

CITY OF CANBY

Stormwater Master Plan Update

Clackamas County, Oregon



December 2022

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CITY OF CANBY
Stormwater Master Plan Update

December 2022

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CITY OF CANBY
Stormwater Master Plan Update

December 2022

INTRODUCTION

The City of Canby first prepared a *Storm Drainage Master Plan* in 1994 to identify environmental constraints in stormwater management, prepare master planning for the orderly provision of stormwater collection and disposal systems, and develop a funding mechanism to implement the plan. At that time, and still true today, stormwater disposal in the majority of the urban area was with subsurface percolation through Class V Underground Injection Control (UIC) structures, known as drywells. There are currently over 435 permitted drywells within the Canby stormwater system.

In 1994, in addition to the drywells, there were eight drainage basins identified within the City Limits that discharged to surface waters, that are still in service today. Six of the eight are under the City of Canby jurisdiction, four of which discharge to the Molalla River, and two that discharge to the Willamette River either directly or via Willow Creek.

The surface water discharge from North Baker Street to the Molalla River that was located just north of NW 6th Place, was eliminated in 2018 with a revised piping configuration. However, a very small area on North Baker Street, south of NW 6th Avenue, was later identified as discharging directly to the Molalla River, which retains the total six outfalls under the City’s jurisdiction.

The remaining two surface water discharges split the Highway 99E drainage at a point between Ivy and Holly Streets, into two basins under the jurisdiction of the Oregon Department of Transportation. The southwestern section drains to the Molalla River. The northeastern section drains to the Willamette Rive via Willow Creek.

In 2014, the City of Canby prepared a *Stormwater Master Plan* (SWMP) that updated the 1994 report and evaluated the existing stormwater system. The SWMP provided guidance for the continued maintenance of the system and identified capital improvement to address deficiencies. The SWMP provided information on the geography, topography, geology, hydrogeology, soils, climate, and water supplies. That information is still applicable today and is not reproduced in this plan update but incorporated by reference.

The 2014 SWMP defined the basins that discharge to surface waters as reproduced below:

Canby Downtown Core Area

This storm system drains the downtown commercial area and is the oldest part of the City’s stormwater infrastructure. The system discharges to the Molalla River in the western part of the community. The total area of the existing basin as determined using GIS mapping, and as modeled, is 48.9 acres. In addition to the typical right of way areas, this basin also includes the entire developed downtown area between Northwest (NW) 1st Avenue (Ave) and NW 3rd Ave, between NW Elm Street and N Ivy Street.

A portion of land located near Wait Park drains to existing UICs and infiltration areas and does not contribute to total basin flow, so it is therefore not included in the basin. The outfall from the Canby Downtown basin is a surface water discharge point via a detention pond, grassy swale, and natural drainage way adjacent to the new police station at the west end of NW 3rd Ave.

Knights Bridge Road

This system drains approximately 1500 feet of Knights Bridge Road and immediate adjacent areas of intersecting streets. The total area modeled for the existing basin is 3.5 acres. The outfall for this storm system is an open pipe located underneath the bridge on which Knights Bridge Rd crosses the Molalla River. The pipe is supported by the bridge structure underneath the roadway and has a free outfall approximately 30 feet above the Molalla River, above the approximate centerline of the river. The conveyance system includes a Contech Model CDS2015-4 hydrodynamic separator for particulate separation, located near N Ash St at a manhole prior to the discharge point.

Southwest Berg Parkway

This conveyance system drains the 3.2 acres of Southwest (SW) Berg Parkway to an outfall near the Molalla River in the Canby Community Park.

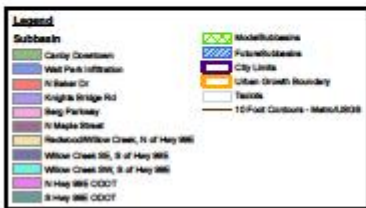
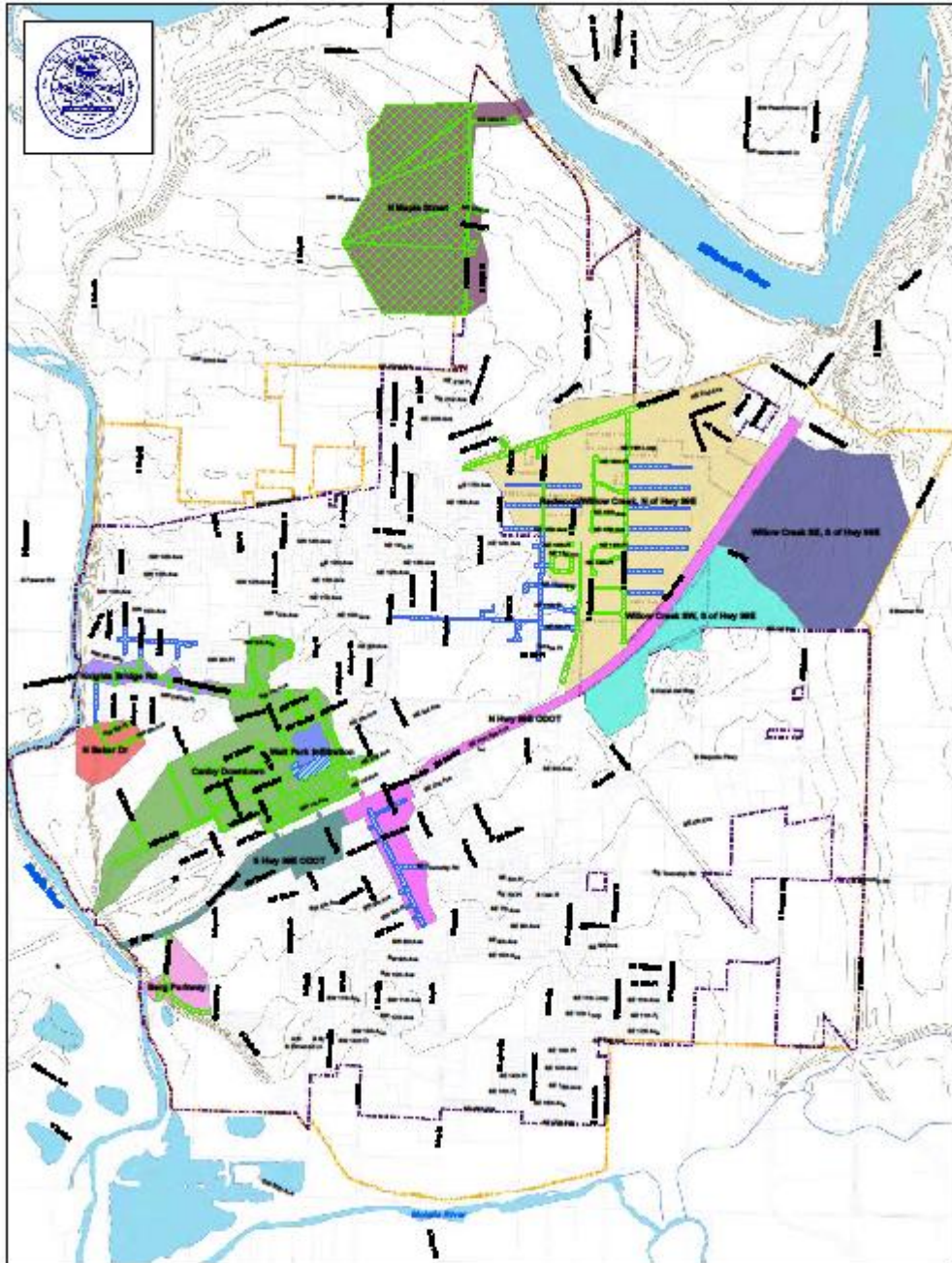
North Maple Street

This system collects stormwater in a number of UICs connected in series along N Maple Street, which is located in the northern part of the City. Runoff from adjacent agricultural land is also collected at the north end of N Maple Street in a second pipe system that is connected underneath NE 34th Pl. The combined runoff then discharges directly to the Willamette River beyond the end of NE 34th Pl. The impervious area of the basin consists of a total of 5.6 acres, and the agricultural area contributing to the basin is 123 acres. The system discharges through a deeply buried pipe at approximately the water surface elevation of the Willamette River.

Redwood/Willow Creek

Due to the inability to percolate, this system drains N Redwood St and adjacent side streets from NE Territorial Rd to the south side of Hwy 99E, and parts of the residential streets on the east side of N Pine St and NE Territorial Rd from N Maple St to Willow Creek. The existing drainage basin modeled for this report consisted of 22.2 acres of impervious. The system's outfall is to Willow Creek on the north side of NE Territorial Road, where it combines with flow from the main stem of Willow Creek and flows onto the Fish Eddy property.

Subsequent to preparation of the 2014 SWMP, the City identified an additional surface water discharge on North Baker Street, south of NW 6th Avenue. The catchment area is 0.3 acres and is connected to an abandoned backwash drain line for the water treatment plant. A map of all drainage basins that discharge to surface waters is shown on the attached plate from the SWMP:



The data used to generate this map is based on current available design drawings and field mapping. This information is the best currently available. However, errors or omissions, measurement and address errors. The City will continue to update and refine and apply the information system as it is refined in management practices.



