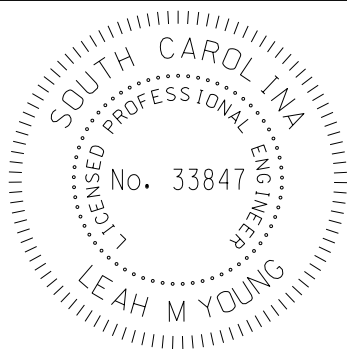




TOWN OF PINWOOD

STORMWATER IMPROVEMENTS PLAN FINAL REPORT

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Executive Summary

The Town of Pinewood has experienced nuisance flooding throughout the Town limits that causes damage to businesses and residents. As part of the watershed master plan, KCI developed a public questionnaire for residents, business owners, and Town staff. Data was captured through a questionnaire (including an online version), public meetings, and meetings with Town staff. The data was then compiled to identify six specific areas that were targeted for the modeling effort.

KCI performed hydrologic and hydraulic modeling of the existing stormwater conveyance networks throughout the Town. The existing networks are unable to convey significant rainfall events and exhibit serious flooding problems due to a combination of undersized stormwater pipes and insufficient inlet capacity. Several alternatives were examined to reduce flooding at specific areas of concern within the study area. Proposed alternatives include regrading or expanding existing ditches, upsizing stormwater pipes, adding additional inlets and redirecting stormwater to safely convey runoff away from residential and commercial properties. Where feasible, green stormwater infrastructure (GSI) was included in the design.

Benefit-Cost-Analyses (BCAs) were conducted for each proposed project. The FEMA BCA toolkit was used to determine the appropriate Benefit-Cost-Ratio (BCR). Additionally, the proposed projects were prioritized based upon several additional factors, including:

- Proximity to critical facilities
- Property flooding
- Roadway flooding
- Existing conditions
- Ease of implementation
- Roadway type

The proposed projects were ranked based on the highest BCR and Weighted Scores across all projects. The list of prioritized projects is below. More detailed information can be found in **Appendix E**.

Table 1. Project Rankings

Project	Estimated Project Cost	Benefit-Cost Ratio	Weighted Score	FEMA BCA Ranking	Weighted Score Ranking	Final Ranking
Outfall 3 Phase 1	\$ 549,200.00	0.37	2.91	1	2	1
Outfall 1 Phase 1	\$ 543,100.00	0.00*	2.95	3	1	2
Outfall 1 Phase 2	\$ 975,600.00	0.00*	1.85	3	3	2
Outfall 2 Railroad Avenue	\$ 837,600.00	0.00	2.15	-	5	3
Outfall 1 Phase 1 - Optional	\$ 569,100.00	-	2.46	-	4	4
Outfall 1 Phase 2 - Optional	\$ 1,284,600.00	-	1.40	-	7	4
Outfall 3 Phase 2	\$ 631,000.00	-	2.85	-	3	5
Outfall 2 Downtown	\$ 1,274,600.00	0.07	1.02	2	8	6
Outfall 2 Downtown - Optional	\$ 1,325,800.00	-	0.98	-	9	7

* Outfall 1 Phases 1 and 2 were analyzed together to try to achieve the maximum amount of benefit for the project



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1. Project Background

The Town of Pinewood has experienced nuisance flooding throughout the Town limits that causes damage for businesses and residents. As part of the watershed master plan, KCI has developed existing conditions models to show hotspots for flooding issues within the town limits. Modeling efforts were focused on certain areas that were identified from a public questionnaire asking residents, business owners, and Town staff about the location and extent of flooding issues.



Figure 1. Project Location

2. Data Collection

Data was available for the Town of Pinewood Stormwater Improvements Plan from various sources. Aerial photography, LIDAR Bare Earth topography, and field surveys were used to produce an existing conditions model in PCSWMM.

Aerial Photography

2021 aerial photography was downloaded from the NOAA Digital Coast Access Viewer (<https://coast.noaa.gov/dataviewer/#/>). The aerials were projected in NAD 1983 State Plane (feet).



Topography

LiDAR ground data was downloaded from the National Oceanic and Atmospheric Administration (NOAA) Digital Coast Access Viewer. The data was downloaded as a raster file and used to create contours in GIS. The vertical datum of the LiDAR files was NAVD 88 (feet), and the horizontal datum was NAD 83 State Plane (feet), Zone 3900 for South Carolina.

Field Survey Data

Survey was completed by the KCI survey group. The survey data consisted of structure inverts and rims for pipes, inlets, and ditches. The horizontal datum used was NAD 83 State Plane (feet) and the vertical datum was NAVD 88 (feet). In addition to the infrastructure survey, multiple ditch and stream cross sections were taken. Connectivity assumptions were made using the best available elevation data provided. Any structure(s) with missing elevation data were assumed to flow to the outfall while maintaining positive gravity slope.

Utilities

GIS survey information for existing sanitary sewer, electric, gas, and data utilities were unavailable for this study. Maps of the water distribution network were provided by the Town of Pinewood, but the data was not digitized, and therefore difficult to add to any GIS maps.

3. Field Observations

The drainage area for the study is split into three major sections. The first two outfalls into Pine Tree Creek which flows south along the west side of the town. The third outfalls into an unnamed creek which flows northeast and receives the stormwater from the eastern part of the Town of Pinewood. The existing topography is very flat with average slopes of <1% from the top of the drainage areas to the outfall for each of the three major sections.

KCI personnel completed a field reconnaissance in 2023, to verify the stormwater infrastructure system connectivity and flooding concerns.

4. Stakeholder Coordination

KCI developed and deployed a public survey in order to gain a better understanding of the community's flooding issues. This survey was developed using Survey123. KCI developed a web application for the public interface where residents and local business owners could answer a series of flooding related questions designed to capture the range and frequency of flooding and erosion issues. Separately, KCI held meetings with Town staff and residents that also pertained to these flooding issues. Flooding information gathered from these meetings were then input into Survey123 by KCI staff.



Figure 2. Public Dashboard and Survey Response Locations

The questionnaire asked respondents to describe the stormwater issue that impacts their home or business. Options included flooding or standing water, erosion, and non-functioning stormwater and drainage infrastructure. Respondents were also asked to describe the type of flooding. Flooding options included, yard, storage space, street, crawlspace, and living space. Respondent had the option to give a specific address or a street with closest cross street. Respondents could also leave contact information if they would allow KCI or the Town to reach out for further information.

Between the online portal and in-person meetings, KCI received 26 responses. The majority of the flooding was reported by the Town maintenance staff. The majority of the responses indicated some sort of street flooding. Four respondents indicated that flooding occurs more than once a year. Refer to the table below for a summary of the survey results. All of the survey results are shown in **Appendix F**.



Table 2. Summary of Flooding Results

Location	Stormwater Issue							Flooding Type							Frequency			
	Standing Water	Flooding	Erosion	Clogged Drains / Pipes	Overflowing Ditches	Turbidity	Other	Street	Yard	Utility	Crawlspace	Living	Other	None	More than 1x yr	Once / Twice Year	Every 2-3 yrs	Only during Major Storm Events
420 Marion St	X								X									
445 S Hampton St				X										X				
Bacon Hill & S Hampton St					X			X										
E Fulton & Elmwood Ave		X							X						X			
E Fulton St				X														
Elmwood Ave					X			X										
Epperson Ave					X			X										
McBride St						X												
Reynolds Rd & N Hampton St		X						X										
S Marion St				X														
W 5th St & McBride St					X		X	X										
W Fulton St & Longshot Rd		X						X										
W Fulton St & S Columbia St					X			X										
16 E Clark St		X						X		X					X			
85 Big Loop		X							X									
115 East Ave N		X									X				X			
135 W Fulton St		X						X										X
201 E Clark St	X								X								X	
329 S Hampton St					X													
401 Railroad Ave		X						X							X			
409 E Fulton St			X															
401 E Fulton St	X																	
420 S Marion		X																
Totals	3	9	1	3	6	1	1	10	4	1	1	0	0	1	4	0	1	1



5. Modeling of Hydraulic and Hydrologic Behavior

Modeling Scope

The PCSWMM software was utilized to simulate the existing hydrologic and hydraulic conditions for the Town of Pinewood Stormwater Improvement Plan. HEC-RAS version 6.4.1 was used to model the existing conditions of Pine Tree Creek, which runs along the west side of Pinewood. An alternatives analysis was completed to explore solutions to the flooding issues. The alternatives were evaluated on the basis of hydraulic performance, construction feasibility and opinions of probable cost.

Using survey data, data from the hydraulic field visit, and the GIS stormwater inventory provided by KCI surveyors, the existing stormwater network was modeled to determine the peak flows during the 2-, 5-, 10- and 25-, 50-, 100- and 500-yr storm events. According to the USDA Web Soil Survey, the watershed consists of primarily of Hydrologic Soil Group (HSG) Class ‘B’ and ‘D’ soils.

Rainfall depth data was acquired from NOAA’s Atlas 14 website. A NRCS (SCS) unit hydrograph was developed using the Type II, 24-hour rainfall depth amount of 6.69 inches for the 25-yr rainfall event. The performance of the existing system was also analyzed under lower-flow (10-yr) and higher-flow (100-yr) conditions. A summary of 24-hour rainfall depths utilized in the H&H model can be found in Table 3. The existing and future conditions models were used to analyze the chosen storm events and indicate the pipes, ditches, and nodes that should be replaced or abandoned.

Table 3. 24-hour Rainfall Depths for Pinewood Storm Events

Return Period (Yr)	Rainfall Design Depths (NOAA Atlas 14 Data for Pinewood, SC) (inches)
2	3.53
5	4.51
10	5.37
25	6.69
50	7.86
100	9.18
500	13.0

Existing Conditions

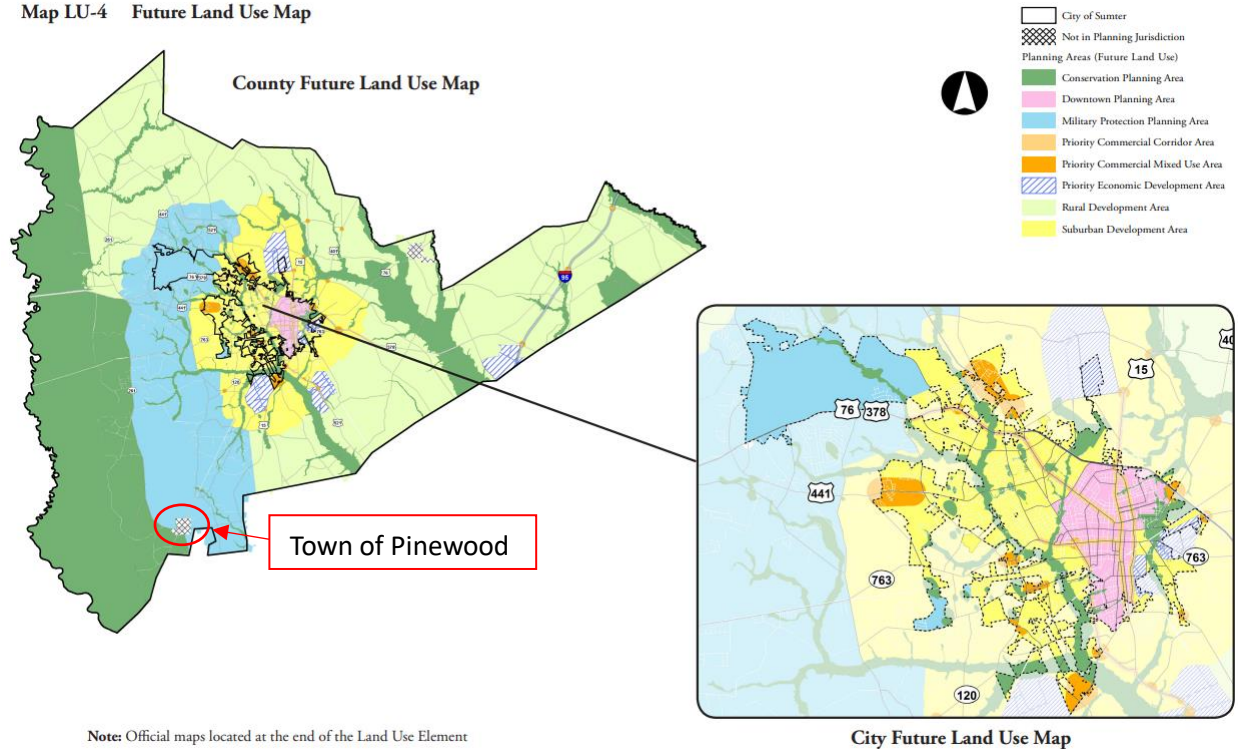
Hydrology

For the HEC-RAS 6.4.1 model, the USGS StreamStats tool was used to determine the drainage area and discharges for each return period in the existing conditions model. The future conditions were evaluated and determined to not differ from existing. In the Sumpter County 2040 comprehensive zoning plan, the drainage area for Pine Tree Creek, outside of the Town of Pinewood, is zoned for Military Protection Planning Area and Conservation Planning Area. This will limit any residential, commercial or industrial development in the area, as shown in Figure 3. As previously mentioned, the NRCS (SCS) Type II method was used create a unit hydrograph for each storm event in PCSWMM. Using the topography, stormwater infrastructure inventory, and aerial photography, the watershed was divided into 3 separate ultimate



outfalls and a separate PCSWMM model was created for each. The Curve Number infiltration method was chosen for the subcatchment layer in the PCSWMM models.

Map LU-4 Future Land Use Map



Note: Official maps located at the end of the Land Use Element

Figure 3: 2040 Sumpter County Land Uses

The drainage areas for Outfalls 1-3 were further split into sub-basins and these became the individual subcatchments in PCSWMM. The hydrologic soil group map from USGS Web Soil Survey and, the existing and future zoning maps from the Town of Pinewood were overlaid on these subcatchments. This allowed for the calculation of a curve number for each subcatchment in the existing and future conditions. An existing and future land use, and map showing which sub-basins had a change of curve number from existing to future can be found in Figure 4. A flow path was drawn for each subcatchment and was added to PCSWMM as the flow length. Finally, an appropriate outlet node was chosen for each subcatchment based on LIDAR ground elevation data.

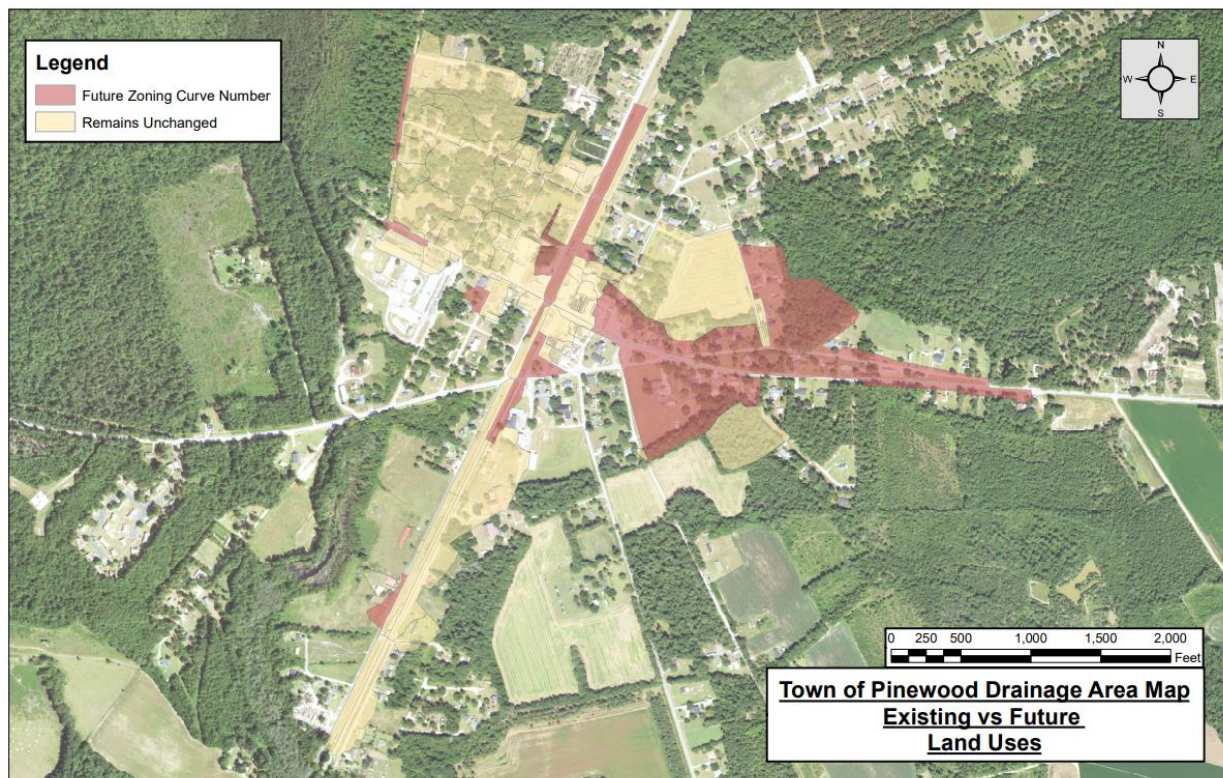


Figure 4: Curve Number Change Map

Nodes

Nodes were developed in PCSWMM to represent access points to the stormwater system. Inlets, manholes, junction boxes, and open-ended pipes were taken from the survey data provided. When available, “depth from surface” data was used with LIDAR ground elevation data to determine node invert and rim (ground) elevations. For nodes that did not have “depth from surface” data provided, surrounding topography and adjacent structures with known depth or elevation data were used to estimate inverts. Missing elevations were interpolated such that the system maintained a positive gravity slope from the upstream to the downstream end.

A number of assumptions were required to modify the node network to meet the modeling requirements in PCSWMM and hydraulically/hydrologically represent the actual stormwater system to the greatest extent.

- Except in special cases, the ponded area at each node was set at 10,000 sf to prevent the software from ignoring the flooded water at each node since bypass street flow was not able to be modeled accurately in the area due to little or no elevation variance.
- In the outfall one PCSWMM model, the elevation of Junction 50 and 52 was assumed to be lower than indicated in the LIDAR and survey to maintain positive slope in the surrounding ditches.

Individual node parameters are tabulated in **Appendix H**.



Conduits

Conduits were developed in PCSWMM to represent pipes, ditches, and open channels in the stormwater system. When available, “depth from surface” data was used with LIDAR Bare Earth ground elevation data to determine conduit invert elevations. For nodes that did not have “depth from surface” data provided, surrounding topography and adjacent structures with known elevation or depth data were used to estimate inverts. Missing elevations were interpolated such that the system maintained a positive gravity slope from the upstream to the downstream end. Sufficient ground cover was provided (as measured from ground elevation to crown of pipe) and appropriate slope ranges were utilized for any conduit with an assumed invert.

The flooding problem is believed to be a combination of undersized piping, insufficient inlet capacity, and eroded ditches. In most cases like this, it would be necessary to model the impact of “non-captured” or bypassed street flow. Since the Town of Pinewood does not have much curb and gutter or defined overland swales between nodes, there were no additional conduits added to model overland flow.

In areas where surveyed data was not available, assumptions were required to best represent the stormwater system.

- Upstream and downstream nodes were chosen based on reasonable assumptions regarding topography, existing drainage patterns, and surveyed invert elevations.
- The surveyed invert elevations of some conduits showed negative slopes in the direction of flow from upstream to downstream nodes. These reverse links are likely due to pipe settling, so they were kept in the model. The ponded area upstream node of all reverse links was edited so that water did not get lost in the model.
- The reverse links were mostly found in the Outfall 2 PCSWMM model. Since a lot of these conduits were also relatively short, the modeling software had continuity errors in these areas. The runoff timestep for Outfall 2 was changed to one second to help the model track the flow in the negative slope pipes.
- The shape of any open channel or ditch that was not surveyed, was found by extracting a cross section from LIDAR ground elevation data.
- In cases where pipes intersected the middle of a ditch and were not the main inlet or outlet of the conduit, the ditch slope was kept constant, and the respective pipe end was offset to reach the surveyed invert elevation.
- In the Outfall 1 PCSWMM model, the elevation of the downstream end of the pipe leading into a catch basin was not surveyed so it was assumed so that the pipe had a maximum slope of 10%.

Individual conduit parameters are tabulated in **Appendix H**.

Outfalls

For the PCSWMM modeling, there was 3 primary outfall locations. Outfall 1 is a point along Pine Tree Creek about 1500 ft upstream of the W Fulton Manning Road crossing. Outfall 2 is a point also along Pine Tree Creek, much farther downstream, about 150 ft downstream of the West Avenue crossing. Outfall 3 is on the east side of the Town of Pinewood into an unnamed stream just north of the intersection of E Fulton St and E Clark St. No FEMA Flood Insurance Study exists for these streams, so the model was set to a free outfall.



HEC-RAS

There was no existing FEMA model for Pine Tree Creek so one was created in HEC-RAS version 6.4.1. Data to create the geometry for this model came from topography from the LiDAR downloaded from NOAA and KCI survey points.

- Six cross sections were added to the model: three upstream and three downstream of the culvert. The cross sections were extracted from LIDAR and a channel was spliced in from the survey points. The stream centerline was drawn based on topography and aerial imagery.
- The W Fulton Manning Rd crossing was modeled as a reinforced concrete double box culvert, each with a span of 6' and a height of 6'.
 - The culvert length is 63.14'.
 - The deck elevations were extracted from LIDAR. The deck width is 38.95' and the distance to the upstream cross section is 26'.
 - The upstream embankment side slopes were coded as 5:1 and the downstream embankment side slopes were coded as 4:1.
 - The wingwalls were added as flared wingwalls at 45°.
- The Expansion Ratio used for the ineffective flow areas downstream of W Fulton Manning Rd in cross section 273.2 is 1.5:1 as recommended for culverts in the HEC-RAS 6.4 Reference Manual.
- The contraction ratio used for the ineffective flow areas upstream of W Fulton Manning Rd in cross section 370.5 is 1:1 as recommended for culverts in the HEC-RAS 6.4 Reference Manual.
- Contraction and expansion coefficients of 0.3 and 0.5 respectively were added to two cross sections upstream of the culvert and one downstream.

Existing Model Results & Discussion

For the Town of Pinewood drainage system, the existing model demonstrates multiple areas with surcharged pipes and flooded storm junctions under the 10- and 25- and 100-yr return events.

The first area of concern is the line of drainage along W 5th St in Outfall 1. The line of conduits eventually flows into the ditches along Gordin St. The pipes and ditches just before the intersection with Gordin St are undersized and causing flooding, and backing up water to the beginning of the line around West Avenue N. Another area of concern in Outfall 1 is the pipes along W Clark St, near the intersection of Gordin St, and in front of Manchester Elementary School. This is where all of the water in Outfall 1 culminates before reaching the outfall which causes flooding during peak flows due to undersized pipes.

In Outfall 2, the pipes along East Avenue N near the E 4th St intersection have settled and no longer maintain positive gravity flow causing flooding. The pipes between ditches in the main drainage line along West Avenue are all undersized and creating backups in the system. The Clafin St and West Avenue S intersection has a pipe with negative slope and is causing flooding in this area.

For Outfall 3, the flooding was mainly caused by undersized ditches and pipes in between E Fulton St and E Clark St.

The HEC-RAS model showed that the culvert crossing under W Fulton Manning Rd had adequate capacity up to the 50-year rainfall event and would overtop in the 100-year event.

Maps showing the flooding results from PCSWMM and HEC-RAS can be found in **Appendix D**. There are two types of maps showing the flooding. The first type shows the duration of surcharging in nodes and



conduits for each outfall for the 10-, 25-, and 100-year rainfall event. The second type shows which nodes and conduits meet capacity for each rainfall event. The HEC-RAS model is a steady flow model, so duration of flooding data is not available for the culvert. The three hydraulic parameters of concern are duration of node flooding, maximum stored volume, and total node ponded volume. The parameters will be tabulated for the existing model and compared to the results from each proposed alternative.

6. Proposed Alternatives

In the following sections, there is a detailed discussion of the proposed alternatives for each outfall. Each outfall will be discussed under two separate headings. “Proposed Improvements” will detail the conceptual construction plan. “Flood reduction” will detail the patterns of flood mitigation within the system and the persisting flooding problems. “Construction feasibility/Impact to Private Property” will discuss the potentially negative impacts of the proposed construction plans. The proposed improvements will all be modeled using the curve numbers calculated using the future land uses. Detailed project maps are shown in **Appendix A**. The table below briefly describes the selected projects.

Table 4. Brief Description of Proposed Projects

Proposed Project	Description
<i>Outfall 1</i>	
Outfall 1 Phase 1	Improvements along W 5 th St and Gordon St
Outfall 1 Phase 1 – Optional	Improvements along W 5 th St and Gordon St; GSI on 230 W 5 th St
Outfall 1 Phase 2	Improvements along W Clark St
Outfall 1 Phase 2 – Optional	Improvements along W Clark St; GSI on Manchester Elementary School
<i>Outfall 2</i>	
Outfall 2 Downtown	Improvements in Downtown Pinewood, along E Clark St, East Avenue S, E 2 nd St and S Hampton St
Outfall 2 Downtown – Optional	Improvements in Downtown Pinewood, along E Clark St, East Avenue S, E 2 nd St and S Hampton St; GSI on E Clark St
Outfall 2 Railroad Avenue	Improvements and paving Railroad Ave
<i>Outfall 3</i>	
Outfall 3 Phase 1	Improvements along Elmwood Ave
Outfall 3 Phase 2	Improvements along E Clark St and E Fulton St

Alternative Outfall 1

Proposed Improvements

The improvements for Outfall 1 can be separated into three major parts. The first involves upgrading a few pipes along W 5th St and redirecting the drainage from W 5th St towards the west side of Gordin St. In the current system, the stormwater from this area flows into the ditches on the east side of Gordin St. An optional improvement in this area is to add a stormwater bioretention basin located on the southeast



corner of the Gordin St and W 5th Ave intersection. This basin is designed to receive, hold, and slowly release the stormwater as it travels towards the overall outfall while also increasing infiltration into the soils. This basin will redirect the drainage to the ditch line along the west side of Gordin.

The existing system has undersized ditches on the west side of Gordin St and about 250ft before the intersection with W Clark St a proposed cross pipe would direct the flow from these ditches to the larger ditches on the east side of Gordin St. The second part of the Outfall 1 improvements will be to upsize and extend the ditch line along the west side of Gordin St to handle the extra capacity needed for the first improvement. The new ditches will connect into the system with an underground junction box just before the outfall. Driveway pipes will be added where necessary in order to extend the ditch line. All of these improvements are analyzed together as Outfall 1 Phase 1.

Phase 2 of the Outfall 1 improvements will be to upsize the pipes in the drainage system that run along the south side of W Clark St between West Ave S and Gordin St. The pipes will be replaced in line and the drop inlets that connect them will be lowered to appropriate elevations to maintain gravity flow and proper cover for the larger pipes. There are also existing catch basins along this street which will be replaced with standard drop inlets. Another optional improvement will be to redirect the drainage entering the system from the school parking lot to a second proposed bioretention basin on the school grounds. The basin will outlet directly into the outfall ditch instead of feeding into a large junction on the southwest corner of the intersection between W Clark St and Gordin St. These improvements will be analyzed together as Outfall 1 Phase 2.

The alternative Outfall 1 improvements serve to slow down the water traveling to the outfall using the bioretention basins and decrease the strain on certain conduits and nodes in the existing system by redirecting the flows. A map of the improvements can be found in **Appendix A**.

Flood Reduction

The improvements reduce the time surcharged for pipes and conduits along W 5th St, Gordin St and W Clark St. Many nodes that are consistent across the existing and alternatives models no longer surcharge or are significantly reduced during the 25-year storm. An area of concern in the existing system was where the ditch along Gordin St and the pipe system along W Clark St intersect each other and cause a backup going both ways. The reduced flow going to this intersection helps reduce the surcharging and backups. The proposed improvements do not eliminate all instances of flooding throughout the system, but they do improve the overall performance. The smaller improvements do not necessarily show up on the flooding maps due to the ranges, but can be seen in the comparison tables in **Appendix C**.

Construction Feasibility/Impacts to Private Property

Additional easements will be required along W 5th Ave to install the new drainage system and along the west side of Gordin to install the new outfall ditch for Outfall 1 Phases 1 & 2. The Outfall 1 Phase 1 – Optional design will require the Town to acquire the parcel at the corner of Gordin St and W 5th Ave for the first basin.

The optional design for Outfall 1 Phase 2 includes a second bioretention cell located on the elementary school property, therefore, no additional easement or right-of-way would be required; however, the Town will have to coordinate the construction and maintenance with the school.



Alternative Outfall 2

Proposed Improvements

The improvements for Outfall 2 can be split into two main sections: Railroad Ave and the Downtown area. There are also some small changes to the system that do not fit into the two main sections. The improvements that don't fall into a certain section include upsizing the pipes that connect the main ditch line where there are road crossings parallel to West Ave. Specifically, the crossings at Clark St, Fulton Manning Rd and Claflin St were upsized.

The Railroad Ave area is currently an unpaved road with little to no drainage infrastructure except for each end of the road. The improvements will include paving the road and adding ditches and driveway pipes along the east side of the new road. The proposed road will be two 11' lanes and 2' paved shoulders on each side for a total paved width of 26'. Instead of flowing south all the way to Pine Tree Creek, the majority of the stormwater from Railroad Ave will be diverted into an existing ditch in the woods that currently serves as a runoff channel for the agricultural fields east of Railroad Ave. This ditch already flows into Pine Tree Creek and has the capacity to receive the extra flow. A ditch will be cut back through the woods to divert the Railroad Ave stormwater into the existing ditch.

The downtown area improvements include redesigning the drainage system that takes stormwater from E Clark St and East Ave under the railroad and into the large ditch line in between the railroad and West Ave. There will be an addition of four inlets on E Clark St, two along each side. These inlets will optionally have a combination or small bioretention cells and curb inlets to improve the aesthetic of the downtown and add drainage capacity. Four inlets along East Ave N will be replaced and directed south to intersect with the E Clark drainage and merge with the inlets around the maintenance yard where they will eventually cross under the railroad. The current pipe under the railroad in this location will be upsized to receive the larger drainage area. The rest of the inlets along East Ave will remain flowing north to a different railroad crossing. Since the drainage area for this crossing is being reduced the pipe will not need to be upsized.

The Outfall 2 improvements serve to decrease the number of pipes crossing under the railroad in the downtown area by consolidating most of the drainage into one crossing. The improvements will also improve the quality of drainage along Railroad Ave because the current design allows for ponding and erosion along the sandy street. The upsized pipes at Fulton Manning Rd and Claflin St will help prevent backups in the ditch that carries most of the flow to the outfall. Lastly the combined tree box and inlets along E Clark St will add to the aesthetic beauty of the downtown area. A map of the improvements can be found in **Appendix A**.

Flood Reduction

Due to Railroad Ave not having any current infrastructure the flooding reduction is hard to demonstrate through comparing the flooding nodes or conduits. With a newly paved road, Railroad Ave will no longer have major ponding and erosion problems, and it will be drivable during all conditions which will improve the quality of life for the residents living there. On the other hand, the quantifiable data shows that the upsized pipes and redesign around the downtown area will reduce the surcharging nodes and conduits. Notable instances of this reduction during the 25-year storm occur at the railroad crossing between E 5th St and E 4th St, and at the railroad crossing just south of Fulton Manning Rd. These crossings both went



from surcharging for about 2 hours to no longer surcharging. Detailed comparison tables are shown in **Appendix C**.

Construction Feasibility/Impacts to Private Property

Although no easement maps were able to be found, the improvements in the downtown area are centered on replacing existing infrastructure, so the access should not be inhibited by private property.

For the Railroad Ave improvements, easements will be required to add the drainage line along the street. Some telecommunication and gas utilities might need to be relocated along Railroad Ave according to observations during the field visits. Easement will also be needed for the property next to 401 Railroad Avenue, where the ditch line will turn perpendicular to the road.

Alternative Outfall 3

Proposed Improvements

The alternative improvements for Outfall 3 will include adding infrastructure along Elmwood Ave and in between Elmwood and N Marion St. The current pipe that conveys stormwater from Big Loop to the outfall channel will be abandoned and the system redesigned to avoid going under buildings.

The improvements along Elmwood Ave will be ditches along either side of the road that are directed into an improved swale in between two homes. This swale will be constructed in between 95 Elmwood Avenue and 103 Elmwood Avenue. This will then take the stormwater into the woods so that it can freely runoff into the outfall channel through the wetlands. Another improvement in this area is a bioswale in between the properties on Elmwood Ave and Marion St. This bioswale will drain into the existing ditch that runs perpendicular to Elmwood Ave. The existing ditch and pipes along the south side of Elmwood Ave will be upsized to better handle the large drainage area. These improvements, north of E Fulton St, will be analyzed together as Outfall 3 Phase 1.

Outfall 3 Phase 2 will include the redesigned system that takes the stormwater from Big Loop and south of E Clark St to the outfall ditch. Two catch basins will be replaced, and two drop inlets will be added. The pipes will be upsized from the existing 30" RCP to reduce backups in the system.

The current design of the 30" pipe conveying stormwater from Big Loop to E Fulton St is problematic because it runs under a house. This will be abandoned and replaced with RCP that avoids running under buildings and two catch basins will be added to help catch extra road runoff on E Clark St near the intersection with Big Loop. A map of the improvements can be found in **Appendix A**.

Flood Reduction

Similar to Railroad Ave, the flooding reduction is hard to quantify in areas where there was no previous infrastructure. With new housing development occurring between N Marion St and Elmwood Ave, the flooding problems will keep increasing if there is no drainage infrastructure added to this area. The areas with nodes and conduits that see a quantifiable change in flooding are around the upgraded ditch on the south end of Elmwood Ave and the upgraded pipes along E Fulton St that flow into the outfall ditch.

The main outfall channel does show an increase in discharges, which impacts the capacity of the existing channel. However, the channel still has capacity during the 25-year storm. The reasoning for the increase is the stormwater that would usually pond in yards and on roads, is now being conveyed by the new



infrastructure so there is an increase in the peak flows. Detailed comparison tables are shown in **Appendix C**.

Construction Feasibility/Impacts to Private Property

Easements will be required for some of the drainage improvements along Elmwood Ave and the bioswale in between the properties on Elmwood and Marion. There is a housing developer who currently owns the rest of the undeveloped land between N Marion St and Elmwood Ave, and they would need to agree to this easement. The stormwater that flows into the wetlands from Elmwood Ave will need an energy dissipator so that the wetland is not negatively affected by higher velocity flows that could cause erosion.

The current pipe that goes under a house will be abandoned and filled and this reduces that house’s risk of flooding during a high-volume storm. The new alignment of that pipe will require that easements be acquired.

7. Impacted Parcels

Table 5 is a list of the anticipated parcels that will be impacted by potential construction. Prior to construction, it is recommended that the Town consider obtaining drainage easements on these parcels for ease of maintenance in the future.

Table 5: Parcels Impacted by Construction

Parcel ID No.	Address	Owner
<i>Outfall 1</i>		
1680001006	0 FULTON TWNS	ROLLINGS FAMILY FARM LLC
1680902005	301 W CLARK ST	WILSON ANNIE L & BRAGDON ANNIE
1680902006	10 GORDIN STREET	AURTREY MARY L & LOGAN HENRY
1680902012	230 W 5TH ST	PUGH ELLA HEIRS OF
1680902013	224 W 5TH ST	JOHNSON ALEXIS ETAL
1680902014	116 MCBRIDE ST	MASHORE LUCRETIA ETAL
1680902024	200 W CLARK ST	SCHOOL MANCHESTER
<i>Outfall 2</i>		
1680003003	0 S HAMPTON ST	SMOAK PROPERTIES OF PINEWOOD
1681003029	4 E CLARK ST	CBT ENTERPRISES LLC
1681003030	8 E CLARK ST	CBT ENTERPRISES LLC
1681003032	16 E CLARK ST	PINEWOOD TOWN OF
1681003033	20 E CLARK ST	AYCOCK INVESTMENTS LLC
1681003038	0 EAST AVENUE SOUTH	HARRIS DANIEL DAVID
1681003039	13 EAST AVENUE SOUTH	HARRIS DANIEL DAVID
1681501001	6 E FULTON-MANNING RD	CHURCH PINEWOOD BAPTIST TRUST
1681501003	140 EPPERSON ST	PINEWOOD TOWN OF
1681501004	180 EPPERSON ST	MCLEOD JESSE E
1681501005	0 RAILROAD AVE	MCKNIGHT JOHNNIE
1690102001	401 RAILROAD AVE	CONYERS GRACIE ETAL



Parcel ID No.	Address	Owner
1690102002	0 RAILROAD AVE	MCKNIGHT JOHNNIE
1690102003	0 RAILROAD AVE	MCKNIGHT KATRINA & JAMEL
1690102005	501 CLAFLIN ST	MCKNIGHT JOHNNIE*& VENUS HEIRS
<i>Outfall 3</i>		
1681004018	109 ELMWOOD AVE	WELLS JOSEPH ROBERT LE
1681004019	107 ELMWOOD AVE	WELLS JOSEPH ROBERT LE
1681004020	103 ELMWOOD AVE	WELLS JOSEPH ROBERT LE
1681004021	75 N MARION ST	C MAC 1 LLC
1681004026	225 E FULTON-MANNING RD	SQUIRES LINDA A
1681004028	227 E CLARK ST	YEADON ROSE MARIE & RONALD
1681004035	0 ELMWOOD AVE	WELLS JOSEPH R LE
1681004037	255 E FULTON-MANNING RD	LESTER RAYMOND P & FRANCES LE
1681004038	0 E FULTON-MANNING RD	CBT ENTERPRISES LLC
1681004043	116 ELMWOOD AVE	MORROW CHASE & DAVID J
1681004044	112 ELMWOOD AVE	ARD MELISSA LYNN
1681004045	108 ELMWOOD AVE	DOZIER ANNA LETHA
1681004046	104 ELMWOOD AVE	DUDEK BOB
1681004047	100 ELMWOOD AVE	MERLO CHARLES & SUSAN
1681004048	94 ELMWOOD AVE	MCCANN DERREK
1681004050	45 N MARION ST	GAINNEY CONSTRUCTION CO LLC
1681004051	55 N MARION ST	GAINNEY CONSTRUCTION CO LLC
1681004052	65 N MARION ST	C MAC 1 LLC
1681502005	228 E CLARK ST	THAMES MARGUERITE C ETAL
1681502029	0 BIG LOOP	THAMES MARGUERITE C

There is only one parcel that the Town may need to acquire to make an optional improvement within Outfall 1 and it is highlighted above.

