown Design Manual (2008)

For questions or additional information please contact:

Jason Irving, MacKay Sposito, (360)-334-5118 or [jirving@mackaysposito.com](mailto:jirving@mackaysposito.com).

Analysis Area Map



Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community

Existing Legend

- Tripping Hazard - Repair
- Ramp - Repair
- Ramp - General Compliant
- Outside Core
- Downtown Core
- Full Block Sidewalk Replacement
- Severe Cracking
- Exposed Aggregate



**Project Identification:**

P-1

**Project Name:**

Isolated Sidewalk, ADA Ramp, and Tripping Hazards Replacement – Downtown Core

**Project Description:**

The project includes removing and replacing isolated sections of sidewalk to replace existing exposed aggregate sidewalks and address severe cracking and tripping hazards. The project also includes constructing new ADA compliant curb ramps to address safety concerns and accessibility deficiencies within the Downtown Core. The limits of this work are from the right-of-way or building face to back of existing curb. The project includes addressing all areas in the Downtown Core that do not meet the >25% criteria and assumes the work will be completed in a single project. See project P-2 for similar improvements outside of the Downtown Core. The project assumes that design and construction will meet the City's Downtown Design Manual guidelines. Examples of removal/replacement include:

- Exposed aggregate sidewalks
- Severely cracked or lifted sidewalks, including panels around existing tree wells
- Installing ADA compliant curb ramps where none currently exist
- Replacing existing curb ramps that are out of compliance

Because this project focuses on isolated locations it does not include installation of new electrical. Tree removal and replacement will be required in some locations. Please see below for an estimated quantity and refer to P-9 for tree removal and replacement project.

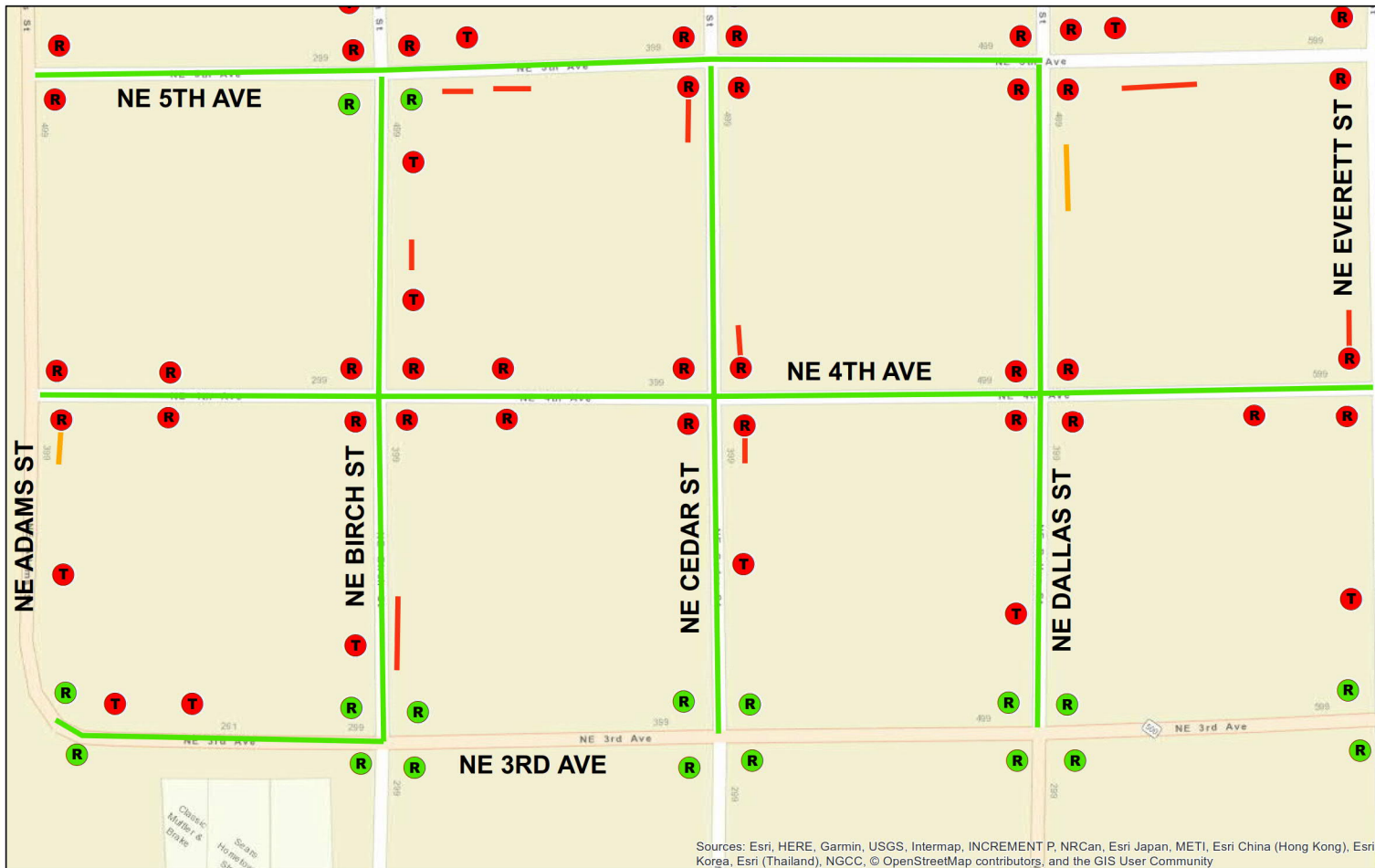
Project Element	Quantity	Unit	Unit Cost (\$/Unit)	Contingency	GC & Overhead	Engineering/ Planning	City Admin	Total Element Cost
				30%	25%	20%	10%	
Ramp	51	Each	\$3,500	\$53,550	\$44,625	\$35,700	\$17,850	\$330,225
Cement Concrete Removal and Replacement	450	S.Y.	\$120	\$16,200	\$13,500	\$10,800	\$5,400	\$99,900