Kennedy/Jenks Consultants

**CITY OF CANBY
STORMWATER MASTER PLAN**

MAJOR BASINS AND SUBBASINS

FIGURE 3

17 September 2013
KJ Project Number 01291029.00

The SWMP provided guiding principles for stormwater system design and identified a capital improvement plan for disposal systems that were deficient or out of compliance with environmental regulations.

Most significant in the 2014 SWMP was the *Groundwater Protectiveness Demonstrations and Risk Prioritization for Underground Injection Control (UIC) Devices*, which is bound in the appendices. That study provides the technical criteria for the continued permitted use of drywells for stormwater disposal. The groundwater protectiveness model concluded UICs are protective of groundwater, and a regulatory acceptable method of stormwater disposal, if they meet one of the following two conditions:

- (1) the vertical separation distance between the UIC and seasonal high groundwater is more than 2.5 feet, **OR**
- (2) the horizontal separation distance between a UIC and water well is more than 267 feet.

These guiding criteria have been essential in the application of UICs for stormwater disposal since adoption of the SWMP in 2014.

Since the initial 1994 report, additional area was identified where drywell disposal is not an acceptable practice, due to high groundwater levels or low permeability. This included expanding the North Redwood drainage basin both westerly to near N Maple Street, and southerly to beyond Highway 99E, as shown on Figure 3 of the 2014 SWMP. In these areas it is acceptable for private development to connect to public conveyance systems or utilize alternative disposal systems.

The purpose of this Stormwater Master Plan Update is to update the guiding principles for stormwater system design, update the 2014 Capital Improvement Plan, update all project costs, and provide guidance for compliance with the Water Pollution Control Facility Permit issued to the City of Canby.

WPCF PERMIT REQUIREMENTS

Subsequent to adoption of the 2014 SWMP, the Oregon DEQ issued Water Pollution Control Facility (WPCF) Permit Number 103077 to the City of Canby. That permit is bound in the appendices and will need to be renewed perpetually. Although currently there are no Class V injection wells in the City of Canby that are out of compliance with the permit, there is still a need to have guidance in the decommissioning of facilities due to a variety of circumstances.

Circumstances that may require corrective actions on an existing facility would include identifying pollutants that exceed the action level, hazardous material spills, identified endangerment of residents or the environment, or recognizing a facility that does not comply with the groundwater protectiveness criteria. Any corrective action requires DEQ notification within 24 hours of discovering the issue, and the City must then submit a written report within 5 days.

The City of Canby prepared a UIC Monitoring Plan in 2015 that addressed the permit condition of testing pollutant levels as listed in Table 1 of the WPCF permit. Subsequently, the City demonstrated compliance with the limitations and secured DEQ approval of a revised monitoring plan.

Major Modification Number 1 to the WPCF permit was approved by DEQ on January 17, 2020, which eliminated monitoring for the six specified pollutants in Table 1. In the future the City is only required to confirm in their annual reports that there have been no changes to site conditions that would reasonably be expected to significantly change the stormwater quality.

Hazardous spills that impact a UIC are subject to the requirements of OAR 340-142, which requires notification of the Oregon Emergency Management Division's Oregon Emergency Response System (OERS) by calling (800) 452-0311.

If any UIC requires decommissioning, the City will need to address the acceptable alternatives for construction.

GUIDING PRINCIPLES FOR SYSTEM DEVELOPMENT

As required in the Canby Public Works Design Standards Chapter 4, Stormwater facilities must be capable of conveying a 10-year storm event without surcharging, and a 25-year event without overtopping the collection system manholes. Design for the 100-year storm event is only required to channel flow to avoid damage to private property.

Storm intensities for conveyance system design are provided by the ODOT Rainfall Intensity vs. Duration curves for Zone 8, based on a 5 minute time of concentration, as follows:

2-year Intensity	1.60 inches / hour
5-year Intensity	2.00 inches / hour
10-year Intensity	2.25 inches / hour
25-year Intensity	2.65 inches / hour
100-year Intensity	3.40 inches / hour

Based on the precipitation Isopluvials prepared by the National Oceanic and Atmospheric Administration, Atlas 2, Volume X for Oregon, the following 24-hour storm events should be used for detention calculations, if required:

2-year, 24-hour Rainfall	2.50 inches
5-year, 24-hour Rainfall	3.10 inches
10-year, 24-hour Rainfall	3.45 inches
25-year, 24-hour Rainfall	3.90 inches
100-year, 24-hour Rainfall	4.40 inches

Design options to be incorporated into future stormwater system designs include:

- In accordance with EPA and DEQ standards, the first priority for stormwater disposal is collection and conveyance to a surface water stream where feasible. Conveyance systems should pipe to a centralized locations to accommodate potential future treatment operations. This would include piping to existing systems that discharge to the surface waters, where feasible.

- Drywell disposal should be utilized where stormwater collections systems cannot efficiently or logistically convey water to surface water discharge locations. Drywell disposal is the first preferred alternative in all locations that meet the groundwater protectiveness criteria and have adequate percolation rates to function efficiently. Where feasible, drywells should be daisy chained together to provide redundancy and capacity averaging.
- On-site bioswales, rain gardens, and green street designs with subsurface percolation are preferred where drywells or surface water discharge is not practical or permitted. Bioswales or raingardens that collect public roadway runoff should be located in the public right-of-way or a public easement that is accessible to maintenance equipment.
- Pervious asphalt, pervious concrete surfaces, and buried percolation trenches **should not be considered** due to demonstrated performance and limited ability to maintain these systems. Experience within the Canby stormwater infrastructure with these alternative designs have not performed adequately.

As noted in the Public Works Design Manual, runoff from private properties is prohibited from disposal into the public right-of-way, excepting in the locations identified in the SWMP or in this Stormwater Master Plan Update. Where a conveyance system is available, stormwater runoff should be collected and conveyed to a surface water discharge.

Areas designated to discharge into the public system include the downtown commercial zone with zero setback requirements, and areas where it is not feasible to percolate stormwater due to high seasonal groundwater levels, such as the Willow Creek/North Redwood Basin. Detention requirements are still applicable to these areas depending upon the capacity of the receiving system.

The Canby Municipal Code encourages Low Impact Development (LID) as a means to mimic predevelopment stormwater characteristics for properties with acceptable site and soil conditions. The multiple projects undertaken by the Public Works Department over the past 20 years have resulted in the conclusion that many of the LID options are not acceptable within the City due to poor percolation rates. This includes all pervious surface treatments and buried infiltration trenches due to blinding and the inability to restore adequate percolation rates.

LID design standards have been deleted from the current Public Works Design Standards.

EXISTING STORMWATER SYSTEM

The existing conveyance systems throughout the City are comprised of gravity storm drainage pipes, open drainage ways or ditches, trench drains, and UICs. The existing stormwater system was shown in Figure 4 in the SWMP and is currently being updated by City staff.

Approximately 125,000 feet of storm pipeline has been identified in the system inventory. Approximately half of this pipe drains to surface outfalls and half drains to infiltration areas, including UICs. The City is responsible for slightly less than 108,800 feet of pipe; however, the

exact amount is unknown due to the fact that the current mapping does not distinguish private and county owned infiltration structures or minor surface systems from those that are owned by the City. Less than 1.5 percent of the pipelines in the system have documented diameter or pipe material type. Known diameters of existing pipes range from 4 inches to 36 inches. The majority of pipes that have known diameters are between 10 and 24 inches.

Approximately 16,000 feet of pipeline within the City is under the jurisdiction of ODOT or County, and captures and conveys runoff through surface drainage systems on Hwy 99E within City limits. Clackamas County is also responsible for an unknown number of UICs within the City, but these are not clearly defined and the locations are not known exactly. Pipelines that are not the responsibility of the City were not included in modeling in the 2014 Master Plan.

The following table summarizes pipe in the system.

**City of Canby
Stormwater Conveyance System Inventory
December 2022**

Category	Total Length of Pipe (feet)
Within City Limits	124,800
Surface Basins	60,800
Infiltration Systems/Private Systems	64,000
Total City Responsibility (Approximate)	108,800
ODOT/Clackamas County (Hwy 99E and S Ivy St)	16,000

Existing Drywells/UICs

The City has identified 435 existing UICs. Of these UICs, the majority are named and labeled with their identification (ID), others that are not named or labeled are given the ID “None” in the City’s database. All of the City’s UIC’s (435) appear to be functioning well and, through modeling, have been demonstrated to be protective of groundwater quality. Refer to the GSI Water Solutions report “Groundwater Protectiveness Demonstrations and Risk Prioritization for Underground Injection Control (UIC) Devices” (GWPD) which is bound in the 2014 SWMP. The summary technical memorandum is attached in the appendix of this update.

In 2021 the City of Canby completed jurisdictional transfer of multiple streets from Clackamas County to the City of Canby. Those streets included portions of N. Locust Street, N. Maple Street, N. Redwood Street, and S. Redwood street both in and out of city limits. These streets added 10 additional UIC facilities to the City’s system for operation and maintenance, all of which are now inventoried and operating acceptably.