8. Anticipated Permitting

The proposed improvements may require a variety of local, state, or federal permits or approvals. It is assumed that all projects would require a SCDHEC Land Disturbance permit. Projects that involve improvements in and around streams or wetlands will require a SCDHEC 401/USACE 404 permit. Several improvements will require coordination with SCDOT and railroad approvals / permits. Below is additional information on the required permits.

SCDHEC 401 / USACE 404

The intent of the USACE (United States Army Corps of Engineers) 404 Clean Water Act permit is to regulate the water quality of waters discharging to Federal waters or wetlands. A USACE 404 permit is required for all activity that results in a discharge to Federal waters or wetlands. A SCDHEC (South Carolina Department of Health and Environmental Control) 401 Certification is required as part of the



USACE 404 permit submittal process. The 404 permit may include a Nationwide Permit (NWP) or an Individual Permit (IP). The NWP is a general permit that authorizes a variety of activities including utility lines, road crossings, and wetland and stream restoration activities. An IP is a permit that is required for projects that are more complex in nature and require notification of the public and commenting agencies. It is highly unlikely that any of the projects described herein would require an IP.

Land Disturbance

According to SCDHEC, a Notice of Intent (NOI) is required for any project resulting in clearing, grading and/or excavation activities that disturb more than 1 acre. A Comprehensive Stormwater Pollution Prevention Plan (C-SWPPP) is required for all sites disturbing 2 acres or more.

SCDOT / Railroad Right-of-Entry

Several project improvements are within the SCDOT right-of-way. As such, projects will be required to submit an encroachment agreement and be subject to SCDOT review. Likewise, projects within the railroad right-of-way will be required to obtain an encroachment agreement and be subject to the railroad review.

9. “What-If” Scenarios and Analysis

Several “what-if” scenarios were investigated to determine the prioritization of projects. The “what-if” scenarios included impacts for major flooding events, such as hurricanes, improving road user function, and incorporating green stormwater infrastructure.

Major Flooding Event

There is one (1) major stream crossing located within the Town limits. W Fulton Manning Road is a SCDOT owned box culvert crossing on Pine Tree Creek. The crossing is located on SC-261 and is the main road in and out of town. A hydraulic analysis of the box culvert showed that the box culvert is adequately sized to convey the 50-year storm event, with the 100-year storm overtopping the road. The surrounding area is low-lying swamp with several homes and businesses that would be severely impacted. Additionally, there is a railroad that runs through the middle of Town and effectively cuts off the west and east sides of Town. There are several small pipes that run underneath the railroad that are currently undersized. A major storm event would effectively cause severe flooding on both sides of the railroad, with houses flooding due to Pine Tree Creek coming out of the banks on the west side of Town, but also the east side of Town effectively acting as a bowl with little to no relief due to undersized or lack of effective drainage.

Improved Road Function

Railroad Avenue runs along the east side of the railroad through Town. Currently, it is a dirt road with no existing drainage infrastructure. Residents frequently complain that every time it rains, the road itself acts as the conveyance. After a large rainfall event, standing water blocks residents access in and out of their homes. Standing water has been noted for days after an event. Adding sufficient drainage along Railroad Avenue would improve the flooding conditions; however, paving the road and regrading away from the railroad will vastly improve the overall road user experience. KCI recommends paving the road



from E Fulton Street to Claflin Street and adding open-channel drainage to the east side of the road to improve drainage.

Green Stormwater Infrastructure (GSI)

KCI investigated incorporating green infrastructure into the stormwater design. As the addition of green infrastructure did not improve the overall performance of the drainage system, these were considered “optional” additions. For Outfall 1, there were two areas that were investigated to provide green stormwater infrastructure: at the corner of W 5th and Gordin Streets and on the Manchester Elementary School property. The Town would have to acquire the parcel at 230 W 5th Street to build a larger bioretention cell, rain garden or stormwater wetland in this location. However, the parcel currently appears to be empty; therefore provides a good opportunity to incorporate GSI while providing a community garden or other amenity for the neighborhood. There is open space within the Manchester Elementary School for the addition of a bioretention cell or rain garden. It would not be much additional cost to pull the school’s parking lot drainage offline to drain to the GSI feature. This would also create an educational opportunity for the school to promote the benefits of GSI to students. These scenarios are shown as Outfall 1 – Phase 1 Optional and Phase 2 Optional.

Finally, KCI investigated using GSI in the downtown area. By taking up 4 existing parking stalls spaced through the downtown, the drainage could easily accommodate creating small bioretention cells and curb bump-outs to provide water quality benefits. It would also enhance the aesthetics of the downtown area by providing trees and flowering plants right in the downtown core. This scenario is shown as Outfall 2 Downtown – Optional.

10. Opinions of Probable Cost

Preliminary opinions of probable costs (OPCs) were developed for each of the modeled alternatives. Unit costs were based on available data from the SCDOT Bid Item Estimator that contains data up to 2024. A summary of the costs estimates for each Alternative can be found in Table 6. Cost estimates taken from the SCDOT Bid Item Estimator that are used in the probable cost summary in **Appendix B** include the following:

- RCP Pipe Installation – All Sizes
- Bore & Jack RCP Pipe Installation – All Sizes
- Inlet/Junction Structures- All Sizes
- Pipe Bedding – All Sizes
- Riprap – All Sizes
- Grading/Trenching – All Sizes
- Demolition/Repair
- Erosion Control – Inlet Protection/Silt Fence

Assumptions for data not available SCDOT Bid Item Estimator were taken from KCI’s internal costing estimates for similar projects. Additionally, the following line items were included for each project:

- 15% Construction Cost Contingency Factor
- 10% Engineering Consultant Cost



- 1% Town of Pinewood Construction Administration Cost
- 2% Town of Pinewood Engineering Inspections Cost

Lump sum cost estimates used in the cost estimates were made for the following:

- \$20,000 Lump Sum for Mobilization
- \$15,000 Construction Surveying
- \$15,000 Traffic Control
- \$10,000 Bioretention Cells

Table 6. Opinions of Probable Cost

Project	Total
Outfall 1 Phase 1	\$543,100.00
Outfall 1 Phase 2	\$975,600.00
Outfall 1 Phase 1 - Optional	\$569,100.00
Outfall 1 Phase 2 - Optional	\$1,284,600.00
Outfall 2 Downtown	\$1,274,600.00
Outfall 2 Downtown - Optional	\$1,325,800.00
Outfall 2 Railroad Ave	\$837,600.00
Outfall 3 Phase 1	\$549,200.00
Outfall 3 Phase 2	\$631,000.00
Grand Total	\$7,990,600.00

The cost estimates assumed that the different phases of certain projects would be built separately, assuming the worst-case scenario in terms of cost. Cost savings can be realized should the Town decide to build the different phases together, seeing benefits from combined mobilization and administrative costs. Cost estimate also did not include operational and maintenance costs over the lifespan of the projects. These values however were captured in the Benefit-Cost-Ratios in Section 12. Detailed cost estimates for each project can be found in **Appendix B**.

11. Low-to-Moderate Income Analysis

The Community Development Block Grant (CDBG) program requires that each CDBG funded activity must either principally benefit low- and moderate-income (LMI) persons, aid in the prevention or elimination of slums or blight, or meet a community development need having a particular urgency. Although the latest American Community Survey (ACS) 5-Year Estimate was conducted from 2016-2020, not all data has been compiled, and instead the data from 2011-2015 was used in this analysis. There are no major developments from 2011 to 2021, therefore this is a reasonable comparison. Please reference historical aerials in Figure 5 and Figure 6 to confirm this assumption:



Figure 5. Town of Pinewood Aerial from June 2011

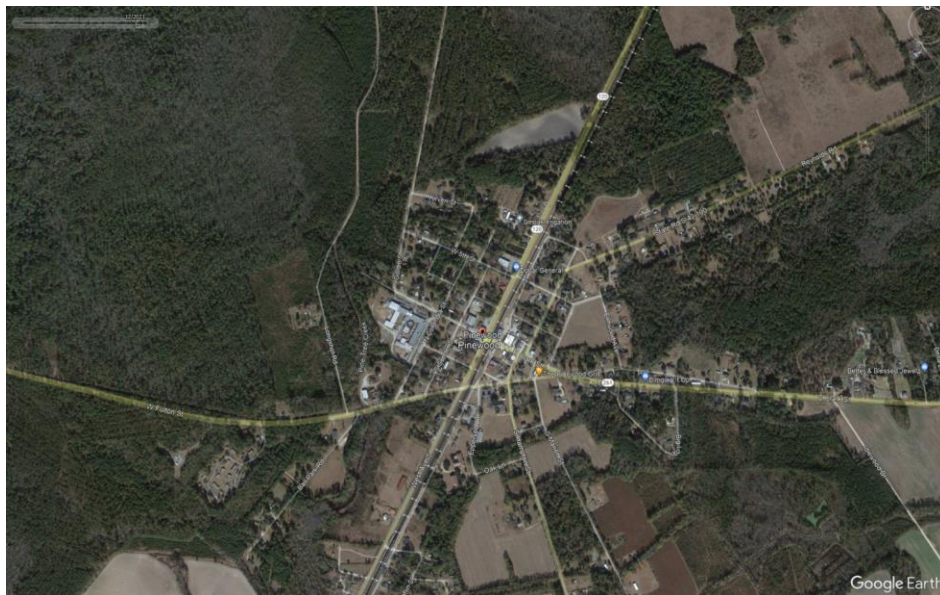
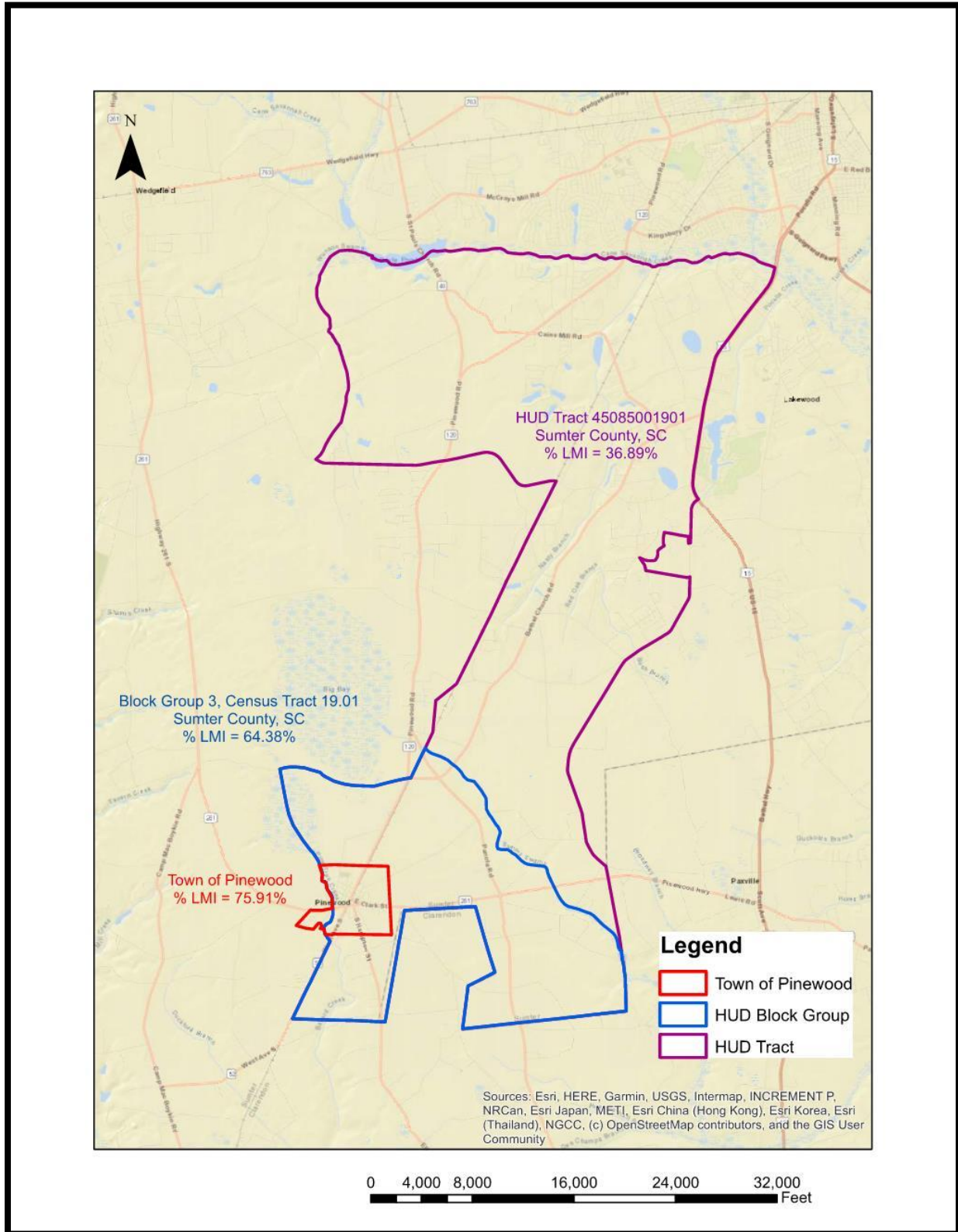


Figure 6. Town of Pinewood Aerial from December 2021

Using the ACS 5-Year 2011-2015 Low- and Moderate-Income HUD data, KCI downloaded the Town of Pinewood data, the 2015 ACS block group data that contains the Town of Pinewood, and the full 2015 ACS tract that contains the Town of Pinewood. Within this information, the Town of Pinewood has a 75.91% LMI population, the block group has a 64.38% LMI population, and the HUD tract has a 36.89% LMI population. This shows that not only does the Town of Pinewood meet the 51% or more criteria for CDBG programs, but a significant portion of the block group and a percentage of the over HUD tract. Figure 7 on the following page summarizes the LMI information.



Figure 7: Map of HUD Low- and Moderate- Income Areas





12. Project BCA and Prioritization

All proposed projects for all three (3) Pinewood Outfalls examined in this study were analyzed using the latest Benefit-Cost Calculator in version 6.0.0 of the FEMA BCA Toolkit application which runs in Microsoft Excel. Due to the somewhat rigid nature of FEMA BCA Calculator, only a limited range of benefits can be calculated within it. Two categories of benefit could be identified and quantified with the Calculator for the Pinewood projects, those being 1) loss of service (LOS) of roadways due to flood overtopping and standing water, and 2) structural flooding (in excess of the finished floor elevation) in homes and other buildings. The benefit the Calculator assigns to the value of roadway LOS is derived on the basis of the duration of roadway flooding and the resulting number of detours combined with the associated additional travel distance and time. In a small rural community such as Pinewood, where traffic volumes are very low (especially on secondary roads), and the required detours tend to be very short, the calculated benefits from preventing incidences of roadway LOS tend to be very small. Conversely, the projects where the modeling analysis predicted structural flooding that would be alleviated by the proposed projects tend to have a higher Benefit-Cost Ratio (BCR). Also, the BCAs include estimates of the operational and maintenance costs over the lifespan of the project, where the OPCs shown in Section 11 only account for the construction costs. The basic approach to the BCAs for each of the Pinewood Outfalls and the results of each are discussed as follows, and the full reports from the FEMA BCA Calculator are provided in **Appendix E**. Results are also presented in Table 7.

Outfall 1

No structural flooding was identified within the portion of the community impacted by the improvements proposed for Outfall 1, but model predictions indicated roadway flooding that would result in half-day losses of service on W Clark, Gordin, W 5th, and McBride Streets during both the 50-year and 100-yr recurrence interval storms. LOS incidents and some disruptions to the operations of Manchester Elementary School (located within the project area) were confirmed anecdotally by members of the community, and in personal communication with the school administrative staff, and they were mentioned in the community survey conducted to support this plan. Due to the manner in which parents loop around W 5th, Gordin, and W Clark Streets for school drop-off and pick-up each day, the BCA analysis was conducted on both project phases proposed for Outfall 1 together.

Also based on the communications with the school administrative staff, it was assumed that 40% of the 399 students currently enrolled at Manchester Elementary were picked up and dropped off daily by their parents, resulting in 640 one-way vehicle trips/day by parents. Daily trips were also added to account for household vehicle trips from the 55 single family homes in the immediate community that would benefit from the project. Eight (8) daily trips were also added to account for the buses serving the school. Despite a total of 924 daily vehicle trips, due to an additional detour distance of only 0.5 miles and additional travel time of 30 minutes, the incidences of roadway LOS only accrued \$3,181 benefits over the 50-year project life for a resulting BCR of 0.0.

Outfall 2

Model predictions indicated and anecdotal accounts confirmed that structural flooding has and will likely occur at one building, which is the downtown warehouse where the Town of Pinewood stores equipment, including construction equipment such as a backhoe and an excavator, and emergency equipment such as generators. The modeling analysis predicted that in the 100-year recurrence interval



storm, flooding of approximately one foot above the finished floor elevation occurs at the facility, which would be completely eliminated by the Outfall 2 - Downtown project. When applied to the estimated \$500,000 value of the contents of the storage building, the elimination of this predicted incidence of structural flooding resulted in a calculated project benefit of \$92,365 over the course of the 50-year project life, resulting in a project BCR of 0.07. The BCR of this project was calculated using only the costs of Phase 2- Downtown proposed project for Outfall 2, because the Outfall 2 - Railroad project consists of improvements to address the problems on Railroad Avenue, which do not affect the predicted hydraulic performance of the downtown project.

While a few incidences of roadway LOS can be substantiated within the project areas for Outfall 2, the most prominent of which is Railroad Avenue, they all occur on small secondary roads where traffic volumes are low, and detours are short. As such, they are likely to generate project benefits of only a few hundred dollars each across the project life, so they were not analyzed with the Calculator.

Outfall 3

Model predictions indicated that structural flooding would occur during the 100-year recurrence interval storm at four single family homes recently constructed along Elmwood Drive in the project area for the proposed Outfall 3 – Phase 1 project. The predicted structural flooding, varying from approximately 0.5-1.0 foot above FFE in each home owes partly to the fact that these relatively new homes are constructed by slab-on-grade methods in an area with little or no stormwater drainage infrastructure. The model predictions are reinforced by anecdotal accounts of repeated lawn and street flooding this part of Town. For all four structures, the predicted incidence of flooding would be completely eliminated by the proposed Phase 1 project. As a result, just as with Outfall 2, the BCR of this project was calculated using only the costs in the Phase 1 project, because the Proposed Phase 2 project will not affect the predicted hydraulic performance. By the same token, the proposed Outfall 3 – Phase 2 project was not analyzed in the calculator as the project area only exhibited a few incidences of roadway LOS on small secondary roads.

Based on the characteristics and monetary values assigned to the four homes, and the damages predicted by the regionally appropriate FEMA depth-damage curves embedded in the Calculator, elimination of these predicted structural flooding incidences resulted in combined project-life benefits of \$206,460 and a project BCR of 0.37.

Qualitative Benefits

The somewhat rigid nature of the FEMA BCA Toolkit renders it limited in the ability to capture the full array of benefits that may accrue to drainage improvement projects in small rural communities such as those proposed herein for Pinewood. Fortunately, HUD guidance for the planning and implementation of larger infrastructure projects which are designated as Covered Projects, explicitly allows for the inclusion of narratives to account for qualitative project benefits to LMI communities (refer to Section 11 above) within project BCA assessments. While none of these projects are near big enough to trigger Covered Project criteria, with that allowance in mind, the following qualitative benefits, which would apply to every project set forth in this plan, are offered. Reducing or eliminating drainage problems and the repeated flooding associated with them will result in:

- **Improved Economic Development Opportunities** – As work-from-home opportunities increase, and the number of days we are required to commute to work is reduced, increasing numbers of



people are moving to outlying small towns in search of affordable houses and/or the merits of rural living (“country life”). Reduced or eliminated flooding will better position Pinewood to take advantage of such trends and improved economic development links directly to improved job opportunities.

- **Improved Water Quality** – Recurring flooding causes more frequent and sustained subsurface inundation of wastewater infrastructure and on-site septic systems (where they are present) by elevated groundwater tables. That increased exposure can result in increased leaking and leaching of pollutants to the groundwater which can find its way to nearby surface waters through the groundwater-surface water interaction along intermittent and perennial streams.
- **Improved Resilience** – Severe weather events often necessitate emergency vehicle responses over and above ordinary incidences. In either case, increase response times due to flood water slow downs and detours can increase the likelihood of adverse outcomes.

Table 7. Summary of FEMA BCA Toolbox

Project	Estimated Project Cost	Rainfall Event	Buildings Impacted		Roads impacted		Benefit Cost Ratio
			Existing	Proposed	Existing	Proposed	
Outfall 1 Phase 1 + 2	\$1,518,700.00	10	0	0	0	0	0.00
		25	0	0	4	2	
		100	0	0	4	2	
Outfall 2 Downtown	\$1,274,600.00	10	0	0	0	0	0.07
		25	0	0	2	1	
		100	1	0	1	0	
Outfall 3 Phase 1	\$569,100.00	10	0	0	0	0	0.37
		25	0	0	2	0	
		100	4	0	3	1	
Outfall 2 Railroad	\$837,600.00	10	0	0	0	0	0.00
		25	0	0	0	0	
		100	0	0	0	0	

In addition to the FEMA BCA toolkit, KCI also utilize a project prioritization template that assessed the proposed projects based on several factors:

- Proximity to critical facilities, such as schools, fire stations, police stations, hospitals, etc.
- Property flooding
- Roadway flooding
- Existing conditions of stormwater infrastructure
- Implementation constraints
- Roadway type

Each project was assigned raw scores for the criteria listed above. The total raw score was divided by the total estimated costs and multiplied by a constant (10,000) to apply the ratios. Final prioritization of the



proposed projects considered these factors as well as the FEMA BCAs. Projects were then ranked from highest total weighted score to lowest, shown in Table 8. Detailed project rankings are in **Appendix E**.

Table 8. Project Rankings

Project	Total Weighted Score	Total Raw Score	Project Cost
Outfall 1 Phase 1	2.95	16	\$ 543,100.00
Outfall 3 Phase 1	2.91	16	\$ 549,200.00
Outfall 3 Phase 2	2.85	18	\$ 631,000.00
Outfall 1 Phase 1 - Optional	2.46	14	\$ 569,100.00
Outfall 2 Railroad Ave	2.15	18	\$ 837,600.00
Outfall 1 Phase 2	1.85	18	\$ 975,600.00
Outfall 1 Phase 2 - Optional	1.40	18	\$ 1,284,600.00
Outfall 2 Downtown	1.02	13	\$ 1,274,600.00
Outfall 2 Downtown - Optional	0.98	13	\$ 1,325,800.00

Based on the BCRs generated by the FEMA BCA Toolkit and the prioritization, projects were ranked against one another to determine a final ranking and prioritization shown in Table 9. These rankings took into account the “what-if” scenarios and engineering judgement to prioritize projects that would provide the greatest amount of benefit to the Town. For example, while the Outfall 2 Railroad Avenue project has a BCR of 0.0 and ranked in the middle for Weighted Score, it was determined that this project would be a highly visible project for the Town and would benefit the residents more than some of the other projects that may have greater flood reduction benefits.



Table 9. Final Project Rankings

Project	Estimated Project Cost	Benefit-Cost Ratio	Weighted Score	FEMA BCA Ranking	Weighted Score Ranking	Final Ranking
Outfall 1 Phase 1	\$ 543,100.00	0.00*	2.95	3	1	2
Outfall 1 Phase 1 - Optional	\$ 569,100.00	-	2.46	-	4	4
Outfall 1 Phase 2	\$ 975,600.00	0.00*	1.85	3	3	2
Outfall 1 Phase 2 - Optional	\$ 1,284,600.00	-	1.40	-	7	4
Outfall 2 Downtown	\$ 1,274,600.00	0.07	1.02	2	8	6
Outfall 2 Downtown - Optional	\$ 1,325,800.00	-	0.98	-	9	7
Outfall 2 Railroad Avenue	\$ 837,600.00	0.00	2.15	-	5	3
Outfall 3 Phase 1	\$ 549,200.00	0.37	2.91	1	2	1
Outfall 3 Phase 2	\$ 631,000.00	-	2.85	-	3	5

* Outfall 1 Phases 1 and 2 were analyzed together to try to achieve the maximum amount of benefit for the project

13. Potential Funding Sources

As described in the previous section, the small service populations (beneficiaries) and absence of significant instances of structural flooding prohibit the ability to achieve a benefit-cost ratio (BCR) of 1.0 or more. Unfortunately, federal grant programs administered by FEMA and HUD typically require a benefit cost analysis (BCA) with a resulting BCR of 1.0 or more. As such, those grant programs are not likely to be suitable targets from which to obtain funding for these projects. However, the projects in question would be of great benefit to the people of Pinewood. Fortunately, other sources of grant funding are available to potentially address these needs. Perhaps the most suitable of these other sources would be State Grants for infrastructure from the South Carolina Rural Infrastructure Authority (SCRIA).

While SCRIA grants have been somewhat focused on water & wastewater infrastructure, due to needs, the program has recently increased the emphasis on funding for stormwater infrastructure. For the FY2025 grant cycle the SCRIA has \$35,000,000 set aside for basic infrastructure grants with the following priorities set forth for stormwater projects:

- Implementation of regional solutions to stormwater problems
- Solutions that resolve public health and/or safety problems and create greater community resilience
- Projects that address documented stormwater problems where there is little or no existing infrastructure to collect and manage stormwater



- Projects that improve aging of severely deteriorated infrastructure or projects that otherwise increase the capacity of exiting drainage infrastructure or streams

Each project identified in this report to address chronic drainage problems in Pinewood aligns very well with at least two, and sometimes three of the four SCRIA objects above. Indeed, the CSCRIA has recently awarded funds to Conway, Darlington, and Beaufort for neighborhood scale projects to address chronic drainage problems caused by the absence of stormwater infrastructure or by deteriorated and/or inadequate infrastructure. More information on each of these grants can be found here:

<https://ria.sc.gov/casestudy/city-of-conway/>

<https://ria.sc.gov/casestudy/city-of-darlington/>

<https://ria.sc.gov/casestudy/city-of-beaufort/>

Due to recent inflation in construction costs applicants can request up to \$1,500,000 in each stormwater project application. Of further interest to the Town of Pinewood, no matching funds are required for these grants in Tier III and IV counties, which include Sumter County. However, such grants only fund construction and construction-related expenditures. All applicants for SCRIA basic infrastructure grants are required to cover the administrative costs associated with their project, which include design, permitting, and any necessary acquisition of properties or easements.

More information on the SCRIA State Grants for basic infrastructure, including instructional webinars, program strategy documents, and application forms, can be found here:

<https://ria.sc.gov/grants/>

14. Detailed Scopes of Work for Top 3 Projects

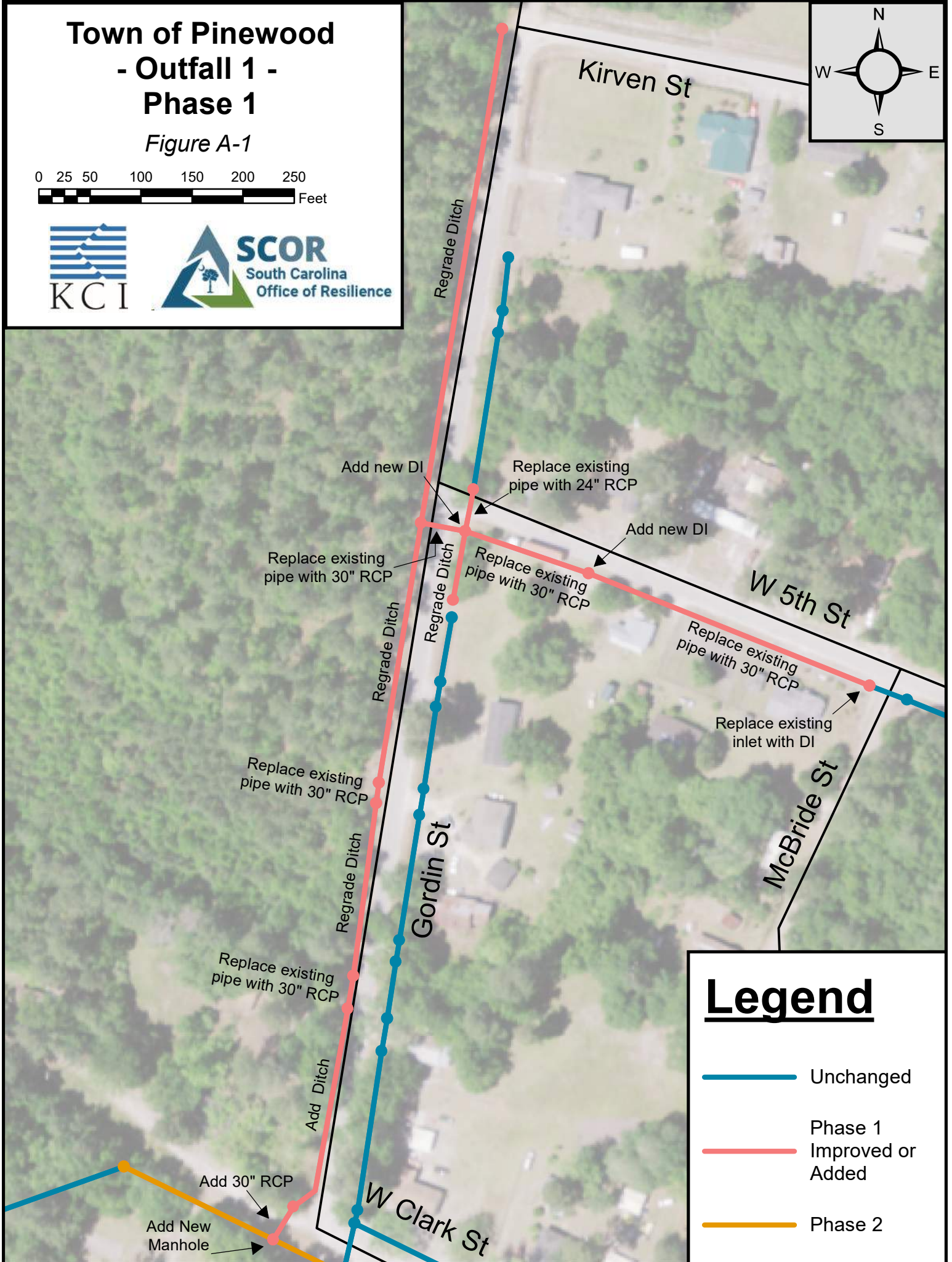
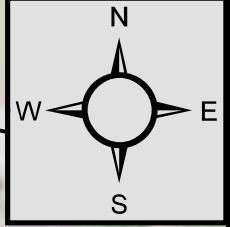
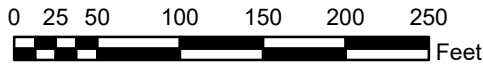
KCI has developed detailed scopes of work for the three (3) top-ranked projects. These scopes of work expand upon the conceptual designs in this report through 30% engineering design. Refer to **Appendix G** for the detailed scopes.



Appendix A – Proposed Alternatives

Town of Pinewood - Outfall 1 - Phase 1

Figure A-1

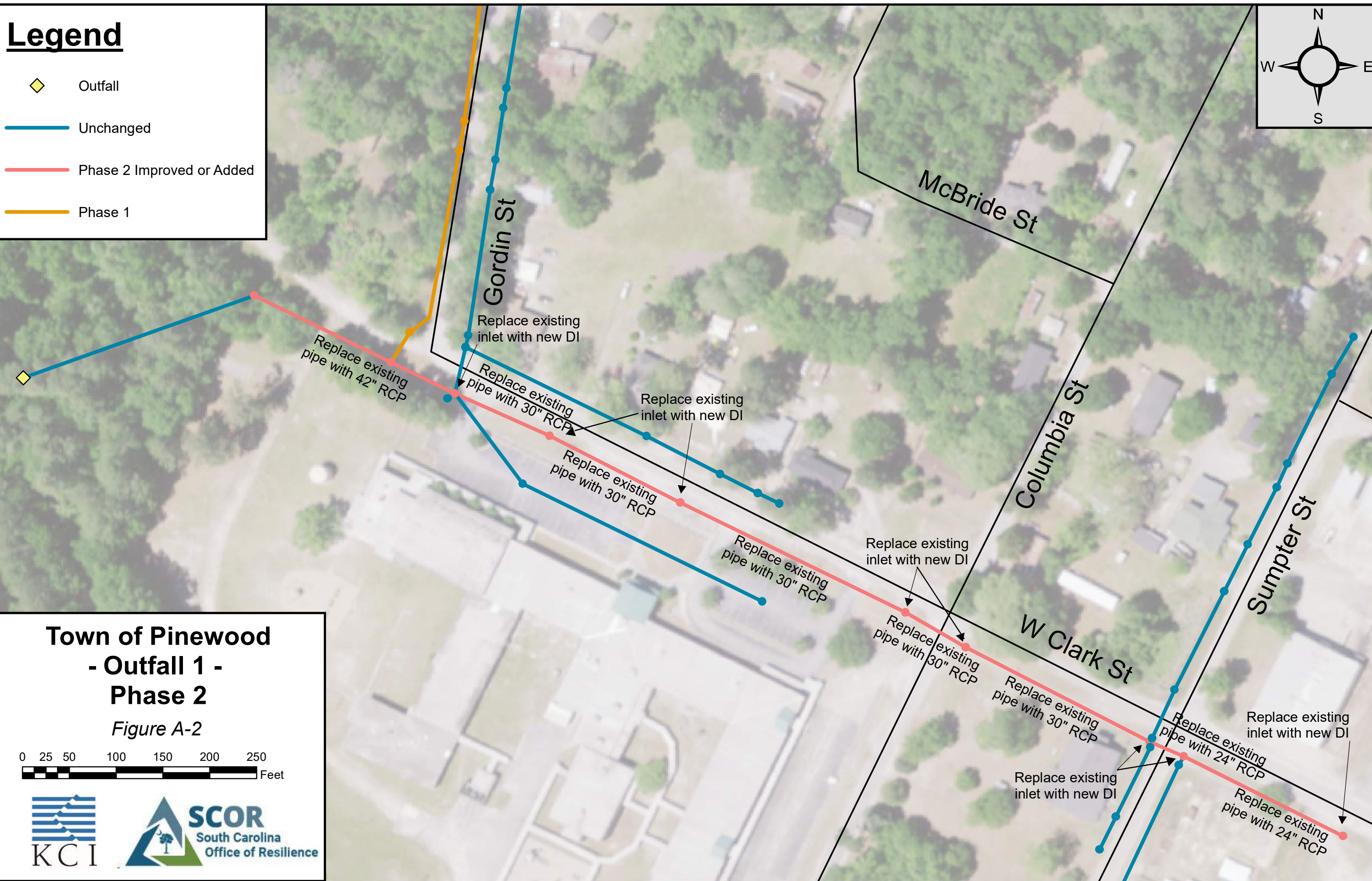
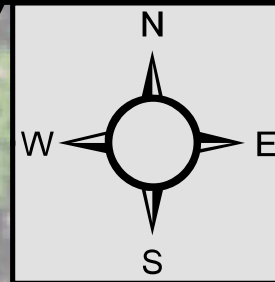


Legend

- Unchanged
- Phase 1 Improved or Added
- Phase 2

Legend

- ◆ Outfall
- Unchanged
- Phase 2 Improved or Added
- Phase 1



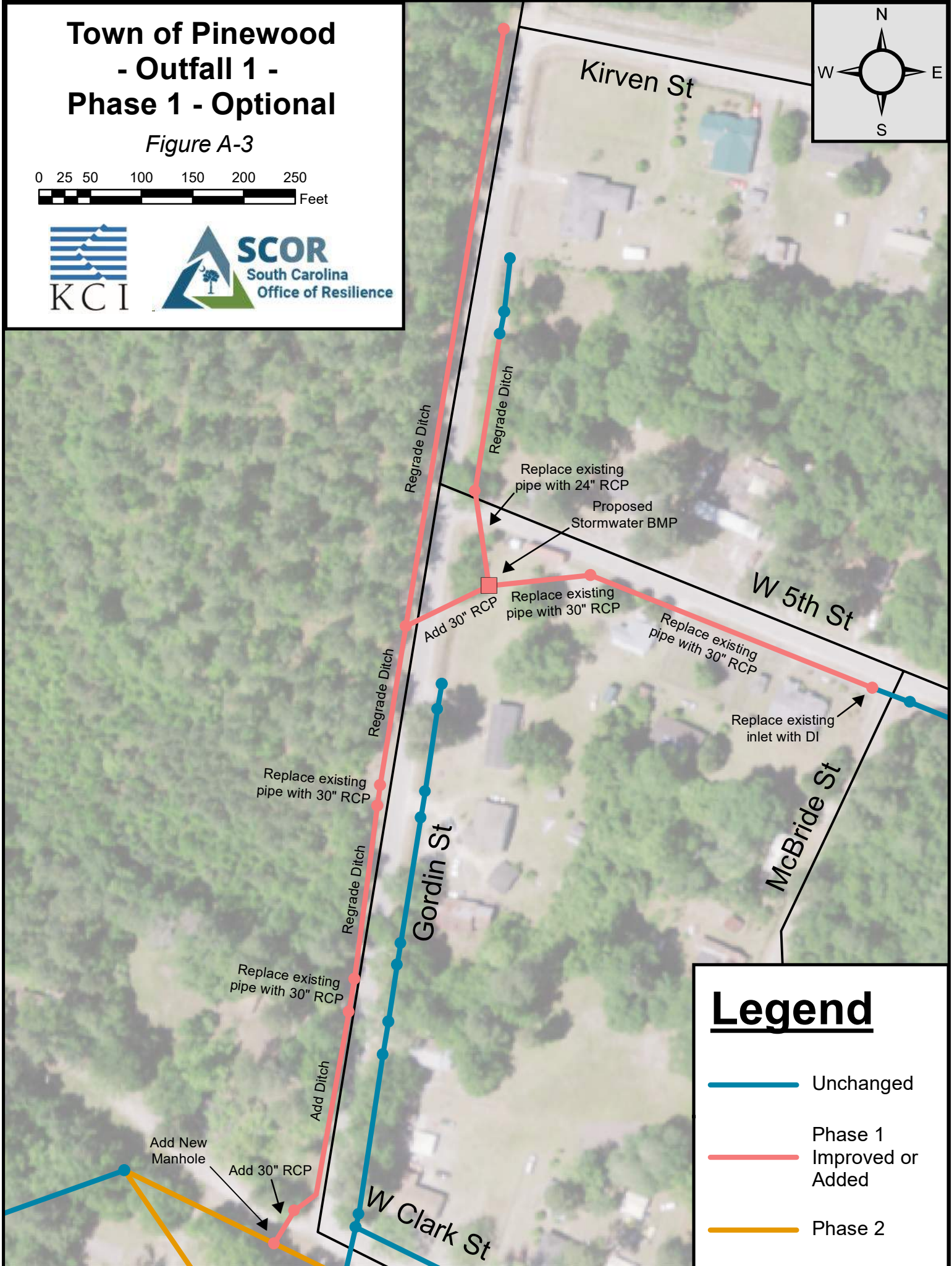
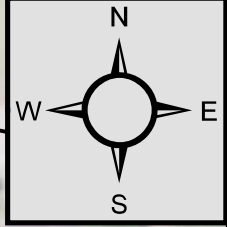
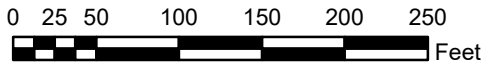
Town of Pinewood - Outfall 1 - Phase 2