<b>Total Project Cost</b>	<b>\$430,125</b>
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**Related Considerations:**

- Ramp includes:
  - o Installing new ramp
  - o Replacing ramp due to:
    - Lack of level landing
    - Obstructions or severe damage
    - Ramp throat exceeding 1:12 slope
    - A half of an inch or more lip at the gutter
    - No detectable warning patterns
- Cement Concrete Removal and Replacement includes:
  - o Severe cracking sidewalk 20 S.Y.
  - o Exposed aggregate sidewalk 230 S.Y.
  - o Tripping hazards 200 S.Y.
- Tripping hazards assumed:
  - o Repaired by removing and replacing sidewalk panels.
- Tree removal and replacement costs:
  - o Approximately 10 trees need to be removed and replaced for this project.
  - o See project P-9

P-1 Isolated Sidewalk, ADA Ramp, and Tripping Hazards Replacement - Downtown Core



Existing Legend

- Downtown Core
- Severe Cracking
- Exposed Aggregate
- T Tripping Hazard - Repair
- R Ramp - Repair
- R Ramp - General Compliant

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community



Project Identification: P-2  
Project Name: Isolated Sidewalk, ADA Ramp, and Tripping Hazards Replacement – Outside Core

Project Description:

The project includes removing and replacing isolated sections of sidewalk to replace existing exposed aggregate sidewalks and address severe cracking and tripping hazards. The project also includes constructing new ADA compliant curb ramps to address safety concerns and accessibility deficiencies outside the Downtown Core area. The limits of this work are from the right-of-way or building face to back of existing curb. The project includes addressing all areas outside the Downtown Core that do not meet the >25% criteria and assumes the work will be completed in a single project. Examples include:

- Exposed aggregate sidewalks
- Severely cracked or lifted sidewalks, including areas around existing tree wells
- Installing ADA compliant curb ramps where none currently exist
- Replacing existing curb ramps that are out of compliance

Because this project focuses on isolated locations it does not include installation of new electrical. Tree removal and replacement will be required in some locations. Please see below for an estimated quantity and refer to P-9 for tree removal and replacement project.

Project Element	Quantity	Unit	Unit Cost (\$/Unit)	Contingency	GC & Overhead	Engineering/ Planning	City Admin	Total Element Cost
				30%	25%	20%	10%	
Ramp	50	Each	\$3,500	\$52,500	\$43,750	\$35,000	\$17,500	\$323,750
Cement Concrete Removal and Replacement	510	S.Y.	\$110	\$16,830	\$14,025	\$11,220	\$5,610	\$103,785