The stormwater system has a substantial number of facilities dedicated to disposal of runoff. The following table was an inventory from the SWMP of the stormwater structures located throughout the City:

City of Canby
Existing Stormwater Management Facilities
December 2022

Location	Stormwater Feature/Structure
Downtown Central System, NW 3rd Ave	Detention Pond (Police Station Area)
N Knights Bridge Rd at N Ash St	Contech Model CDS2015-4 hydrodynamic separator
N Knights Bridge Rd, Grant Street to N Ash St	Pervious Pavement on North Side of Street
NW Territorial Rd at N Birch St	Swale, Rock, located on the South Side of Territorial Rd and on Both Sides of N Birch St
NW Territorial Rd at N Juniper St	Rock Swale
N Juniper St at N Juniper Pl (S)	Rock Swale
NW 13th Ave between N Ash St and N Birch St	Pervious Pavement, both sides of the street (~100 ft)
NW 9th Ave at N Elm St	250 ft of Pervious Pavement, both sides of the street
NW 9th Ave at N Cedar Ct	Pervious Pavement, both sides of the street
NW Hawthorne Ct at NW 13 th Ave	Pervious Pavement
N Baker St at N Alder St	Vegetated Swale
NW 11 th Ave N Alder St to N Ash St	Vegetated Swales, Both Sides of Street
NE 11th Ave east of N Ivy St	Pervious Pavement, South Side ~ 1 block
N Locust St at NW 9th Ave	50 ft Pervious Pavement, West Side (w/ Gravel Shoulders)
Auburn Farms Subdivision, NE 22 nd at N Locust St	Vegetated Swales and Trench Drains
Fairgrounds Area, NE 4th Ave	Pervious Pavement
Wait City Park	Pervious Pavement in all Parking Surrounding Park
NW 3rd Ave at N Elm St	Pervious Pavement
Apollo Subdivision near NW 1 st Ave	Vegetated Swale
NW 1 st Ave and N Fir St	Vegetated Swales
NW 8 th Place	Pervious Pavement
NE 19th Ave Cul-de-sac	Pervious Pavement
NE 10 th Ave at NE Oak Circle	Pervious Pavement
NE Laurelwood Loop	Pervious Pavement
NE Vine St	Pervious Pavement
Canby Cinema NE 2nd Ave at N Knott St	Rain Gardens, Swales on NE 2 nd Ave and Pervious Parking Lot
Countryside Living NW 2nd Ave at N Fir St	Rain Gardens
Canby Market Center Commercial Development Sequoia Parkway and SE 1st Ave	Retention Pond (private) near Spring Source of Willow Creek, receives overflow from Fred Meyer private drywells and some public right-of-way
SE Hazel Dell Way	Trench Drains
S Sequoia Parkway at SE Township Rd	Vegetated swales and Trench Drains
S Walnut St	Vegetated swales
S Pine St	Pervious Pavement
SW 13 th Ave	Pervious Pavement
NW Territorial Rd at Willow Creek	Proposed 'Fish Eddy' Constructed Stormwater Treatment Wetland

As noted, many of the listed LID improvements are only marginally acceptable and continue to perform below standards. This results in temporary surcharging during substantial storm events, which is acceptable, however if this causes property damage, then alternative reconstruction should be undertaken.

The 2014 SWMP included an inventory of all areas of concern and proposed repairs, which were then summarized in the Capital Improvement Plan. In the eight years since adoption of the plan, the City has resolved the majority of the concerns listed. The following table is reproduced from the 2014 SWMP with a narrative on the actions taken by the City:

City of Canby
STATUS OF STORMWATER AREAS OF CONCERN
 December 2022

<i>Location</i>	<i>Identified Issues or Resolution</i>
End of NW 3rd Ave, near the Police Station	The Police Station access and parking areas have been paved and no stormwater flooding issues resulted. No further action is required.
NW 2nd Ave (downtown)	This section of pipe has continued to perform adequately without damaging impacts to the downtown collection area. No improvements are warranted; however, this system should continue to be monitored.
NW 3rd Ave	Similar to NW 2 nd Ave and the area near the police station, this pipe system continues to operate without concerns and should only continue to be monitored.
NW 6th Ave (downtown)	This line has acceptable capacity, however, if plugging is observed due to root intrusion this line needs to be replaced and upsized to provide a more conservative capacity.
N Baker Dr, NW Baker St to NW 6th Pl *	The City completed construction to abandon the direct connections to the Molalla River and installed a new piped system to eliminate the concerns in the North Baker area.
N Knights Bridge Road, Molalla River to N Aspen Ct	The hydrodynamic separator has been operating acceptably and the storm lines continue to carry flow to minimize surcharging. Not a high priority but if funding is available, the 8” lines should be replaced with 10” HDPE
NW 9th Ave at NW Ash Ave	This drywell has been cleaned and has been operating acceptable since. No further actions are required at this location.
NW 9th Ave at NW Aspen Ct	Similar to NW 9 th and N Ash, periodic maintenance to remove sediment allows this drywell to operate acceptably. No further actions are required.
NW 9th Ave at N Holly St	Pipe elbow continues to limit access and should have a manhole retrofitted over the line to assist in cleaning.
NW 9th Ave between N Holly St and N Ivy St	The sedimentation manhole and drywell serving this area needs to be tested to determine if they have sufficient capacity for the design storm.

NW 13th Ave between N Ash St and N Birch St	Limited pervious pavement has been constructed in this area but flooding still occurs along the west side of the street.
10th Ave from N Locust St to N Pine Street*	Significant flooding currently occurs in this area and is expected to be worse once the existing gravel shoulders are paved. The road is owned by Clackamas County and any projects will require coordination with the County.
N Maple St at NW 34th Pl	When the CWA and EPA identify Canby as a permitted agency, this outfall may need treatment concurrently with all six City jurisdictional outfalls. This will only be required if made a permit condition and will have an associated time frame to permit securing needed funding.
NW Territorial Rd at N Holly St *	Trench drains in the private development are anticipated to fail and are located along property lines and therefore inaccessible. The City needs to continue monitoring the system and clean the mainline as needed.
12 th Ave and N Pine St *	Minor flooding occurs in this area
NE 11th Ave at N Pine St	Minor flooding occurs in this area
Canby Cinema NE 2nd Ave at N Knott St	The existing rain gardens are experience maintenance problems; plugging and trash. New Drywell should be installed in the alley north of the cinema
SE Hazel Dell Way *	This area incurs flooding 2 -3" deep in the vicinity of the trench drains
S Pine St at SE 2nd Ave, behind Canby Builders	Flooding occurs in this area - Unmaintained UICs in adjacent private development. A public drywell should be retrofitted to thus system
S Ivy St at SE 2nd Ave	The storm drainage system is included in the S Ivy Street reconstruction project scheduled for 2023 so no further action is required.
SW 2nd Ave	The pipe in this area is in marginal condition and contains some roots
SW 7th Ave and S Ivy St	Flooding occurs in this area and pipe in poor condition
SW 13th Ave and S Cedar St	Flooding occurs at UIC A-5 (the adjacent right-of-way have adequate space available for a swale)
SW 13th Ave south of Canby High School	Flooding occurs in this area (easement may be available for a swale)
Village on the Lochs Area, S Elm St	Flooding occurs at UIC A-11 when private UICs in the adjacent park fail

CAPITAL IMPROVEMENT PLANNING

The City of Canby does not currently have stormwater water quality treatment requirements and the City is not a “regulated” small Municipal Storm Sewer System (MS4) subject to the EPA Phase II Stormwater Rule. The primary basis for adopting a Capital Improvement Plan for the City of Canby is to improve stormwater collection and disposal deficiencies in the system.

The Capital Improvement Plan does include some long-range projects in anticipation of future classification as an EPA regulated MS4, however, the CIP is not intended to identify all

improvements that may be required. It is important to reserve lands for long-range projects in anticipation of future treatment requirements.

The City has two large natural basins that will provide very efficient stormwater treatment areas, including the Fish Eddy (or Three Sisters property) on Territorial Road that was purchased by the Wastewater Department for future effluent disposal, and the Police Station ponds that will drain to the Molalla River. The Police station site already operates very efficiently to detain stormwater and improve water quality.

In the years since adoption of the SWMP, the City has addressed many of the identified deficiencies listed in the Capital Improvement Plan. The following table reproduces the CIP published in the 2013 SWMP and indicates the current status of each project. Projects that have not been completed show the current estimated cost for the work. Projects that have been completed have the current replacement value listed.