Figure A-2



Town of Pinewood - Outfall 1 - Phase 1 - Optional

Figure A-3

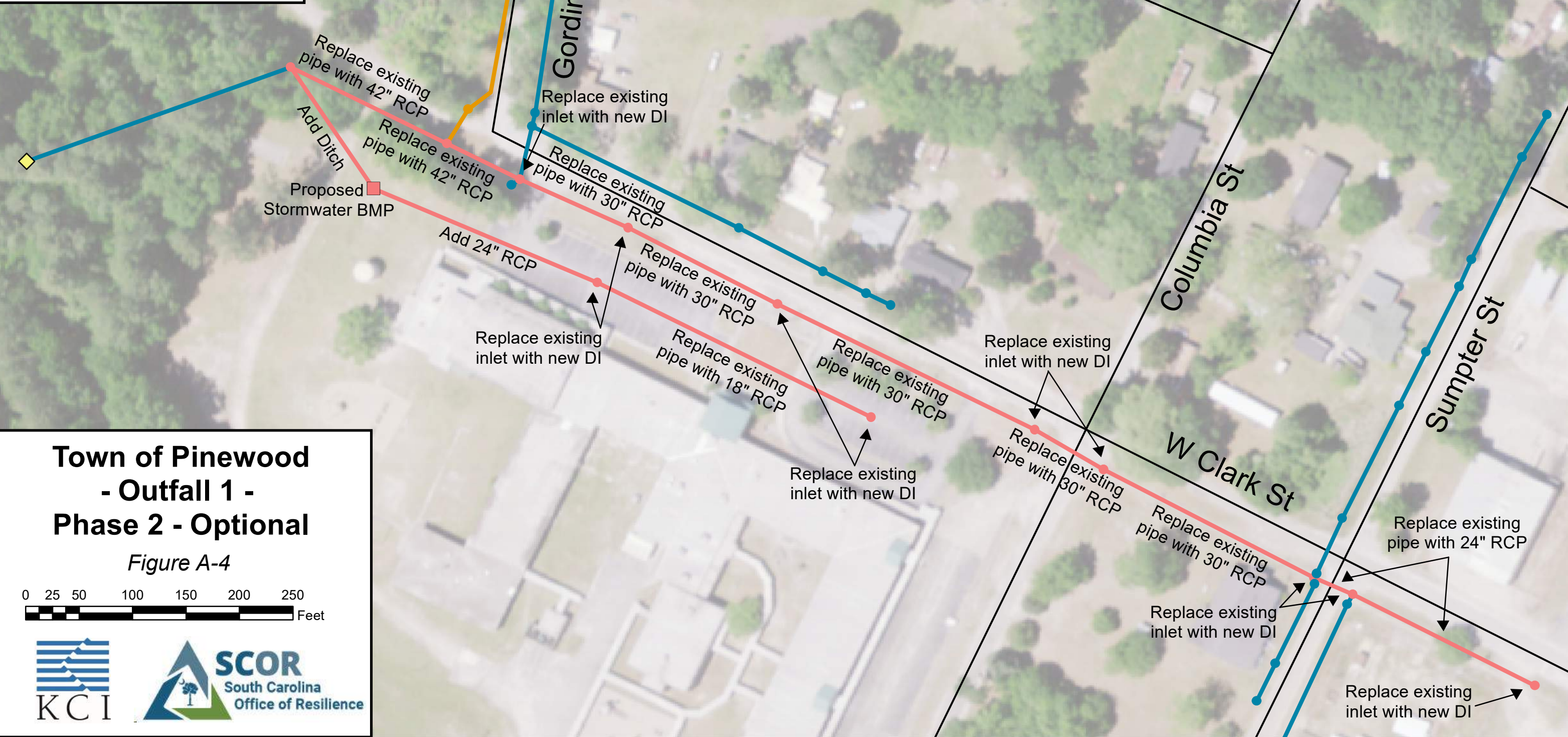
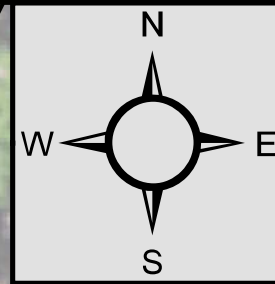


Legend

- Unchanged
- Phase 1 Improved or Added
- Phase 2

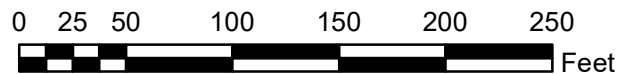
Legend

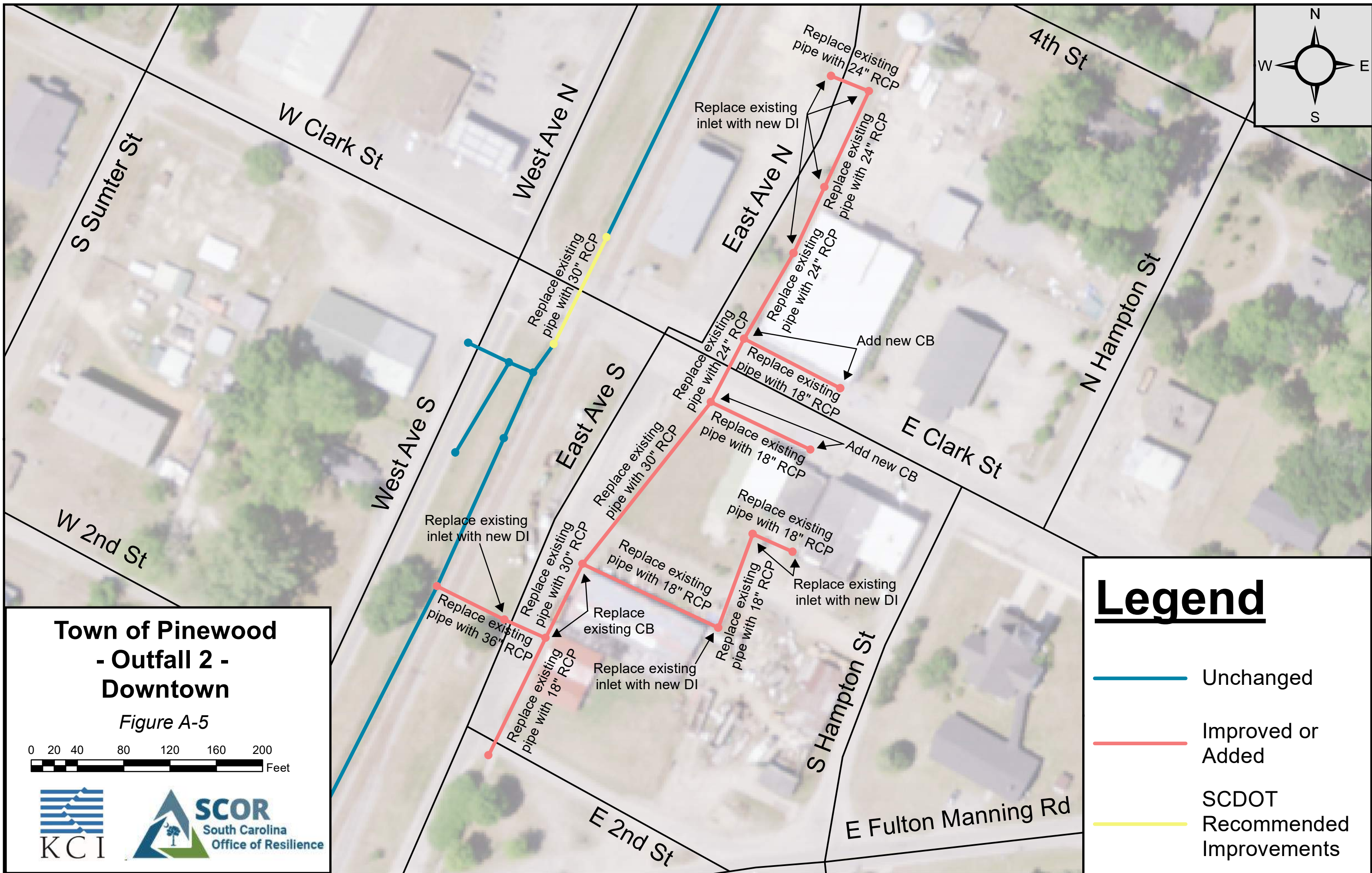
- ◆ Outfall
- Unchanged
- Phase 2 Improved or Added
- Phase 1



Town of Pinewood - Outfall 1 - Phase 2 - Optional

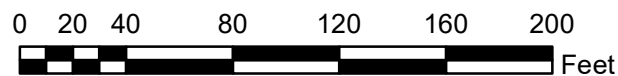
Figure A-4





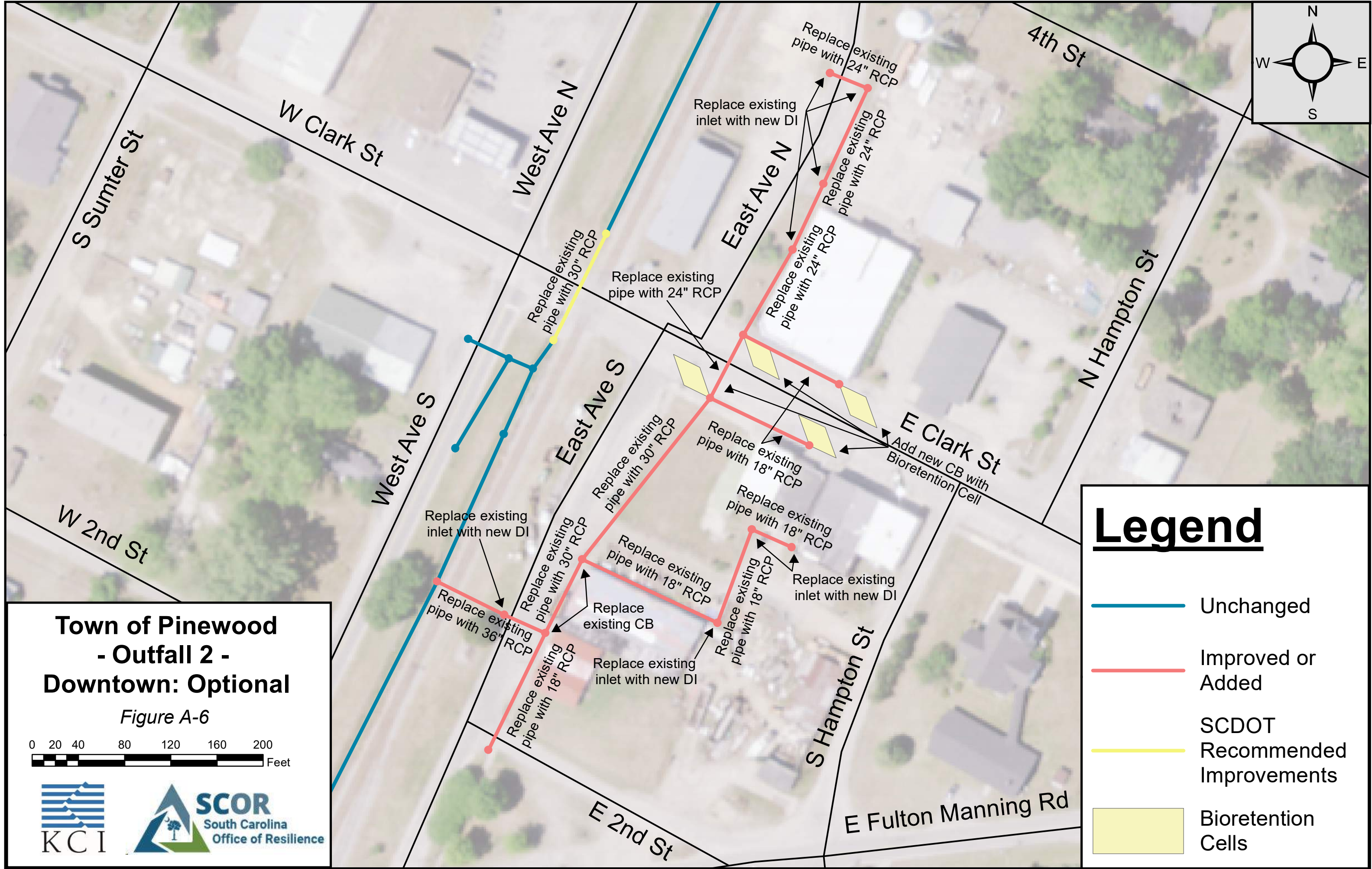
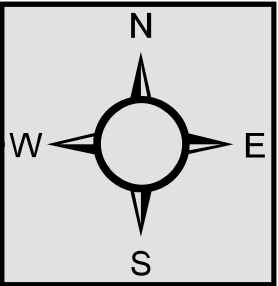
**Town of Pinewood
- Outfall 2 -
Downtown**

Figure A-5



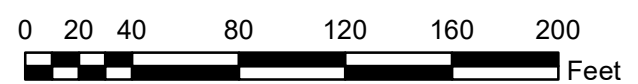
Legend

- Unchanged
- Improved or Added
- SCDOT Recommended Improvements



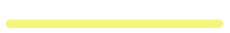



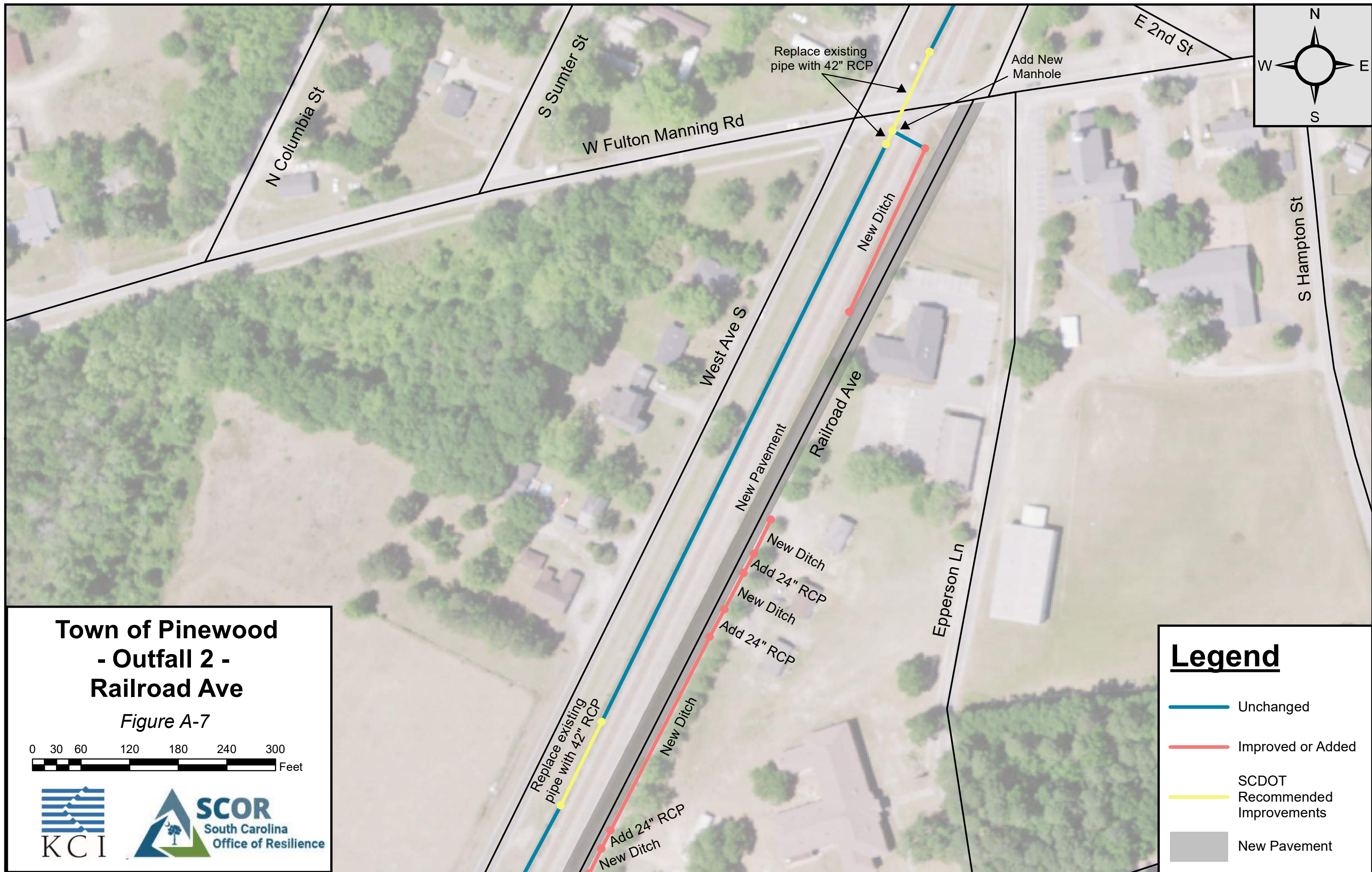
Town of Pinewood - Outfall 2 - Downtown: Optional

Figure A-6



Legend

-  Unchanged
-  Improved or Added
-  SCDOT Recommended Improvements
-  Bioretention Cells



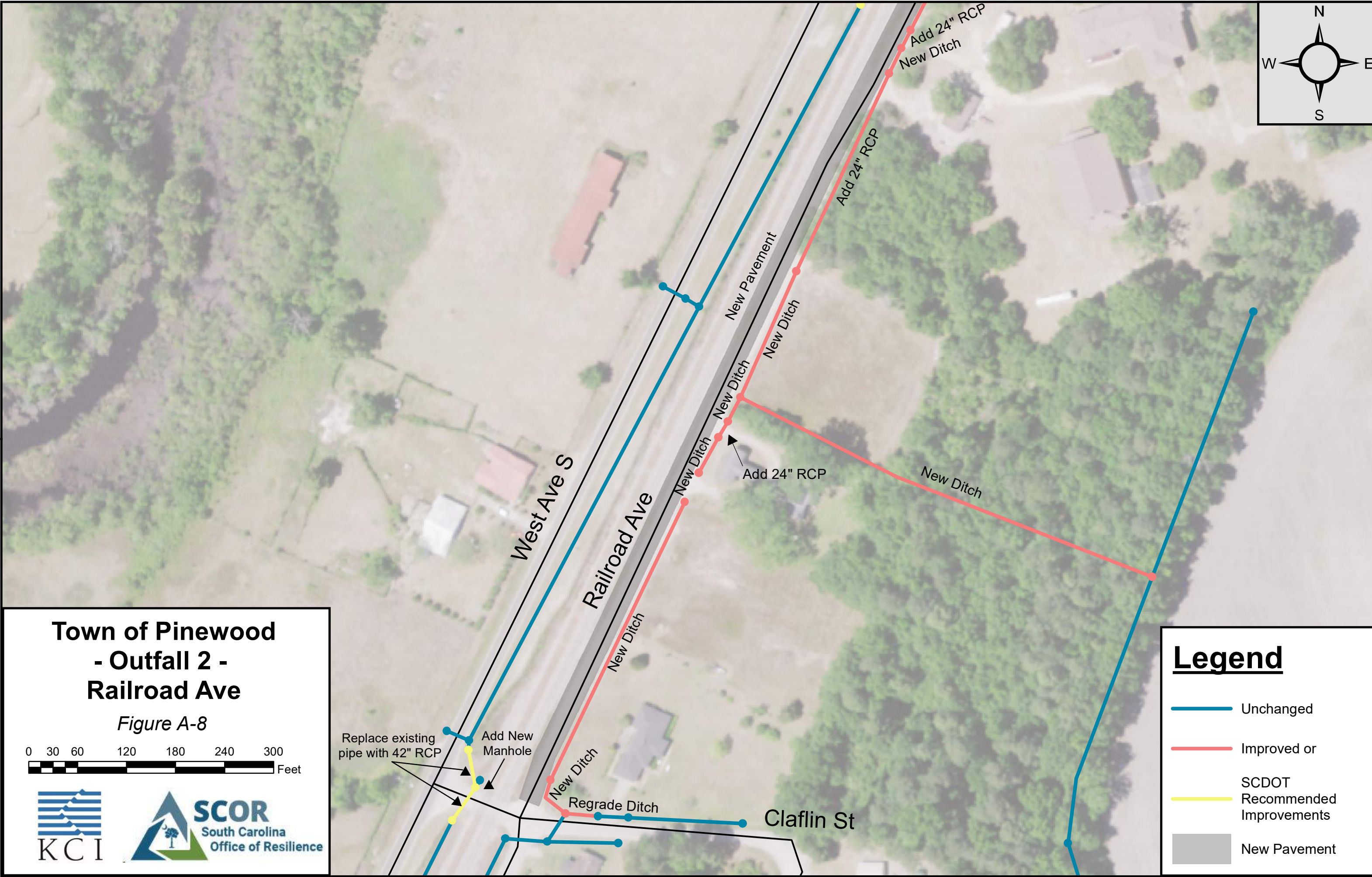
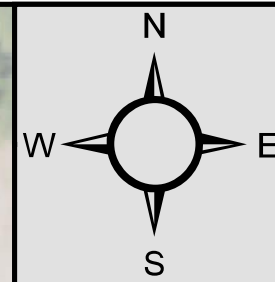
**Town of Pinewood
- Outfall 2 -
Railroad Ave**

Figure A-7



Legend

- Unchanged
- Improved or Added
- SCDOT Recommended Improvements
- New Pavement



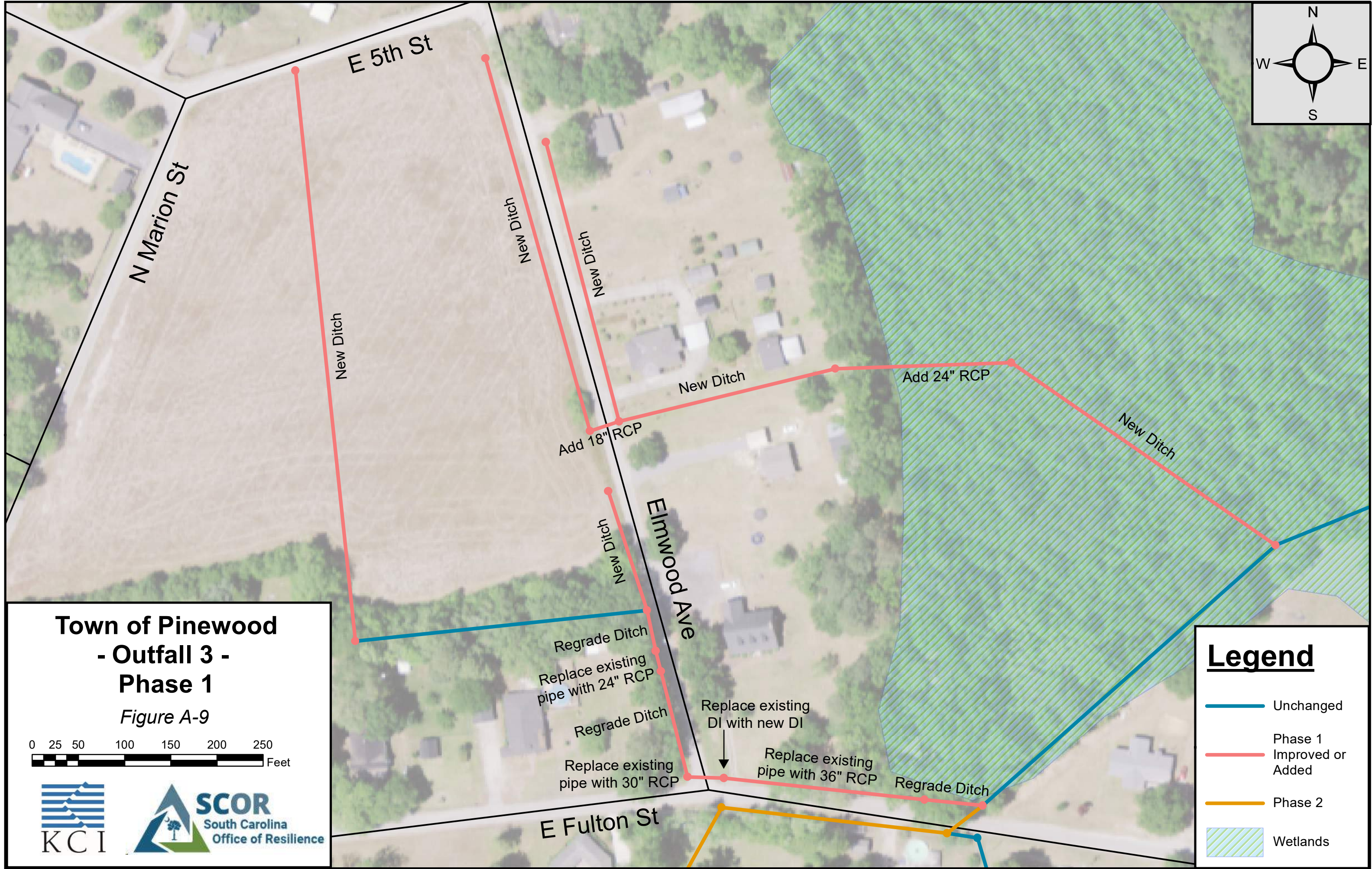
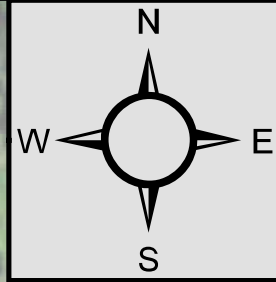
Town of Pinewood - Outfall 2 - Railroad Ave

Figure A-8



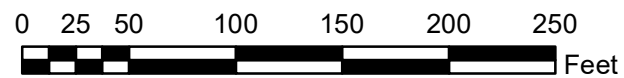
Legend

- Unchanged
- Improved or
- SCDOT Recommended Improvements
- New Pavement




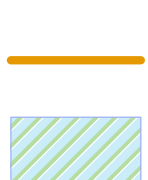


**Town of Pinewood
- Outfall 3 -
Phase 1**

Figure A-9

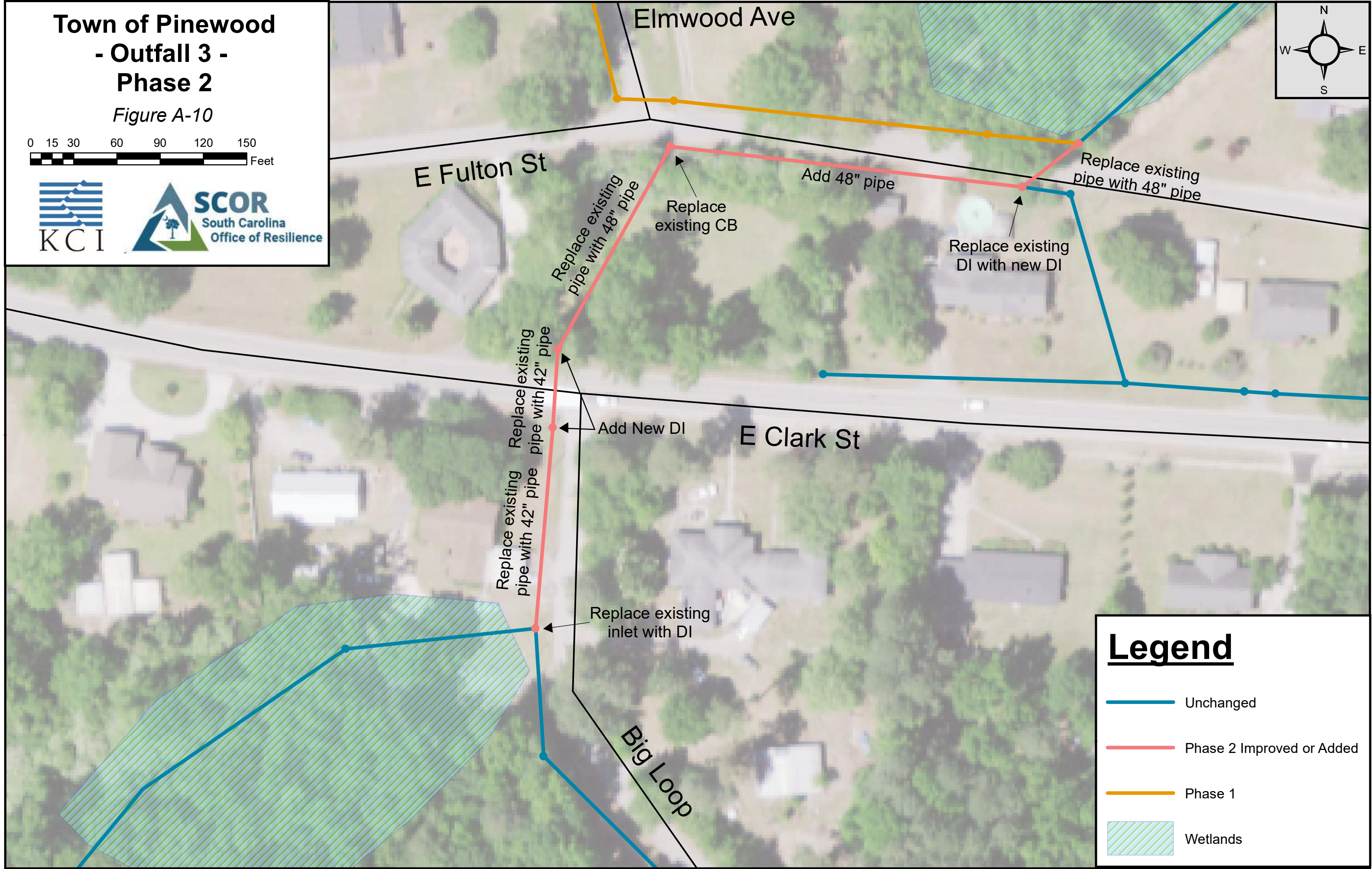
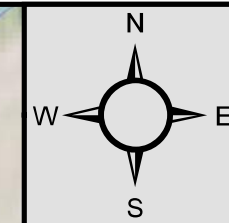
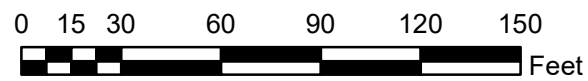


Legend

-  Unchanged
-  Phase 1 Improved or Added
-  Phase 2
-  Wetlands

Town of Pinewood - Outfall 3 - Phase 2

Figure A-10




Legend


- Unchanged
- Phase 2 Improved or Added
- Phase 1
- Wetlands




Appendix B – Cost Estimates

	Project: Town of Pinewood Stormwater Plan - 752307445					
	Client: South Carolina Office of Resilience					
	Owner: Town of Pinewood					
	Outfall 1 Phase 1					
SCDOT Pay Item #	Description	Units	#	Unit Price	Cost	
Roadway Items						
4012080	FULL DEPTH ASPH. PAV. PATCHING 8" UNIF	SY	44	\$ 100.00	\$ 4,400.00	
2023000	REMOVAL & DISPOSAL OF EXISTING PAVEMENT	SY	44	\$ 35.00	\$ 1,540.00	
Structures						
2021010	REMOVAL & DISPOSAL OF EXISTING DROP INLET	EA	1	\$ 1,275.00	\$ 1,275.00	
7141115	30" RC PIPE CUL.-CLASS III	LF	516	\$ 475.00	\$ 245,100.00	
7141124	24" RC PIPE CUL.-CLASS IV	LF	44	\$ 450.00	\$ 19,800.00	
7141125	30" RC PIPE CUL.-CLASS IV	LF	44	\$ 500.00	\$ 22,000.00	
7192011	DROP INLET (24" X 24") WITH STANDARD 4' X 4' BOX	EA	3	\$ 6,200.00	\$ 18,600.00	
7192108	MANHOLE WITH STANDARD 5' X 5' BOX	EA	1	\$ 10,000.00	\$ 10,000.00	
2031000	UNCLASSIFIED EXCAVATION	CY	532	\$ 40.00	\$ 21,280.00	
Erosion Control						
8041010	RIP-RAP (CLASS A)	TON	80	\$ 125.00	\$ 10,000.00	
8048205	GEOTEXTILE FOR EROSION CONTROL UNDER RIPRAP(CLASS 2)TYPE B	SY	112	\$ 35.00	\$ 3,920.00	
2015000	SELECTED CLEARING & GRUBBING	AC	0.4	\$ 10,000.00	\$ 4,000.00	
8151110	TEMPORARY EROSION CONTROL BLANKET (ECB)	MSY	2.0	\$ 2,100.00	\$ 4,200.00	
8151201	HYDRAULIC EROSION CONTROL PRODUCT (HECP) - TYPE 1	AC	0.4	\$ 2,650.00	\$ 1,060.00	
8151203	HYDRAULIC EROSION CONTROL PRODUCT (HECP) - TYPE 3	AC	0.4	\$ 3,360.00	\$ 1,344.00	
8152007	SEDIMENT TUBES FOR DITCH CHECKS	LF	150	\$ 15.00	\$ 2,250.00	
8154155	INLET FILTER CLEANING	EA	3	\$ 180.00	\$ 540.00	
8156205	INLET STRUCTURE FILTER - TYPE D1	EA	3	\$ 700.00	\$ 2,100.00	
8156207	FILTER MATERIAL FOR INLET STRUCTURE FILTER - TYPE D1	EA	3	\$ 275.00	\$ 825.00	
Other						
1031000	MOBILIZATION	LS	1	\$ 20,000.00	\$ 20,000.00	
SP	CONSTRUCTION SURVEYING	LS	1	\$ 15,000.00	\$ 15,000.00	
SP	TRAFFIC CONTROL	LS	1	\$ 15,000.00	\$ 15,000.00	


Construction Total	\$ 424,234.00
15% Contingency	\$ 63,635.10
10% Engineering Design	\$ 42,423.40
1% Construction Admin	\$ 4,242.34
2% Inspections	\$ 8,484.68
Total	\$ 543,019.52
Rounded Total	\$ 543,100.00

	Project: Town of Pinewood Stormwater Plan - 752307445					
	Client: South Carolina Office of Resilience					
	Owner: Town of Pinewood					
	Outfall 1 Phase 2					
SCDOT Pay Item #	Description	Units	#	Unit Price	Cost	
Roadway Items						
4012080	FULL DEPTH ASPH. PAV. PATCHING 8" UNIF	SY	28	\$ 100.00	\$ 2,800.00	
2023000	REMOVAL & DISPOSAL OF EXISTING PAVEMENT	SY	28	\$ 35.00	\$ 980.00	
Structures						
2021010	REMOVAL & DISPOSAL OF EXISTING DROP INLET	EA	7	\$ 1,275.00	\$ 8,925.00	
7141114	24" RC PIPE CUL.-CLASS III	LF	192	\$ 425.00	\$ 81,600.00	
7141115	30" RC PIPE CUL.-CLASS III	LF	760	\$ 475.00	\$ 361,000.00	
7141117	42" RC PIPE CUL.-CLASS III	LF	240	\$ 525.00	\$ 126,000.00	
7141124	24" RC PIPE CUL.-CLASS IV	LF	40	\$ 450.00	\$ 18,000.00	
7141125	30" RC PIPE CUL.-CLASS IV	LF	76	\$ 500.00	\$ 38,000.00	
7192011	DROP INLET (24" X 24") WITH STANDARD 4' X 4' BOX	EA	8	\$ 6,200.00	\$ 49,600.00	
7196000	EXTRA DEPTH OF BOX	LF	0.25	\$ 500.00	\$ 125.00	
Erosion Control						
8041020	RIP-RAP (CLASS B)	TON	53	\$ 150.00	\$ 7,950.00	
8048205	GEOTEXTILE FOR EROSION CONTROL UNDER RIPRAP(CLASS 2)TYPE B	SY	75	\$ 35.00	\$ 2,625.00	
2015000	SELECTED CLEARING & GRUBBING	AC	0.2	\$ 10,000.00	\$ 2,000.00	
8151110	TEMPORARY EROSION CONTROL BLANKET (ECB)	MSY	1.0	\$ 2,100.00	\$ 2,100.00	
8151201	HYDRAULIC EROSION CONTROL PRODUCT (HECP) - TYPE 1	AC	0.2	\$ 2,650.00	\$ 530.00	
8151203	HYDRAULIC EROSION CONTROL PRODUCT (HECP) - TYPE 3	AC	0.2	\$ 3,360.00	\$ 672.00	
8154155	INLET FILTER CLEANING	EA	8	\$ 180.00	\$ 1,440.00	
8156205	INLET STRUCTURE FILTER - TYPE D1	EA	8	\$ 700.00	\$ 5,600.00	
8156207	FILTER MATERIAL FOR INLET STRUCTURE FILTER - TYPE D1	EA	8	\$ 275.00	\$ 2,200.00	
Other						
1031000	MOBILIZATION	LS	1	\$ 20,000.00	\$ 20,000.00	
SP	CONSTRUCTION SURVEYING	LS	1	\$ 15,000.00	\$ 15,000.00	
SP	TRAFFIC CONTROL	LS	1	\$ 15,000.00	\$ 15,000.00	

Construction Total	\$ 762,147.00
15% Contingency	\$ 114,322.05
10% Engineering Design	\$ 76,214.70
1% Construction Admin	\$ 7,621.47
2% Inspections	\$ 15,242.94
Total	\$ 975,548.16
Rounded Total	\$ 975,600.00