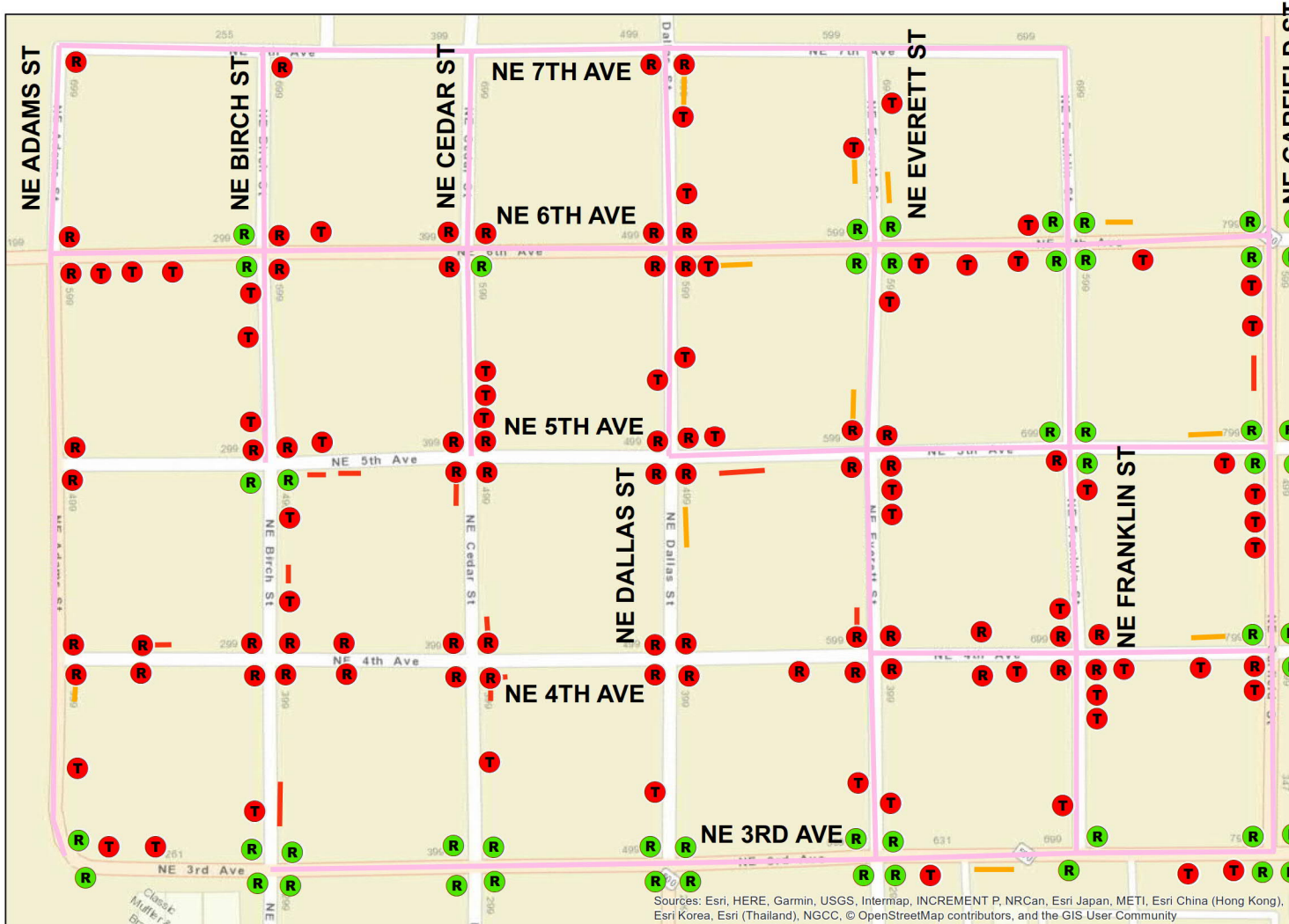
<b>Total Project Cost</b>	<b>\$427,535</b>
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Related Considerations:

- Ramp includes:
  - o Installing new ramp
  - o Replacing ramp due to:
    - Lack of level landing
    - Obstructions or damaged sidewalks
    - Ramp throat exceeding 1:12 slope
    - A half of an inch or more lip at the gutter
    - No detectable warning patterns
- Cement Concrete Removal and Replacement includes:
  - o Severe cracking sidewalk 100 S.Y.
  - o Exposed aggregate sidewalk 10 S.Y.
  - o Tripping hazards 400 S.Y.
- Tripping hazards assumed:
  - o Be repaired by removing and replacing sidewalk panels.
- Tree removal and replacement costs:
  - o Approximately 25 trees need to be removed and replaced for this project.
  - o See project P-9



P-2 Isolated Sidewalk, ADA Ramp, and Tripping Hazards Replacement – Outside Core



Existing Legend

- Outside Core
- Severe Cracking
- Exposed Aggregate
- Tripping Hazard - Repair
- Ramp - Repair
- Ramp - General Compliant

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community



**Project Identification:** P-3  
**Project Name:** Full Block Sidewalk and ADA Ramp Replacement – Downtown Core

**Project Description:**  
 This sample project includes removing and replacing a single side of one full block of sidewalk, and replacing or installing new ADA compliant curb ramps to address safety concerns and accessibility deficiencies within the block. The limits of this work are from the right-of-way or building face to back of existing curb between the block. The project includes areas that meet the >25% sidewalk replacement criteria. The project assumes that design and construction will meet the City's Downtown Design Manual guidelines. The existing furnishings will be preserved and protected during construction of this project including:

- Benches
- Drinking fountains
- Trash Receptacles
- Bike Racks
- Natural stones
- Water features
- Sculptures
- Accent lighting

The project includes removing and replacing existing trees when adjacent to severely cracked or lifted sidewalk panels. Refer to P-9 for tree removal and replacement project and P-8 for new electrical project.