The listed costs are based on the SWMP estimated cost, adjusted by the current Engineering News Record (ENR) Construction Cost Index (CCI). The current ENR CCI for December 2022 is 13,175. The estimated cost of future improvements substantiates the System Development Charge improvement fee, and the current 2022 value of the work completed is used to support the SDC reimbursement fee. The following project summary includes both existing and future projects:

City of Canby
2013 CAPITAL IMPROVEMENT PROJECT SUMMARY
 December 2022 ENR CCI 13,175

	<i>Project</i>	<i>Status</i>	<i>2022 Cost/Value</i>
1	North Baker Drive Erosion Mitigation	Completed In-House	\$32,000
2	NW 10th Ave. from N Locust St. to N Pine St.	Future	\$320,000
3	SE Hazel Dell Way - Added new Drywell	Completed In-House	\$9,500
4	SW 13th Ave near Canby High School Swale	Future	\$40,000
5	UIC E-8 and E-11 Decommission	Completed In-House	\$12,500
6	NW 2nd Ave and N Ivy St. UIC Decommission	Completed In-House	\$52,000
7	Cinema UIC (One decom/One In-service)	½ Completed In-House	\$50,000
8	S Ivy Street Storm System, 99E to S 7 th Ave	Future	\$1,000,000
9	N Maple Street new UIC	Completed In-House	\$40,000
10	N Maple St. and NW 34th Pollution Control MH	Completed By Developer	\$40,000
11	NW 13th from N Ash to N Birch new UIC	Completed In-House	\$38,000
12	NW 9th Ave from N Ash St. to N Birch	Completed In-House	\$57,000
13	Knights Bridge 12" Upsizing Cedar to Aspen	Future	\$180,000
14	NW 2nd Cedar St. to Baker Outfall Upsize	Future	\$950,000
15	NW 3rd Ave Grant to Cedar Storm System	Future	\$920,000
16	N Holly Street two new UIC	Completed In-House	\$80,000
17	N Juniper and NE 5th Pervious Pavement	Completed under Contract	\$40,000
18	N Baker St. and N Alder Vortex MH	Completed In-House	\$25,000
19	N Cedar Street new MH	Completed In-House	\$14,000
20	S Pine St. and SE 2nd Ave new UIC	Completed In-House	\$40,000

	<i>Project</i>	<i>Status</i>	<i>2022 Cost/Value</i>
21	Police Station/NW 3rd Ave Pond Monitoring	Future	\$40,000
22	Fish Eddy Wetland Flow Monitoring	Future	\$40,000
23	Fish Eddy Wetland Ponds	Future	\$925,000
24	Knight's Bridge Road Treatment Swale	Future	\$70,000
25	Comprehensive Survey of Existing System	On-Going	\$25,000
26	Operation and Maintenance Manual	Completed In-House	\$14,000
27	System Flow Monitoring Model	On-Going	\$25,000
a	NE 4 th Ave Fairgrounds DW	Completed In -House	\$40,000
b	NW 5 th Ave, Douglas to Cedar Ct	Completed In-House	\$80,000
c	NW 9 th Ave, Holly to Ivy DW	Completed In -House	\$40,000
d	N Pine St, 10 th to 11 th Place	Completed In-House	\$110,000
e	Master Plan / SDC Update	Future	\$50,000
f	N Maple Street and 22 nd Ave UIC	Future	\$40,000
g	N Juniper St and NE 10 th Ave UIC	Future	\$40,000
h	Collection System Oversizing	Future	\$100,000

The following table lists the cost and priority of all future capital improvement projects:

City of Canby
2022 CAPITAL IMPROVEMENT PLAN
December 2022 ENR CCI 13,175

	<i>Project</i>	<i>2022 Cost</i>	<i>Priority</i>
2	NW 10th Ave. from N Locust St. to N Pine St.	\$320,000	6-10 yrs
4	SW 13th Ave near Canby High School Swale	\$40,000	6-10 yrs
7	Cinema UIC (One Remaining In-service)	\$25,000	6-10 yrs
8	S Ivy Street Storm System, 99E to S 7 th Ave	\$1,000,000	1-5 yrs
13	Knights Bridge 12" Upsizing Cedar to Aspen	\$180,000	1-5 yrs
14	NW 2nd Cedar St. to Baker Outfall Upsize	\$950,000	11-20 yrs
15	NW 3rd Ave Grant to Cedar Storm System	\$920,000	11-20 yrs
21	Police Station/NW 3rd Ave Pond Monitoring	\$40,000	11-20 yrs
22	Fish Eddy Wetland Flow Monitoring Station	\$40,000	11-20 yrs
23	Fish Eddy Wetland Ponds	\$925,000	11-20 yrs
24	Knight's Bridge Road Treatment Swale	\$70,000	11-20 yrs
25	Comprehensive Survey of Existing System	\$25,000	1-20 yrs
27	System Flow Monitoring	\$25,000	1-20 yrs
e	Master Plan / SDC Update	50,000	1-20 yrs
f	N Maple Street and 22 nd Ave New UIC	\$40,000	1-5 yrs
g	N Juniper St and NE 10 th Ave New UIC	\$40,000	1-5 yrs
h	Collection System Oversizing	\$100,000	1-20 yrs
	Total 1-5 Year	\$1,260,000	
	Total 6-10 Year	\$385,000	

	Total 11-20 Year	\$2,945,000	
	Total 1-20 Year	\$200,000	
	TOTAL CAPITAL COST	\$4,790,000	

A narrative description of each remaining project is reproduced below, based on the information in the 2014 SWMP:

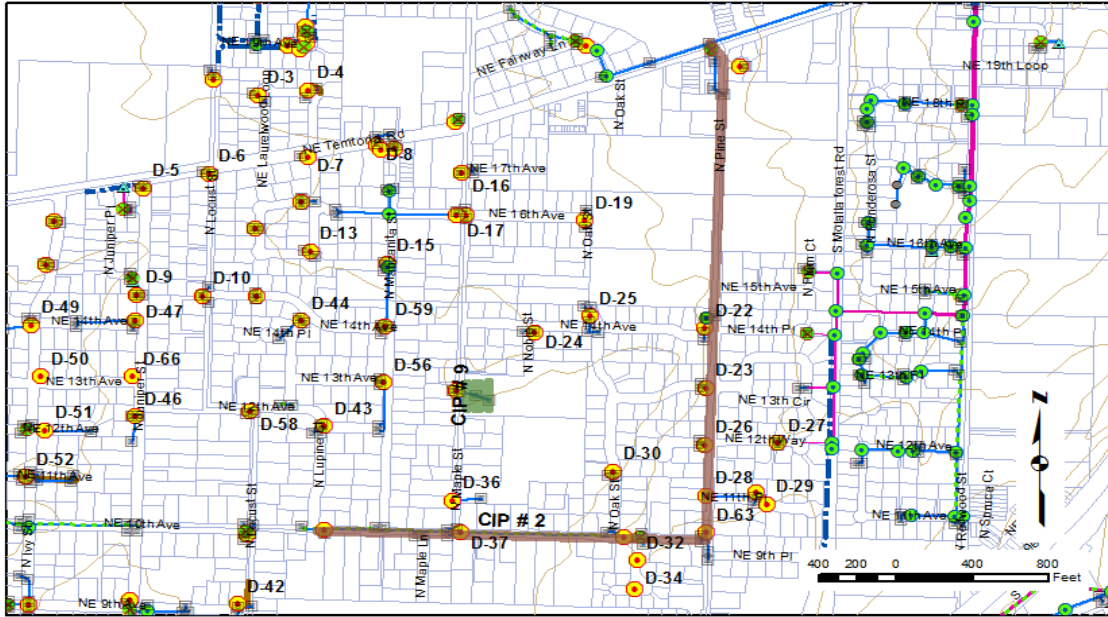
No. 2: NE10th Ave. from N Locust St. to N Pine St.

This street currently has gravel shoulders and no curb or sidewalks. Large puddles form during storm events, and the roadway often becomes flooded with stormwater runoff. This is due to the lack of capacity, poor infiltration abilities of the existing UICs. It is anticipated that when curb and gutter and sidewalks are added, problems with flooding will be worse. Furthermore, groundwater modeling and City observations have demonstrated that four UICs within this corridor are likely to have wet feet and should be decommissioned. Finally, UIC D-63 at the intersection of NE 10th Ave and N Pine St has been identified as high risk and must be decommissioned.

Recommended Improvements

The recommended improvements consist of decommissioning five UICs (D-31, D-63, D-28, D-26, D-23) and replacing the existing piping on NE 10th Ave from N Locust to N Pine St with new 12-inch and 18-inch piping. This piping will connect the remaining UICs in series from Locust to Pine St. At Pine St, a new pipeline alignment will convey runoff north on Pine St to Territorial Rd. The new alignment on Pine St will consist of 24-inch pipe. The system will also require the installation of fourteen new manholes. The project will require approximately 1,650 LF of 12” pipe, 370 LF of 18” pipe and 2,900 LF of 24” pipe. The total project cost is estimated at \$1,800,000.

N Pine St. is currently under the jurisdiction of Clackamas County. Approximately 60 percent of the cost of the proposed improvements should be allocated to Clackamas County based on the length of piping along N Pine St relative to the total length of piping for the CIP, and because four of the five drywells to be decommissioned are located on N Pine St. Clackamas County’s share of the CIP is approximately \$1,000,000 and the City of Canby’s share of the CIP is approximately \$800,000.