	Project: Town of Pinewood Stormwater Plan - 752307445				
	Client: South Carolina Office of Resilience				
	Owner: Town of Pinewood				
	Outfall 1 Phase 1 - Optional				
SCDOT Pay Item #	Description	Units	#	Unit Price	Cost
Roadway Items					
4012080	FULL DEPTH ASPH. PAV. PATCHING 8" UNIF	SY	28	\$ 100.00	\$ 2,800.00
2023000	REMOVAL & DISPOSAL OF EXISTING PAVEMENT	SY	28	\$ 35.00	\$ 980.00
Structures					
7141115	30" RC PIPE CUL.-CLASS III	LF	432	\$ 475.00	\$ 205,200.00
7141124	24" RC PIPE CUL.-CLASS IV	LF	68	\$ 450.00	\$ 30,600.00
7141125	30" RC PIPE CUL.-CLASS IV	LF	56	\$ 500.00	\$ 28,000.00
7192011	DROP INLET (24" X 24") WITH STANDARD 4' X 4' BOX	EA	2	\$ 6,200.00	\$ 12,400.00
7192108	MANHOLE WITH STANDARD 5' X 5' BOX	EA	1	\$ 10,000.00	\$ 10,000.00
2031000	UNCLASSIFIED EXCAVATION	CY	523	\$ 40.00	\$ 20,920.00
Erosion Control					
8041010	RIP-RAP (CLASS A)	TON	80	\$ 125.00	\$ 10,000.00
8048205	GEOTEXTILE FOR EROSION CONTROL UNDER RIPRAP(CLASS 2)TYPE B	SY	112	\$ 35.00	\$ 3,920.00
8159000	STORMWATER MANAGEMENT BASIN	EA	1	\$ 50,000.00	\$ 50,000.00
2015000	SELECTED CLEARING & GRUBBING	AC	0.3	\$ 10,000.00	\$ 3,000.00
8151110	TEMPORARY EROSION CONTROL BLANKET (ECB)	MSY	1.5	\$ 2,100.00	\$ 3,150.00
8151201	HYDRAULIC EROSION CONTROL PRODUCT (HECP) - TYPE 1	AC	0.3	\$ 2,650.00	\$ 795.00
8151203	HYDRAULIC EROSION CONTROL PRODUCT (HECP) - TYPE 3	AC	0.3	\$ 3,360.00	\$ 1,008.00
8152007	SEDIMENT TUBES FOR DITCH CHECKS	LF	20	\$ 15.00	\$ 300.00
8154155	INLET FILTER CLEANING	EA	3	\$ 180.00	\$ 540.00
8156205	INLET STRUCTURE FILTER - TYPE D1	EA	3	\$ 700.00	\$ 2,100.00
8156207	FILTER MATERIAL FOR INLET STRUCTURE FILTER - TYPE D1	EA	3	\$ 275.00	\$ 825.00
Other					
SP	PARCEL ACQUISITION (0.35 AC)	LS	1	\$ 8,000.00	\$ 8,000.00
1031000	MOBILIZATION	LS	1	\$ 20,000.00	\$ 20,000.00
SP	CONSTRUCTION SURVEYING	LS	1	\$ 15,000.00	\$ 15,000.00
SP	TRAFFIC CONTROL	LS	1	\$ 15,000.00	\$ 15,000.00

Construction Total	\$ 444,538.00
15% Contingency	\$ 66,680.70
10% Engineering Design	\$ 44,453.80
1% Construction Admin	\$ 4,445.38
2% Inspections	\$ 8,890.76
Total	\$ 569,008.64
Rounded Total	\$ 569,100.00

	Project: Town of Pinewood Stormwater Plan - 752307445				
	Client: South Carolina Office of Resilience				
	Owner: Town of Pinewood				
	Outfall 1 Phase 2 - Optional				
SCDOT Pay Item #	Description	Units	#	Unit Price	Cost
Roadway Items					
4012080	FULL DEPTH ASPH. PAV. PATCHING 8" UNIF	SY	60	\$ 100.00	\$ 6,000.00
2023000	REMOVAL & DISPOSAL OF EXISTING PAVEMENT	SY	60	\$ 35.00	\$ 2,100.00
Structures					
2021010	REMOVAL & DISPOSAL OF EXISTING DROP INLET	EA	2	\$ 1,275.00	\$ 2,550.00
7141114	24" RC PIPE CUL.-CLASS III	LF	192	\$ 425.00	\$ 81,600.00
7141115	30" RC PIPE CUL.-CLASS III	LF	760	\$ 475.00	\$ 361,000.00
7141117	42" RC PIPE CUL.-CLASS III	LF	240	\$ 525.00	\$ 126,000.00
7141123	18" RC PIPE CUL.-CLASS IV	LF	288	\$ 340.00	\$ 97,920.00
7141124	24" RC PIPE CUL.-CLASS IV	LF	268	\$ 450.00	\$ 120,600.00
7141125	30" RC PIPE CUL.-CLASS IV	LF	76	\$ 500.00	\$ 38,000.00
7192011	DROP INLET (24" X 24") WITH STANDARD 4' X 4' BOX	EA	10	\$ 6,200.00	\$ 62,000.00
7196000	EXTRA DEPTH OF BOX	LF	0.25	\$ 500.00	\$ 125.00
7192275	60" X 60" JUNCTION BOX	EA	1	\$ 14,000.00	\$ 14,000.00
2031000	UNCLASSIFIED EXCAVATION	CY	135	\$ 40.00	\$ 5,400.00
Erosion Control					
8041020	RIP-RAP (CLASS B)	TON	53	\$ 150.00	\$ 7,950.00
8048205	GEOTEXTILE FOR EROSION CONTROL UNDER RIPRAP(CLASS 2)TYPE B	SY	75	\$ 35.00	\$ 2,625.00
2015000	SELECTED CLEARING & GRUBBING	AC	0.1	\$ 10,000.00	\$ 1,000.00
8151110	TEMPORARY EROSION CONTROL BLANKET (ECB)	MSY	0.5	\$ 2,100.00	\$ 1,050.00
8151201	HYDRAULIC EROSION CONTROL PRODUCT (HECP) - TYPE 1	AC	0.1	\$ 2,650.00	\$ 265.00
8151203	HYDRAULIC EROSION CONTROL PRODUCT (HECP) - TYPE 3	AC	0.1	\$ 3,360.00	\$ 336.00
8152007	SEDIMENT TUBES FOR DITCH CHECKS	LF	20	\$ 15.00	\$ 300.00
8154155	INLET FILTER CLEANING	EA	11	\$ 180.00	\$ 1,980.00
8156205	INLET STRUCTURE FILTER - TYPE D1	EA	11	\$ 700.00	\$ 7,700.00
8156207	FILTER MATERIAL FOR INLET STRUCTURE FILTER - TYPE D1	EA	11	\$ 275.00	\$ 3,025.00
Other					
SP	BIORETENTION CELLS	EA	1	\$ 10,000.00	\$ 10,000.00
1031000	MOBILIZATION	LS	1	\$ 20,000.00	\$ 20,000.00
SP	CONSTRUCTION SURVEYING	LS	1	\$ 15,000.00	\$ 15,000.00
SP	TRAFFIC CONTROL	LS	1	\$ 15,000.00	\$ 15,000.00

Construction Total	\$ 1,003,526.00
15% Contingency	\$ 150,528.90
10% Engineering Design	\$ 100,352.60
1% Construction Admin	\$ 10,035.26
2% Inspections	\$ 20,070.52
Total	\$ 1,284,513.28
Rounded Total	\$ 1,284,600.00



Project: Town of Pinewood Stormwater Plan - 752307445


Client: South Carolina Office of Resilience

Owner: Town of Pinewood

Outfall 2 Downtown

SCDOT Pay Item #	Description	Units	#	Unit Price	Cost
Roadway Items					
4012080	FULL DEPTH ASPH. PAV. PATCHING 8" UNIF	SY	72	\$ 100.00	\$ 7,200.00
5021011	FULL DEPTH CONCRETE PAVEMENT PATCH - 8"	SY	225	\$ 275.00	\$ 61,875.00
2023000	REMOVAL & DISPOSAL OF EXISTING PAVEMENT	SY	297	\$ 35.00	\$ 10,395.00
7201000	CONCRETE CURB (9" X 15")	LF	430	\$ 55.00	\$ 23,650.00
Structures					
2021005	REMOVAL & DISPOSAL OF EXISTING CATCH BASIN	EA	2	\$ 3,500.00	\$ 7,000.00
2021010	REMOVAL & DISPOSAL OF EXISTING DROP INLET	EA	4	\$ 1,275.00	\$ 5,100.00
7141113	18" RC PIPE CUL.-CLASS III	LF	556	\$ 325.00	\$ 180,700.00
7141114	24" RC PIPE CUL.-CLASS III	LF	240	\$ 425.00	\$ 102,000.00
7141115	30" RC PIPE CUL.-CLASS III	LF	252	\$ 475.00	\$ 119,700.00
7141124	24" RC PIPE CUL.-CLASS IV	LF	40	\$ 450.00	\$ 18,000.00
7141126	36" RC PIPE CUL.-CLASS IV	LF	40	\$ 525.00	\$ 21,000.00
7141889	36" REINFORCED CONCRETE PIPE (CLASS V SPECIAL)TRENCHLESS	LF	68	\$ 3,450.00	\$ 234,600.00
7191625	CATCH BASIN -TYPE 17	EA	6	\$ 12,250.00	\$ 73,500.00
7192011	DROP INLET (24" X 24") WITH STANDARD 4' X 4' BOX	EA	8	\$ 6,200.00	\$ 49,600.00
Erosion Control					
8041020	RIP-RAP (CLASS B)	TON	82	\$ 150.00	\$ 12,300.00
8048205	GEOTEXTILE FOR EROSION CONTROL UNDER RIPRAP(CLASS 2)TYPE B	SY	64	\$ 35.00	\$ 2,240.00
2015000	SELECTED CLEARING & GRUBBING	AC	0.2	\$ 10,000.00	\$ 2,000.00
8151110	TEMPORARY EROSION CONTROL BLANKET (ECB)	MSY	1.0	\$ 2,100.00	\$ 2,100.00
8151201	HYDRAULIC EROSION CONTROL PRODUCT (HECP) - TYPE 1	AC	0.2	\$ 2,650.00	\$ 530.00
8151203	HYDRAULIC EROSION CONTROL PRODUCT (HECP) - TYPE 3	AC	0.2	\$ 3,360.00	\$ 672.00
8154155	INLET FILTER CLEANING	EA	14	\$ 180.00	\$ 2,520.00
8156205	INLET STRUCTURE FILTER - TYPE D1	EA	8	\$ 700.00	\$ 5,600.00
8156207	FILTER MATERIAL FOR INLET STRUCTURE FILTER - TYPE D1	EA	8	\$ 275.00	\$ 2,200.00
8156213	INLET STRUCTURE FILTER - TYPE E (CATCH BASIN TYPE 17)	EA	6	\$ 205.00	\$ 1,230.00
Other					
1031000	MOBILIZATION	LS	1	\$ 20,000.00	\$ 20,000.00
SP	CONSTRUCTION SURVEYING	LS	1	\$ 15,000.00	\$ 15,000.00
SP	TRAFFIC CONTROL	LS	1	\$ 15,000.00	\$ 15,000.00

Construction Total	\$ 995,712.00
15% Contingency	\$ 149,356.80
10% Engineering Design	\$ 99,571.20
1% Construction Admin	\$ 9,957.12
2% Inspections	\$ 19,914.24
Total	\$ 1,274,511.36
Rounded Total	\$ 1,274,600.00


	Project: Town of Pinewood Stormwater Plan - 752307445				
	Client: South Carolina Office of Resilience				
	Owner: Town of Pinewood				
	Outfall 2 Downtown - Optional				
SCDOT Pay Item #	Description	Units	#	Unit Price	Cost
Roadway Items					
4012080	FULL DEPTH ASPH. PAV. PATCHING 8" UNIF	SY	72	\$ 100.00	\$ 7,200.00
5021011	FULL DEPTH CONCRETE PAVEMENT PATCH - 8"	SY	225	\$ 275.00	\$ 61,875.00
2023000	REMOVAL & DISPOSAL OF EXISTING PAVEMENT	SY	297	\$ 35.00	\$ 10,395.00
7201000	CONCRETE CURB (9" X 15")	LF	430	\$ 55.00	\$ 23,650.00
Structures					
2021005	REMOVAL & DISPOSAL OF EXISTING CATCH BASIN	EA	2	\$ 3,500.00	\$ 7,000.00
2021010	REMOVAL & DISPOSAL OF EXISTING DROP INLET	EA	4	\$ 1,275.00	\$ 5,100.00
7141113	18" RC PIPE CUL.-CLASS III	LF	556	\$ 325.00	\$ 180,700.00
7141114	24" RC PIPE CUL.-CLASS III	LF	240	\$ 425.00	\$ 102,000.00
7141115	30" RC PIPE CUL.-CLASS III	LF	252	\$ 475.00	\$ 119,700.00
7141124	24" RC PIPE CUL.-CLASS IV	LF	40	\$ 450.00	\$ 18,000.00
7141126	36" RC PIPE CUL.-CLASS IV	LF	40	\$ 525.00	\$ 21,000.00
7141889	36" REINFORCED CONCRETE PIPE (CLASS V SPECIAL)TRENCHLESS	LF	68	\$ 3,450.00	\$ 234,600.00
7191625	CATCH BASIN -TYPE 17	EA	6	\$ 12,250.00	\$ 73,500.00
7192011	DROP INLET (24" X 24") WITH STANDARD 4' X 4' BOX	EA	8	\$ 6,200.00	\$ 49,600.00
Erosion Control					
8041020	RIP-RAP (CLASS B)	TON	82	\$ 150.00	\$ 12,300.00
8048205	GEOTEXTILE FOR EROSION CONTROL UNDER RIPRAP(CLASS 2)TYPE B	SY	64	\$ 35.00	\$ 2,240.00
2015000	SELECTED CLEARING & GRUBBING	AC	0.2	\$ 10,000.00	\$ 2,000.00
8151110	TEMPORARY EROSION CONTROL BLANKET (ECB)	MSY	1.0	\$ 2,100.00	\$ 2,100.00
8151201	HYDRAULIC EROSION CONTROL PRODUCT (HECP) - TYPE 1	AC	0.2	\$ 2,650.00	\$ 530.00
8151203	HYDRAULIC EROSION CONTROL PRODUCT (HECP) - TYPE 3	AC	0.2	\$ 3,360.00	\$ 672.00
8154155	INLET FILTER CLEANING	EA	14	\$ 180.00	\$ 2,520.00
8156205	INLET STRUCTURE FILTER - TYPE D1	EA	8	\$ 700.00	\$ 5,600.00
8156207	FILTER MATERIAL FOR INLET STRUCTURE FILTER - TYPE D1	EA	8	\$ 275.00	\$ 2,200.00
8156213	INLET STRUCTURE FILTER - TYPE E (CATCH BASIN TYPE 17)	EA	6	\$ 205.00	\$ 1,230.00
Other					
1031000	MOBILIZATION	LS	1	\$ 20,000.00	\$ 20,000.00
SP	BIORETENTION CELLS	EA	4	\$ 10,000.00	\$ 40,000.00
SP	CONSTRUCTION SURVEYING	LS	1	\$ 15,000.00	\$ 15,000.00
SP	TRAFFIC CONTROL	LS	1	\$ 15,000.00	\$ 15,000.00
Construction Total					\$ 1,035,712.00
15% Contingency					\$ 155,356.80
10% Engineering Design					\$ 103,571.20
1% Construction Admin					\$ 10,357.12
2% Inspections					\$ 20,714.24
Total					\$ 1,325,711.36
Rounded Total					\$ 1,325,800.00




Project: Town of Pinewood Stormwater Plan - 752307445
 Client: South Carolina Office of Resilience
 Owner: Town of Pinewood
 Outfall 2 Railroad Ave

SCDOT Pay Item #	Description	Units	#	Unit Price	Cost
Roadway Items					
4030340	H/M ASPH.SURF.CR. TYPE C-175LB/SY	TON	525	\$ 115.00	\$ 60,375.00
4020330	H/M ASPH.INTERMEDIATE CR.TYPE C-300LB/SY	TON	900	\$ 95.00	\$ 85,500.00
3050106	GRADED AGGR.BASE COURSE-6"UNIF	SY	6000	\$ 25.00	\$ 150,000.00
4011004	LIQUID ASPHALT BINDER PG64-22	TON	85	\$ 770.00	\$ 65,450.00
5021011	FULL DEPTH CONCRETE PAVEMENT PATCH - 8"	SY	60	\$ 275.00	\$ 16,500.00
2023000	REMOVAL & DISPOSAL OF EXISTING PAVEMENT	SY	60	\$ 35.00	\$ 2,100.00
Structures					
7141114	24" RC PIPE CUL.-CLASS III	LF	384	\$ 425.00	\$ 163,200.00
2031000	UNCLASSIFIED EXCAVATION	CY	880	\$ 40.00	\$ 35,200.00
Erosion Control					
8041010	RIP-RAP (CLASS A)	TON	67	\$ 125.00	\$ 8,375.00
8041020	RIP-RAP (CLASS B)	TON	49	\$ 150.00	\$ 7,350.00
8048205	GEOTEXTILE FOR EROSION CONTROL UNDER RIPRAP(CLASS 2)TYPE B	SY	132	\$ 35.00	\$ 4,620.00
2015000	SELECTED CLEARING & GRUBBING	AC	0.1	\$ 10,000.00	\$ 1,000.00
8151110	TEMPORARY EROSION CONTROL BLANKET (ECB)	MSY	0.5	\$ 2,100.00	\$ 1,050.00
8151201	HYDRAULIC EROSION CONTROL PRODUCT (HECP) - TYPE 1	AC	0.1	\$ 2,650.00	\$ 265.00
8151203	HYDRAULIC EROSION CONTROL PRODUCT (HECP) - TYPE 3	AC	0.1	\$ 3,360.00	\$ 336.00
8152007	SEDIMENT TUBES FOR DITCH CHECKS	LF	200	\$ 15.00	\$ 3,000.00
Other					
1031000	MOBILIZATION	LS	1	\$ 20,000.00	\$ 20,000.00
SP	CONSTRUCTION SURVEYING	LS	1	\$ 15,000.00	\$ 15,000.00
SP	TRAFFIC CONTROL	LS	1	\$ 15,000.00	\$ 15,000.00

Construction Total	\$ 654,321.00
15% Contingency	\$ 98,148.15
10% Engineering Design	\$ 65,432.10
1% Construction Admin	\$ 6,543.21
2% Inspections	\$ 13,086.42
Total	\$ 837,530.88
Rounded Total	\$ 837,600.00

	Project: Town of Pinewood Stormwater Plan - 752307445				
	Client: South Carolina Office of Resilience				
	Owner: Town of Pinewood				
	Outfall 3 Phase 1				
SCDOT Pay Item #	Description	Units	#	Unit Price	Cost
Roadway Items					
4012080	FULL DEPTH ASPH. PAV. PATCHING 8" UNIF	SY	25	\$ 100.00	\$ 2,500.00
2023000	REMOVAL & DISPOSAL OF EXISTING PAVEMENT	SY	25	\$ 35.00	\$ 875.00
Structures					
2021010	REMOVAL & DISPOSAL OF EXISTING DROP INLET	EA	1	\$ 1,275.00	\$ 1,275.00
7141114	24" RC PIPE CUL.-CLASS III	LF	216	\$ 425.00	\$ 91,800.00
7141116	36" RC PIPE CUL.-CLASS III	LF	220	\$ 500.00	\$ 110,000.00
7141123	18" RC PIPE CUL.-CLASS IV	LF	36	\$ 340.00	\$ 12,240.00
7141125	30" RC PIPE CUL.-CLASS IV	LF	40	\$ 500.00	\$ 20,000.00
7192011	DROP INLET (24" X 24") WITH STANDARD 4' X 4' BOX	EA	1	\$ 6,200.00	\$ 6,200.00
2031000	UNCLASSIFIED EXCAVATION	CY	1032	\$ 40.00	\$ 41,280.00
Erosion Control					
8041010	RIP-RAP (CLASS A)	TON	20	\$ 125.00	\$ 2,500.00
8041020	RIP-RAP (CLASS B)	TON	164	\$ 150.00	\$ 24,600.00
8048205	GEOTEXTILE FOR EROSION CONTROL UNDER RIPRAP(CLASS 2)TYPE B	SY	156	\$ 35.00	\$ 5,460.00
2034000	MUCK EXCAVATION	CY	280	\$ 40.00	\$ 11,200.00
2015000	SELECTED CLEARING & GRUBBING	AC	0.7	\$ 10,000.00	\$ 7,000.00
8131000	SODDING	MSY	2.5	\$ 10,000.00	\$ 25,000.00
8151110	TEMPORARY EROSION CONTROL BLANKET (ECB)	MSY	3.4	\$ 2,100.00	\$ 7,140.00
8151201	HYDRAULIC EROSION CONTROL PRODUCT (HECP) - TYPE 1	AC	0.7	\$ 2,650.00	\$ 1,855.00
8151203	HYDRAULIC EROSION CONTROL PRODUCT (HECP) - TYPE 3	AC	0.7	\$ 3,360.00	\$ 2,352.00
8152007	SEDIMENT TUBES FOR DITCH CHECKS	LF	300	\$ 15.00	\$ 4,500.00
8154155	INLET FILTER CLEANING	EA	1	\$ 180.00	\$ 180.00
8156205	INLET STRUCTURE FILTER - TYPE D1	EA	1	\$ 700.00	\$ 700.00
8156207	FILTER MATERIAL FOR INLET STRUCTURE FILTER - TYPE D1	EA	1	\$ 275.00	\$ 275.00
Other					
1031000	MOBILIZATION	LS	1	\$ 20,000.00	\$ 20,000.00
SP	404 PERMIT	LS	1	\$ 100.00	\$ 100.00
SP	CONSTRUCTION SURVEYING	LS	1	\$ 15,000.00	\$ 15,000.00
SP	TRAFFIC CONTROL	LS	1	\$ 15,000.00	\$ 15,000.00

Construction Total	\$ 429,032.00
15% Contingency	\$ 64,354.80
10% Engineering Design	\$ 42,903.20
1% Construction Admin	\$ 4,290.32
2% Inspections	\$ 8,580.64
Total	\$ 549,160.96
Rounded Total	\$ 549,200.00

	Project: Town of Pinewood Stormwater Plan - 752307445					
	Client: South Carolina Office of Resilience					
	Owner: Town of Pinewood					
	Outfall 3 Phase 2					
SCDOT Pay Item #	Description	Units	#	Unit Price	Cost	
Roadway Items						
4012080	FULL DEPTH ASPH. PAV. PATCHING 8" UNIF	SY	33	\$ 100.00	\$ 3,300.00	
2023000	REMOVAL & DISPOSAL OF EXISTING PAVEMENT	SY	33	\$ 35.00	\$ 1,155.00	
Structures						
2021005	REMOVAL & DISPOSAL OF EXISTING CATCH BASIN	EA	1	\$ 3,500.00	\$ 3,500.00	
2021010	REMOVAL & DISPOSAL OF EXISTING DROP INLET	EA	2	\$ 1,275.00	\$ 2,550.00	
7141117	42" RC PIPE CUL.-CLASS III	LF	140	\$ 525.00	\$ 73,500.00	
7141118	48" RC PIPE CUL.-CLASS III	LF	408	\$ 550.00	\$ 224,400.00	
7141127	42" RC PIPE CUL.-CLASS IV	LF	56	\$ 550.00	\$ 30,800.00	
7141128	48" RC PIPE CUL.-CLASS IV	LF	52	\$ 600.00	\$ 31,200.00	
7191625	CATCH BASIN -TYPE 17	EA	1	\$ 12,250.00	\$ 12,250.00	
7192011	DROP INLET (24" X 24") WITH STANDARD 4' X 4' BOX	EA	4	\$ 6,200.00	\$ 24,800.00	
7196000	EXTRA DEPTH OF BOX	LF	1.665	\$ 500.00	\$ 832.50	
Erosion Control						
8041020	RIP-RAP (CLASS B)	TON	152	\$ 150.00	\$ 22,800.00	
8048205	GEOTEXTILE FOR EROSION CONTROL UNDER RIPRAP(CLASS 2)TYPE B	SY	119	\$ 35.00	\$ 4,165.00	
2015000	SELECTED CLEARING & GRUBBING	AC	0.1	\$ 10,000.00	\$ 1,000.00	
8151110	TEMPORARY EROSION CONTROL BLANKET (ECB)	MSY	0.5	\$ 2,100.00	\$ 1,050.00	
8151201	HYDRAULIC EROSION CONTROL PRODUCT (HECP) - TYPE 1	AC	0.1	\$ 2,650.00	\$ 265.00	
8151203	HYDRAULIC EROSION CONTROL PRODUCT (HECP) - TYPE 3	AC	0.1	\$ 3,360.00	\$ 336.00	
8154155	INLET FILTER CLEANING	EA	5	\$ 180.00	\$ 900.00	
8156205	INLET STRUCTURE FILTER - TYPE D1	EA	4	\$ 700.00	\$ 2,800.00	
8156207	FILTER MATERIAL FOR INLET STRUCTURE FILTER - TYPE D1	EA	4	\$ 275.00	\$ 1,100.00	
8156213	INLET STRUCTURE FILTER - TYPE E (CATCH BASIN TYPE 17)	EA	1	\$ 205.00	\$ 205.00	
Other						
1031000	MOBILIZATION	LS	1	\$ 20,000.00	\$ 20,000.00	
SP	CONSTRUCTION SURVEYING	LS	1	\$ 15,000.00	\$ 15,000.00	
SP	TRAFFIC CONTROL	LS	1	\$ 15,000.00	\$ 15,000.00	

Construction Total	\$ 492,908.50
15% Contingency	\$ 73,936.28
10% Engineering Design	\$ 49,290.85
1% Construction Admin	\$ 4,929.09
2% Inspections	\$ 9,858.17
Total	\$ 630,922.88
Rounded Total	\$ 631,000.00



Project: Town of Pinewood Stormwater Plan - 752307445
Client: South Carolina Office of Resilience
Owner: Town of Pinewood
Engineer's Opinion of Probable Cost

Project	Total
Outfall 1 Phase 1	\$543,100.00
Outfall 1 Phase 2	\$975,600.00
Outfall 1 Phase 1 - Optional	\$569,100.00
Outfall 1 Phase 2 - Optional	\$1,284,600.00
Outfall 2 Downtown	\$1,274,600.00
Outfall 2 Downtown - Optional	\$1,325,800.00
Outfall 2 Railroad Ave	\$837,600.00
Outfall 3 Phase 1	\$549,200.00
Outfall 3 Phase 2	\$631,000.00

Grand Total	\$7,990,600.00
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Appendix C – Comparison Tables

Outfall 1 10-Year

Junctions

Name	Existing		Name	Alternative		Existing - Alternative	
	Max. Depth (ft)	Hours Surcharged (h)		Max. Depth (ft)	Hours Surcharged (h)	Change in Depth	Change in Duration
J10	0	0	J10	0	0	0	0
			J17	2.27	0	-2.27	0
			J18	2.6	0	-2.6	0
			J19	3.38	0	-3.38	0
J22	0	0	J22	0	0	0	0
			J3	3.68	1.85	-3.68	-1.85
J4	0	0	J4	0.15	0	-0.15	0
J5	0	0	J5	0	0	0	0
			J7	2.35	0	-2.35	0
s10	2.71	1.2	s10	2.08	0	0.63	1.2
s11	2.18	1.08	s11	1.48	0	0.7	1.08
s12	1.67	0.74	s12	0.56	0	1.11	0.74
s13	1.09	0	s13	0.19	0	0.9	0
s14	4.17	1.22	s14	2.58	0.07	1.59	1.15
s15	4.17	0.33	s15	2.66	0.1	1.51	0.23
s16	2.88	0.4	s16	0.81	0	2.07	0.4
s17	2.43	1.32	s17	1.83	0	0.6	1.32
s18	3.86	0.38	s18	2.6	0.1	1.26	0.28
s19	2.25	0.3	s19	2.93	0.22	-0.68	0.08
s20	3.89	0	s20	3.52	0	0.37	0
s21	0.16	0	s21	0.16	0	0	0
s22	3.28	0	s22	2.7	0	0.58	0
s23	2.28	0	s23	2.5	0	-0.22	0
s24	1.01	0.17	s24	1	0.09	0.01	0.08
s25	0.48	0	s25	0.42	0	0.06	0
s26	1.27	0.13	s26	0.97	0	0.3	0.13
s27	2.4	0.26	s27	2.4	0.16	0	0.1
s28	3.43	0.63	s28	2.87	0	0.56	0.63
s31	2.79	0	s31	2.14	0	0.65	0
s32	3.34	0	s32	2.21	0	1.13	0
s33	3.34	0				3.34	0
s34	3.32	0	s34	2.17	0	1.15	0
s35	0.34	0	s35	2.83	0	-2.49	0
s36	3.57	0.51	s36	2.12	0	1.45	0.51
s37	3.05	0	s37	1.56	0	1.49	0
s38	0.72	0	s38	2.75	0	-2.03	0
s39	3.55	0	s39	1.66	0	1.89	0
s40	0.56	0	s40	3.03	0	-2.47	0
s41	3.08	0	s41	1.17	0	1.91	0
s42	3.06	0.97	s42	0.76	0	2.3	0.97

s43	2.02	0	s43	2.01	0	0.01	0
s44	3.21	1.21				3.21	1.21
s45	2.78	0	s45	2.77	0	0.01	0
s46	3.87	1.61				3.87	1.61
s47	3.9	0	s47	3.88	0	0.02	0
s48	3.89	0	s48	3.88	0	0.01	0
s49	3.48	1.31				3.48	1.31
s5	0.9	0	s5	0.94	0	-0.04	0
s51	1.52	0.31	s51	1.49	0	0.03	0.31
s53	1.46	0	s53	1.43	0	0.03	0
s54	4.47	1.73	s54	4.43	1.62	0.04	0.11
s55	3.13	1.16	s55	3.13	0.87	0	0.29
s57	2.97	1.24	s57	2.82	1.04	0.15	0.2
s58	2.3	1.45	s58	2.27	1.31	0.03	0.14
s59	1.91	0.97	s59	1.87	0.85	0.04	0.12
s6	0.85	0	s6	0.89	0	-0.04	0
s60	1.17	0	s60	1.14	0	0.03	0
s61	1.73	0	s61	1.7	0	0.03	0
s62	1.28	0	s62	1.27	0	0.01	0
s63	1.41	0	s63	1.41	0	0	0
s64	1.5	0	s64	1.46	0	0.04	0
s65	1.41	0	s65	1.37	0.81	0.04	-0.81
s66	0.64	0	s66	0.64	0	0	0
s67	0.95	0	s67	0.95	0	0	0
s69	0.97	0	s69	0.97	0	0	0
s7	2.39	1.01	s7	1.26	0	1.13	1.01
s72	0.25	0	s72	0.25	0	0	0
s73	0.2	0	s73	0.2	0	0	0
s74	1.25	0	s74	0.83	0	0.42	0
s75	0.64	0	s75	0.64	0	0	0
s76	1.63	0	s76	1.45	0	0.18	0
s77	1.05	0	s77	0.87	0	0.18	0
s78	0.91	0	s78	0.84	0	0.07	0
s8	2.69	1.2	s8	1.59	0.07	1.1	1.13
s9	1.93	0.96	s9	1.14	0	0.79	0.96

Outfall 1 10-Year

Conduits

Name	Existing		Name	Alternative		Existing - Alternative	
	Available Capacity Ratio	Time Full (h)		Available Capacity Ratio	Time Full (h)	Change in Available Capacity Ratio	Change in Time
10	1.93	1.22	10	0.93	0.1	1	1.12
11	1.22	1.74	11	0.57	0	0.65	1.74
12	1.1	0.38	12	1.07	0.1	0.03	0.28
13	1.27	0.38	13	0.83	0.22	0.44	0.16
14	0.48	2.89	14	0.68	0.75	-0.2	2.14
15	0.63	2.24	15	0.57	0.66	0.06	1.58
16	0.02	0	16	0.02	0	0	0
17	5.88	0.63	17	2.6	0.01	3.28	0.62
18	1.09	0.66	18	30.17	0.01	-29.08	0.65
19	1.7	0.17	19	1.7	0.09	0	0.08
2	1.35	0.01	2	1.35	0.01	0	0
20	0.03	0.67	20	0.03	0.58	0	0.09
21	0.72	0.26	21	0.71	0.16	0.01	0.1
22	0.83	3.52	22	0.86	1.75	-0.03	1.77
24	3.72	1.87	24	0.71	0.17	3.01	1.7
25	0.11	0				0.11	0
26	2.65	1.92	26	0.48	0.15	2.17	1.77
27	2.15	1.86	27	0.22	0	1.93	1.86
28	0.24	0	28	1.94	1.62	-1.7	-1.62
29	1.02	1.72	29	0.03	0	0.99	1.72
3	0.28	1.2	3	0.06	0.22	0.22	0.98
30	0.37	1.89	30	0.37	2.31	0	-0.42
31	0.89	1.9				0.89	1.9
32	0.98	1.89				0.98	1.89
34	0.4	1.73	34	0.41	1.62	-0.01	0.11
35	0.5	1.4	35	0.5	1.27	0	0.13
36	0.53	0.31	36	0.54	0	-0.01	0.31
37	0.29	1.18	37	0.3	1.05	-0.01	0.13
38	1.15	1.24	38	1.25	1.04	-0.1	0.2
39	0.93	1.6	39	1.01	1.46	-0.08	0.14
4	0.43	1.2	4	0.72	0.07	-0.29	1.13
40	0.35	1.28	40	0.46	1.15	-0.11	0.13
41	0.19	0.98	41	0.38	0.9	-0.19	0.08
42	0.48	0	42	0.48	0	0	0
43	0.91	0	43	0.91	0	0	0
44	1.19	0.01	44	1.19	0.01	0	0
45	1.66	1.77	45	1.49	1.85	0.17	-0.08
47	2.4	0.01	47	2.39	0.01	0.01	0
48	0.45	0	48	0.45	0	0	0

49	1.09	0.39	49	1.16	0.01	-0.07	0.38
5	0.71	1.2	5	0.25	0.22	0.46	0.98
51	0.56	0	51	0.58	0	-0.02	0
6	0.17	1.08	6	0.11	0	0.06	1.08
7	0.35	1.2	7	0.34	0	0.01	1.2
8	0.07	1.08	8	0.02	0	0.05	1.08
9	1.35	1.22	9	0.64	0.07	0.71	1.15
C1	1.77	0.01	C1	1.76	0.01	0.01	0
C10	0.4	1.21	C10	0.09	0	0.31	1.21
C102	0	0	C102	0	0	0	0
C11	0.11	0	C11	0	0	0.11	0
C12	0.29	0.51	C12	0.03	0	0.26	0.51
C13	0.32	0	C13	0.06	0	0.26	0
C14	0.12	0	C14	0.53	0	-0.41	0
C15	0.14	0	C15	0.03	0	0.11	0
C16	0.37	0				0.37	0
C19	0.08	1.45	C19	0.08	1.31	0	0.14
C2	0	0	C2	0	0	0	0
C20	0.08	0.49	C20	0.08	0.26	0	0.23
C21	0.04	0	C21	0.04	0	0	0
C22	0.04	0.96	C22	0.04	0	0	0.96
C23	0.1	1.01	C23	0.1	0	0	1.01
			C24	0.09	0	-0.09	0
C28	0	0	C28	0	0	0	0
C3	0.1	0	C3	0.12	0	-0.02	0
C31	0.19	0.22	C31	0.19	0.04	0	0.18
			C33	0.51	0.7	-0.51	-0.7
			C34	0.27	0	-0.27	0
C35	0.48	0.63	C35	0.17	0	0.31	0.63
C36	0.71	0.95	C36	0.71	0.83	0	0.12
			C37	2.59	1.54	-2.59	-1.54
C4	0	0	C4	0	0	0	0
			C5	3.43	0.05	-3.43	-0.05
			C6	1.95	1.99	-1.95	-1.99
			C7	1.55	4.54	-1.55	-4.54
C75	0.03	0	C75	0.05	0	-0.02	0
C76	0.09	0.97	C76	0.09	0.85	0	0.12
C77	0	0	C77	0	0	0	0
C8	0	0	C8	0.02	0	-0.02	0
C9	0.26	1.61	C9	24.19	0.57	-23.93	1.04

Outfall 1 25-Year

Junctions

Name	Existing		Name	Alternative		Existing - Alternative	
	Max. Depth (ft)	Hours Surcharged (h)		Max. Depth (ft)	Hours Surcharged (h)	Change in Depth	Change in Duration
J10	0	0	J10	0	0	0	0
			J17	2.47	0	-2.47	0
			J18	3.08	0	-3.08	0
			J19	3.84	0.34	-3.84	-0.34
J22	0.08	0	J22	0.07	0	0.01	0
			J3	4.05	2.54	-4.05	-2.54
J4	0	0	J4	0.4	0	-0.4	0
J5	0.01	0	J5	0	0	0.01	0
			J7	2.6	0	-2.6	0
s10	2.95	1.8	s10	2.9	0.24	0.05	1.56
s11	2.42	1.67	s11	2.3	0.21	0.12	1.46
s12	1.91	1.4	s12	1.38	0	0.53	1.4
s13	1.34	0	s13	0.81	0	0.53	0
s14	4.17	1.8	s14	4.58	0.39	-0.41	1.41
s15	4.17	0.64	s15	4.27	0.41	-0.1	0.23
s16	2.89	0.63	s16	1.18	0	1.71	0.63
s17	2.71	1.91	s17	2.26	0.16	0.45	1.75
s18	3.31	0.7	s18	4.42	0.42	-1.11	0.28
s19	2.47	0.63	s19	4.27	0.49	-1.8	0.14
s20	4.06	0	s20	4.06	0	0	0
s21	0.18	0	s21	0.18	0	0	0
s22	3.47	0	s22	3.27	0	0.2	0
s23	2.35	0	s23	2.66	0	-0.31	0
s24	1.13	0.45	s24	1.1	0.38	0.03	0.07
s25	0.54	0	s25	0.51	0	0.03	0
s26	1.35	0.48	s26	1.31	0.33	0.04	0.15
s27	2.41	0.57	s27	2.4	0.42	0.01	0.15
s28	3.6	0.96	s28	3.44	0.34	0.16	0.62
s31	2.96	0	s31	2.7	0	0.26	0
s32	3.52	0	s32	2.79	0	0.73	0
s33	3.52	0				3.52	0
s34	3.5	0	s34	2.75	0	0.75	0
s35	0.4	0	s35	3.08	0	-2.68	0
s36	3.8	1.33	s36	2.72	0	1.08	1.33
s37	3.29	0	s37	2.16	0	1.13	0
s38	0.81	0	s38	2.95	0	-2.14	0
s39	3.84	0	s39	2.26	0	1.58	0
s40	0.66	0	s40	3.29	0	-2.63	0
s41	3.36	0	s41	1.77	0	1.59	0
s42	3.38	1.74	s42	1.37	0	2.01	1.74

s43	2.45	0	s43	2.47	0	-0.02	0
s44	3.53	1.93				3.53	1.93
s45	3.21	0	s45	3.23	0	-0.02	0
s46	4.23	2.29				4.23	2.29
s47	4.27	1.25	s47	4.24	0.85	0.03	0.4
s48	4.26	1.24	s48	4.23	0.85	0.03	0.39
s49	3.84	2.01				3.84	2.01
s5	1.01	0.23	s5	1.01	0.2	0	0.03
s51	1.82	1.51	s51	1.77	1.29	0.05	0.22
s53	1.75	1.39	s53	1.71	1.17	0.04	0.22
s54	4.86	2.49	s54	4.79	2.33	0.07	0.16
s55	3.18	1.87	s55	3.16	1.43	0.02	0.44
s57	2.92	2.02	s57	2.9	1.72	0.02	0.3
s58	2.6	2.25	s58	2.55	2.06	0.05	0.19
s59	2.2	1.85	s59	2.16	1.64	0.04	0.21
s6	0.97	0	s6	0.92	0	0.05	0
s60	1.46	0	s60	1.41	0	0.05	0
s61	2.03	0.5	s61	1.98	0	0.05	0.5
s62	1.6	0.83	s62	1.57	0.65	0.03	0.18
s63	1.68	0.97	s63	1.67	0.84	0.01	0.13
s64	1.78	1.46	s64	1.74	1.22	0.04	0.24
s65	1.7	1.2	s65	1.65	1.73	0.05	-0.53
s66	0.86	0	s66	0.86	0	0	0
s67	1.27	0.02	s67	1.27	0.02	0	0
s69	1.18	0	s69	1.18	0	0	0
s7	2.63	1.61	s7	2.08	0.17	0.55	1.44
s72	0.51	0	s72	0.51	0	0	0
s73	0.28	0	s73	0.24	0	0.04	0
s74	1.51	0	s74	1.15	0	0.36	0
s75	0.76	0	s75	0.76	0	0	0
s76	1.86	0.48	s76	1.78	0	0.08	0.48
s77	1.28	0	s77	1.2	0	0.08	0
s78	1.13	0	s78	1.09	0	0.04	0
s8	2.94	1.8	s8	2.39	0.4	0.55	1.4
s9	2.19	1.56	s9	1.81	0.31	0.38	1.25