Project Element	Quantity	Unit	Unit Cost (\$/Unit)	Contingency	GC & Overhead	Engineering/ Planning	City Admin	Total Element Cost
				30%	25%	20%	10%	
Ramp	5	Each	\$3,500	\$5,250	\$4,375	\$3,500	\$1,750	\$32,375
Cement Concrete Removal and Replacement	200	S.Y.	\$120	\$7,200	\$6,000	\$4,800	\$2,400	\$44,400

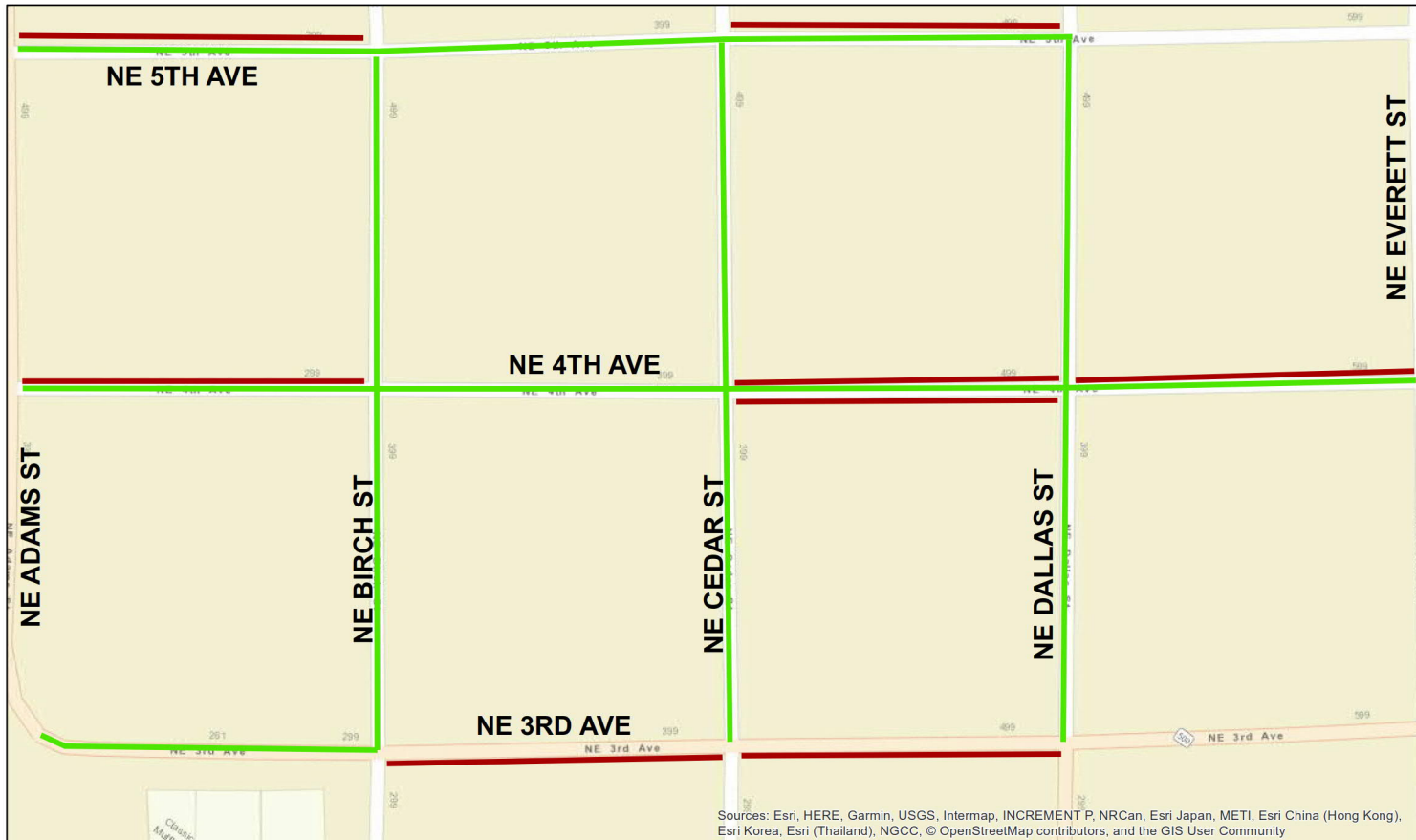
<b>Total Project Cost</b>	<b>\$76,775</b>
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**Related Considerations:**



- Ramp:
  - o Both ramps at the returns and a mid-block ramp will be replaced on a single side of one full block.
  - o Ramps at the returns are also included in the quantities and costs for project P-1 and ramps will be duplicated in quantities and costs if two Full Block Sidewalk and ADA Ramp Replacement projects intersect each other.
  - o Replace ramp due to:
    - Lack of level landing
    - Obstructions or damaged sidewalks
    - Ramp throat exceeding 1:12 slope
    - A half of an inch or more lip at the gutter
    - No detectable warning patterns
- Cement Concrete Removal and Replacement assumes:
  - o Typical full block length 200 ft
  - o Typical sidewalk width 9 ft
- Tree removal and replacement costs:
  - o Approximately 4 trees need to removed and replaced for this project.
  - o See project P-9
- New electrical costs:
  - o See project P-8