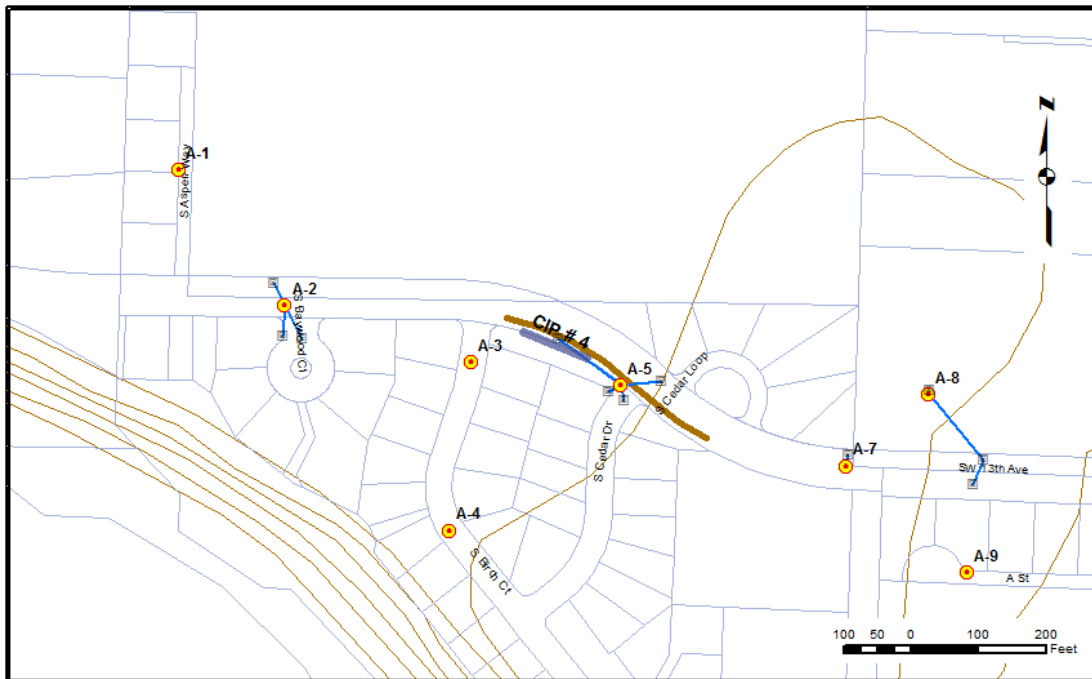


No. 4: SW 13th Ave near Canby High School

Currently, flooding occurs along this corridor because the existing UIC A-5 has insufficient capacity. The area often becomes an overloaded with stormwater runoff.

Recommended Improvements

The recommended improvements consist of utilizing the width of the right-of-way and installing a swale for stormwater retention and infiltration to increase the infiltration capacity in the area. The estimated cost of the project is \$40,000.

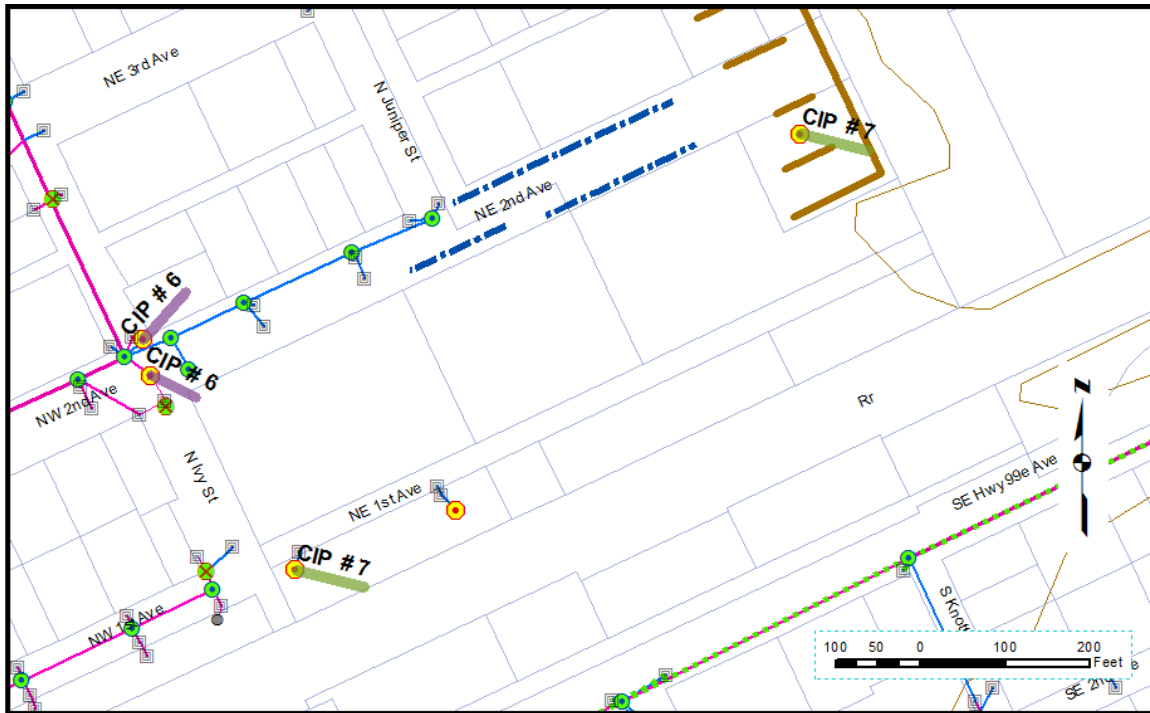


No 7: Cinema and NW 1st and Ivy St UIC Decommission

Currently, there is one existing UIC (unnamed) located in the Canby Cinema parking lot near the intersection of NW 2nd Ave and N Knott St as well as one UIC located at the intersection NE 1st Ave and N Ivy St. The UIC located in the Cinema parking lot is unregistered and no longer in use and should be decommissioned, while the City would like to decommission the UIC located at NE 1st and N Ivy St. The exact location of the UICs to be decommissioned is uncertain and should be confirmed as the first step of this CIP.

Recommended Improvements

The recommended improvement is confirming the location of and decommissioning two UICs. No new or additional stormwater infrastructure is anticipated to be required to handle existing flows, as one of the UICs being decommissioned is currently not being used, and the other is located near existing stormwater infrastructure with excess capacity. The City has completed a portion of this task and the remaining effort is estimated to cost \$20,000.



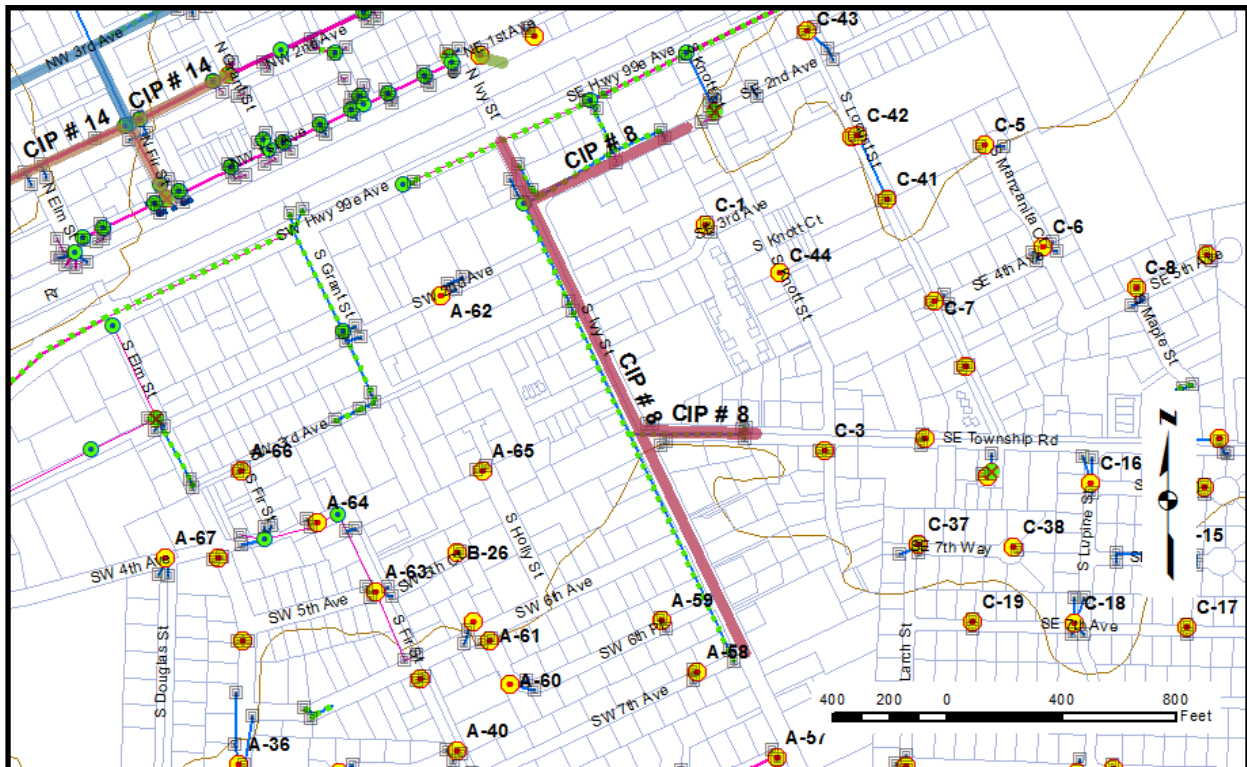
No. 8: South Ivy Street

Currently, periodic and minor flooding occurs in this area. The roadway can become overloaded with stormwater runoff. The current stormwater infrastructure consists of a county-owned pipe system with no manholes that is inaccessible and may be full of mud. The system ties into the ODOT system along 99E but the condition of the system is completely unknown. Groundwater modeling indicates this area may have high groundwater. The roadway jurisdiction in this area was recently given to the City of Canby. S Ivy St south of approximately SW 7th Ave is served by existing drywells that are functioning well.

Recommended Improvements

The recommended improvements consist of installing pavement piped stormwater system including new manholes and catch basins along S Ivy St. Because of the large number of unknowns this system was not modeled. The drainage basin served is approximately 5 acres and all pipe was assumed to be 18" diameter. Approximately 3000 feet of piping is required. The estimated cost of the project is \$1,000,000.