Outfall 1 25-Year

Conduits

Name	Existing		Name	Alternative		Existing - Alternative	
	Available Capacity Ratio	Time Full (h)		Available Capacity Ratio	Time Full (h)	Change in Available Capacity Ratio	Change in Time
10	1.99	1.8	10	1	0.41	0.99	1.39
11	1.37	2.37	11	0.73	0.16	0.64	2.21
12	1.09	0.7	12	1.15	0.42	-0.06	0.28
13	1.27	0.7	13	0.91	0.49	0.36	0.21
14	0.5	3.81	14	0.78	1.1	-0.28	2.71
15	0.63	3.02	15	0.78	0.97	-0.15	2.05
16	0.03	0	16	0.03	0	0	0
17	6.2	0.96	17	3.33	0.34	2.87	0.62
18	1.17	1.04	18	33.8	0.34	-32.63	0.7
19	1.78	0.45	19	1.76	0.38	0.02	0.07
2	1.63	0.23	2	1.63	0.2	0	0.03
20	0.05	1.58	20	0.05	1.37	0	0.21
21	0.71	0.56	21	0.76	0.42	-0.05	0.14
22	0.83	4.62	22	0.91	2.36	-0.08	2.26
24	3.95	2.59	24	0.95	0.47	3	2.12
25	0.16	0.74				0.16	0.74
26	2.84	2.64	26	0.67	0.46	2.17	2.18
27	2.24	2.58	27	0.31	0.2	1.93	2.38
28	0.33	0	28	2.12	2.29	-1.79	-2.29
29	1.07	2.44	29	0.03	0	1.04	2.44
3	0.33	1.8	3	0.14	0.48	0.19	1.32
30	0.51	2.61	30	0.51	3.12	0	-0.51
31	0.98	2.62				0.98	2.62
32	1.23	2.61				1.23	2.61
34	0.47	2.49	34	0.47	2.33	0	0.16
35	0.49	2.21	35	0.5	2.01	-0.01	0.2
36	0.56	1.51	36	0.56	1.29	0	0.22
37	0.37	2.01	37	0.37	1.82	0	0.19
38	1.22	2.02	38	1.34	1.72	-0.12	0.3
39	0.99	2.39	39	1.09	2.19	-0.1	0.2
4	0.44	1.8	4	0.98	0.4	-0.54	1.4
40	0.48	2.09	40	0.63	1.9	-0.15	0.19
41	0.35	1.86	41	0.74	1.77	-0.39	0.09
42	0.62	0.02	42	0.62	0.02	0	0
43	1.18	0.02	43	1.18	0.02	0	0
44	1.54	0.77	44	1.54	0.4	0	0.37
45	1.66	2.49	45	1.46	2.54	0.2	-0.05
47	2.67	0.98	47	2.66	0.85	0.01	0.13
48	0.61	0	48	0.61	0	0	0

49	1.35	1.08	49	1.45	0.27	-0.1	0.81
5	0.73	1.8	5	0.33	0.48	0.4	1.32
51	0.76	0	51	0.76	0	0	0
6	0.17	1.67	6	0.21	0.36	-0.04	1.31
7	0.35	1.8	7	0.58	0.24	-0.23	1.56
8	0.1	1.67	8	0.04	0.21	0.06	1.46
9	1.43	1.8	9	0.69	0.39	0.74	1.41
C1	2.39	1.25	C1	2.36	0.85	0.03	0.4
C10	0.41	1.93	C10	0.13	0	0.28	1.93
C102	0	0	C102	0	0	0	0
C11	0.12	0	C11	0	0	0.12	0
C12	0.31	1.33	C12	0.04	0	0.27	1.33
C13	0.34	0	C13	0.08	0	0.26	0
C14	0.16	0	C14	0.58	0	-0.42	0
C15	0.15	0	C15	0.04	0	0.11	0
C16	0.39	0				0.39	0
C19	0.08	2.25	C19	0.09	2.06	-0.01	0.19
C2	0	0	C2	0	0	0	0
C20	0.1	1.1	C20	0.1	0.45	0	0.65
C21	0.05	0.48	C21	0.05	0	0	0.48
C22	0.05	1.56	C22	0.05	0.31	0	1.25
C23	0.12	1.61	C23	0.12	0.17	0	1.44
			C24	0.1	0	-0.1	0
C28	0		C28	0	0	0	0
C3	0.11	0	C3	0.14	0	-0.03	0
C31	0.2	0.53	C31	0.2	0.39	0	0.14
			C33	0.57	1.04	-0.57	-1.04
			C34	0.3	0	-0.3	0
C35	0.5	0.96	C35	0.23	0.34	0.27	0.62
C36	0.79		C36	0.79	1.62	0	-1.62
			C37	2.84	2.21	-2.84	-2.21
C4	0		C4	0	0	0	0
			C5	3.99	0.41	-3.99	-0.41
			C6	1.97	2.7	-1.97	-2.7
			C7	1.84	5.84	-1.84	-5.84
C75	0.07	1.46	C75	0.1	1.22	-0.03	0.24
C76	0.09	1.85	C76	0.09	1.64	0	0.21
C77	0		C77	0	0.77	0	-0.77
C8	0	0	C8	0.03	0.71	-0.03	-0.71
C9	0.26		C9	23.75	1.23	-23.49	-1.23

Outfall 1 100-Year Junctions

Name	Existing		Name	Alternative		Existing - Alternative	
	Max. Depth (ft)	Hours Surcharged (h)		Max. Depth (ft)	Hours Surcharged (h)	Change in Depth	Change in Duration
J10	0	0	J10	0	0	0	0
			J17	2.81	0	-2.81	0
			J18	3.59	0	-3.59	0
			J19	4.33	0.85	-4.33	-0.85
J22	0.54	0	J22	0.53	0	0.01	0
			J3	4.62	4.04	-4.62	-4.04
J4	0	0	J4	0.85	0	-0.85	0
J5	0.36	0	J5	0	0	0.36	0
			J7	3.05	0	-3.05	0
s10	3.3	2.93	s10	3.31	0.72	-0.01	2.21
s11	2.77	2.8	s11	2.71	0.71	0.06	2.09
s12	2.27	2.54	s12	1.78	0.6	0.49	1.94
s13	2.39	1.14	s13	1.24	0	1.15	1.14
s14	4.43	2.9	s14	4.67	0.8	-0.24	2.1
s15	4.17	1.18	s15	4.67	0.84	-0.5	0.34
s16	3.08	1.12	s16	2.88	0.18	0.2	0.94
s17	3.14	3.04	s17	2.9	0.34	0.24	2.7
s18	3.86	1.29	s18	4.42	0.88	-0.56	0.41
s19	3.19	1.21	s19	4.2	0.99	-1.01	0.22
s20	4.36	0	s20	4.63	0	-0.27	0
s21	0.22	0	s21	0.22	0	0	0
s22	3.84	0	s22	3.91	0	-0.07	0
s23	2.46	0	s23	2.86	0	-0.4	0
s24	1.44	0.87	s24	1.4	0.82	0.04	0.05
s25	0.72	0	s25	0.69	0	0.03	0
s26	1.54	1.02	s26	1.52	0.91	0.02	0.11
s27	2.55	1.16	s27	2.5	1	0.05	0.16
s28	3.96	1.79	s28	4.07	0.81	-0.11	0.98
s31	3.31	0	s31	3.35	0	-0.04	0
s32	3.88	0	s32	3.49	0	0.39	0
s33	3.88	0				3.88	0
s34	3.85	0	s34	3.45	0	0.4	0
s35	0.67	0	s35	3.49	0	-2.82	0
s36	4.18	2.52	s36	3.46	0	0.72	2.52
s37	3.67	1.27	s37	2.89	0	0.78	1.27
s38	0.96	0	s38	3.28	0	-2.32	0
s39	4.32	1.03	s39	3.01	0	1.31	1.03
s40	0.82	0	s40	3.74	1.09	-2.92	-1.09
s41	3.84	0	s41	2.52	0	1.32	0
s42	3.95	2.89	s42	2.11	0.11	1.84	2.78

s43	3.29	0	s43	3.3	0	-0.01	0
s44	4.1	3.07				4.1	3.07
s45	4.04	0.03	s45	4.06	0.08	-0.02	-0.05
s46	4.86	3.44				4.86	3.44
s47	4.98	2.45	s47	4.98	1.79	0	0.66
s48	4.97	2.45	s48	4.98	1.79	-0.01	0.66
s49	4.47	3.15				4.47	3.15
s5	1.26	2.04	s5	1.09	0.46	0.17	1.58
s51	2.21	3.08	s51	2.17	2.66	0.04	0.42
s53	2.14	2.98	s53	2.11	2.58	0.03	0.4
s54	5.41	3.92	s54	5.34	3.72	0.07	0.2
s55	3.73	3.09	s55	3.69	2.36	0.04	0.73
s57	3.34	3.44	s57	3.3	2.96	0.04	0.48
s58	2.98	3.75	s58	2.95	3.42	0.03	0.33
s59	2.59	3.38	s59	2.56	2.96	0.03	0.42
s6	1.32	0	s6	0.96	0	0.36	0
s60	1.84	2.4	s60	1.81	2.02	0.03	0.38
s61	2.42	2.55	s61	2.38	2.18	0.04	0.37
s62	2.01	2.59	s62	2	2.26	0.01	0.33
s63	2.13	2.63	s63	2.12	2.32	0.01	0.31
s64	2.17	3.23	s64	2.13	2.86	0.04	0.37
s65	2.08	3.11	s65	2.05	3.2	0.03	-0.09
s66	1.61	0.27	s66	1.61	0.27	0	0
s67	1.98	0.29	s67	2.01	0.28	-0.03	0.01
s69	1.84	2.26	s69	1.84	1.99	0	0.27
s7	2.98	2.75	s7	2.49	0.69	0.49	2.06
s72	0.96	0	s72	0.96	0	0	0
s73	0.6	0	s73	0.54	0	0.06	0
s74	1.84	1.44	s74	1.54	0	0.3	1.44
s75	0.97	0	s75	0.97	0	0	0
s76	2.21	1.79	s76	2.07	0.66	0.14	1.13
s77	1.62	0	s77	1.49	0	0.13	0
s78	1.49	0	s78	1.42	0	0.07	0
s8	3.31	2.92	s8	2.81	0.85	0.5	2.07
s9	2.53	2.7	s9	2.23	0.84	0.3	1.86

Outfall 1 100-Year Conduits

Name	Existing		Name	Alternative		Existing - Alternative	
	Available Capacity Ratio	Time Full (h)		Available Capacity Ratio	Time Full (h)	Change in Available Capacity Ratio	Change in Time
10	2.05	2.9	10	0.98	0.84	1.07	2.06
11	1.35	3.51	11	1.21	0.34	0.14	3.17
12	1.15	1.28	12	1.14	0.88	0.01	0.4
13	1.37	1.29	13	0.91	0.99	0.46	0.3
14	0.55	5.76	14	0.77	1.75	-0.22	4.01
15	0.82	4.84	15	1.09	1.56	-0.27	3.28
16	0.05	0	16	0.05	0	0	0
17	6.83	1.79	17	4.57	0.81	2.26	0.98
18	1.3	1.9	18	38.07	0.85	-36.77	1.05
19	2.05	0.87	19	2.02	0.82	0.03	0.05
2	1.69	2.04	2	1.81	0.46	-0.12	1.58
20	0.08	3.11	20	0.08	2.7	0	0.41
21	0.71	1.16	21	0.73	1	-0.02	0.16
22	0.83	6.74	22	0.94	3.35	-0.11	3.39
24	4.31	3.88	24	1.46	0.98	2.85	2.9
25	0.22	1.83				0.22	1.83
26	3.11	4.04	26	1.02	0.97	2.09	3.07
27	2.4	3.91	27	0.5	0.59	1.9	3.32
28	0.51	0	28	2.38	3.58	-1.87	-3.58
29	1.14	3.61	29	0.05	0.3	1.09	3.31
3	0.31	2.93	3	0.25	0.97	0.06	1.96
30	0.78	4.01	30	0.78	5.04	0	-1.03
31	1.1	4.04				1.1	4.04
32	1.26	4				1.26	4
34	0.54	3.92	34	0.54	3.72	0	0.2
35	0.48	3.71	35	0.48	3.36	0	0.35
36	0.68	3.08	36	0.7	2.66	-0.02	0.42
37	0.5	3.52	37	0.52	3.15	-0.02	0.37
38	1.39	3.44	38	1.44	2.95	-0.05	0.49
39	1.13	3.87	39	1.18	3.55	-0.05	0.32
4	0.46	2.92	4	1.17	0.86	-0.71	2.06
40	0.69	3.6	40	0.8	3.24	-0.11	0.36
41	0.6	3.44	41	1	3.22	-0.4	0.22
42	0.73	0.29	42	0.73	0.28	0	0.01
43	1.43	2.26	43	1.43	1.99	0	0.27
44	1.88	2.67	44	1.88	2.31	0	0.36
45	1.65	3.92	45	1.43	4.04	0.22	-0.12
47	2.7	2.64	47	2.69	2.33	0.01	0.31
48	0.93	0	48	0.93	0	0	0

49	1.38	2.24	49	1.53	0.8	-0.15	1.44
5	0.76	2.93	5	0.4	0.97	0.36	1.96
51	1.11	0.77	51	1.15	0.01	-0.04	0.76
6	0.18	2.8	6	0.26	0.8	-0.08	2
7	0.4	2.93	7	0.73	0.72	-0.33	2.21
8	0.11	2.8	8	0.09	0.71	0.02	2.09
9	1.52	2.93	9	0.83	0.8	0.69	2.13
C1	2.97	2.45	C1	2.9	1.79	0.07	0.66
C10	0.46	3.07	C10	0.21	0	0.25	3.07
C102	0	0	C102	0	0	0	0
C11	0.12	1.03	C11	0.01	0	0.11	1.03
C12	0.34	2.52	C12	0.07	0	0.27	2.52
C13	0.37	0	C13	0.12	0	0.25	0
C14	0.25	0	C14	0.65	0	-0.4	0
C15	0.17	0	C15	0.06	0	0.11	0
C16	0.41	0				0.41	0
C19	0.09	3.75	C19	0.09	3.42	0	0.33
C2	0	0.03	C2	0.01	0.08	-0.01	-0.05
C20	0.15	2.26	C20	0.15	0.91	0	1.35
C21	0.08	1.79	C21	0.08	0.66	0	1.13
C22	0.05	2.7	C22	0.06	0.84	-0.01	1.86
C23	0.13	2.75	C23	0.14	0.69	-0.01	2.06
			C24	0.11	1.09	-0.11	-1.09
C28	0.08	2.61	C28	0	0	0.08	2.61
C3	0.12	0	C3	0.17	0	-0.05	0
C31	0.23	1.08	C31	0.23	0.97	0	0.11
			C33	0.63	1.67	-0.63	-1.67
			C34	0.34	0	-0.34	0
C35	0.57	1.79	C35	0.36	0.81	0.21	0.98
C36	0.8	3.37	C36	0.8	2.95	0	0.42
			C37	3.18	3.38	-3.18	-3.38
C4	0	11.41	C4	0	0	0	11.41
			C5	4.73	0.93	-4.73	-0.93
			C6	1.93	4.4	-1.93	-4.4
			C7	1.83	8.72	-1.83	-8.72
C75	0.17	3.23	C75	0.21	2.86	-0.04	0.37
C76	0.1	3.38	C76	0.1	2.96	0	0.42
C77	0.01	2.6	C77	0.01	2.29	0	0.31
C8	0	0	C8	0.03	1.75	-0.03	-1.75
C9	0.26	3.44	C9	23.16	2.13	-22.9	1.31

Outfall 2 10-Year

Junctions

Name	Existing		Name	Alternative		Existing - Alternative	
	Max. Depth (ft)	Hours Surcharged (h)		Max. Depth (ft)	Hours Surcharged (h)	Change in Depth	Change in Duration
J1	0	0	J1	0	0	0	0
			J10	0	0	0	0
J11	1.3	0	J11	2.13	0	-0.83	0
J12	0	0	J12	0	0	0	0
			J13	1.01	0	-1.01	0
			J14	3.32	0	-3.32	0
J15	2.9	0	J15	2.56	0	0.34	0
			J16	2.39	0	-2.39	0
			J17	2.81	0	-2.81	0
			J18	2.81	0	-2.81	0
			J19	1.76	0	-1.76	0
			J2	0.32	0	-0.32	0
J20	2.98	0	J20	2.15	0	0.83	0
			J21	2.77	0.27	-2.77	-0.27
			J22	2.76	0	-2.76	0
J23	0	0	J23	0	0	0	0
J24	0	0	J24	2.15	0.3	-2.15	-0.3
			J25	1.87	0	-1.87	0
			J26	1.66	0	-1.66	0
			J27	1.96	0	-1.96	0
			J28	1.93	0	-1.93	0
			J29	2	0	-2	0
J3	0	0	J3	0	0	0	0
			J30	2.23	0.09	-2.23	-0.09
			J31	3.51	0	-3.51	0
			J32	0.63	0	-0.63	0
			J33	0.25	0	-0.25	0
			J34	3.49	0	-3.49	0
			J35	0.98	0	-0.98	0
			J36	0.86	0	-0.86	0
J37	0.64	0	J37	1.08	0	-0.44	0
			J38	0.57	0	-0.57	0
			J5	0.55	0	-0.55	0
J6	0.95	0	J6	0.85	0	0.1	0
J7	0.95	0	J7	1.44	0	-0.49	0
J8	0.56	0	J8	0.41	0	0.15	0
			J9	3.04	0.15	-3.04	-0.15
s124	0.36	0	s124	0.32	0	0.04	0
s125	1.98	0.89	s125	1.64	0	0.34	0.89
s126	0.73	0	s126	0.73	0	0	0

s128	1.41	0.49	s128	0.79	0	0.62	0.49
s129	2.23	0.52	s129	0.9	0	1.33	0.52
s130	0.86	0	s130	1.12	0	-0.26	0
s131	2.13	0.77	s131	1.31	0	0.82	0.77
s132	1.72	0.52	s132	1.24	0	0.48	0.52
s133	2.15	1.2	s133	1.23	0	0.92	1.2
s134	2.17	1.32				2.17	1.32
s136	4.17	0	s136	2.25	0	1.92	0
s137	0.59	0	s137	0.54	0	0.05	0
s138	0.72	0	s138	0.73	0	-0.01	0
s140	2.45	0	s140	2.02	0	0.43	0
s145	1.8	0.15	s145	0.48	0	1.32	0.15
s146	1.59	0.03	s146	0.53	0	1.06	0.03
s147	1.12	0	s147	0.49	0	0.63	0
s148	1.68	0.26	s148	2.58	0	-0.9	0.26
s149	2.38	1.12	s149	2.5	0	-0.12	1.12
s150	2.93	0.43	s150	1.9	0	1.03	0.43
s151	0.4	0	s151	1.57	0	-1.17	0
s152	0.51	0				0.51	0
s153	0.32	0	s153	0.32	0	0	0
s154	1.97	22.05	s154	1.96	22.05	0.01	0
s155	2.89	0	s155	1.98	0	0.91	0
s156	1.59	0.31	s156	0.51	0	1.08	0.31
s157	2.92	0	s157	2.66	0	0.26	0
s158	2.96	0	s158	2.75	0	0.21	0
s159	2.81	0	s159	2.97	0	-0.16	0
s160	2.83	2.25	s160	2.9	0	-0.07	2.25
s161	1.39	0	s161	0.92	0	0.47	0
s162	3.61	0	s162	2.36	0	1.25	0
s163	1.41	0	s163	2.25	0	-0.84	0
s164	2.73	0	s164	2.05	0	0.68	0
s165	2.69	0	s165	2.03	0	0.66	0
s166	2.56	4.33	s166	1.82	1.63	0.74	2.7
s167	0.64	0	s167	0.68	0	-0.04	0
s168	2.38	4.17	s168	2.42	0	-0.04	4.17
s169	1.61	0	s169	2.44	0	-0.83	0
s171	1.91	0.65				1.91	0.65
s173	1.07	0	s173	0.66	0	0.41	0
s178	0.69	0	s178	0.84	0	-0.15	0
s179	0.76	0	s179	0.75	0	0.01	0
s180	0.53	0	s180	0.36	0	0.17	0
s181	1	0				1	0
s183	0.27	0	s183	1.11	0	-0.84	0
s184	0.62	0	s184	1.45	0	-0.83	0
s210	2.3	0	s210	1.74	0	0.56	0
s211	1.52	0.03	s211	0.77	0	0.75	0.03
s212	1.71	0.9	s212	0.69	0	1.02	0.9

s213	2.05	1.16	s213	0.81	0	1.24	1.16
s214	2.33	0.91	s214	0.87	0	1.46	0.91
s216	0	0	s216	0	0	0	0
s79	1.11	0	s79	1.11	0	0	0
s80	2.71	0	s80	0.95	0	1.76	0
s81	1.93	0	s81	0.39	0	1.54	0
s82	1.62	1.18	s82	0.7	0	0.92	1.18
s83	1.21	0	s83	0.21	0	1	0
s84	0.54	0	s84	0.33	0	0.21	0

Outfall 2 10-Year

Conduits

Name	Existing		Name	Alternative		Existing - Alternative	
	Available Capacity Ratio	Time Full (h)		Available Capacity Ratio	Time Full (h)	Change in Available Capacity Ratio	Change in Time
100	2.65	4.17	100	0.75	0	1.9	3.42
101	1.3	4.17	101	0.37	0	0.93	3.8
102	2.39	0.65				2.39	0.65
104	0.36	0	104	0.37	0	-0.01	-0.37
105	1.64	0.01	105	1.66	0.01	-0.02	-1.65
106	0.5	0				0.5	0
107	0.04	0	107	0.04	0.33	0	-0.04
120a	1.62	2.25	120a	0.72	0	0.9	1.53
120b	2	2.25	120b	0.59	0	1.41	1.66
121	0.96	1.51	121	0.42	0	0.54	1.09
122	0.49	0.77	122	0.24	0	0.25	0.53
123	2.63	1.39	123	0.57	0	2.06	0.82
124	0.28	0.91	124	0.05	0	0.23	0.86
125	0.85	0.91	125	0.51	0	0.34	0.4
126	1.25	1.16	126	0.64	0	0.61	0.52
52	0.1	1.4	52	0.08	0	0.02	1.32
53	0.26	1.17	53	0.12	0	0.14	1.05
54	0.55	0	54	0.55	0	0	-0.55
73	0.22	0	73	0.23	0	-0.01	-0.23
74	0.4	0.52	74	0.23	0	0.17	0.29
75	0.93	1.03				0.93	1.03
76	0.3	0.52	76	0.09	0	0.21	0.43
77	0.11	0.52	77	0.4	0	-0.29	0.12
78	0.47	0	78	0.47	0	0	-0.47
79	1.53	2.88	79	1.7	0.01	-0.17	1.18
80	1.06	1.93				1.06	1.93
84	0.12	0.15	84	0.17	0	-0.05	-0.02
85	0.21	0.03	85	0.28	0	-0.07	-0.25
87	2.16	1.66	87	0.62	0	1.54	1.04
88	0.33	0.43	88	0.23	0	0.1	0.2
89	1.28	1.66	89	0.81	0	0.47	0.85
90	0.32	0				0.32	0
91	0.52	1.29				0.52	1.29
92	0.12	22.05	92	0.12	22.05	0	21.93
93	0.1	2.68	93	0.1	0.47	0	2.58
94	0.38	1.12	94	0.25	0	0.13	0.87
95	1.25	1.49	95	0.89	0	0.36	0.6
96	0.21	2.74	96	0.3	1.48	-0.09	2.44
97	3.3	3.09	97	0.96	0	2.34	2.13

98	0.89	4.33	98	0.98	1.63	-0.09	3.35
99	0	4.17	99	0	1.58	0	4.17
C1	0	0	C1	0	0	0	0
			C10	0.11	0.01	-0.11	-0.11
C103	0.2	0	C103	0.02	0	0.18	-0.02
			C11	0.04	0.09	-0.04	-0.04
			C12	0.12	0.36	-0.12	-0.12
			C13	0.1	0.27	-0.1	-0.1
			C14	1.17	0.61	-1.17	-1.17
			C15	0.23	0	-0.23	-0.23
			C16	1.04	0.86	-1.04	-1.04
			C17	0.18	0.15	-0.18	-0.18
			C18	0.26	0.47	-0.26	-0.26
			C19	0.21	0	-0.21	-0.21
			C2	0.77	0	-0.77	-0.77
			C20	0.01	0	-0.01	-0.01
			C21	0.03	0.3	-0.03	-0.03
			C22	0	0	0	0
			C23	0.53	0	-0.53	-0.53
C24	0	0	C24	0	0	0	0
C25	0.03	0	C25	0.28	0	-0.25	-0.28
C26	0.35	0	C26	0.14	0	0.21	-0.14
			C27	0.18	0	-0.18	-0.18
			C28	0.01	0	-0.01	-0.01
C29	0.25	0	C29	0.06	0	0.19	-0.06
			C3	0.75	0	-0.75	-0.75
C30	0.1	0	C30	0.27	0	-0.17	-0.27
			C31	0.57	0	-0.57	-0.57
C32	0.36	0	C32	0.12	0	0.24	-0.12
C33	0.04	0	C33	0.11	0	-0.07	-0.11
C34	0.13	0	C34	0.07	0	0.06	-0.07
			C35	0.01	1.05	-0.01	-0.01
			C36	0.32	0	-0.32	-0.32
			C37	0.02	0	-0.02	-0.02
			C38	0	0	0	0
C39	0.18	0	C39	1.07	0.01	-0.89	-1.07
C4	0	0	C4	0	0	0	0
C40	0.11	0	C40	0.31	0	-0.2	-0.31
C41	0.07	0	C41	0.19	0	-0.12	-0.19
C42	0	0	C42	0	0	0	0
C43	0.09	0	C43	0.26	0	-0.17	-0.26
			C44	0	0	0	0
			C45	0.51	0	-0.51	-0.51
C46	0	0	C46	0	0	0	0
C47	0.14	0	C47	0.39	0	-0.25	-0.39
			C48	0.26	0	-0.26	-0.26
			C5	0.13	0	-0.13	-0.13

C6	0	0	C6	0	0	0	0
C69	0.04	0	C69	0.05	0	-0.01	-0.05
C7	0.01	0	C7	0.01	0	0	-0.01
C70	0.03	0.84	C70	0.03	0	0	0.81
C72	0.02	1.25	C72	0.02	0	0	1.23
C73	0.03	0	C73	0.11	0	-0.08	-0.11
C74	0.01	0.89	C74	0.02	0	-0.01	0.87
C78	0	0	C78	0	0	0	0
C79	0	0	C79	0	0	0	0
			C8	0.08	0	-0.08	-0.08
C80	0.78	1.32				0.78	1.32
C82	0.44	0.68				0.44	0.68
C83	0	0	C83	0.02	0	-0.02	-0.02
			C9	0.02	0	-0.02	-0.02

Outfall 2 25-Year

Junctions

Name	Existing		Name	Alternative		Existing - Alternative	
	Max. Depth (ft)	Hours Surcharged (h)		Max. Depth (ft)	Hours Surcharged (h)	Change in Depth	Change in Duration
J1	0	0	J1	0	0	0	0
			J10	0	0	0	0
J11	1.57	0	J11	2.36	0	-0.79	0
J12	0	0	J12	0	0	0	0
			J13	1.18	0	-1.18	0
			J14	3.76	0	-3.76	0
J15	3.36	0	J15	2.94	0	0.42	0
			J16	2.64	0.62	-2.64	-0.62
			J17	3.06	0.5	-3.06	-0.5
			J18	3.27	0.3	-3.27	-0.3
			J19	2.01	0	-2.01	0
			J2	0.73	0	-0.73	0
J20	3.36	0	J20	2.55	0	0.81	0
			J21	3.02	0.78	-3.02	-0.78
			J22	3.02	0.36	-3.02	-0.36
J23	0	0	J23	0	0	0	0
J24	0	0	J24	2.62	0.66	-2.62	-0.66
			J25	2.35	0.36	-2.35	-0.36
			J26	2.15	0.17	-2.15	-0.17
			J27	2.43	0	-2.43	0
			J28	2.18	0	-2.18	0
			J29	2.25	0.35	-2.25	-0.35
J3	0	0	J3	0	0	0	0
			J30	2.47	0.74	-2.47	-0.74
			J31	3.95	0	-3.95	0
			J32	0.73	0	-0.73	0
			J33	0.28	0	-0.28	0
			J34	3.94	0	-3.94	0
			J35	1.15	0	-1.15	0
			J36	0.95	0	-0.95	0
J37	0.69	0	J37	1.26	0	-0.57	0
			J38	0.64	0	-0.64	0
			J5	0.82	0	-0.82	0
J6	1.01	0	J6	0.94	0	0.07	0
J7	0.99	0	J7	1.62	0	-0.63	0
J8	0.61	0	J8	0.47	0	0.14	0
			J9	3.5	0.54	-3.5	-0.54
s124	0.41	0	s124	0.37	0	0.04	0
s125	2.34	1.86	s125	2.02	0	0.32	1.86
s126	0.82	0	s126	0.82	0	0	0

s128	1.6	0.92	s128	1	0	0.6	0.92
s129	2.1	1.28	s129	1.12	0	0.98	1.28
s130	1.15	0	s130	1.35	0	-0.2	0
s131	2.38	1.64	s131	1.48	0	0.9	1.64
s132	2	0.98	s132	1.49	0	0.51	0.98
s133	2.75	2.12	s133	1.51	0	1.24	2.12
s134	2.91	2.22				2.91	2.22
s136	4.55	0	s136	2.7	0	1.85	0
s137	0.67	0	s137	0.61	0	0.06	0
s138	0.85	0	s138	0.86	0	-0.01	0
s140	2.9	0	s140	2.37	0	0.53	0
s145	2.45	0.25	s145	0.55	0	1.9	0.25
s146	2.2	0.23	s146	0.61	0	1.59	0.23
s147	2.44	0.1	s147	0.56	0	1.88	0.1
s148	2.91	1.88	s148	2.99	0	-0.08	1.88
s149	2.97	2.24	s149	2.93	0	0.04	2.24
s150	2.97	1.78	s150	2.37	0	0.6	1.78
s151	0.47	0	s151	2.02	0	-1.55	0
s152	0.61	0				0.61	0
s153	0.65	0	s153	0.36	0	0.29	0
s154	2.23	22.4	s154	2.03	22.4	0.2	0
s155	3.34	0	s155	2.35	0	0.99	0
s156	1.85	0.79	s156	0.59	0	1.26	0.79
s157	3.39	0	s157	3.03	0	0.36	0
s158	3.44	0	s158	3.12	0	0.32	0
s159	3.18	0	s159	3.28	0	-0.1	0
s160	3.22	3.15	s160	3.22	0	0	3.15
s161	1.77	1.87	s161	1.28	0	0.49	1.87
s162	3.99	0.74	s162	2.68	0	1.31	0.74
s163	1.46	0	s163	2.51	0	-1.05	0
s164	3.1	0	s164	2.27	0	0.83	0
s165	3.06	0	s165	2.26	0	0.8	0
s166	2.94	5.35	s166	2.04	1.95	0.9	3.4
s167	0.86	0	s167	0.86	0	0	0
s168	2.6	5.23	s168	2.6	0	0	5.23
s169	1.67	0	s169	2.57	0	-0.9	0
s171	2.39	1.07				2.39	1.07
s173	1.14	0	s173	0.75	0	0.39	0
s178	0.81	0	s178	0.99	0	-0.18	0
s179	0.91	0	s179	0.86	0	0.05	0
s180	0.71	0	s180	0.53	0	0.18	0
s181	1.13	0				1.13	0
s183	0.54	0	s183	1.34	0.41	-0.8	-0.41
s184	0.89	0	s184	1.68	0	-0.79	0
s210	2.67	0	s210	2.11	0	0.56	0
s211	1.76	0.87	s211	0.93	0	0.83	0.87
s212	2	1.88	s212	0.86	0	1.14	1.88

s213	2.38	2.05	s213	0.98	0	1.4	2.05
s214	2.49	1.88	s214	1.05	0	1.44	1.88
s216	0	0	s216	0	0	0	0
s79	1.36	0.95	s79	1.24	0	0.12	0.95
s80	3.08	1.47	s80	1.35	0	1.73	1.47
s81	2.31	0	s81	0.58	0	1.73	0
s82	2	2.11	s82	0.75	0	1.25	2.11
s83	1.58	0	s83	0.25	0	1.33	0
s84	0.91	0	s84	0.38	0	0.53	0

Outfall 2 25-Year

Conduits

Name	Existing		Name	Alternative		Existing - Alternative	
	Available Capacity Ratio	Time Full (h)		Available Capacity Ratio	Time Full (h)	Change in Available Capacity Ratio	Change in Time
100	2.88	5.23	100	0.98	0	1.9	4.25
101	1.41	5.23	101	0.48	0	0.93	4.75
102	2.87	1.07				2.87	1.07
104	0.48	0	104	0.49	0	-0.01	-0.49
105	2.15	0.01	105	2.26	0.01	-0.11	-2.25
106	0.66	0				0.66	0
107	0.06	0	107	0.67	0.57	-0.61	-0.67
120a	1.63	3.15	120a	0.91	0	0.72	2.24
120b	2.01	3.15	120b	0.75	0	1.26	2.4
121	0.96	2.39	121	0.56	0	0.4	1.83
122	0.51	1.64	122	0.32	0	0.19	1.32
123	2.58	2.29	123	0.75	0	1.83	1.54
124	0.59	1.88	124	0.07	0	0.52	1.81
125	0.95	1.88	125	0.68	0	0.27	1.2
126	1.22	2.05	126	0.86	0	0.36	1.19
52	0.18	2.3	52	0.11	0	0.07	2.19
53	0.39	2.11	53	0.16	0	0.23	1.95
54	0.73	0.95	54	0.73	0	0	0.22
73	0.3	0	73	0.31	0	-0.01	-0.31
74	0.52	1.28	74	0.3	0	0.22	0.98
75	0.89	2.02				0.89	2.02
76	0.52	1.28	76	0.11	0	0.41	1.17
77	0.14	0.98	77	0.52	0	-0.38	0.46
78	0.61	0	78	0.62	0	-0.01	-0.62
79	1.52	3.83	79	2.14	0.23	-0.62	1.69
80	1.4	2.78				1.4	2.78
84	0.26	0.25	84	0.22	0	0.04	0.03
85	0.35	0.23	85	0.36	0	-0.01	-0.13
87	2.14	2.61	87	0.81	0	1.33	1.8
88	0.43	1.78	88	0.3	0	0.13	1.48
89	1.49	2.61	89	1.05	0.01	0.44	1.56
90	0.42	0				0.42	0
91	0.68	2.31				0.68	2.31
92	0.16	22.4	92	0.16	22.4	0	22.24
93	0.13	3.56	93	0.13	0.67	0	3.43
94	0.33	2.24	94	0.32	0	0.01	1.92
95	1.3	2.46	95	1.16	0.08	0.14	1.3
96	0.25	3.61	96	0.38	1.73	-0.13	3.23
97	3.56	3.98	97	1.22	0.01	2.34	2.76

98	0.95	5.35	98	1.14	1.94	-0.19	4.21
99	0.01	5.23	99	0.01	1.84	0	5.22
C1	0	0	C1	0	0	0	0
			C10	0.33	0.73	-0.33	-0.33
C103	0.21	0	C103	0.02	0	0.19	-0.02
			C11	0.14	0.74	-0.14	-0.14
			C12	0.52	0.82	-0.52	-0.52
			C13	0.31	0.78	-0.31	-0.31
			C14	1.72	0.94	-1.72	-1.72
			C15	0.87	0.5	-0.87	-0.87
			C16	1.25	1.15	-1.25	-1.25
			C17	0.22	0.54	-0.22	-0.22
			C18	0.37	0.81	-0.37	-0.37
			C19	0.28	0	-0.28	-0.28
			C2	1.01	0.01	-1.01	-1.01
			C20	0.05	0.36	-0.05	-0.05
			C21	0.08	0.66	-0.08	-0.08
			C22	0	0	0	0
			C23	0.76	0	-0.76	-0.76
C24	0	0	C24	0	0	0	0
C25	0.03	0	C25	0.33	0	-0.3	-0.33
C26	0.35	0	C26	0.17	0	0.18	-0.17
			C27	0.28	0	-0.28	-0.28
			C28	0.01	0	-0.01	-0.01
C29	0.26	0	C29	0.07	0	0.19	-0.07
			C3	0.98	0	-0.98	-0.98
C30	0.11	0	C30	0.35	0	-0.24	-0.35
			C31	0.78	0	-0.78	-0.78
C32	0.43	0	C32	0.17	0	0.26	-0.17
C33	0.04	0	C33	0.14	0	-0.1	-0.14
C34	0.17	0	C34	0.09	0	0.08	-0.09
			C35	0.03	1.33	-0.03	-0.03
			C36	0.43	0	-0.43	-0.43
			C37	0.03	0	-0.03	-0.03
			C38	0	0	0	0
C39	0.17	0.74	C39	1.35	0.01	-1.18	-0.61
C4	0	0	C4	0	0	0	0
C40	0.12	0	C40	0.39	0	-0.27	-0.39
C41	0.08	0	C41	0.25	0	-0.17	-0.25
C42	0	0	C42	0.07	0	-0.07	-0.07
C43	0.1	0	C43	0.33	0	-0.23	-0.33
			C44	0	0	0	0
			C45	0.66	0	-0.66	-0.66
C46	0	0	C46	0	0	0	0
C47	0.17	0	C47	0.5	0	-0.33	-0.5
			C48	0.34	0.31	-0.34	-0.34
			C5	0.17	0.01	-0.17	-0.17