### P-3 Full Block Sidewalk and ADA Ramp Replacement – Downtown Core



#### Existing Legend

-  Downtown Core
-  Full Block Sidewalk Replacement

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community



Project Identification:

P-4

Project Name:

Full Block Sidewalk and ADA Replacement – Outside Core

Project Description:

The project includes removing and replacing a single side of the street for full block sections of sidewalk, and replacing or installing new ADA compliant curb ramps to address safety concerns and accessibility deficiencies within the block. The project also includes constructing sidewalks where none currently existing to improve connectivity. The limits of this work are from the right-of-way or building face to back of existing curb. The project meets the >25% sidewalk replacement criteria. The project includes removing and replacing existing trees when adjacent to severely cracked or lifted sidewalk panels. Refer to P-9 for tree removal and replacement project and P-8 for new electrical project.

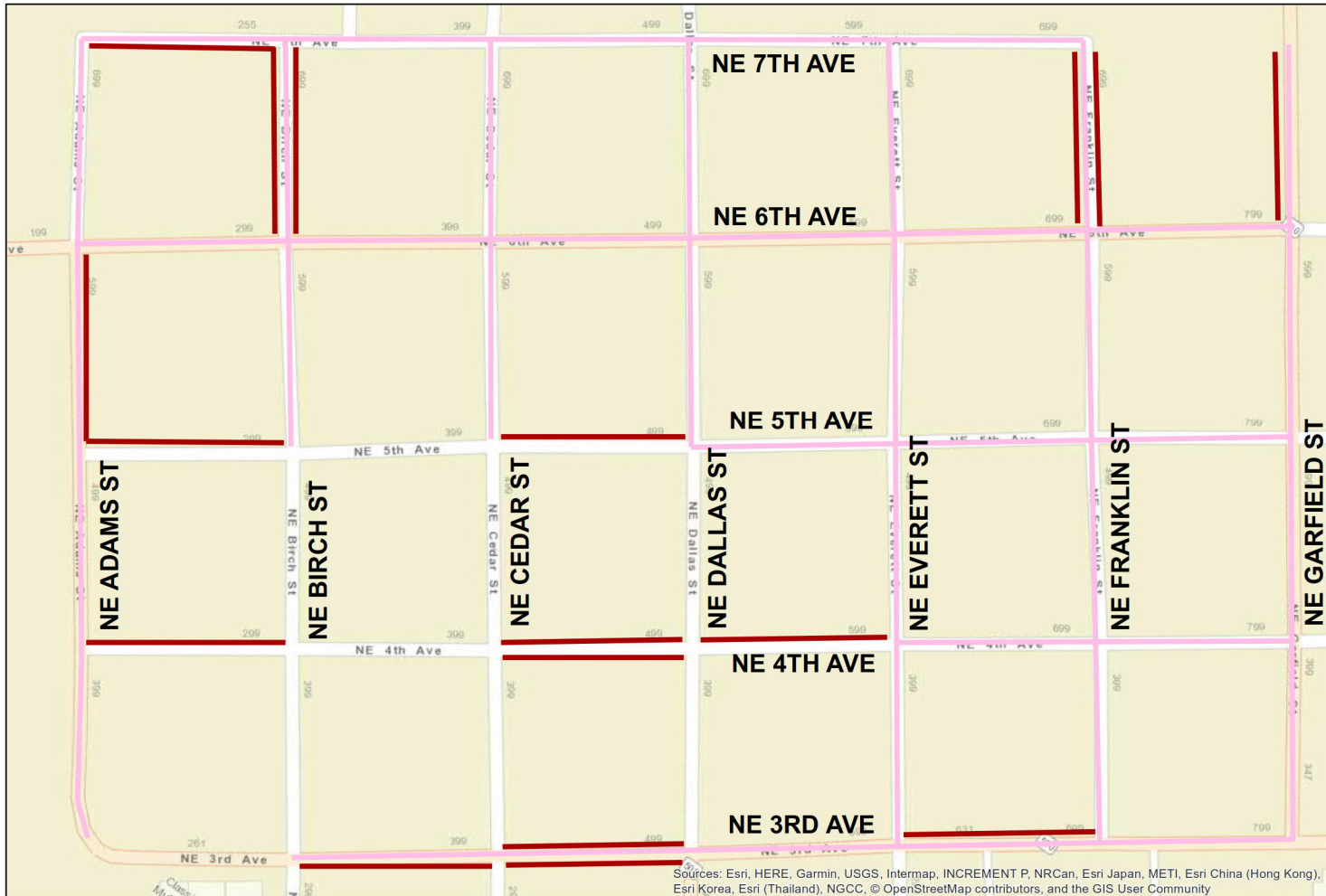
Project Element	Quantity	Unit	Unit Cost (\$/Unit)	Contingency	GC & Overhead	Engineering/ Planning	City Admin	Total Element Cost
				30%	25%	20%	10%	
Ramp	4	EA	\$3,500	\$4,200	\$3,500	\$2,800	\$1,400	\$25,900
Cement Concrete Removal and Replacement	120	S.Y.	\$110	\$3,960	\$3,300	\$2,640	\$1,320	\$24,420