In addition to the unknowns along S Ivy St., The ODOT system along Hwy 99E is also of unknown condition and capacity and was not evaluated as part of this Stormwater Master Plan. Additional investigation of the storm system in S Ivy Street should be completed before the City's scheduled street improvements are undertaken in 2023.

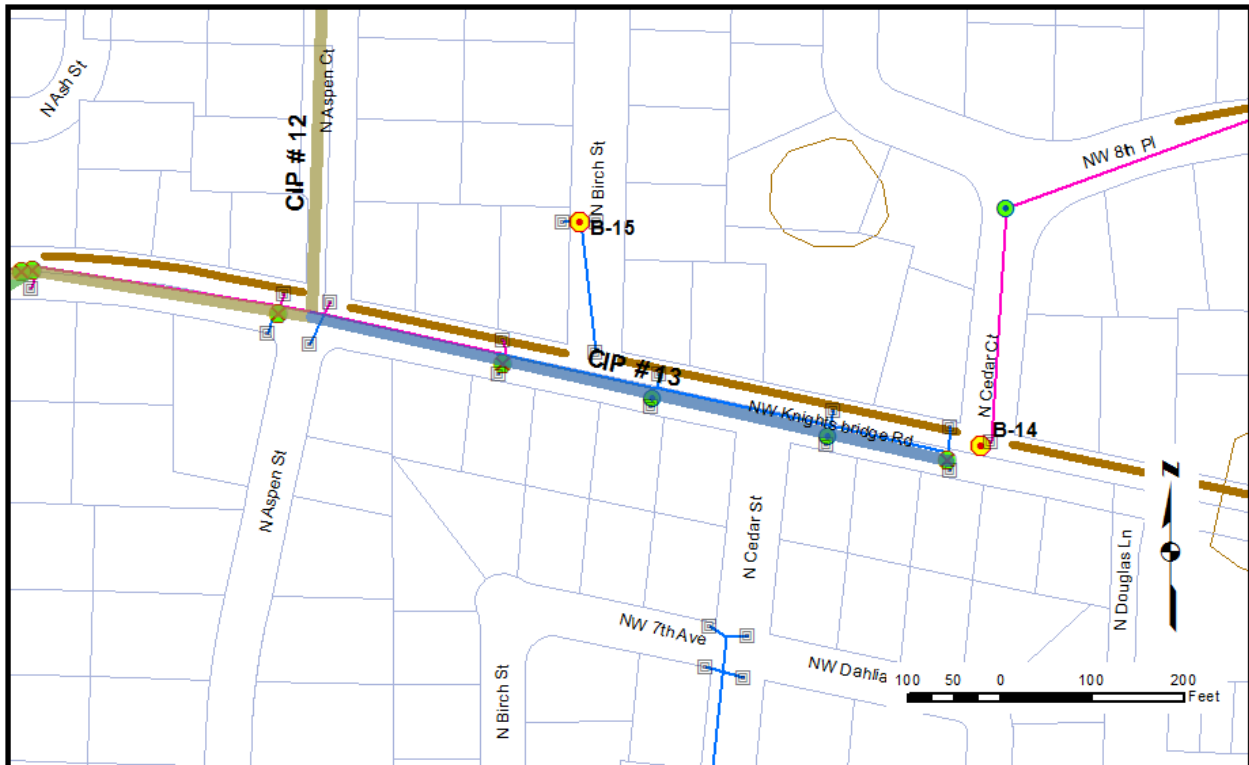


No 13: Knights Bridge Road

The existing 8" diameter pipe located beneath Knights Bridge Rd from N Aspen Ct to N Cedar Ct currently has misaligned joints and has been infiltrated with tree roots. This greatly reduces the capacity of the existing pipe and the efficiency of the system.

Recommended Improvements

The recommended improvements consist of replacing the existing 8" diameter pipe with new 12" diameter HDPE pipe. The alignment should tie into the existing alignment at Knights Bridge Rd and N Aspen Ct, which outfalls to the Molalla River. The alignment consists of approximately 750 LF of 12" diameter HDPE. The estimated cost of the project is \$180,000.



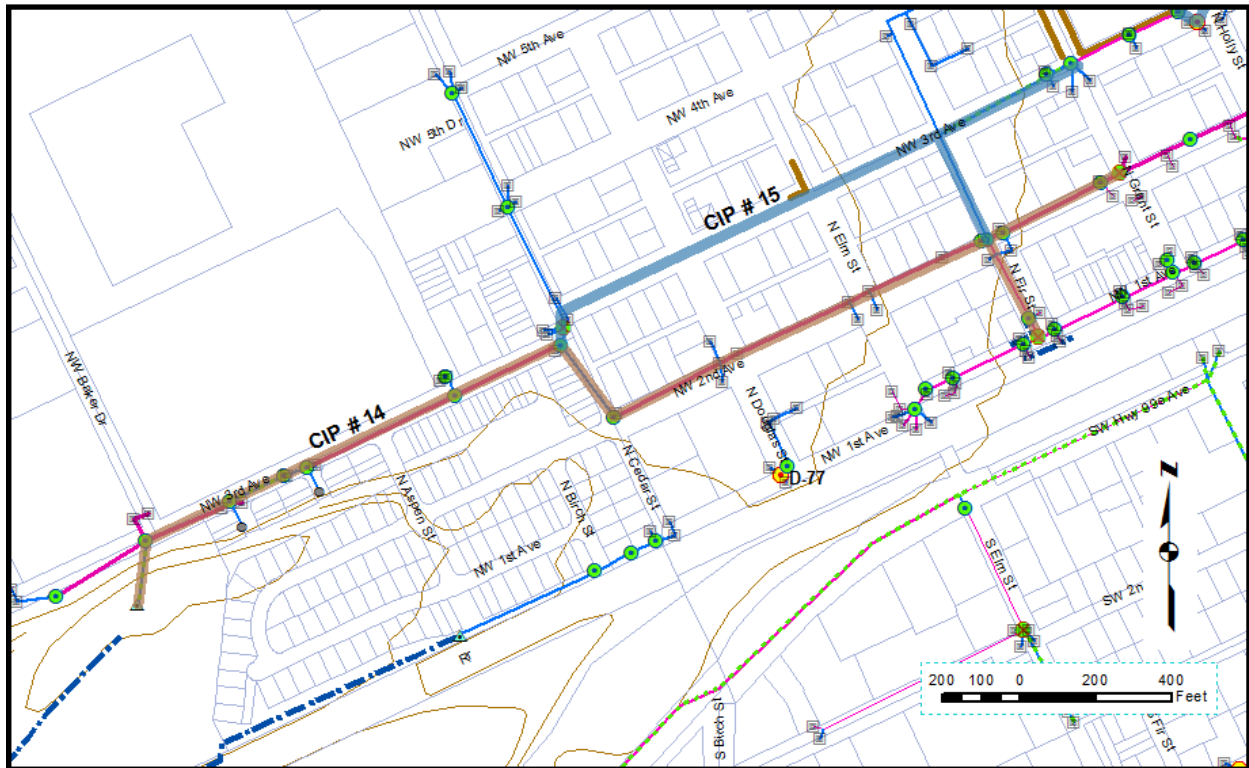
No. 14: NW 2nd Ave from N Grant Street to NW Baker Drive

Stormwater runoff and conveyance modeling for this area of downtown Canby has shown that the existing infrastructure is undersized, which can lead to surcharging in the pipes and manholes as well as flooding in the area. Furthermore, the existing pipe is old, is in bad condition, has roots, has been observed to be flowing full and needs replacement.

Recommended Improvements

Prior to initiating any capital improvements to the downtown system (CIP #15 and CIP #16) the city should conduct flow monitoring to verify and calibrate model results. Hydrologic and hydraulic models are particularly sensitive in areas with relatively flat slopes such as found in the downtown areas. Flow monitoring should be conducted at the outfall to the detention pond on NW 3rd Ave, at the intersection of NW 2nd Ave and N Cedar St. and at the intersection of NW 3rd Ave and N Fir St. If model results calibrated through flow monitoring show the existing pipe size is adequate, then cleaning and lining of the existing pipe may be an alternative lower cost option. To be conservative, the estimated cost for pipe replacement with a larger size is presented in this CIP.

The recommended improvements consist of increasing the capacity of the existing conveyance system alignment by replacing the existing pipe with larger diameter pipe. The total approximate length of pipe to be installed is 400 LF of 30" diameter HDPE pipe and 1,350 LF of 36" HDPE. The estimated cost of the project is \$950,000.



No. 15: NW 3rd Ave from N Cedar St. to N Holly St.