C6	0	0	C6	0	0	0	0
C69	0.04	0	C69	0.06	0	-0.02	-0.06
C7	0.01	0	C7	0.01	0	0	-0.01
C70	0.06	1.87	C70	0.03	0	0.03	1.84
C72	0.03	2.17	C72	0.03	0	0	2.14
C73	0.04	0	C73	0.14	0	-0.1	-0.14
C74	0.02	1.86	C74	0.03	0.38	-0.01	1.83
C78	0	0	C78	0	0	0	0
C79	0.01	0	C79	0	0	0.01	0
			C8	0.11	0	-0.11	-0.11
C80	1.03	2.22				1.03	2.22
C82	0.58	0.89				0.58	0.89
C83	0	0	C83	0.03	0	-0.03	-0.03
			C9	0.08	0	-0.08	-0.08

Outfall 2 100-Year Junctions

Name	Existing		Name	Alternative		Existing - Alternative	
	Max. Depth (ft)	Hours Surcharged (h)		Max. Depth (ft)	Hours Surcharged (h)	Change in Depth	Change in Duration
J1	0	0	J1	0	0	0	0
			J10	0	0	0	0
J11	2.01	0	J11	2.67	0	-0.66	0
J12	0	0	J12	0	0	0	0
			J13	1.45	0	-1.45	0
			J14	4.18	0.24	-4.18	-0.24
J15	3.89	0	J15	3.62	0	0.27	0
			J16	2.93	1.27	-2.93	-1.27
			J17	3.34	1.15	-3.34	-1.15
			J18	3.68	0.63	-3.68	-0.63
			J19	2.28	0.56	-2.28	-0.56
			J2	3.13	0.16	-3.13	-0.16
J20	3.93	0	J20	3.35	0	0.58	0
			J21	3.3	1.38	-3.3	-1.38
			J22	3.3	1.1	-3.3	-1.1
J23	0	0	J23	0	0	0	0
J24	0	0	J24	3.02	0.98	-3.02	-0.98
			J25	2.73	0.68	-2.73	-0.68
			J26	2.61	0.52	-2.61	-0.52
			J27	2.85	0	-2.85	0
			J28	2.45	0.99	-2.45	-0.99
			J29	2.53	1.13	-2.53	-1.13
J3	0	0	J3	0	0	0	0
			J30	2.76	1.34	-2.76	-1.34
			J31	4.36	0	-4.36	0
			J32	0.89	0	-0.89	0
			J33	0.33	0	-0.33	0
			J34	4.3	0	-4.3	0
			J35	1.43	0	-1.43	0
			J36	1.07	0	-1.07	0
J37	0.79	0	J37	1.51	0	-0.72	0
			J38	0.88	0	-0.88	0
			J5	3.31	0.18	-3.31	-0.18
J6	1.11	0	J6	1.04	0	0.07	0
J7	1.08	0	J7	1.85	0	-0.77	0
J8	0.72	0	J8	0.57	0	0.15	0
			J9	3.91	0.84	-3.91	-0.84
s124	0.72	0	s124	0.44	0	0.28	0
s125	2.87	3.68	s125	2.8	0.32	0.07	3.36
s126	0.96	0	s126	0.96	0	0	0

s128	1.89	2.36	s128	3.01	0.13	-1.12	2.23
s129	2.36	2.83	s129	3.69	0.14	-1.33	2.69
s130	1.35	0.53	s130	3.79	0.17	-2.44	0.36
s131	2.72	3.19	s131	2.26	0.22	0.46	2.97
s132	2.2	2.35	s132	3.81	0.19	-1.61	2.16
s133	2.95	3.83	s133	3.65	0.2	-0.7	3.63
s134	3	3.93				3	3.93
s136	5.12	1.09	s136	3.56	0	1.56	1.09
s137	0.94	0	s137	0.72	0	0.22	0
s138	1.08	0	s138	1.09	0	-0.01	0
s140	3.43	0	s140	3.02	0	0.41	0
s145	2.45	0.81	s145	1.03	0	1.42	0.81
s146	2.24	0.63	s146	1.13	0	1.11	0.63
s147	2.44	0.37	s147	1.33	0	1.11	0.37
s148	2.91	3.69	s148	3.74	0.54	-0.83	3.15
s149	3.07	4.02	s149	3.74	0.5	-0.67	3.52
s150	3.23	3.62	s150	3.44	0.43	-0.21	3.19
s151	1.03	0.01	s151	3.87	0.22	-2.84	-0.21
s152	1.45	0.9				1.45	0.9
s153	1.17	0	s153	0.51	0	0.66	0
s154	2.76	22.79	s154	2.21	22.79	0.55	0
s155	3.87	0	s155	3.02	0	0.85	0
s156	2.28	2.77	s156	1.28	0	1	2.77
s157	3.92	0	s157	3.71	0	0.21	0
s158	3.98	0	s158	3.81	0	0.17	0
s159	3.62	0	s159	3.75	0	-0.13	0
s160	3.66	4.86	s160	3.73	0.33	-0.07	4.53
s161	2.22	3.93	s161	2.09	0.38	0.13	3.55
s162	4.44	3.22	s162	3.12	0	1.32	3.22
s163	1.52	0	s163	2.82	0	-1.3	0
s164	3.6	0	s164	2.58	0	1.02	0
s165	3.56	0	s165	2.57	0	0.99	0
s166	3.43	7.38	s166	2.36	2.47	1.07	4.91
s167	1.15	0	s167	1.1	0	0.05	0
s168	2.91	7.27	s168	2.84	0	0.07	7.27
s169	1.75	0	s169	2.74	0	-0.99	0
s171	3.57	1.67				3.57	1.67
s173	1.24	0	s173	0.91	0	0.33	0
s178	0.98	0	s178	1.28	0	-0.3	0
s179	1.26	0.09	s179	1.1	0	0.16	0.09
s180	1.08	0	s180	0.85	0	0.23	0
s181	1.33	0				1.33	0
s183	0.98	0	s183	1.64	0.79	-0.66	-0.79
s184	1.33	0	s184	1.99	0	-0.66	0
s210	3.24	0	s210	2.88	0	0.36	0
s211	2.1	2.28	s211	1.64	0.03	0.46	2.25
s212	2.49	3.74	s212	1.5	0.03	0.99	3.71

s213	2.89	3.84	s213	1.65	0.15	1.24	3.69
s214	2.68	3.67	s214	1.71	0.09	0.97	3.58
s216	0	0	s216	0	0	0	0
s79	1.93	2.99	s79	1.56	0.26	0.37	2.73
s80	3.65	3.12	s80	2.15	0	1.5	3.12
s81	2.88	0	s81	1.38	0	1.5	0
s82	2.57	3.85	s82	1.07	0	1.5	3.85
s83	2.16	0	s83	0.65	0	1.51	0
s84	1.48	0	s84	0.44	0	1.04	0

Outfall 2 100-Year Conduits

Name	Existing		Name	Alternative		Existing - Alternative	
	Available Capacity Ratio	Time Full (h)		Available Capacity Ratio	Time Full (h)	Change in Available Capacity Ratio	Change in Time
100	3.16	7.27	100	1.32	0.01	1.84	5.95
101	1.54	7.27	101	0.65	0	0.89	6.62
102	3.86	1.67				3.86	1.67
104	0.67	0	104	0.74	0	-0.07	-0.74
105	3	0.09	105	3.48	0.01	-0.48	-3.39
106	0.91	0				0.91	0
107	0.08	2.13	107	0.69	0.9	-0.61	1.44
120a	1.67	4.86	120a	1.14	0.33	0.53	3.72
120b	2.19	4.86	120b	0.96	0.38	1.23	3.9
121	0.95	4.09	121	0.9	0.37	0.05	3.19
122	0.57	3.19	122	0.47	0.22	0.1	2.72
123	2.6	3.99	123	1.12	0.32	1.48	2.87
124	0.88	3.74	124	0.12	0.09	0.76	3.62
125	1.05	3.67	125	1	0.09	0.05	2.67
126	1.23	3.84	126	1.26	0.15	-0.03	2.58
52	0.23	4.01	52	0.14	0.21	0.09	3.87
53	0.3	3.85	53	0.23	0	0.07	3.62
54	0.96	2.99	54	1	0.26	-0.04	1.99
73	0.47	0	73	0.48	0	-0.01	-0.48
74	0.58	2.83	74	0.54	0.17	0.04	2.29
75	0.9	3.89				0.9	3.89
76	0.67	2.83	76	0.27	0.14	0.4	2.56
77	0.16	2.34	77	0.87	0.19	-0.71	1.47
78	0.87	0	78	0.88	0	-0.01	-0.88
79	1.53	5.91	79	2.79	0.63	-1.26	3.12
80	1.43	4.49				1.43	4.49
84	0.23	0.81	84	0.31	0	-0.08	0.5
85	0.33	0.63	85	0.52	0	-0.19	0.11
87	2.15	4.37	87	1.21	0.54	0.94	3.16
88	0.5	3.62	88	0.41	0.43	0.09	3.21
89	1.47	4.37	89	1.57	0.5	-0.1	2.8
90	0.61	0.9				0.61	0.9
91	0.96	4.08				0.96	4.08
92	0.22	22.79	92	0.22	22.79	0	22.57
93	0.18	5.32	93	0.18	0.98	0	5.14
94	0.39	4.02	94	0.48	0.5	-0.09	3.54
95	1.32	4.22	95	1.74	0.57	-0.42	2.48
96	0.38	5.3	96	0.51	2.25	-0.13	4.79
97	3.79	5.8	97	1.59	0.01	2.2	4.21

98	1.03	7.38	98	1.2	2.47	-0.17	6.18
99	0.01	7.27	99	0.01	2.36	0	7.26
C1	0	0	C1	0	0	0	0
			C10	0.42	1.34	-0.42	-0.42
C103	0.24	0	C103	0.02	0	0.22	-0.02
			C11	0.18	1.34	-0.18	-0.18
			C12	0.63	1.41	-0.63	-0.63
			C13	0.44	1.38	-0.44	-0.44
			C14	1.69	1.5	-1.69	-1.69
			C15	0.45	1.15	-0.45	-0.45
			C16	1.4	1.67	-1.4	-1.4
			C17	0.3	0.84	-0.3	-0.3
			C18	0.48	1.19	-0.48	-0.48
			C19	0.4	0.42	-0.4	-0.4
			C2	1.59	0.22	-1.59	-1.59
			C20	0.14	0.68	-0.14	-0.14
			C21	0.26	0.98	-0.26	-0.26
			C22	0	0	0	0
			C23	1.03	0.01	-1.03	-1.03
C24	0	0	C24	0	0	0	0
C25	0.03	0	C25	0.38	0	-0.35	-0.38
C26	0.34	0	C26	0.21	0	0.13	-0.21
			C27	0.42	0	-0.42	-0.42
			C28	0.02	0	-0.02	-0.02
C29	0.27	0	C29	0.09	0	0.18	-0.09
			C3	1.59	0.2	-1.59	-1.59
C30	0.12	0	C30	0.46	0	-0.34	-0.46
			C31	1.17	0.01	-1.17	-1.17
C32	0.57	0	C32	0.27	0	0.3	-0.27
C33	0.05	0	C33	0.18	0	-0.13	-0.18
C34	0.23	0	C34	0.14	0	0.09	-0.14
			C35	0.08	1.84	-0.08	-0.08
			C36	0.67	0	-0.67	-0.67
			C37	0.06	0.42	-0.06	-0.06
			C38	0	0	0	0
C39	0.2	3.22	C39	1.76	0.01	-1.56	1.46
C4	0	0	C4	0	0	0	0
C40	0.13	0	C40	0.51	0	-0.38	-0.51
C41	0.09	0	C41	0.34	0	-0.25	-0.34
C42	0.01	0	C42	0.08	0	-0.07	-0.08
C43	0.1	0	C43	0.43	0	-0.33	-0.43
			C44	0	0	0	0
			C45	1.05	0.43	-1.05	-1.05
C46	0	0	C46	0	0	0	0
C47	0.22	0	C47	0.68	0	-0.46	-0.68
			C48	0.51	0.68	-0.51	-0.51
			C5	0.26	0.4	-0.26	-0.26

C6	0	0	C6	0	0	0	0
C69	0.05	0	C69	0.09	0	-0.04	-0.09
C7	0.02	0	C7	0.01	0	0.01	-0.01
C70	0.14	3.55	C70	0.04	0.47	0.1	3.51
C72	0.03	3.89	C72	0.04	0	-0.01	3.85
C73	0.04	1.08	C73	0.19	0	-0.15	0.89
C74	0.03	3.68	C74	0.04	0.72	-0.01	3.64
C78	0	0	C78	0	0	0	0
C79	0.01	0	C79	0	0	0.01	0
			C8	0.23	0.22	-0.23	-0.23
C80	1.06	3.93				1.06	3.93
C82	0.81	1.37				0.81	1.37
C83	0	0	C83	0.04	0	-0.04	-0.04
			C9	0.11	0.99	-0.11	-0.11

Outfall 3 10-Year

Junctions

Name	Existing		Name	Alternative		Existing - Alternative	
	Max. Depth (ft)	Hours Surcharged (h)		Max. Depth (ft)	Hours Surcharged (h)	Change in Depth	Change in Duration
J1	3.89	0.78	J1	3.76	0.24	0.13	0.54
			J10	0.18	0	-0.18	0
			J11	0.5	0	-0.5	0
			J12	0.29	0	-0.29	0
J13	2	0.41	J13	1.26	0	0.74	0.41
J14	0	0	J14	0	0	0	0
			J15	0.3	0	-0.3	0
			J16	0.72	0	-0.72	0
J18	0	0	J18	0	0	0	0
J19	0	0	J19	0	0	0	0
J2	3.03	0.04	J2	2.03	0	1	0.04
J20	4.1	0	J20	4.53	0	-0.43	0
J25	1.05	0	J25	0.3	0	0.75	0
J26	3.15	0	J26	2.38	0	0.77	0
J27	2.49	0	J27	2.73	0	-0.24	0
J3	1.97	0	J3	0.98	0	0.99	0
			J4	0.47	0	-0.47	0
			J5	1.04	0	-1.04	0
			J6	4.18	0.52	-4.18	-0.52
			J7	4.22	0.56	-4.22	-0.56
			J8	0.2	0	-0.2	0
J9	0	0	J9	0	0	0	0
s100	0.59	0	s100	0.68	0	-0.09	0
s101	0.6	0	s101	0.67	0	-0.07	0
s102	0.52	0	s102	0.52	0	0	0
s103	0.99	0	s103	0.99	0	0	0
s104	3.75	1.43	s104	4.39	0.87	-0.64	0.56
s105	1.43	0	s105	1.44	0	-0.01	0
s106	0.62	0	s106	0.61	0	0.01	0
s107	0.87	0	s107	0.86	0	0.01	0
s108	0.88	0	s108	4.02	0	-3.14	0
s109	0.9	0	s109	0.9	0	0	0
s110	0.99	0	s110	0.99	0	0	0
s111	4.28	0	s111	4.73	0	-0.45	0
s112	1.33	0.34	s112	1.33	0.33	0	0.01
s113	1.36	0.39	s113	1.36	0.38	0	0.01
s115	1.37	0	s115	1.37	0	0	0
s117	2.95	2.33	s117	1.56	0	1.39	2.33
s118	3.86	2.41	s118	3.47	0.19	0.39	2.22
s119	1.77	1.41	s119	1.5	0	0.27	1.41

s120	3.68	7.98	s120	1.35	0	2.33	7.98
s121	3.43	2.38	s121	2.11	0.06	1.32	2.32
s123	1.87	0	s123	1.41	0	0.46	0
s127	0.36	0	s127	0.36	0	0	0
s85	0.95	0	s85	0.83	0	0.12	0
s89	0.42	0	s89	0.39	0	0.03	0
s92	1.07	0	s92	1.19	0	-0.12	0
s94	1.11	0	s94	1.26	0	-0.15	0

Outfall 3 10-Year

Conduits

Name	Existing		Name	Alternative		Existing - Alternative	
	Available Capacity Ratio	Time Full (h)		Available Capacity Ratio	Time Full (h)	Change in Available Capacity Ratio	Change in Time
50	0.02	0	50	0.02	0	0	0
56	0.73	0	56	0.59	0	0.14	0
58	0.45	0	58	0.37	0	0.08	0
61	0.63	0	61	0.73	0	-0.1	0
62	0.23	0	62	0.23	0	0	0
63	0.54	4.13	63	0.77	0.87	-0.23	3.26
64	0.36	0	64	0.36	0	0	0
65	0.72	0	65	0.72	0	0	0
66	1.19	0.39	66	1.2	0.38	-0.01	0.01
67	0.67	2.94	67	0.52	1.21	0.15	1.73
68	1.04	1.43				1.04	1.43
69	1.81	2.41	69	0.84	1.03	0.97	1.38
70	0.59	2.41	70	0.36	0.19	0.23	2.22
71	1.14	7.98	71	0.73	0	0.41	7.98
72	0.82	2.41	72	0.55	0.19	0.27	2.22
C1	0.77	0.89	C1	0.87	0.51	-0.1	0.38
			C10	0.01	0.15	-0.01	-0.15
C104_1	0.34	0	C104_1	0.59	0	-0.25	0
C104_2	0.41	0	C104_2	0.55	0	-0.14	0
C105	0.09	0	C105	0.08	0	0.01	0
C106	0.01	0	C106	0	0	0.01	0
C107	0.1	0	C107	0.13	0	-0.03	0
C108	0.01	0	C108	0.03	0	-0.02	0
			C12	0.2	0	-0.2	0
			C190	0.51	0.52	-0.51	-0.52
			C191	0.82	0.56	-0.82	-0.56
			C192	0.89	0.87	-0.89	-0.87
			C194	0.61	0	-0.61	0
C2	0.73	1.05	C2	0.89	0.51	-0.16	0.54
C3	0	0	C3	0	0	0	0
C4	0.09	0.04	C4	0.04	0	0.05	0.04
C47	0.87	0.41	C47	0.47	0	0.4	0.41
C48	0.81	22.61	C48	0.22	0	0.59	22.61
C49	0.75	2.37	C49	0.32	0	0.43	2.37
			C5	0.01	0	-0.01	0
C50	0	0	C50	0	0	0	0
C54	0.61	0	C54	0.65	0	-0.04	0
C55	1	0.62	C55	1.01	0.6	-0.01	0.02
C56	0.27	0.56	C56	0.27	0.55	0	0.01

C57	0.55	0	C57	0.56	0	-0.01	0
C58	0.23	0	C58	0.23	0	0	0
			C6	0.01	0	-0.01	0
C61	0.02	0	C61	0.02	0	0	0
C66	0	0	C66	0	0	0	0
C67	0.18	0.44	C67	0.15	0.67	0.03	-0.23
C68	0	0	C68	0	0	0	0
			C7	0.03	0	-0.03	0
			C8	0.28	0	-0.28	0
			C9	0.01	0	-0.01	0

Outfall 3 25-Year

Junctions

Name	Existing		Name	Alternative		Existing - Alternative	
	Max. Depth (ft)	Hours Surcharged (h)		Max. Depth (ft)	Hours Surcharged (h)	Change in Depth	Change in Duration
J1	4.6	1.21	J1	4.46	0.62	0.14	0.59
			J10	0.22	0	-0.22	0
			J11	0.62	0	-0.62	0
			J12	0.33	0	-0.33	0
J13	2	0.99	J13	1.48	0	0.52	0.99
J14	0	0	J14	0	0	0	0
			J15	0.34	0	-0.34	0
			J16	0.83	0	-0.83	0
J18	0	0	J18	0	0	0	0
J19	0	0	J19	0	0	0	0
J2	3.67	0.64	J2	3.32	0.13	0.35	0.51
J20	4.3	0	J20	4.95	0	-0.65	0
J25	2.01	0	J25	1.25	0	0.76	0
J26	4.11	0	J26	3.33	0	0.78	0
J27	2.65	0	J27	3.02	0	-0.37	0
J3	2.63	0	J3	2.29	0	0.34	0
			J4	0.64	0	-0.64	0
			J5	1.21	0	-1.21	0
			J6	4.84	0.84	-4.84	-0.84
			J7	4.85	0.88	-4.85	-0.88
			J8	0.23	0	-0.23	0
J9	0	0	J9	0	0	0	0
s100	0.76	0	s100	0.97	0	-0.21	0
s101	0.77	0	s101	0.95	0	-0.18	0
s102	0.67	0	s102	0.67	0	0	0
s103	1.15	0	s103	1.15	0	0	0
s104	4.01	1.83	s104	4.86	1.2	-0.85	0.63
s105	1.71	0.77	s105	1.76	0.72	-0.05	0.05
s106	0.78	0	s106	0.78	0	0	0
s107	1.1	0	s107	1.1	0	0	0
s108	1.07	0	s108	4.46	0	-3.39	0
s109	1.15	0	s109	1.15	0	0	0
s110	1.26	0.17	s110	1.27	0.29	-0.01	-0.12
s111	4.48	0	s111	5.16	0	-0.68	0
s112	1.6	0.93	s112	1.61	0.9	-0.01	0.03
s113	1.62	0.96	s113	1.66	0.91	-0.04	0.05
s115	1.64	0.65	s115	1.68	0.64	-0.04	0.01
s117	3.37	2.96	s117	3	0.12	0.37	2.84
s118	4.31	3.04	s118	4.79	0.54	-0.48	2.5
s119	2.1	2.07	s119	1.78	0	0.32	2.07

s120	3.82	10.08	s120	1.73	0	2.09	10.08
s121	3.97	3	s121	3.52	0.36	0.45	2.64
s123	2	0.16	s123	1.66	0	0.34	0.16
s127	0.51	0	s127	0.51	0	0	0
s85	1.21	0	s85	1.01	0	0.2	0
s89	0.55	0	s89	0.68	0	-0.13	0
s92	1.27	0	s92	1.48	0	-0.21	0
s94	1.31	0	s94	1.55	0	-0.24	0

Outfall 3 25-Year

Conduits

Name	Existing		Name	Alternative		Existing - Alternative	
	Available Capacity Ratio	Time Full (h)		Available Capacity Ratio	Time Full (h)	Change in Available Capacity Ratio	Change in Time
50	0.04	0	50	0.04	0	0	0
56	0.98	0	56	0.8	0	0.18	0
58	0.52	0	58	0.43	0	0.09	0
61	0.83	0	61	0.82	0	0.01	0
62	0.31	0	62	0.31	0	0	0
63	0.54	5.22	63	0.86	1.2	-0.32	4.02
64	0.45	0	64	0.46	0	-0.01	0
65	0.91	0.17	65	0.92	0.29	-0.01	-0.12
66	1.25	0.96	66	1.28	0.91	-0.03	0.05
67	0.72	3.63	67	0.57	1.55	0.15	2.08
68	1.16	1.83				1.16	1.83
69	1.94	3.04	69	1.16	1.36	0.78	1.68
70	0.59	3.04	70	0.5	0.54	0.09	2.5
71	1.13	10.08	71	1.02	0.01	0.11	10.07
72	1.07	3.04	72	0.76	0.54	0.31	2.5
C1	0.83	1.32	C1	0.99	0.82	-0.16	0.5
			C10	0.02	0.59	-0.02	-0.59
C104_1	0.38	0	C104_1	0.73	0	-0.35	0
C104_2	0.47	0	C104_2	0.71	0	-0.24	0
C105	0.11	0	C105	0.09	0.59	0.02	-0.59
C106	0.03	0	C106	0.02	0	0.01	0
C107	0.12	0	C107	0.17	0	-0.05	0
C108	0.01	0	C108	0.05	0	-0.04	0
			C12	0.28	0	-0.28	0
			C190	0.59	0.84	-0.59	-0.84
			C191	0.96	0.88	-0.96	-0.88
			C192	1.05	1.2	-1.05	-1.2
			C194	0.84	0	-0.84	0
C2	0.83	1.45	C2	1.17	0.82	-0.34	0.63
C3	0	0	C3	0	0	0	0
C4	0.16	0.64	C4	0.14	0.13	0.02	0.51
C47	1	0.98	C47	0.65	0	0.35	0.98
C48	0.81	22.82	C48	0.31	0	0.5	22.82
C49	0.74	2.99	C49	0.44	0.12	0.3	2.87
			C5	0.02	0	-0.02	0
C50	0	0	C50	0	0	0	0
C54	0.72	0.77	C54	0.89	0.72	-0.17	0.05
C55	0.99	1.12	C55	1.21	1.06	-0.22	0.06
C56	0.33	1.07	C56	0.33	1.02	0	0.05

C57	0.69	0.51	C57	0.69	0.58	0	-0.07
C58	0.3	0.33	C58	0.3	0.34	0	-0.01
			C6	0.01	0	-0.01	0
C61	0.03	0	C61	0.02	0	0.01	0
C66	0	0	C66	0	0	0	0
C67	0.25	0.84	C67	0.2	1.01	0.05	-0.17
C68	0	0	C68	0	0	0	0
			C7	0.04	0	-0.04	0
			C8	0.38	0	-0.38	0
			C9	0.01	0	-0.01	0

Outfall 3 100-Year Junctions

Name	Existing		Name	Alternative		Existing - Alternative	
	Max. Depth (ft)	Hours Surcharged (h)		Max. Depth (ft)	Hours Surcharged (h)	Change in Depth	Change in Duration
J1	5.46	1.84	J1	5.26	1.08	0.2	0.76
			J10	0.29	0	-0.29	0
			J11	0.9	0	-0.9	0
			J12	0.39	0	-0.39	0
J13	2	1.69	J13	2.25	0	-0.25	1.69
J14	0.28	0	J14	0.37	0	-0.09	0
			J15	0.39	0	-0.39	0
			J16	1.23	0	-1.23	0
J18	0	0	J18	0	0	0	0
J19	0	0	J19	0	0	0	0
J2	4.28	1.32	J2	4.16	0.7	0.12	0.62
J20	4.64	0	J20	5.45	0	-0.81	0
J25	3.59	0	J25	2.83	0	0.76	0
J26	5.69	0	J26	4.93	0	0.76	0
J27	2.93	0	J27	3.39	0	-0.46	0
J3	3	0.6	J3	3	0.14	0	0.46
			J4	0.95	0	-0.95	0
			J5	1.54	0	-1.54	0
			J6	5.58	1.29	-5.58	-1.29
			J7	5.64	1.33	-5.64	-1.33
			J8	0.29	0	-0.29	0
J9	0.01	0	J9	0	0	0.01	0
s100	1.05	0	s100	1.34	0	-0.29	0
s101	1.06	0	s101	1.32	0	-0.26	0
s102	0.91	0	s102	0.91	0	0	0
s103	1.37	0.88	s103	1.37	1.06	0	-0.18
s104	4.4	2.47	s104	5.42	1.75	-1.02	0.72
s105	2.14	1.63	s105	2.24	1.46	-0.1	0.17
s106	1	0	s106	1.01	0	-0.01	0
s107	1.4	1.05	s107	1.43	1.16	-0.03	-0.11
s108	1.39	0	s108	4.99	0	-3.6	0
s109	1.47	1.2	s109	1.51	1.27	-0.04	-0.07
s110	1.63	1.39	s110	1.68	1.39	-0.05	0
s111	4.8	0	s111	5.7	0	-0.9	0
s112	1.97	1.77	s112	2.03	1.67	-0.06	0.1
s113	2.03	1.78	s113	2.12	1.67	-0.09	0.11
s115	2.06	1.57	s115	2.15	1.43	-0.09	0.14
s117	4.16	3.75	s117	4.14	0.58	0.02	3.17
s118	5.21	3.84	s118	5.8	0.96	-0.59	2.88
s119	2.55	2.84	s119	2.68	0.23	-0.13	2.61

s120	3.96	15.32	s120	3.17	0.36	0.79	14.96
s121	5.21	3.8	s121	4.53	0.78	0.68	3.02
s123	2	0.35	s123	2	0.11	0	0.24
s127	0.74	0	s127	0.74	0	0	0
s85	1.46	0	s85	1.38	0	0.08	0
s89	0.87	0	s89	1.04	0	-0.17	0
s92	1.56	0	s92	1.85	0	-0.29	0
s94	1.59	0	s94	1.92	0	-0.33	0

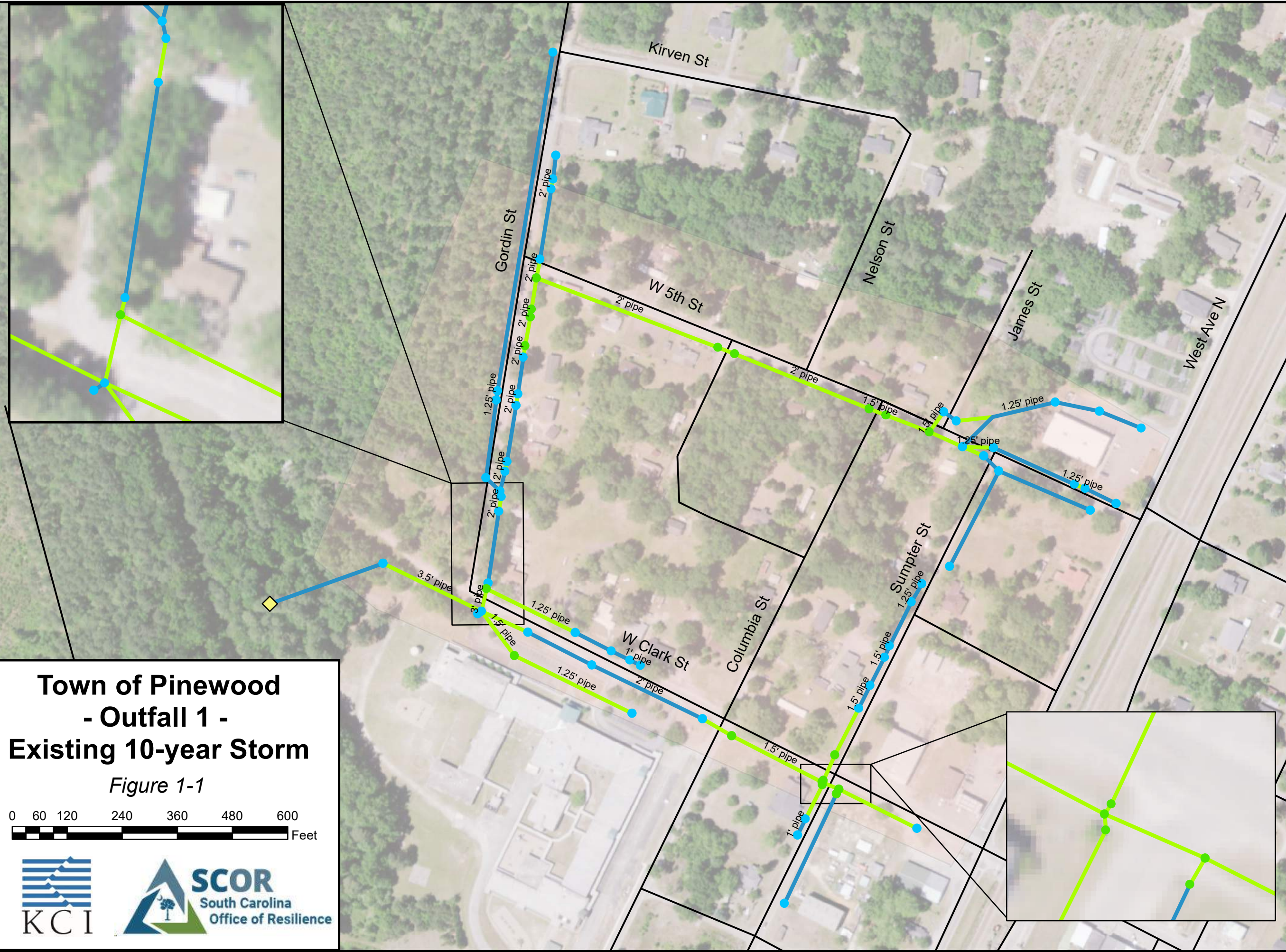
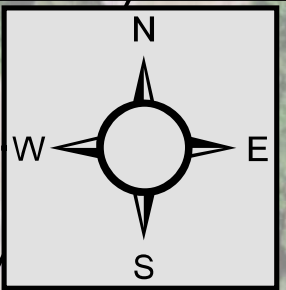
Outfall 3 100-Year Conduits

Name	Existing		Name	Alternative		Existing - Alternative	
	Available Capacity Ratio	Time Full (h)		Available Capacity Ratio	Time Full (h)	Change in Available Capacity Ratio	Change in Time
50	0.08	0	50	0.08	0	0	0
56	1.59	0.01	56	1.34	0.01	0.25	0
58	0.77	0	58	0.59	0	0.18	0
61	1.2	0.01	61	1.05	0.4	0.15	-0.39
62	0.46	0.88	62	0.46	1.06	0	-0.18
63	0.57	7.56	63	1.02	1.75	-0.45	5.81
64	0.57	1.05	64	0.58	1.16	-0.01	-0.11
65	1.1	1.39	65	1.11	1.39	-0.01	0
66	1.21	1.78	66	1.25	1.67	-0.04	0.11
67	0.79	5.01	67	0.64	2.11	0.15	2.9
68	1.28	2.47				1.28	2.47
69	2.17	3.84	69	1.25	1.92	0.92	1.92
70	0.61	3.84	70	0.57	0.96	0.04	2.88
71	1.13	15.31	71	1.35	0.42	-0.22	14.89
72	1.6	3.84	72	1.02	0.96	0.58	2.88
C1	1.07	1.96	C1	1.25	1.28	-0.18	0.68
			C10	0.03	1.05	-0.03	-1.05
C104_1	0.42	0	C104_1	0.81	0	-0.39	0
C104_2	0.59	0	C104_2	0.95	0	-0.36	0
C105	0.17	0.46	C105	0.11	1.06	0.06	-0.6
C106	0.04	0	C106	0.04	0	0	0
C107	0.16	0	C107	0.23	0	-0.07	0
C108	0.01	0	C108	0.05	0	-0.04	0
			C12	0.44	0.39	-0.44	-0.39
			C190	0.68	1.29	-0.68	-1.29
			C191	1.07	1.33	-1.07	-1.33
			C192	1.18	1.75	-1.18	-1.75
			C194	1.29	0.01	-1.29	-0.01
C2	0.83	2.08	C2	1.25	1.28	-0.42	0.8
C3	0.01	0.78	C3	0	0	0.01	0.78
C4	0.43	1.32	C4	0.27	0.7	0.16	0.62
C47	1	1.69	C47	1	0.2	0	1.49
C48	0.79	23.05	C48	0.45	0.36	0.34	22.69
C49	0.75	3.79	C49	0.58	0.58	0.17	3.21
			C5	0.02	0.11	-0.02	-0.11
C50	0.02	1.7	C50	0.02	1.6	0	0.1
C54	0.93	1.63	C54	1.22	1.46	-0.29	0.17
C55	1.21	1.93	C55	1.54	1.82	-0.33	0.11
C56	0.38	1.89	C56	0.38	1.78	0	0.11

C57	0.83	1.52	C57	0.83	1.5	0	0.02
C58	0.38	1.38	C58	0.38	1.42	0	-0.04
			C6	0.01	0	-0.01	0
C61	0.04	0	C61	0.03	0	0.01	0
C66	0	0	C66	0	0	0	0
C67	0.4	1.41	C67	0.32	1.45	0.08	-0.04
C68	0	0	C68	0	0	0	0
			C7	0.06	0	-0.06	0
			C8	0.53	0	-0.53	0
			C9	0.01	0	-0.01	0



Appendix D – Flooding Maps



Legend

- ◆ Outfall
- AOI #1

Junctions

Hours flooded

- < 0.5 hours
- < 4 hours
- < 8 hours
- 8+ hours

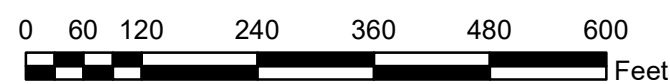
Conduits

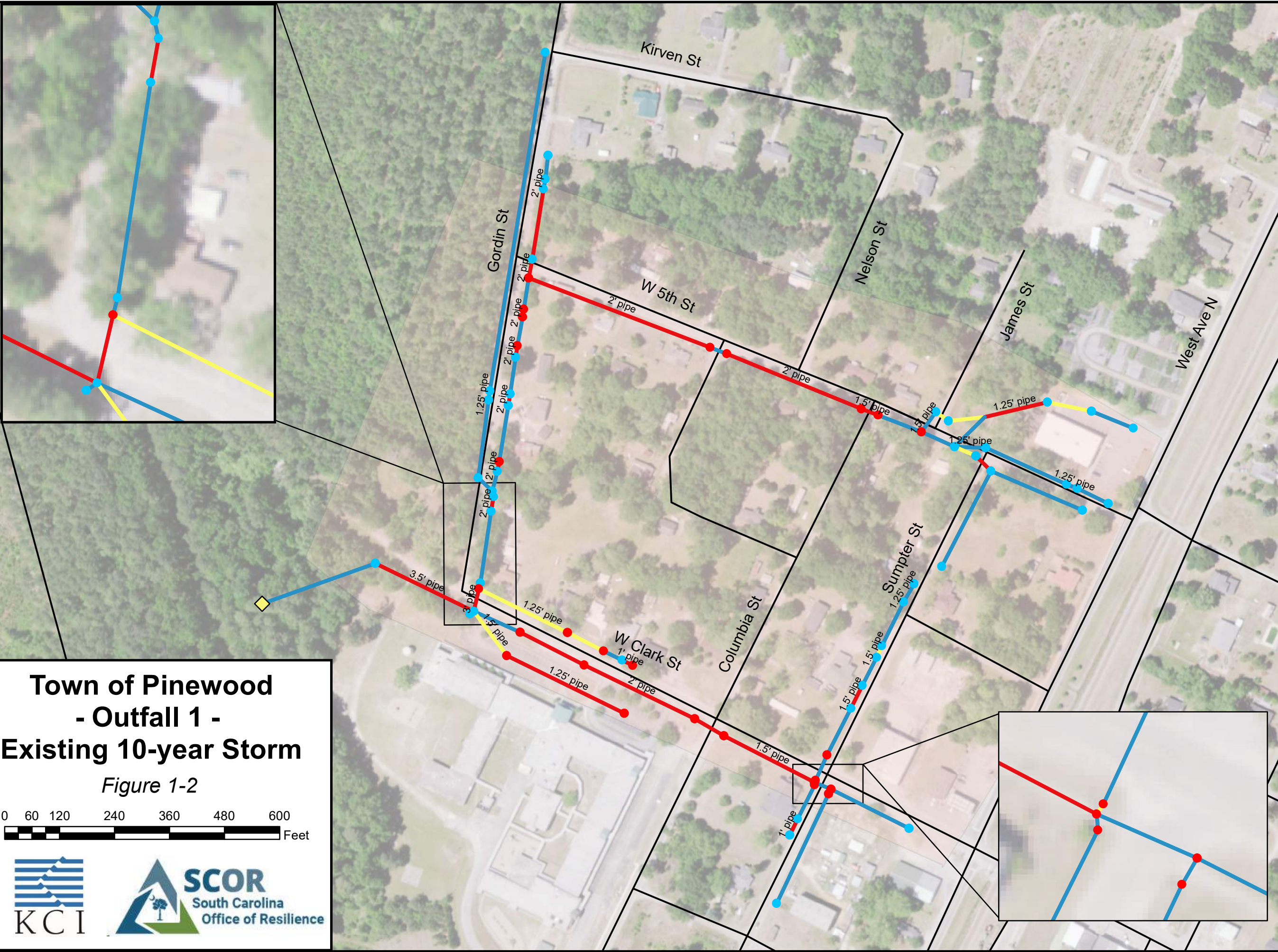
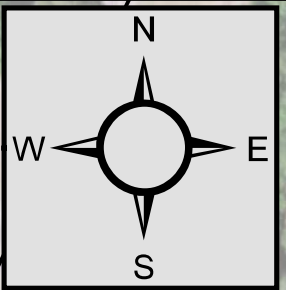
Hours flooded