<b>Total Project Cost</b>	<b>\$50,320</b>
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Related Considerations:

- Ramp:
  - o Both ramps at the returns will be replaced on a single side of one full block.
  - o Ramps at the returns are also included in the quantities and costs for project P-2 and ramps will be duplicated in quantities and costs if two Full Block Sidewalk and ADA Ramp Replacement projects intersect each other.
  - o Replace ramp due to:
    - Lack of level landing
    - Obstructions or damaged sidewalks
    - Ramp throat exceeding 1:12 slope
    - A half of an inch or more lip at the gutter
    - No detectable warning patterns
- Cement Concrete Removal and Replacement assumes:
  - o Typical full block length 200 ft
  - o Typical sidewalk width 5 ft
- Tree removal and replacement costs:
  - o Approximately 4 trees need to be removed and replaced for this project.
  - o See project P-9
- New electrical costs:
  - o See project P-8

P-4 Full Block Sidewalk and ADA Replacement – Outside Core



**Existing Legend**

- Outside Core
- Full Block Sidewalk Replacement

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community



Project Identification: P-5  
Project Name: Pedestrian Crossing Safety Upgrades

Project Description:

The project consists of design and installation of pedestrian safety crossing upgrades within the downtown area to improve pedestrian safety. The project assumes a total of three crossing upgrades, one each on NE 3rd, NE Adams and NE Garfield. Additional traffic and engineering analysis is needed to determine specific crossing locations. The recommended upgrades include installation of a complete Rectangular Rapid Flashing Beacon (RRFB) crosswalk system complying with MUTCD Standards. For the purpose of budget estimation, each proposed RRFB system is anticipated to consist of (2) mono-directional RRFBs preceding the crossing location, (2) bi-directional RRFB installations at the crosswalk, crosswalk striping, addition of (2) ADA ramps, and MUTCD standard regulatory sign installations. The project assumes solar power electrical.

Project Element	Quantity	Unit	Unit Cost (\$/Unit)	Contingency	GC & Overhead	Engineering/ Planning	City Admin	Total Element Cost
				30%	25%	20%	10%	
ADA Ramps	2	EA	\$3,700	\$2,220	\$1,850	\$1,480	\$740	\$13,690
Sidewalk Replacement	10	S.Y.	\$110	\$330	\$275	\$220	\$110	\$2,035
MUTCD Regulatory Signs	4	EA	\$250	\$300	\$250	\$200	\$100	\$1,850
RRFB System Installations	1	LS	\$50,000	\$15,000	\$12,500	\$10,000	\$5,000	\$92,500

Cost Per RRFB Location	\$96,385
Quantity of RRFBs	3
Total Project Cost	\$289,155



Project Identification: P-6  
Project Name: Smoke Testing/Video Inspection - Sanitary and Storm Sewer Systems

Project Description:  
This project includes completing smoke testing for the sanitary sewer collection and conveyance system and video inspection for both the storm and sanitary sewer collection and conveyance systems. Currently, there is very little condition and mapping information available for these systems in the downtown area. It is also likely that cross connections exist with the storm and sanitary sewer. For example, roof downspouts may be connected to basement drains and the sanitary sewer system, which can contribute to basement flooding and increased sanitary sewer flows. This project will identify cross connections through smoke testing and provide the City with valuable sanitary and storm sewer mapping and condition information to assist with future replacement needs, methods, and costs. Estimate assumes cleaning and video inspection of storm and sanitary mainline and lateral piping.

Project Element	Quantity	Unit	Unit Cost (\$/Unit)	Contingency	GC & Overhead	Engineering/ Planning	City Admin	Total Element Cost
				30%	25%	20%	10%	
Smoke Testing - Sanitary Sewer	12500	LF	\$1	\$3,750	\$3,125	\$2,500	\$1,250	\$23,125
Video Inspection - Sanitary Lateral	200	EA	\$75	\$4,500	\$3,750	\$3,000	\$1,500	\$27,750
Video Inspection - Sanitary Main	12500	LF	\$2	\$7,500	\$6,250	\$5,000	\$2,500	\$46,250
Video Inspection - Storm Sewer	12500	LF	\$2	\$7,500	\$6,250	\$5,000	\$2,500	\$46,250

Total Project Cost	\$143,375
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Project Identification: P-7  
Project Name: Downspout Separation

Project Description:

This project includes separating roof downspouts that are currently connected to the sanitary sewer system and redirecting and connecting to the storm sewer system. Downspouts that collect roof runoff and are connected to a property's sanitary sewer lateral may also be connected to the same piping system as a basement drain. This can cause basement flooding during heavy rain events as well as increased sanitary sewer flow which impacts conveyance and treatment capacity and costs. Project P-6 identifies cross connection locations through smoke testing and video inspection. This project includes excavating the cross connection location, disconnecting from the sanitary sewer system, and installing new piping to connect to the nearest storm sewer catch basin, manhole or mainline. The estimate includes costs for addressing a single cross connection location and an assumed number of cross connections within the downtown area.