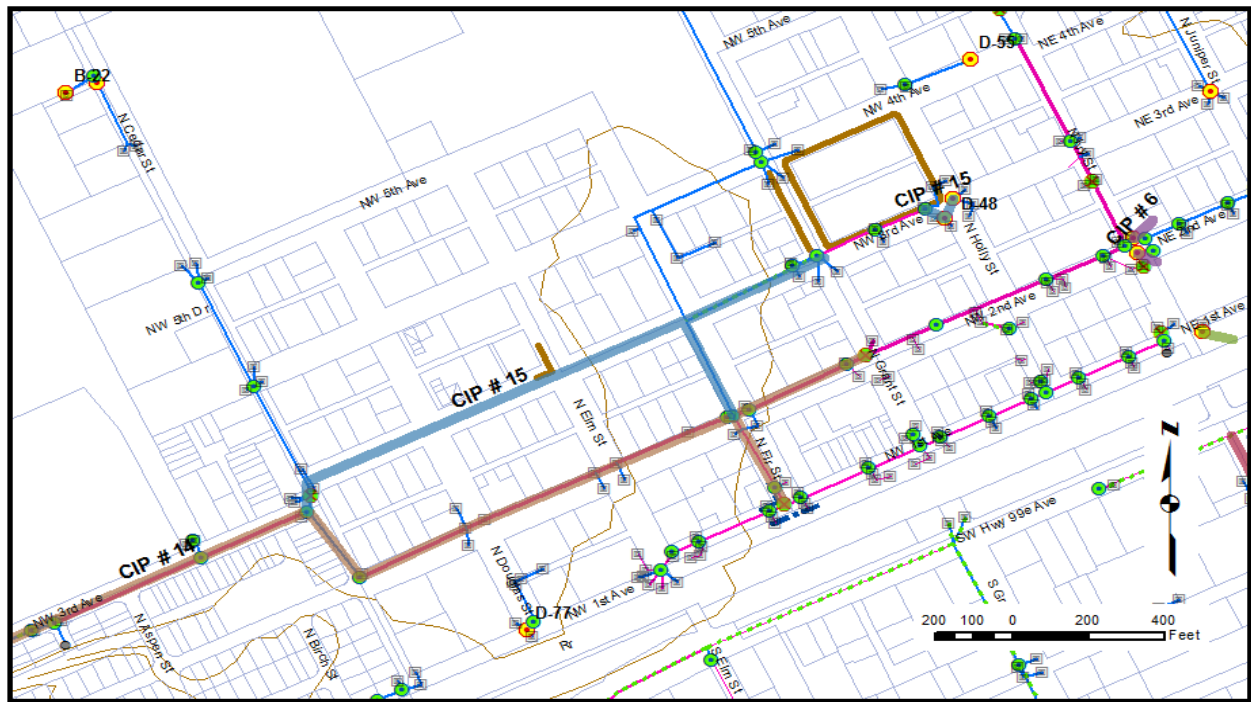
Stormwater runoff and conveyance modeling for this area of downtown Canby has shown that the existing infrastructure is undersized, which can lead to surcharging in the pipes and manholes as well as flooding in the area. To help mitigate surcharging and flooding in the existing conveyance system, CIP #16 involves the installation of a new stormwater conveyance pipeline along NW 3rd Ave from N Holly St. to N Cedar St.

Recommended Improvements

Prior to initiating any capital improvements to the downtown system (CIP #15 and CIP #16) the city should conduct flow monitoring to verify and calibrate model results. Hydrologic and hydraulic models are particularly sensitive in areas with relatively flat slopes such as found in the downtown areas. Flow monitoring should be conducted at the outfall to the detention pond on NW 3rd Ave, at the intersection of NW 2nd Ave and N Cedar St. and at the intersection of NW 3rd Ave and N Fir St. Model results calibrated through flow monitoring will provide more accurate estimates of required pipe sizes.

Decommissioning of the two UICs that is described below should be completed only after the pipe improvements have been completed so that significant flooding problems are not created in the downtown area. In addition, this project should not be completed until CIP #15 has been completed, increasing the capacity of NW 3rd St between N Cedar St. and N Baker Dr.

The recommended improvements consist of mitigating the flow from existing stormwater conveyance structures by installing a new stormwater pipeline along NW 3rd Ave between N Holly St and N Cedar St. The CIP also involves the decommission of two UICs identified for removal by GSI, as well as the capping of an existing 21" stormwater pipe at NW 3rd Ave and N Fir St. The total approximate length of pipe to be installed is 150 LF of 18" diameter HDPE pipe, 400 LF of 20" diameter HDPE, 1,200 LF of 30" diameter HDPE pipe and 2 new manholes and eight new catch basins. The estimated cost of the project is \$920,000.

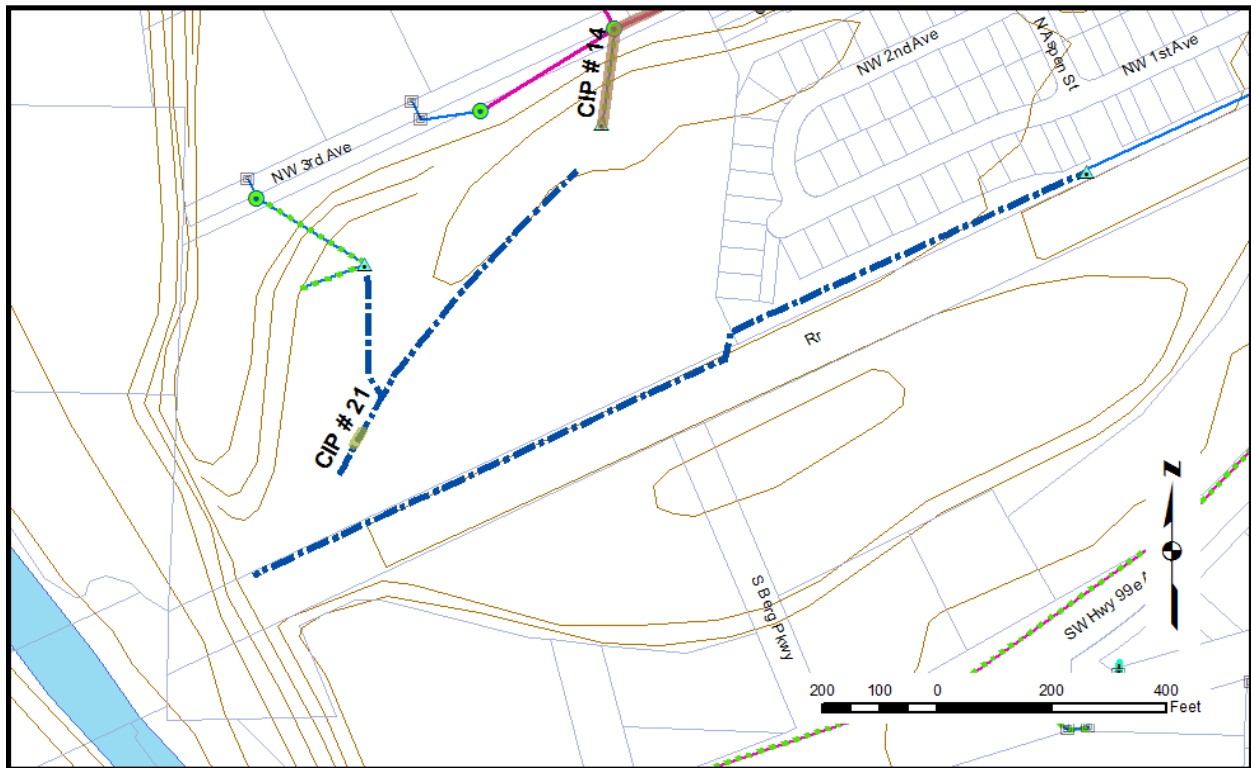


No. 21: Police Station/NW 3rd Ave Pond

The City of Canby currently utilizes a constructed stormwater detention pond within an empty field near the Police Station located at NW 3rd Ave. The Detention pond flows to a stormwater conveyance swale which outfalls to the Molalla River.

Recommended Improvements

The recommended improvements to this detention pond are to install a flow monitoring system located just upstream of the existing culverts. This flow monitoring system will allow the City to quantify the discharge occurring from the stormwater pond. The system should consist of constructed concrete channel or flume, a stilling well connected to the concrete channel, and a flow measurement data logger. The estimated cost of the project is \$40,000.