- < 0.5 hours
- < 4 hours
- < 8 hours
- 8+ hours

**Town of Pinewood
- Outfall 1 -
Existing 10-year Storm**

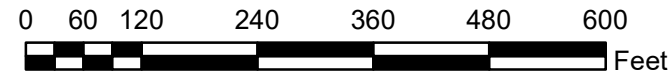
Figure 1-1





Town of Pinewood - Outfall 1 - Existing 10-year Storm

Figure 1-2



Legend

- ◆ Outfall
- AOI #1

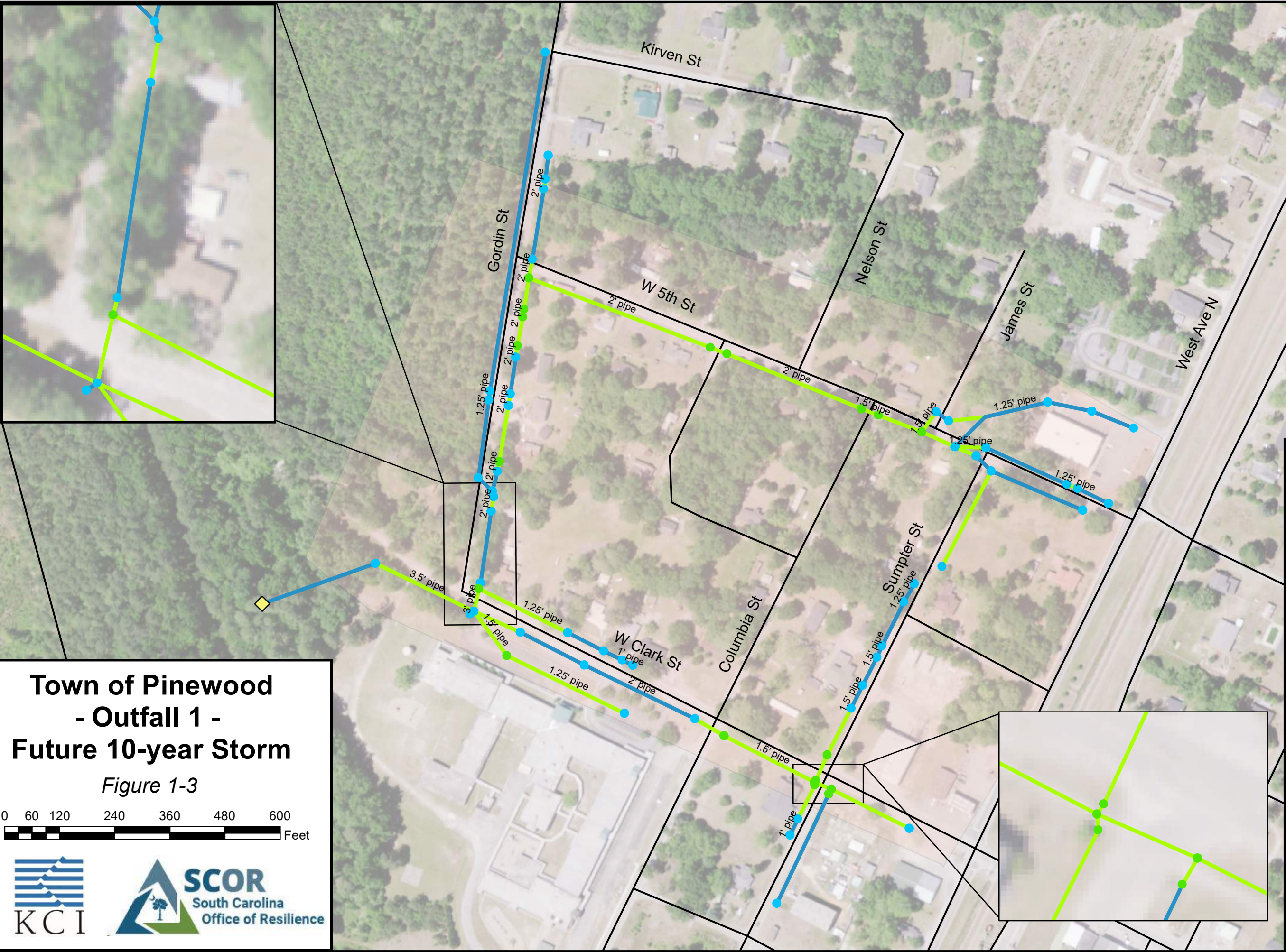
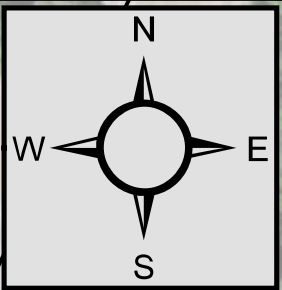
Junctions

- Surcharged
- Contained

Conduits

Available Capacity Ratio

- < 0.5
- 0.5 - 0.9
- > 0.9



Legend

- ◆ Outfall
- AOI #1

Junctions

Hours flooded

- < 0.5 hours
- < 4 hours
- < 8 hours
- 8+ hours

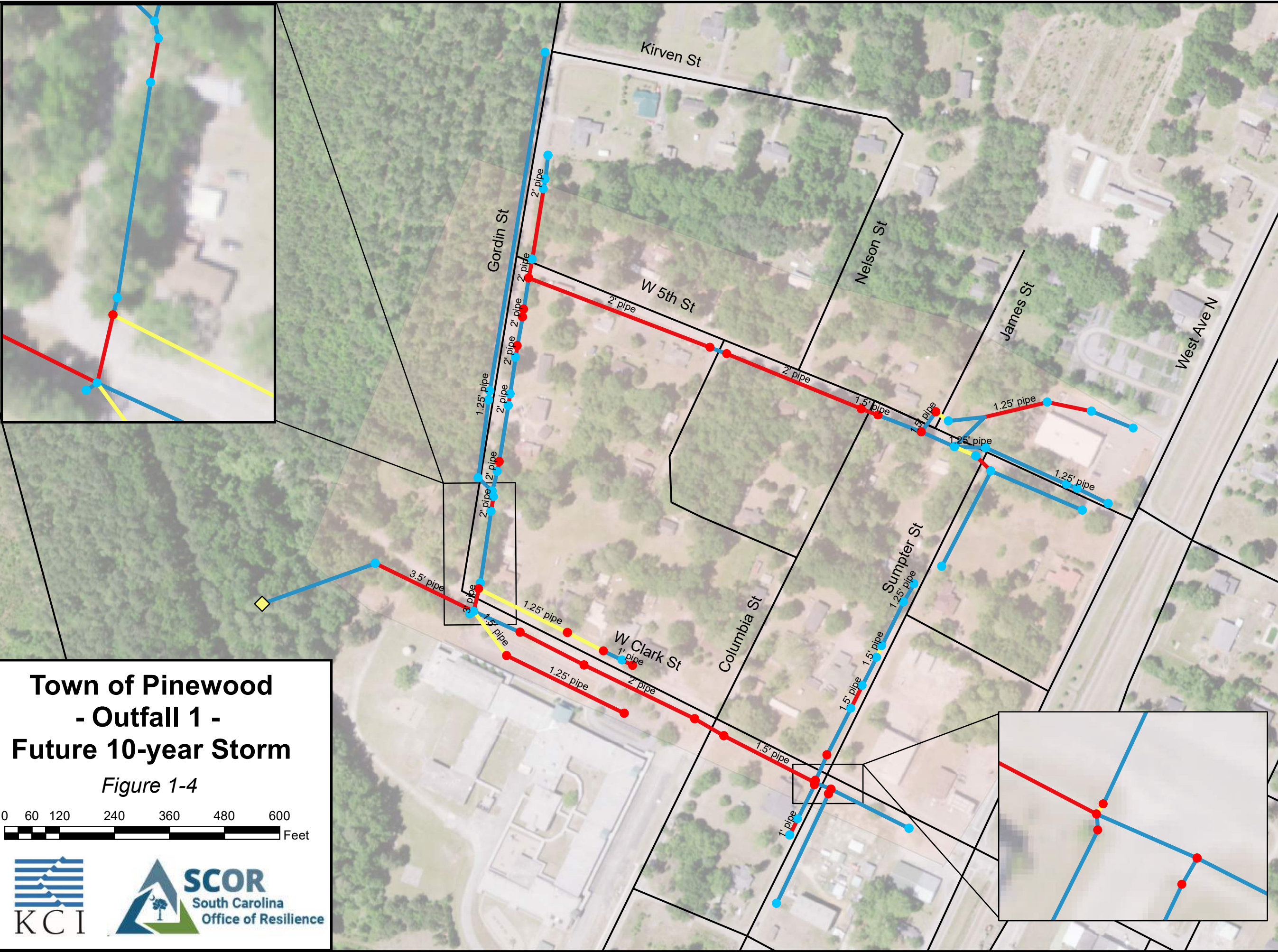
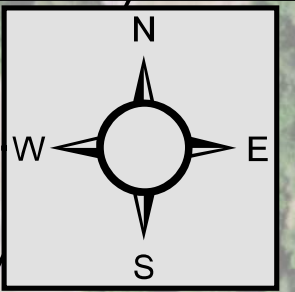
Conduits

Hours flooded

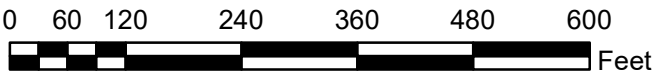
- < 0.5 hours
- < 4 hours
- < 8 hours
- 8+ hours

**Town of Pinewood
- Outfall 1 -
Future 10-year Storm**
Figure 1-3





**Town of Pinewood
- Outfall 1 -
Future 10-year Storm**
Figure 1-4



Legend

- ◆ Outfall
- AOI #1

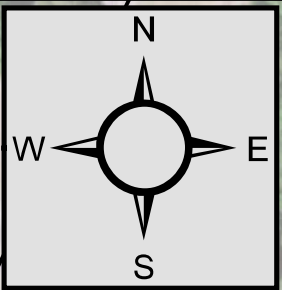
Junctions

- Surcharged
- Contained

Conduits

Available Capacity Ratio

- < 0.5
- 0.5 - 0.9
- > 0.9



Legend

- ◆ Outfall
- AOI #1

Junctions

Hours flooded

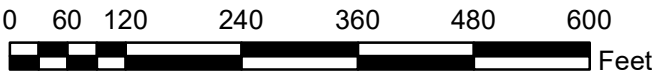
- < 0.5 hours
- < 4 hours
- < 8 hours
- 8+ hours

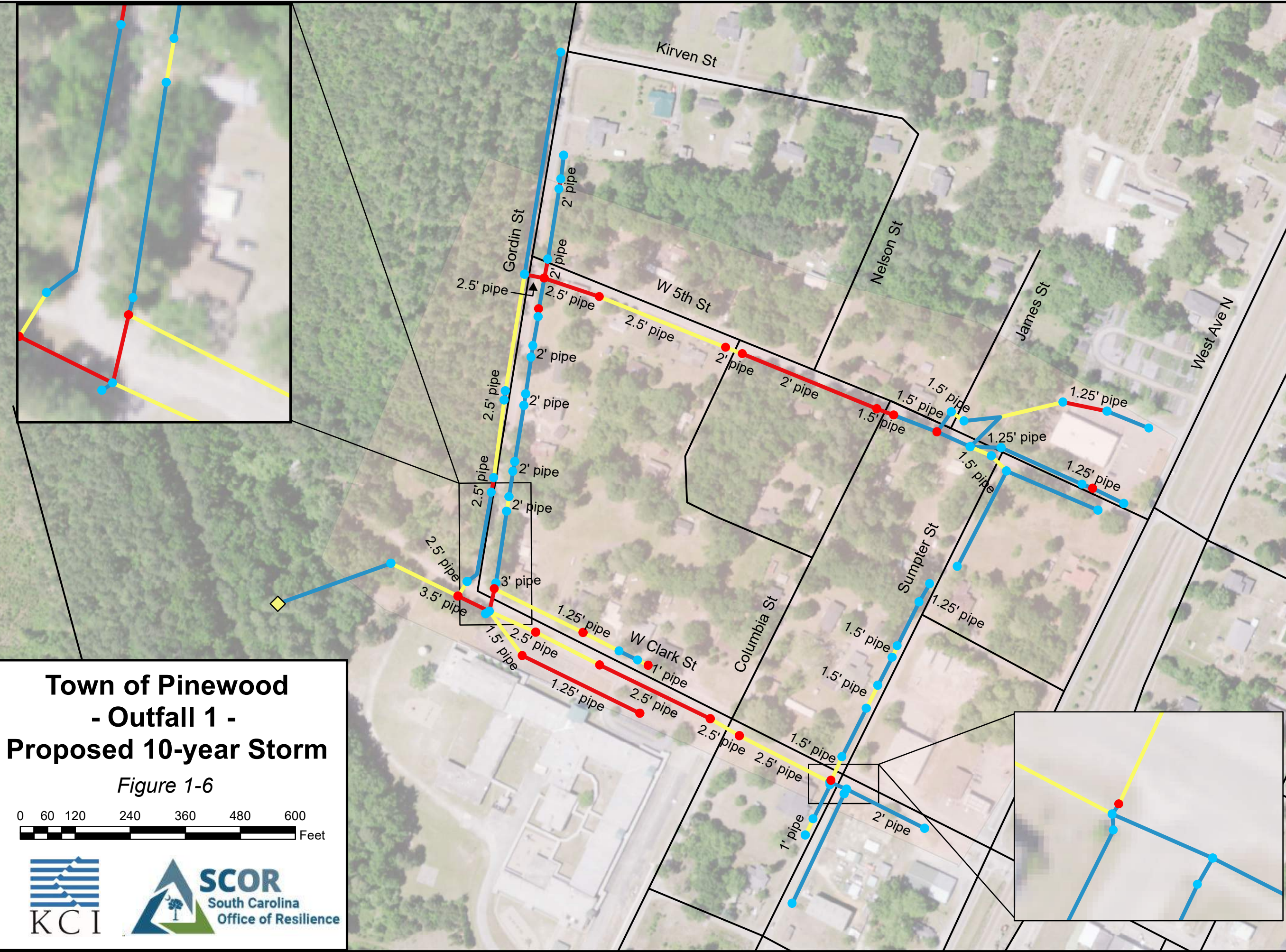
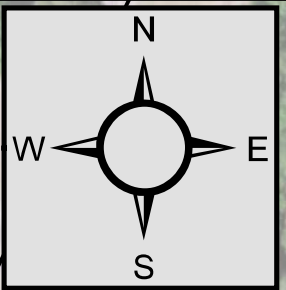
Conduits

Hours flooded

- < 0.5 hours
- < 4 hours
- < 8 hours
- 8+ hours

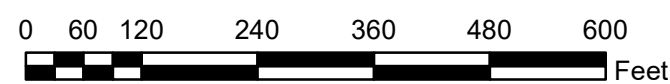
**Town of Pinewood
- Outfall 1 -
Proposed 10-year Storm**
Figure 1-5





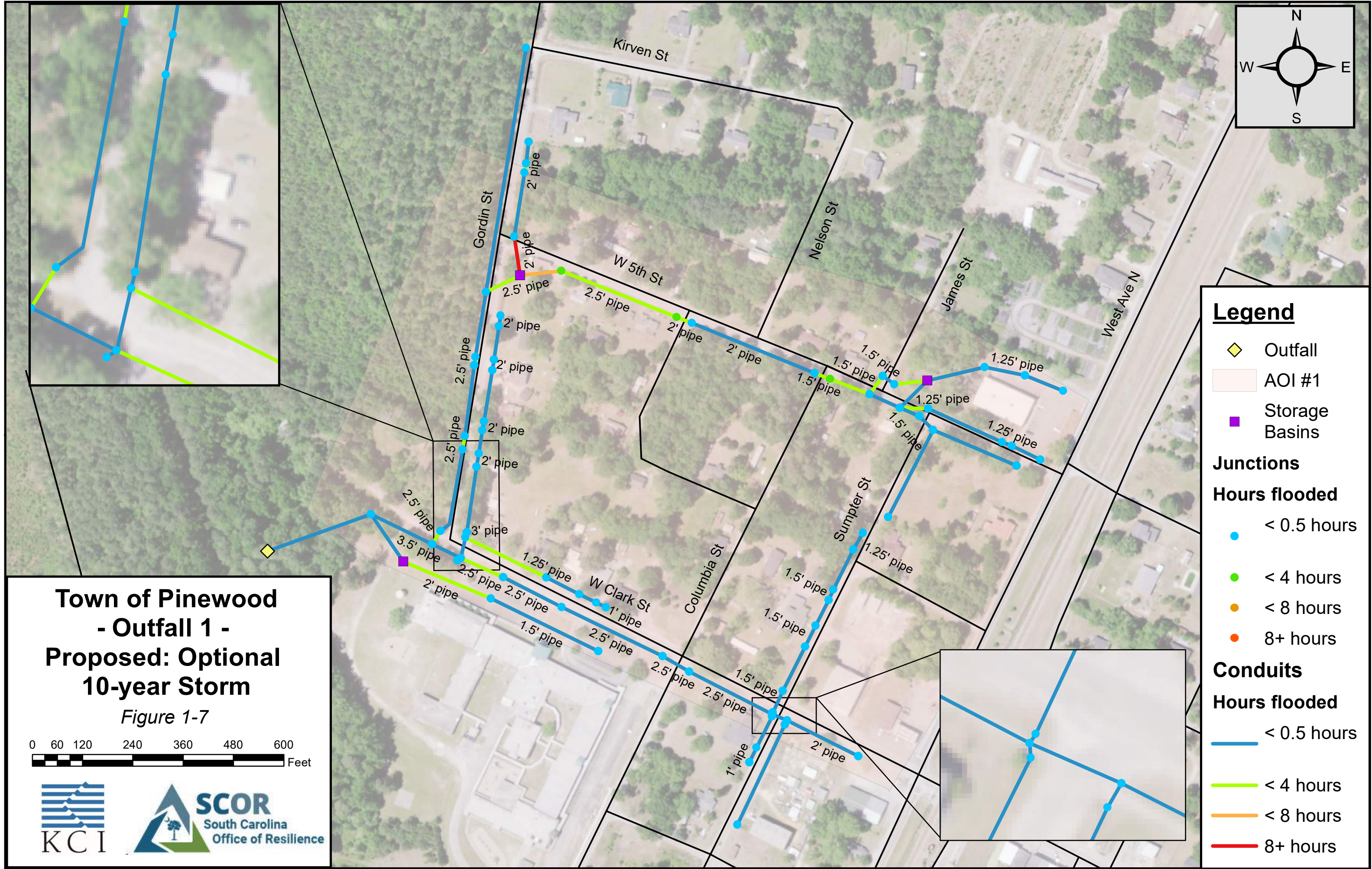
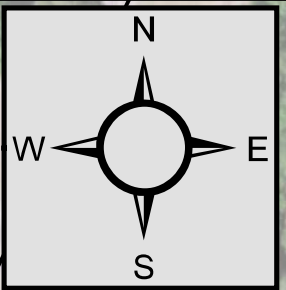
Town of Pinewood - Outfall 1 - Proposed 10-year Storm

Figure 1-6



Legend

- ◆ Outfall
- AOI #1
- Junctions**
 - Surcharged
 - Contained
- Conduits**
- Available Capacity Ratio**
 - < 0.5
 - 0.5 - 0.9
 - > 0.9



Legend

- Outfall
- AOI #1
- Storage Basins

Junctions

Hours flooded

- < 0.5 hours
- < 4 hours
- < 8 hours
- 8+ hours

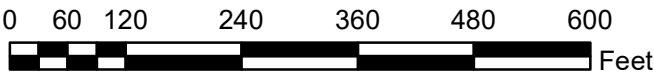
Conduits

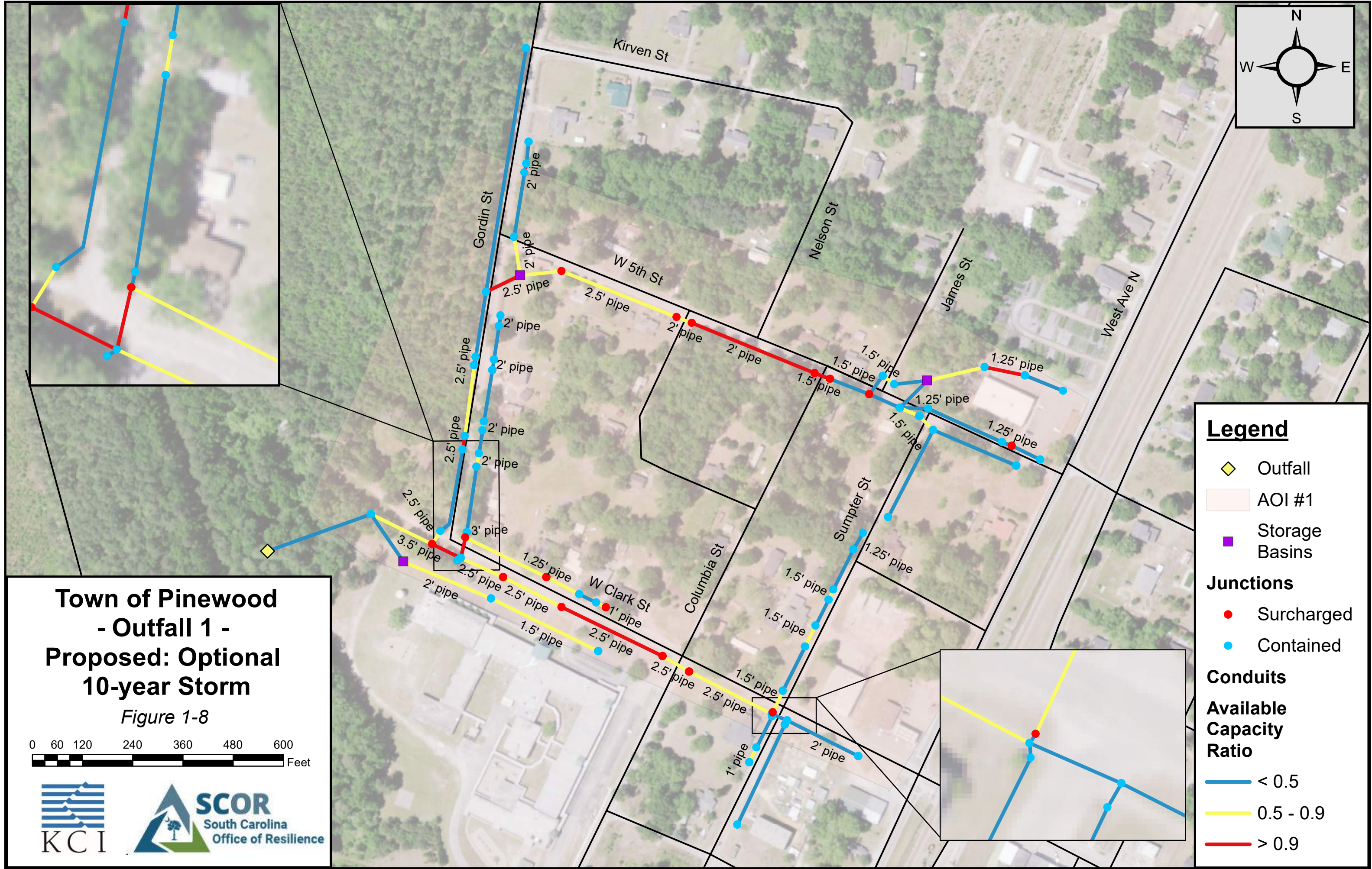
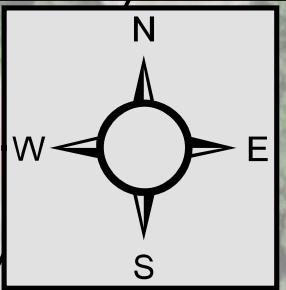
Hours flooded

- < 0.5 hours
- < 4 hours
- < 8 hours
- 8+ hours

**Town of Pinewood
- Outfall 1 -
Proposed: Optional
10-year Storm**

Figure 1-7





**Town of Pinewood
- Outfall 1 -
Proposed: Optional
10-year Storm**

Figure 1-8

0 60 120 240 360 480 600 Feet

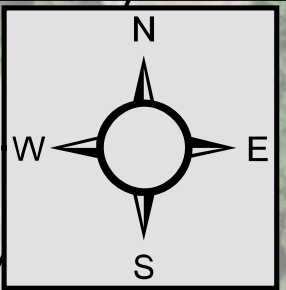


Legend

- ◆ Outfall
- AOI #1
- Storage Basins

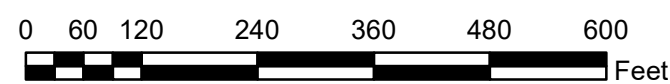
- Junctions**
- Surcharged
 - Contained

- Conduits**
- Available Capacity Ratio**
- < 0.5
 - 0.5 - 0.9
 - > 0.9



Town of Pinewood - Outfall 1 - Existing 25-year Storm

Figure 1-9



Legend

- ◆ Outfall
- AOI #1

Junctions

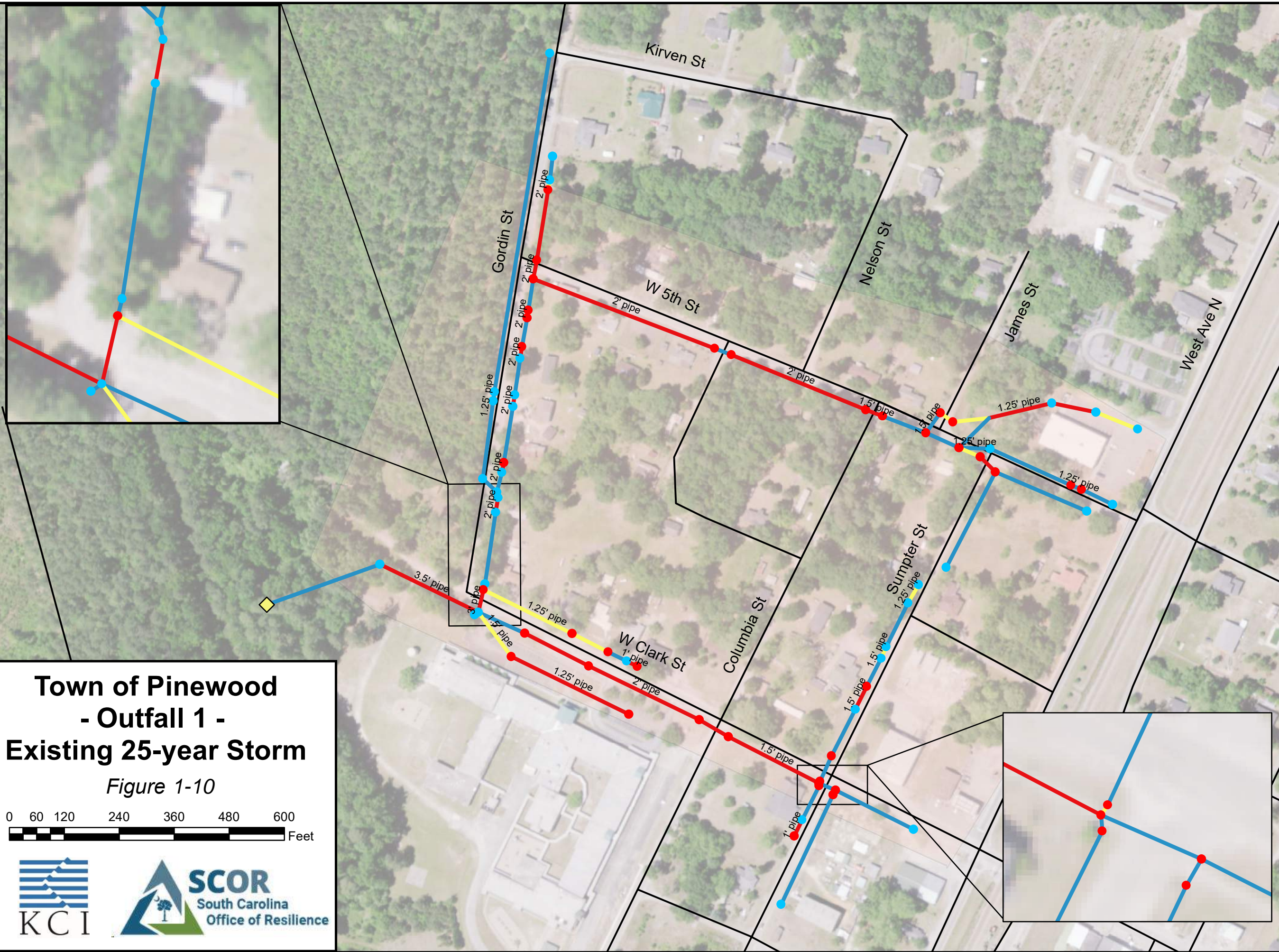
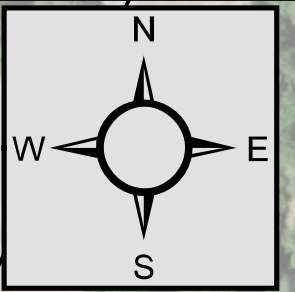
Hours flooded

- < 0.5 hours
- < 4 hours
- < 8 hours
- 8+ hours

Conduits

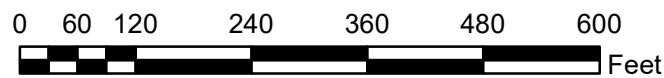
Hours flooded

- < 0.5 hours
- < 4 hours
- < 8 hours
- 8+ hours



Town of Pinewood - Outfall 1 - Existing 25-year Storm

Figure 1-10



Legend

- ◆ Outfall
- AOI #1

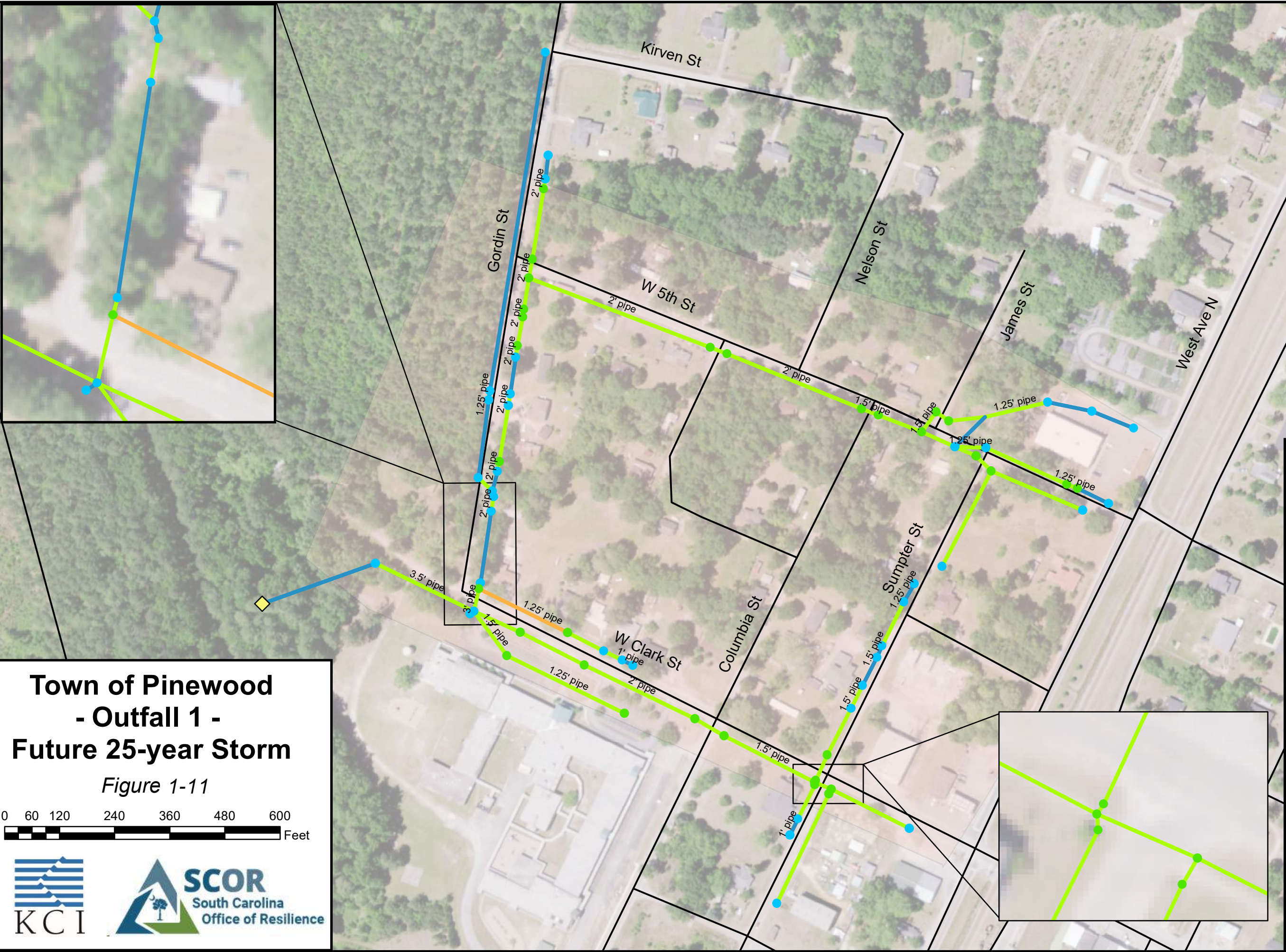
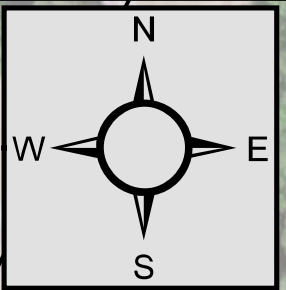
Junctions

- Surcharged
- Contained

Conduits

Available Capacity Ratio

- < 0.5
- 0.5 - 0.9
- > 0.9



Legend

- ◆ Outfall
- AOI #1

Junctions

Hours flooded

- < 0.5 hours
- < 4 hours
- < 8 hours
- 8+ hours

Conduits

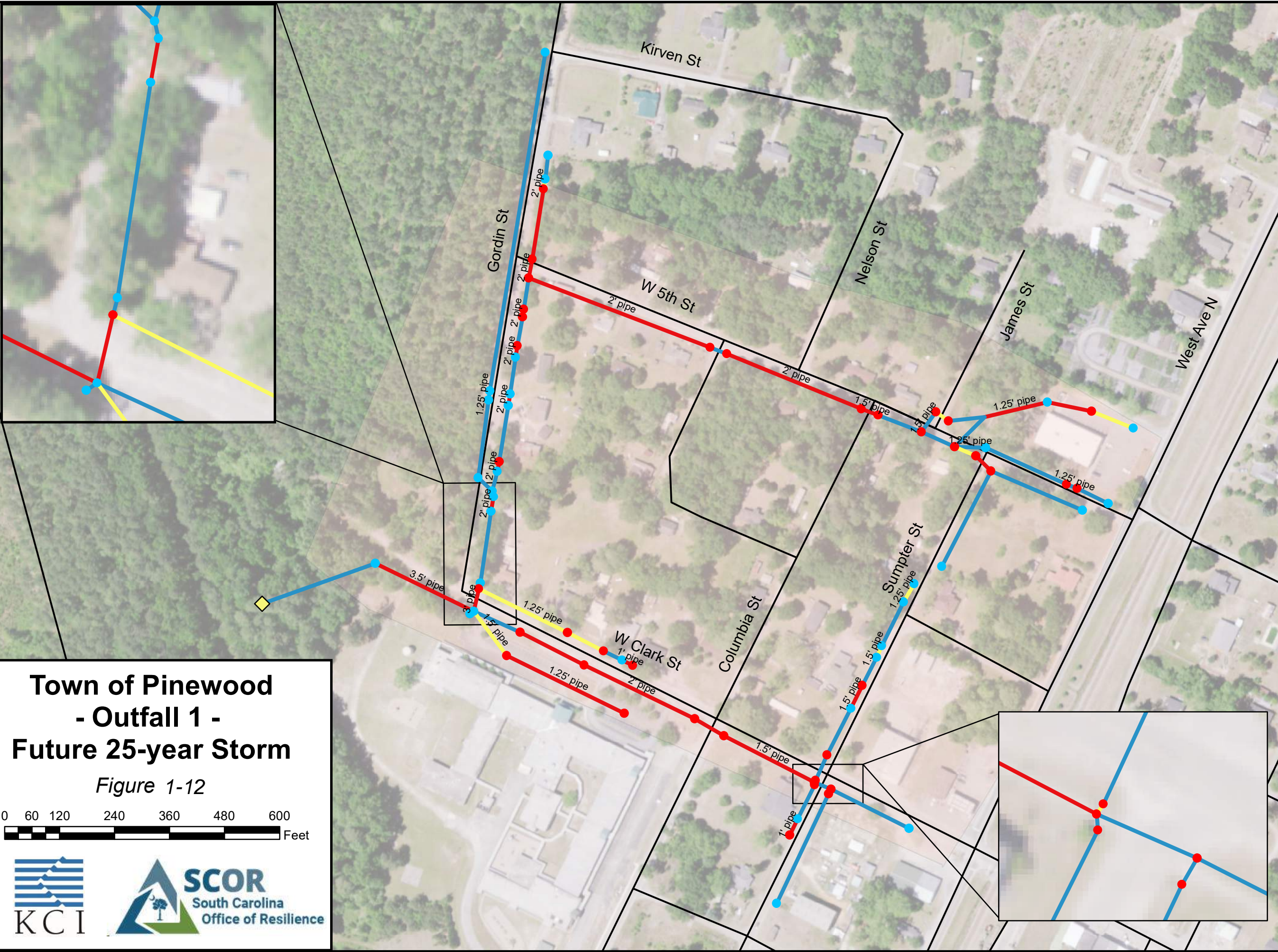
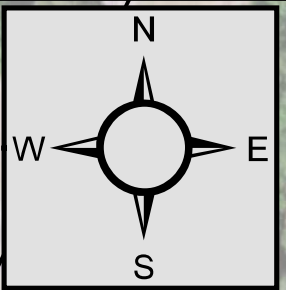
Hours flooded