Project Element	Quantity	Unit	Unit Cost (\$/Unit)	Contingency	GC & Overhead	Engineering/ Planning	City Admin	Total Element Cost
				30%	25%	20%	10%	
6-Inch Storm Sewer Piping	50	LF	\$70	\$1,050	\$875	\$700	\$350	\$6,475
Storm Sewer Cleanout	1	EA	\$600	\$180	\$150	\$120	\$60	\$1,110
Connection to Existing Storm Sewer Main or Structure	1	EA	\$1,500	\$450	\$375	\$300	\$150	\$2,775

Subtotal Downspout Separation Cost (EA)	\$10,360
Assumed Quantity of Cross Connections	20
<b>Total Project Cost</b>	<b>\$207,200</b>



Project Identification: P-8  
Project Name: Event/Festival Electrical Upgrades

Project Description:  
This project includes installing new electrical service to support events in the downtown area. Examples include Camas Days, First Fridays, the Farmer's Market, Holiday Festivals, and a variety of other events. Currently electrical service is provided through receptacles at street lighting, extension chords from private property, or gas powered generators. Street lighting receptacles were intended for holiday lighting and do not have the capacity to support electrical needs for vendors, which often include electric cooking appliances and other high power uses. This causes frequent tripping of circuit breakers. The use of extension chords and generators is a safety hazard and contributes to noise and air pollution. This project will install new conduit, junction boxes, receptacles and wiring to provide increased access and capacity to electrical service. The estimate assumes upgrades to both sides of the street for a single block.

Project Element	Quantity	Unit	Unit Cost (\$/Unit)	Contingency	GC & Overhead	Engineering/ Planning	City Admin	Total Element Cost
				30%	25%	20%	10%	
Service Drop/Pedestal/Meter	1	EA	\$10,000	\$3,000	\$2,500	\$2,000	\$1,000	\$18,500
Service Location, Complete*	10	EA	\$2,000	\$6,000	\$5,000	\$4,000	\$2,000	\$37,000

Subtotal Cost Per Block	\$55,500
Assumed Quantity of Blocks	7
Total Project Cost	\$388,500

\*"Service Location, Complete " includes conduit, wiring, junction box, receptacle, etc. for each location for where electrical service is provided. Estimate assumes a single service location can support two vendors and twenty vendors per block (ten services total per block). Estimate also assumes that conduits will be installed under the sidewalk and work will take place in conjunction with complete sidewalk replacement within a given block.



Project Identification: P-9  
Project Name: Hazard Tree Removal and Replacement Program

Project Description:

This project includes removing and replacing a hazardous trees within the downtown area as recommended in the 2017 arborist report for Downtown Camas. Base on the recommendations there are 41 trees identified in the report that consist of all 34 Maple trees inventoried along with 1 Oak, 1 Sweet Gum, 1 Prunus and 4 Ash trees. It is intended that the costs established for this project can be used for a standalone project or integrated into larger projects such as full block sidewalk replacements (minus the Sidewalk Repair/Replacement cost shown). The project assumes the following: tree removal; partial removal and repair of sidewalk; expanded tree pit; installation of a tree grate; root barrier; new tree planting and temporary irrigation for establishment. \* Temporary Irrigation is assume to be a tree watering bag that is maintained for a period of 5 months.

Project Element	Quantity	Unit	Unit Cost (\$/Unit)	Contingency	GC & Overhead	Engineering/ Planning	City Admin	Total Element Cost
				30%	25%	20%	10%	
Tree Removal	1	EA	\$500	\$150	\$125	\$100	\$50	\$925
Sidewalk Repair/Replacement	5	S.Y.	\$110	\$165	\$138	\$110	\$55	\$1,018
New Tree Pit Installation	1	EA	\$500	\$150	\$125	\$100	\$50	\$925
Tree Grate Installation	1	EA	\$2,000	\$600	\$500	\$400	\$200	\$3,700
Root Barrier Installation	24	LF	\$4	\$29	\$24	\$19	\$10	\$178
New Tree Installation	1	LS	\$500	\$150	\$125	\$100	\$50	\$925
Temporary Irrigation*	1	LS	\$400	\$120	\$100	\$80	\$40	\$740

Unit Tree Replacement Cost	\$8,410
Arborist Recommended Tree Replacement	41
<b>Total Project Cost</b>	<b>\$344,814</b>

Related Considerations:

- This project does not include the cost for completing an overall redesign of the downtown street tree plantings to serve as a prioritized and phased guide for implementing the tree removal and replacement as recommended in the City of Camas – Tree Inventory prepared by New Day Arborist in October, 2017. However, it is strongly recommended that this effort be completed prior to moving forward with the removal and replacement projects, so as to ensure the goals and standards established in the City's Downtown Design Manual are being met.
- Prioritization of tree removal should be given to those trees that pose most immediate risk to the public safety as recommended in the City of Camas Tree Inventory.
- Per the Downtown Design Manual, trees and plantings should be irrigated. In addition to preparing a Street Tree Master Plan, it is recommended that an Irrigation System Mater Plan be developed to guide the phased infrastructure and installation of a permanent irrigation system as larger projects are being completed.