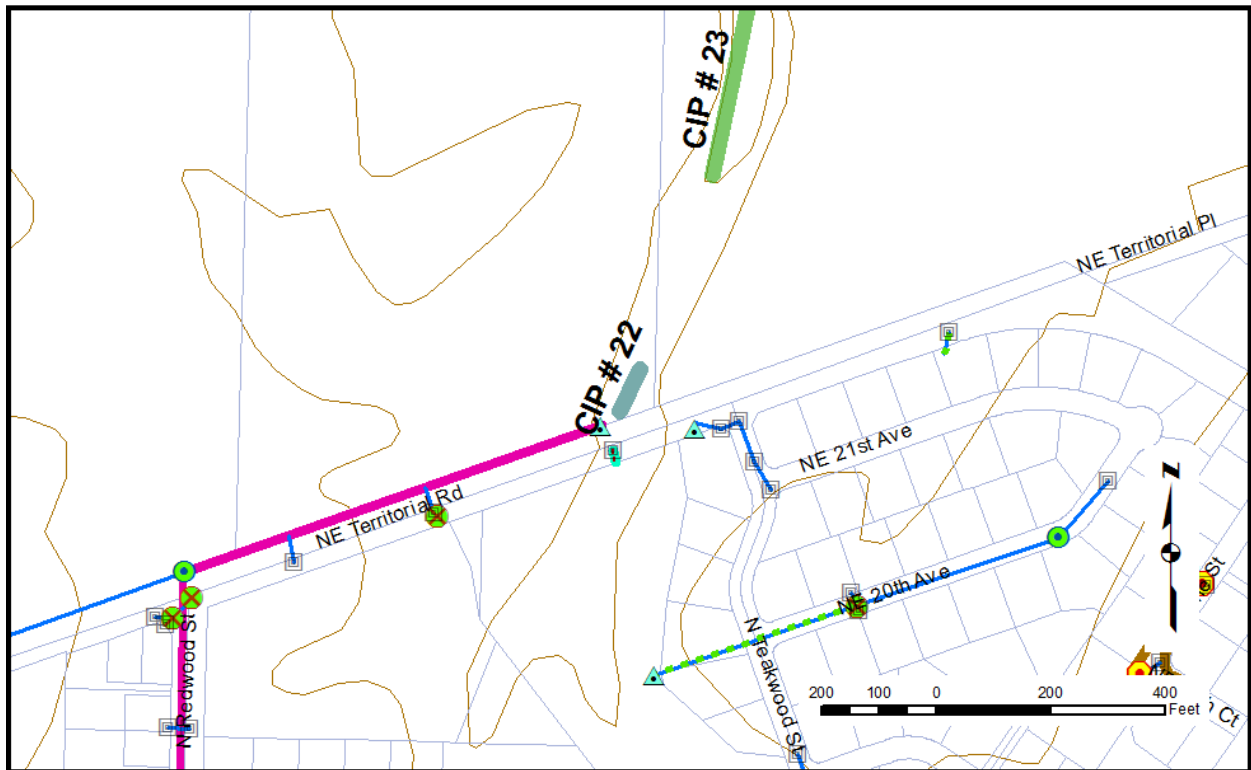


No. 22: Fish Eddy Wetland Flow Monitoring

Willow Creek is an existing creek which collects stormwater, conveys stormwater runoff to the location of the future Fish Eddy wetland.

Recommended Improvements

The recommended improvements to this stormwater conveyance creek are to install a flow monitoring system located within Willow Creek, just North of NE Territorial Rd. This flow monitoring system will allow the City to quantify the discharge occurring from the stormwater pond, and provide guidance for sizing the future Fish Eddy Wetland. The system should consist of constructed concrete channel or flume, a stilling well connected to the concrete channel, and a flow measurement data logger. The estimated cost of the project is \$40,000..

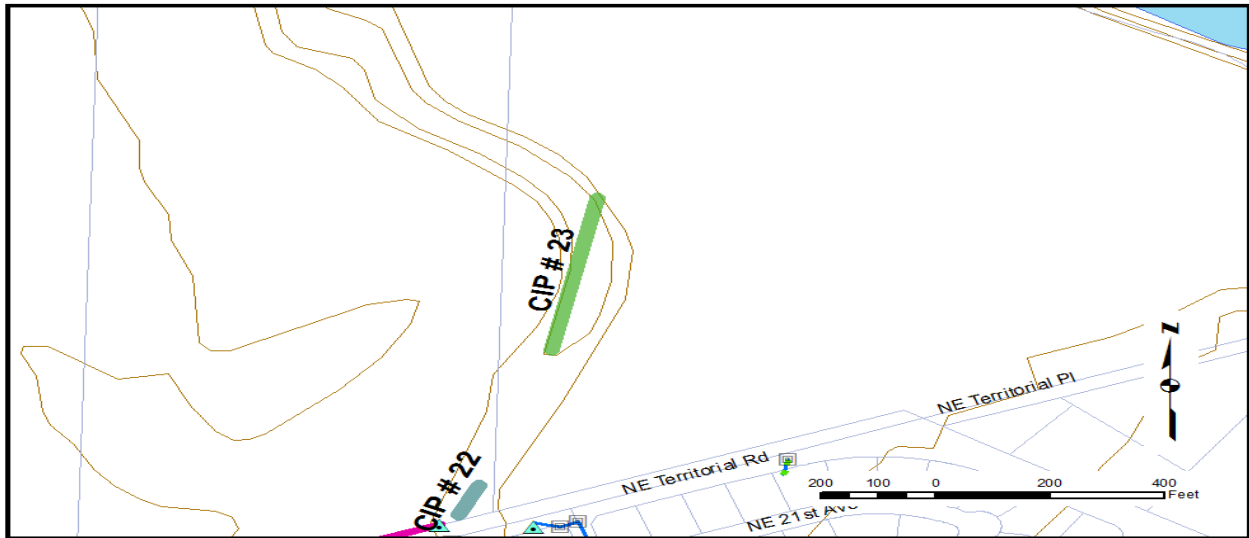


No. 23: Fish Eddy Wetland

Recommended Improvements

A stormwater treatment wetland is proposed on the Fish Eddy property north of NE Territorial Rd and adjacent to the existing Willow Creek. This treatment wetland is part of a restoration of the entire Fish Eddy property to native seasonal wetland and wet prairie habitat as part of the Willamette Wayside Properties Master Plan.

The Fish Eddy property was purchased for \$750,000 in 2008 by the City of Canby using wastewater system funds. This land is planned to provide stormwater treatment in the wet weather seasons when mandated by EPA, and treatment of excess thermal load in the wastewater plant effluent during the dry weather season when mandated by DEQ. The estimated cost for the treatment wetland is \$925,000.

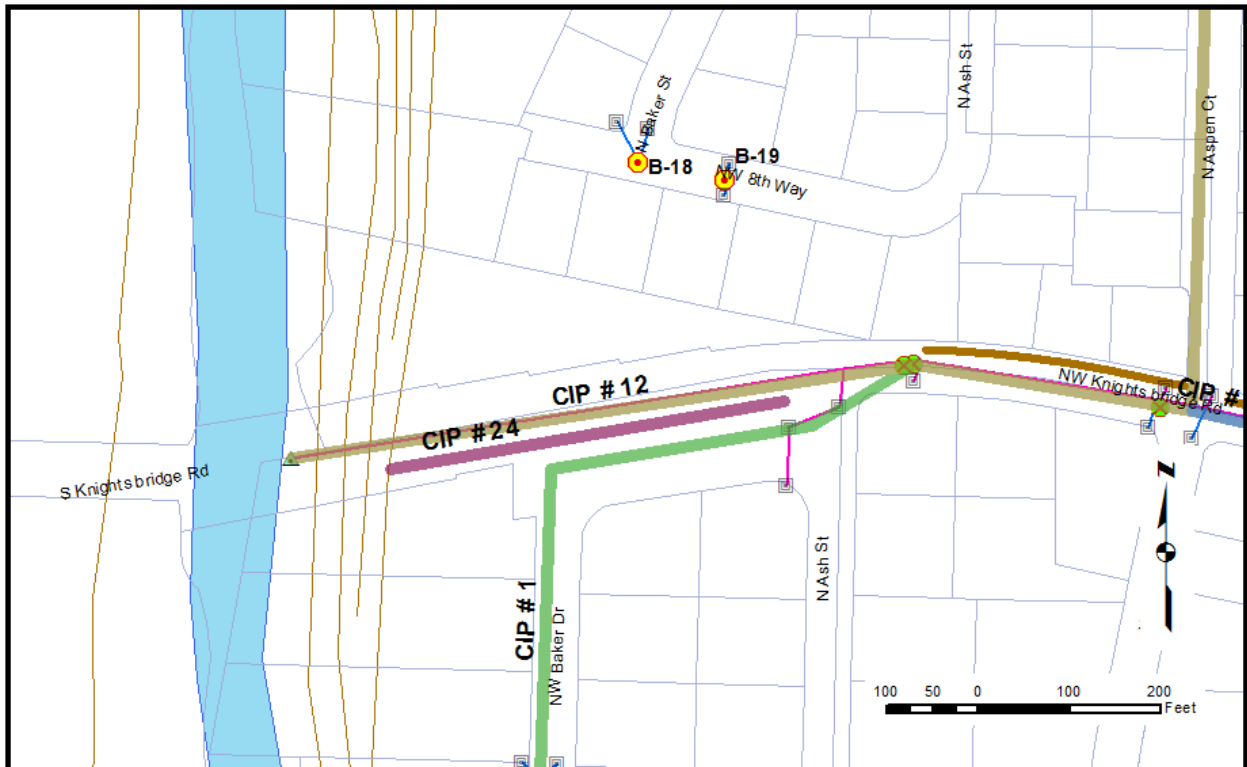


No. 24: Knight's Bridge Runoff Treatment

Currently, runoff from the Knight's Bridge basin flows through a Contech Model CDS2015-4 hydrodynamic separator treatment system and then freely discharges to the Molalla River from a pipe attached to the underside of Knight's Bridge.

Recommended Improvements

A stormwater treatment flow through swale is proposed on the City-owned property on the south side of Knight's Bridge Rd, west of Ash St. This stormwater treatment swale is proposed in anticipation of future DEQ stormwater discharge requirements. The estimated cost for the treatment swale is \$70,000.



No. 28: N Maple Street and 22nd Ave UIC

No. 29: N Juniper St and NE 10th Ave UIC

Due to localized flooding during design storm events, new UIC installations are proposed to be installed at N Maple and 22nd Avenue, and at N Juniper and 10th Avenue. The estimated costs are \$40,000 per UIC.

Operation and Maintenance (O&M) Manual

As recommended in the 2014 SWMP, the City has prepared a Stormwater Management Plan that includes all information to guide the operation and maintenance of the Canby stormwater system. This document, which is bound in the appendices, provides monitoring and assessment practices, recommended maintenance functions, emergency response procedures, and if warranted, closure procedures and reporting requirements.

Appendices:

A. Stormwater O & M Manual

B. Water Pollution Control Facility Permit

C. Groundwater Protectiveness Demonstration Summary