City of Camas  
Downtown Infrastructure Analysis



Project Identification: P-10  
Project Name: Curb to Curb Pavement and Utilities Reconstruction – Downtown Core

Project Description:  
The project includes complete reconstruction of the street section, curb, water, sewer and storm utilities for a single block within the Downtown Core area as previously defined. Areas where this project applies are based on streets identified as “poor” or “very poor” in the City’s “Pavement Management Program Budget Options Report” dated December 2016. Street sections identified in the report as “fair” or better are included in project P-12 Pavement Preservation. The limits of this work are from back of curb to back of curb. The estimate assumes the City’s Local Street Section, detail 04C. Utility project elements include all piping, structures, services, valves, fittings, etc.

Project Element	Quantity	Unit	Unit Cost (\$/Unit)	Contingency	GC & Overhead	Engineering/ Planning	City Admin	Total Element Cost
				40%*	25%	20%	10%	
Roadway Reconstruction	7,200	SF	\$10	\$28,800	\$18,000	\$14,400	\$7,200	\$140,400
Cement Concrete Curb and Gutter	400	LF	\$30	\$4,800	\$3,000	\$2,400	\$1,200	\$23,400
12-Inch Storm Sewer**	200	LF	\$200	\$16,000	\$10,000	\$8,000	\$4,000	\$78,000
8-Inch Potable Water**	200	LF	\$270	\$21,600	\$13,500	\$10,800	\$5,400	\$105,300
8-Inch Sanitary Sewer**	200	LF	\$250	\$20,000	\$12,500	\$10,000	\$5,000	\$97,500

Total Project Cost	\$444,600
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\*Contingency increased from 30% to 40% to account for higher construction costs in downtown core area

\*\*Street sections that orient north and south have a lower utility reconstruction cost due to mains typically running west and east



Project Identification: P-11  
Project Name: Curb to Curb Pavement and Utilities Reconstruction – Outside Core

Project Description:  
The project includes complete reconstruction of the street section, water, sewer and storm utilities for a single block outside Downtown Core area as previously defined. It is assumed that 50 percent of curb on either side of the street will be replaced based on its current condition. Areas where this project applies are based on streets identified as “poor” or “very poor” in the City’s “Pavement Management Program Budget Options Report” dated December 2016. Street sections identified in the report as “fair” or better are included in project P-12 Pavement Preservation. The limits of this work are from back of curb to back of curb. The estimate assumes the City’s Local Street Section, detail 04C. Utility project elements include all piping, structures, services, valves, fittings, etc.

Project Element	Quantity	Unit	Unit Cost (\$/Unit)	Contingency	GC & Overhead	Engineering/ Planning	City Admin	Total Element Cost
				30%	25%	20%	10%	
Roadway Reconstruction	7,200	SF	\$10	\$21,600	\$18,000	\$14,400	\$7,200	\$133,200
Cement Concrete Curb and Gutter	400	LF	\$30	\$3,600	\$3,000	\$2,400	\$1,200	\$22,200
12-Inch Storm Sewer*	200	LF	\$200	\$12,000	\$10,000	\$8,000	\$4,000	\$74,000
8-Inch Potable Water*	200	LF	\$270	\$16,200	\$13,500	\$10,800	\$5,400	\$99,900
8-Inch Sanitary Sewer*	200	LF	\$250	\$15,000	\$12,500	\$10,000	\$5,000	\$92,500

Total Project Cost	\$421,800
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\*Street sections that orient north and south have a lower utility reconstruction cost due to mains typically running west and east



Project Identification: P-12  
Project Name: Pavement Preservation

Project Description:

The project includes pavement restoration in the downtown and outside core. This is a general project for street conditions of very good, good non-load related, and good load related. The limits of this work are from curb to curb. For this project, refer to the Pavement Management Program Budget Options Report for street condition, functional class and treatment.

Project Element	Quantity	Unit	Unit Cost (\$/Unit)	Contingency	GC & Overhead	Engineering/ Planning	City Admin	Total Element Cost
				30%	25%	20%	10%	
Crack Seal	200	LF	\$1	\$60	\$50	\$40	\$20	\$370
Slurry Seal	200	LF	\$2	\$120	\$100	\$80	\$40	\$740

Total Project Cost	\$1,110
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