- < 0.5 hours
- < 4 hours
- < 8 hours
- 8+ hours

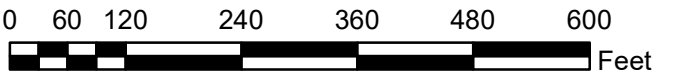
**Town of Pinewood
- Outfall 1 -
Future 25-year Storm**

Figure 1-11





**Town of Pinewood
- Outfall 1 -
Future 25-year Storm**
Figure 1-12



Legend

- ◆ Outfall
- AOI #1

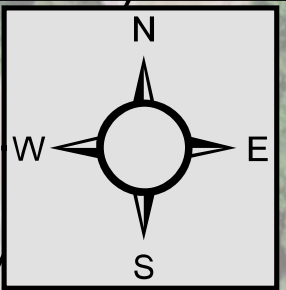
Junctions

- Surcharged
- Contained

Conduits

Available Capacity Ratio

- < 0.5
- 0.5 - 0.9
- > 0.9



Legend

- ◆ Outfall
- AOI #1

Junctions

Hours flooded

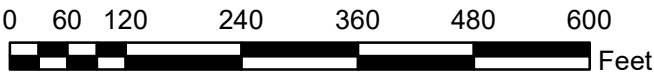
- < 0.5 hours
- < 4 hours
- < 8 hours
- 8+ hours

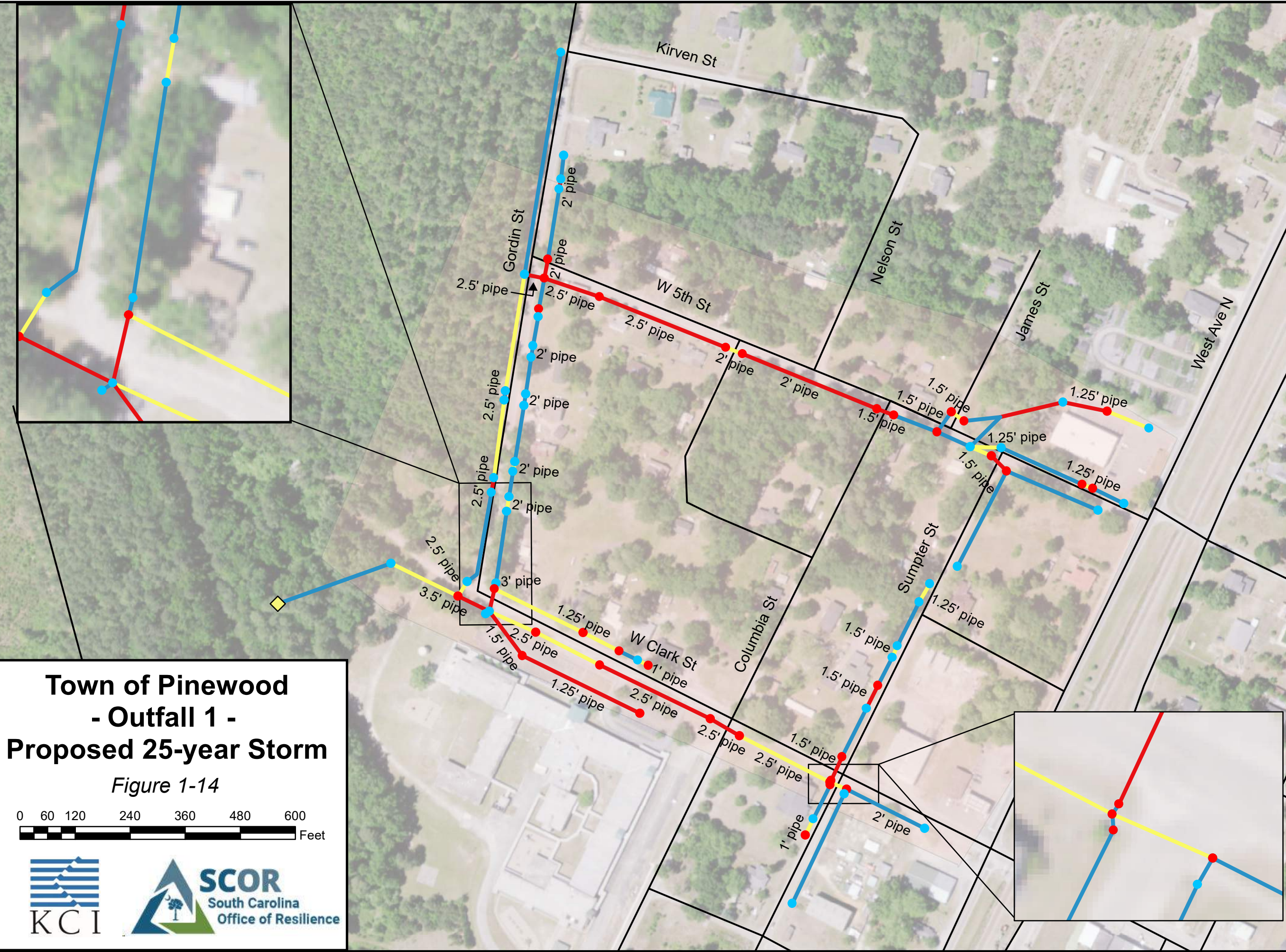
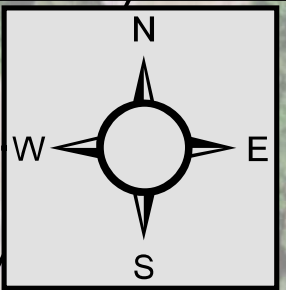
Conduits

Hours flooded








- < 0.5 hours
- < 4 hours
- < 8 hours
- 8+ hours

**Town of Pinewood
- Outfall 1 -
Proposed 25-year Storm**
Figure 1-13



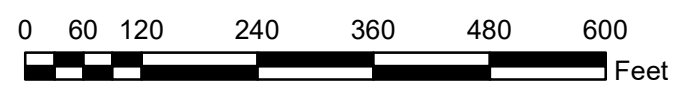


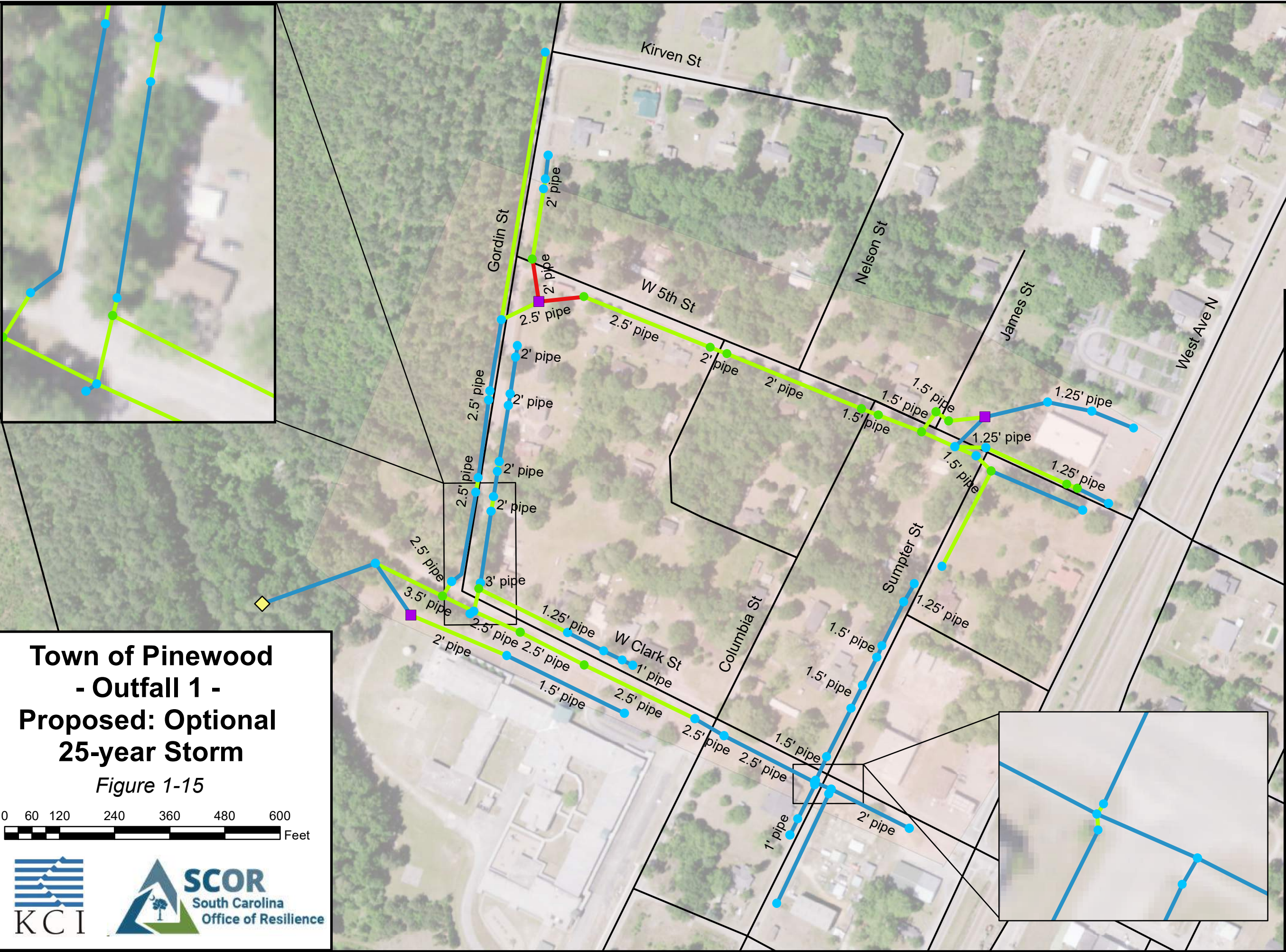
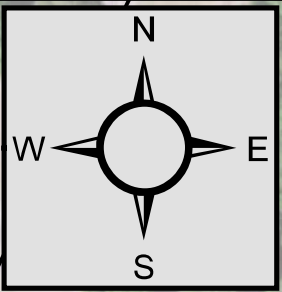
Legend

-  Outfall
-  AOI #1
- Junctions**
-  Surcharged
-  Contained
- Conduits**
- Available Capacity Ratio**
-  < 0.5
-  0.5 - 0.9
-  > 0.9

**Town of Pinewood
- Outfall 1 -
Proposed 25-year Storm**

Figure 1-14





Legend

- ◆ Outfall
- AOI #1
- Storage Basins

Junctions

Hours flooded

- < 0.5 hours
- < 4 hours
- < 8 hours
- 8+ hours

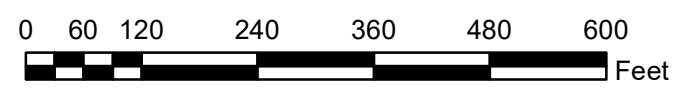
Conduits

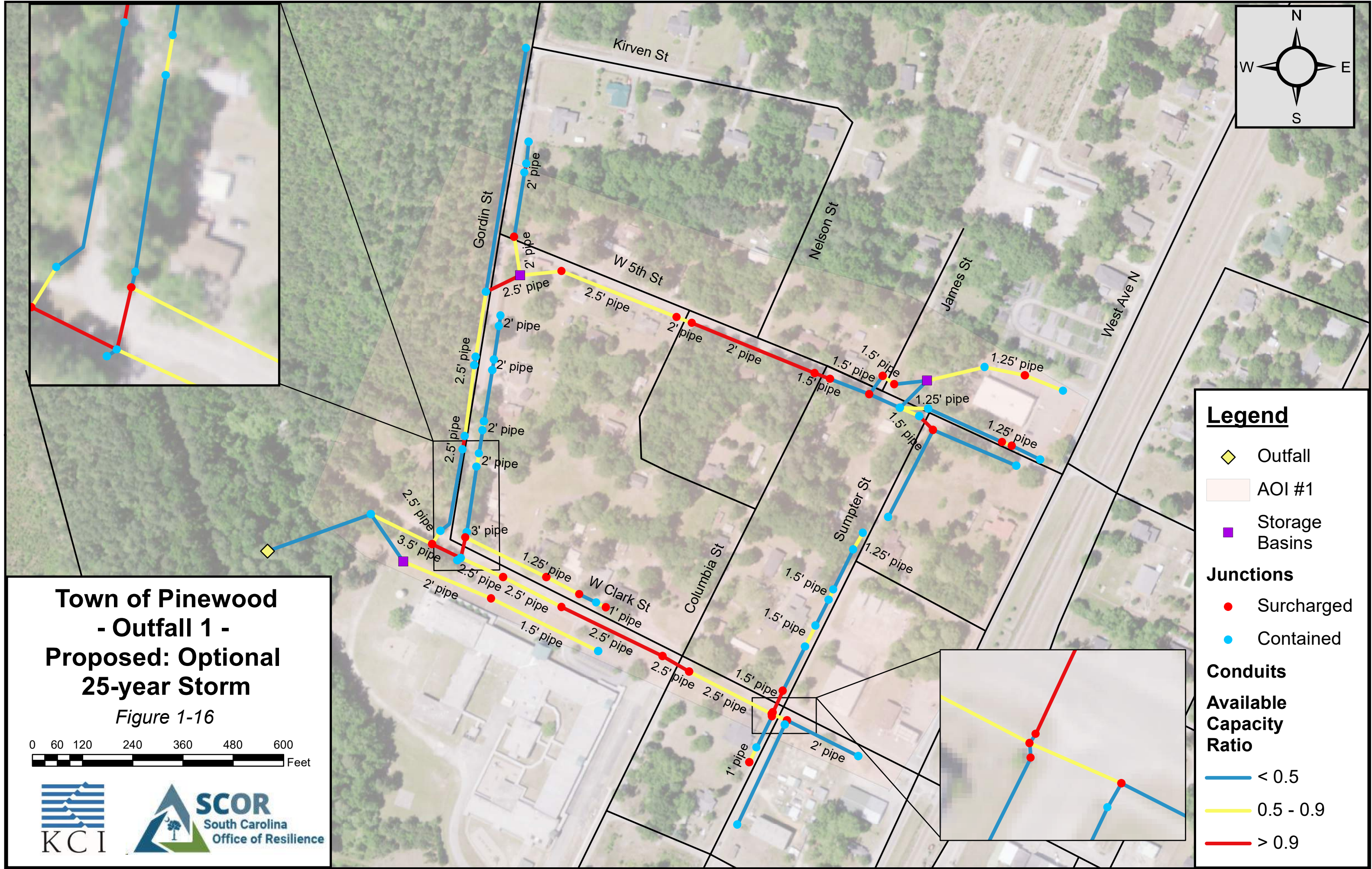
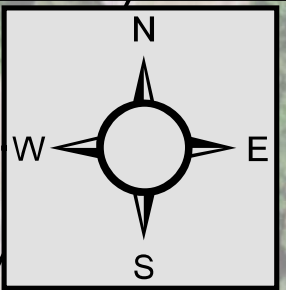
Hours flooded

- < 0.5 hours
- < 4 hours
- < 8 hours
- 8+ hours

**Town of Pinewood
- Outfall 1 -
Proposed: Optional
25-year Storm**

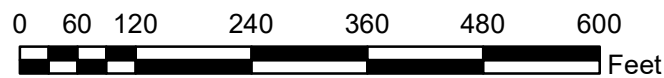
Figure 1-15





Town of Pinewood - Outfall 1 - Proposed: Optional 25-year Storm

Figure 1-16

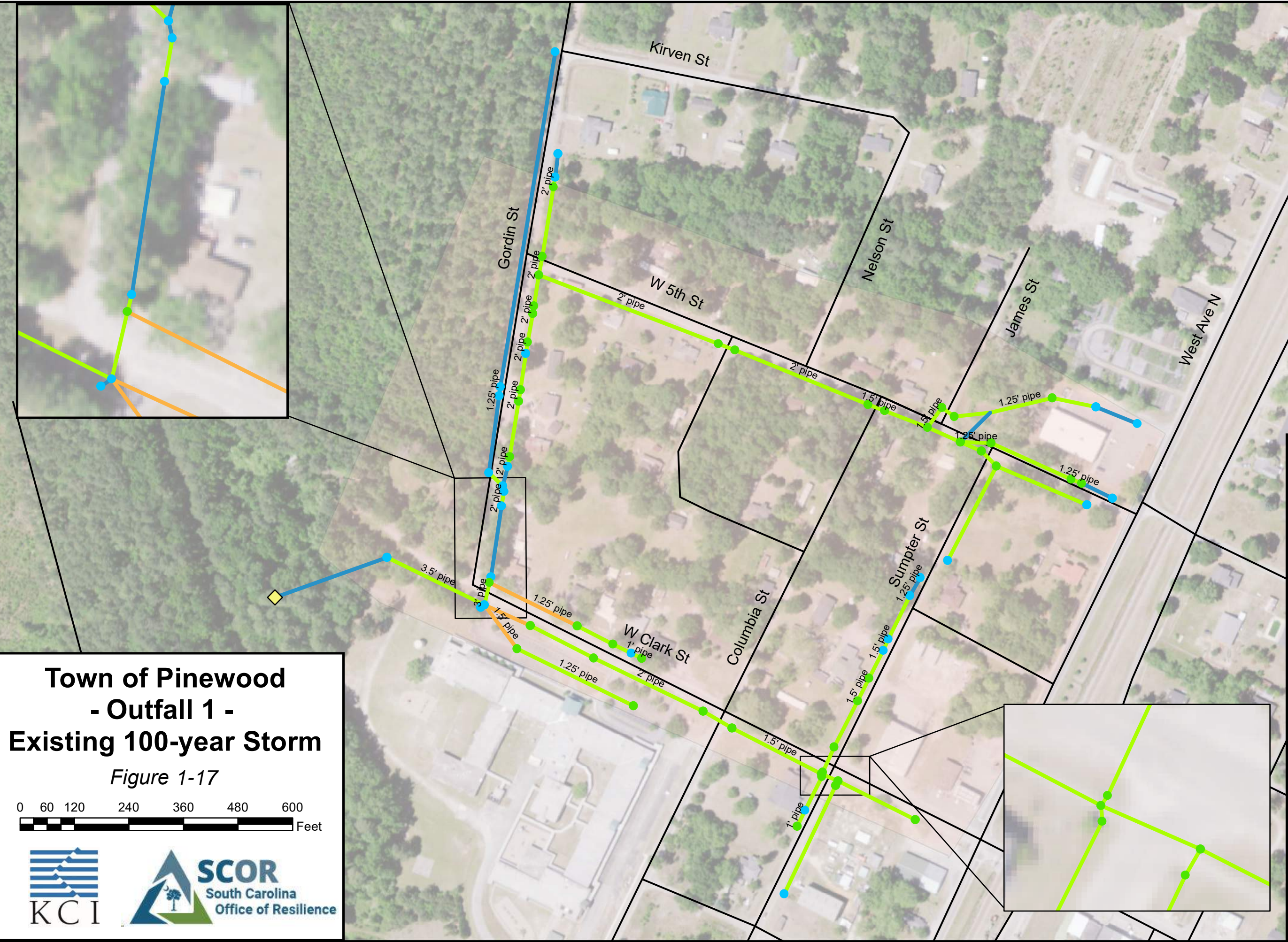
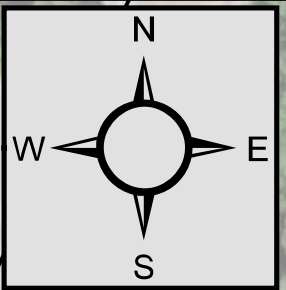


Legend

- ◇ Outfall
- AOI #1
- Storage Basins

- ### Junctions
- Surcharged
 - Contained

- ### Conduits
- #### Available Capacity Ratio
- < 0.5
 - 0.5 - 0.9
 - > 0.9



Legend

- ◆ Outfall
- AOI #1

Junctions

Hours flooded

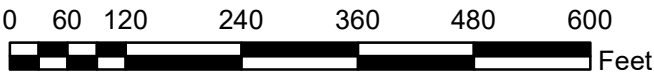
- < 0.5 hours
- < 4 hours
- < 8 hours
- 8+ hours

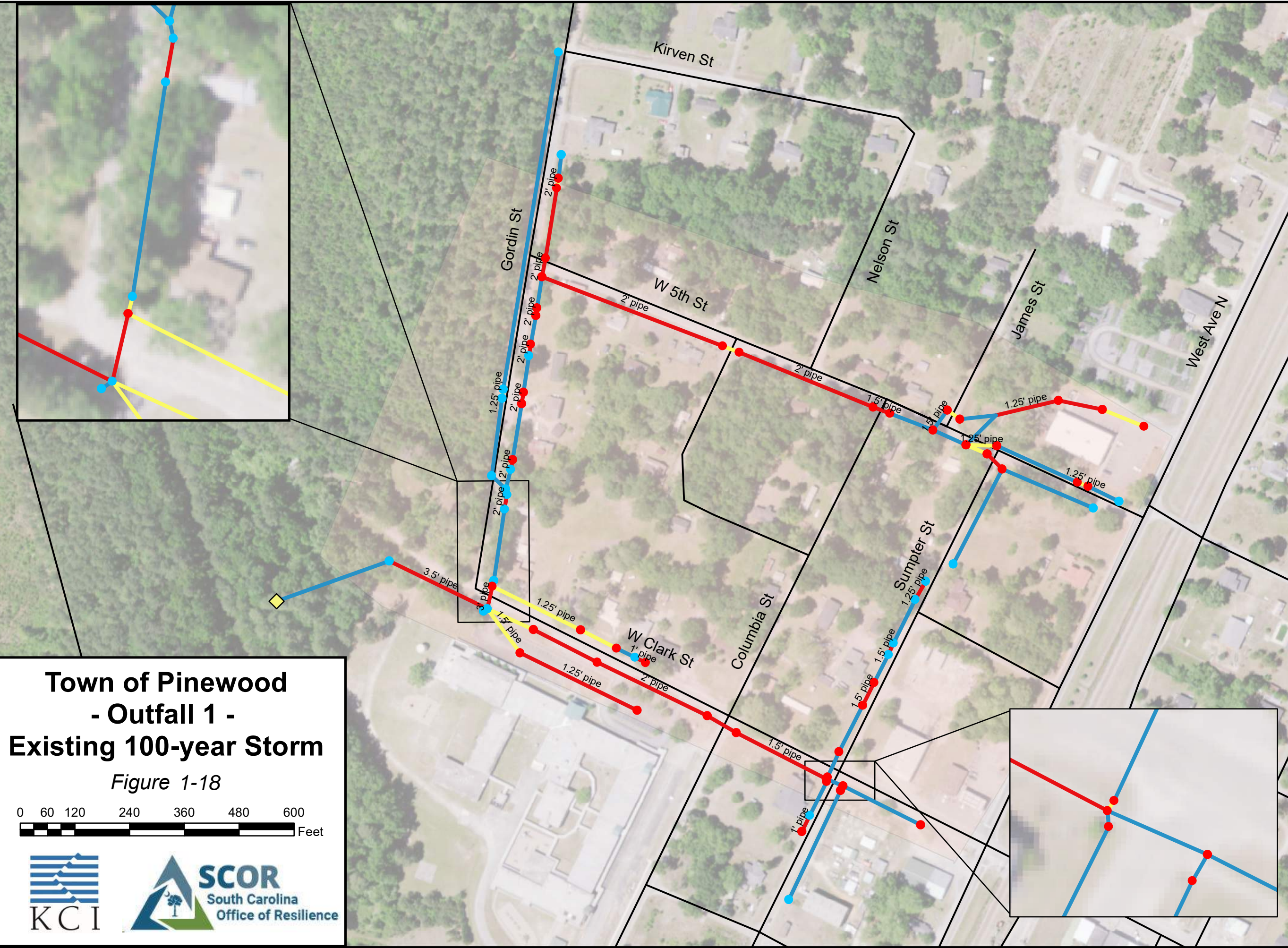
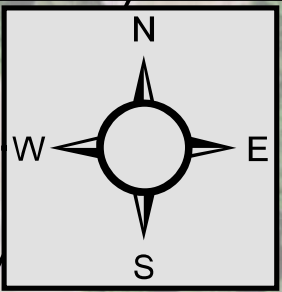
Conduits

Hours flooded

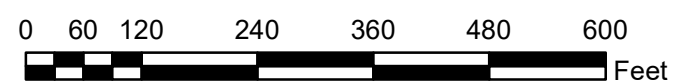
- < 0.5 hours
- < 4 hours
- < 8 hours
- 8+ hours

**Town of Pinewood
- Outfall 1 -
Existing 100-year Storm**
Figure 1-17





**Town of Pinewood
- Outfall 1 -
Existing 100-year Storm**
Figure 1-18



Legend

- ◆ Outfall
- AOI #1

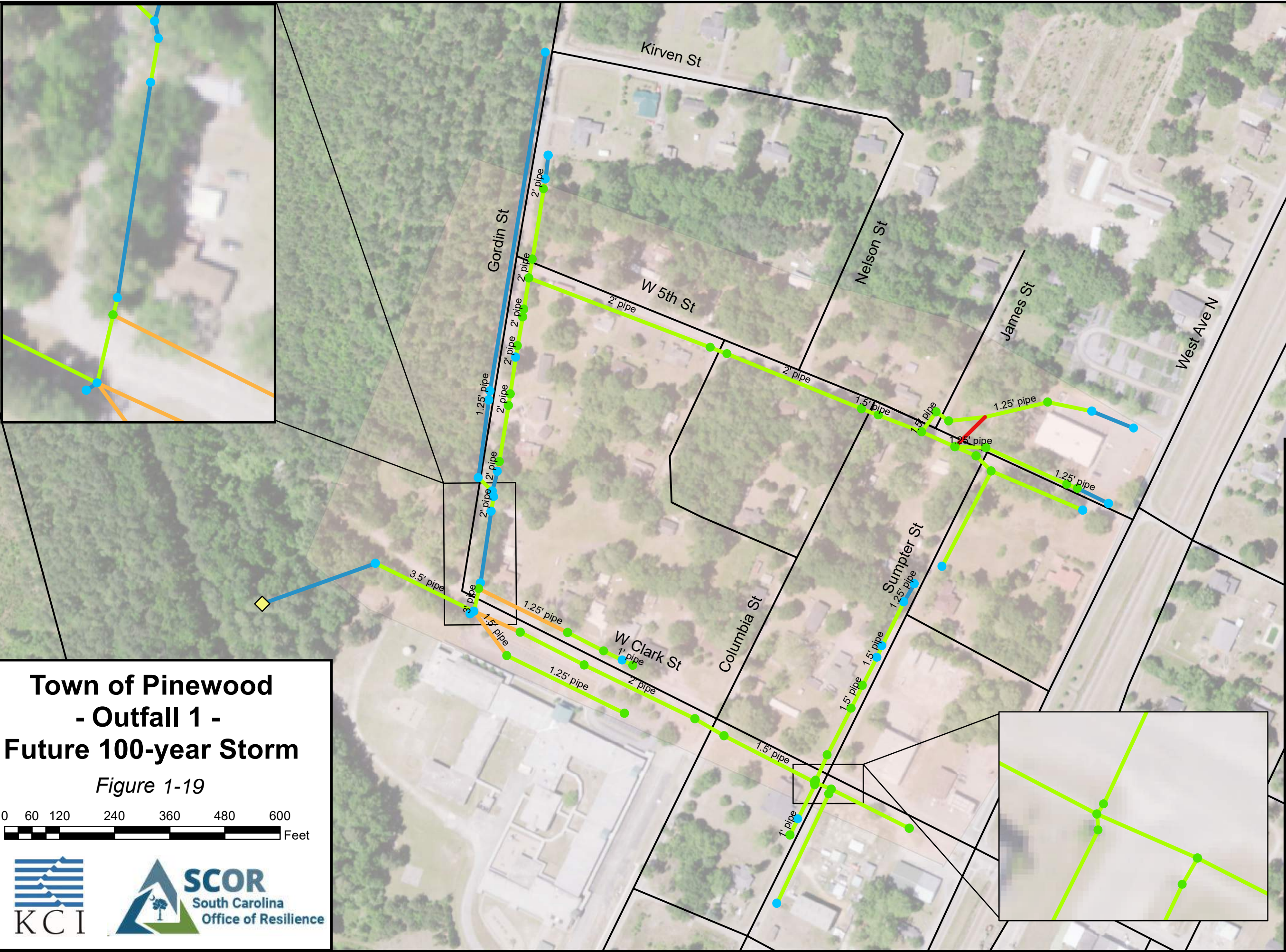
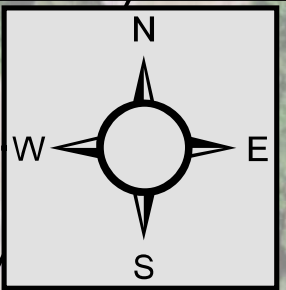
Junctions

- Surcharged
- Contained

Conduits

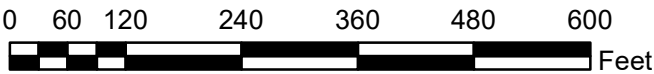
Available Capacity Ratio

- < 0.5
- 0.5 - 0.9
- > 0.9



Town of Pinewood - Outfall 1 - Future 100-year Storm

Figure 1-19



Legend

- ◆ Outfall
- AOI #1

Junctions

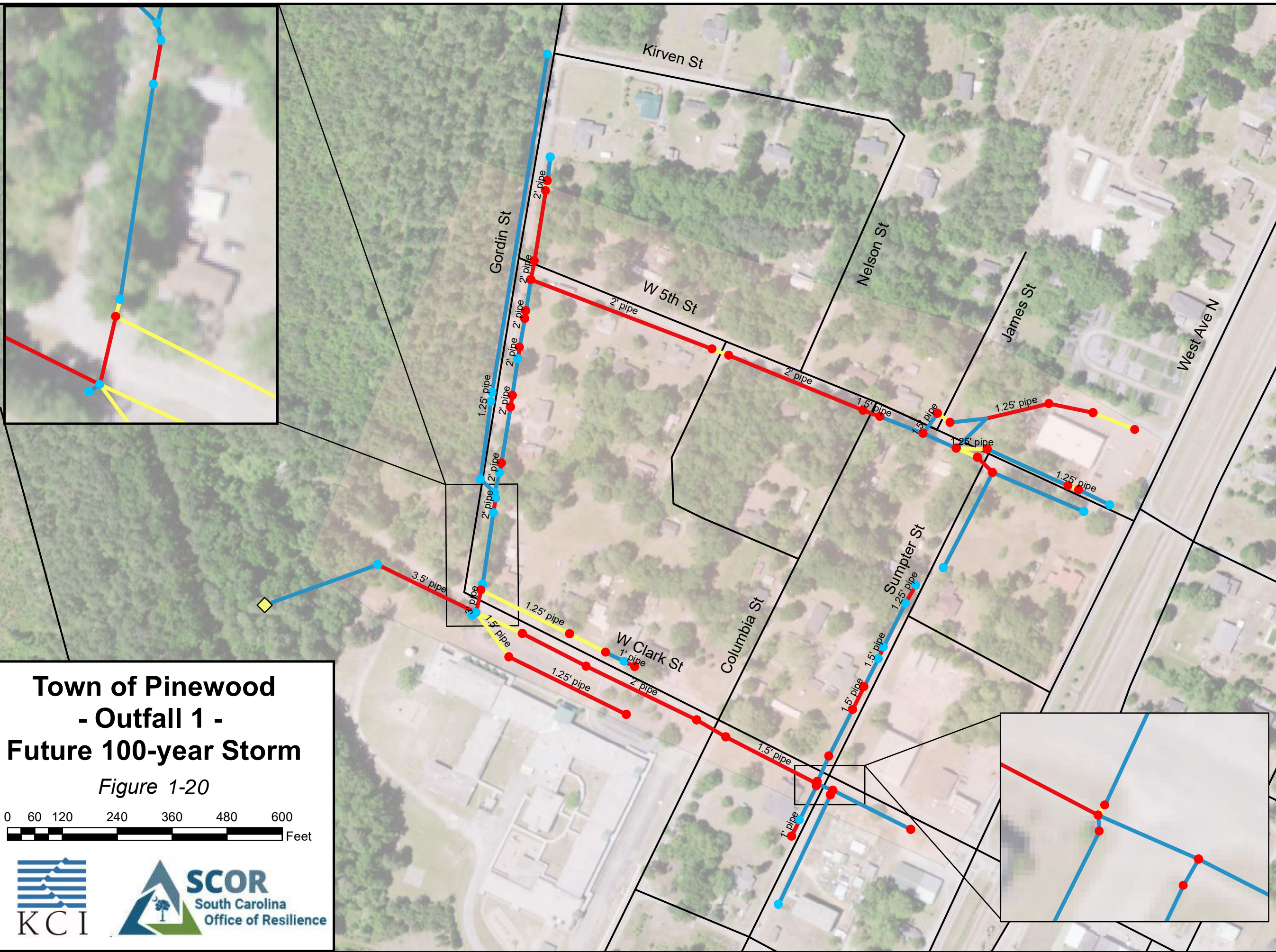
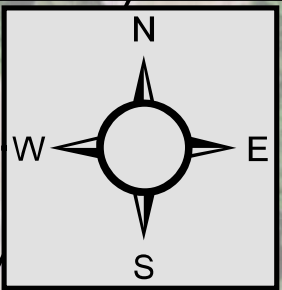
Hours flooded

- < 0.5 hours
- < 4 hours
- < 8 hours
- 8+ hours

Conduits

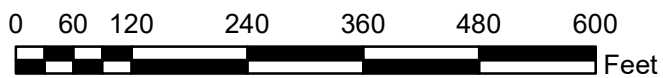
Hours flooded

- < 0.5 hours
- < 4 hours
- < 8 hours
- 8+ hours



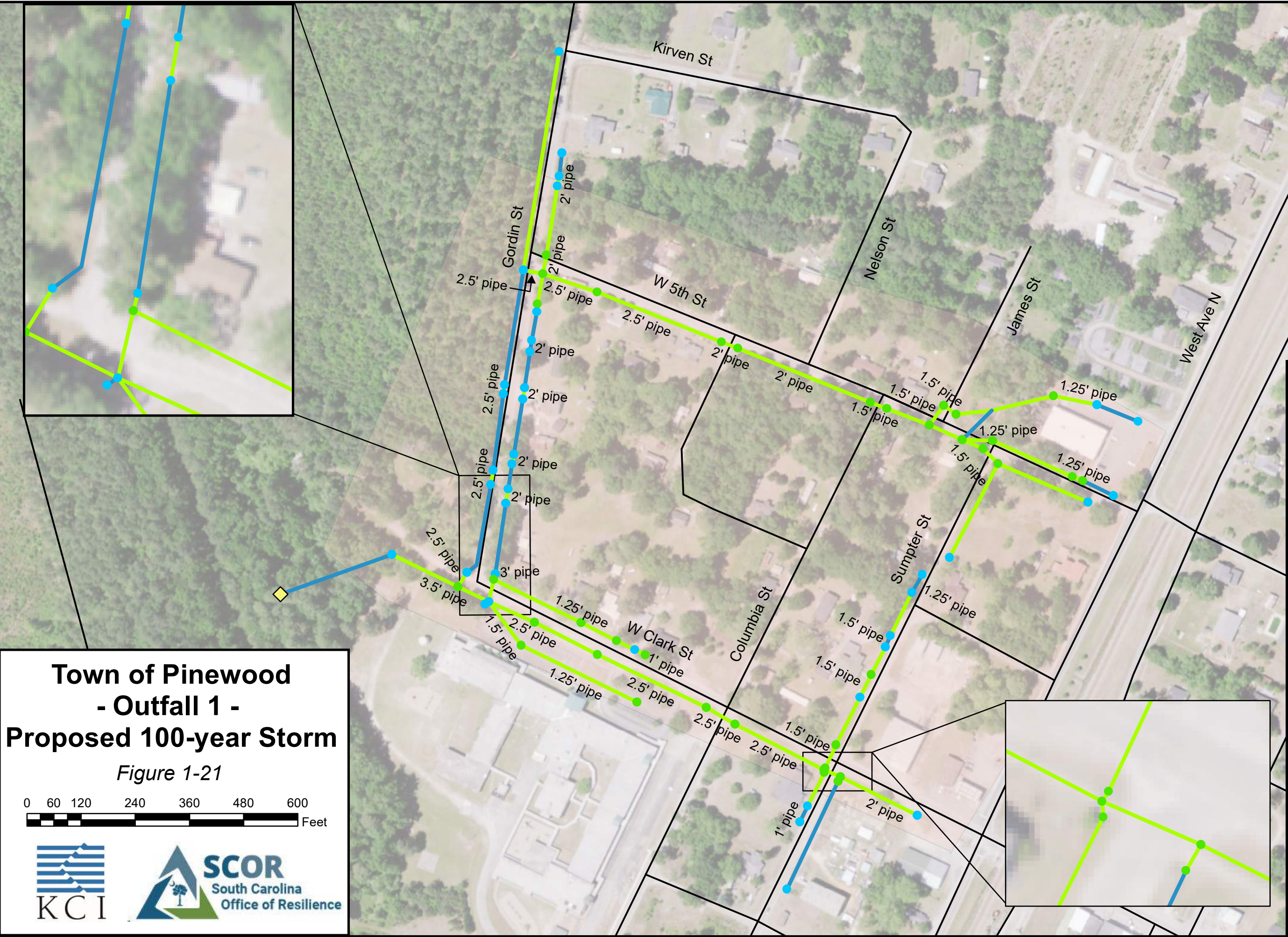
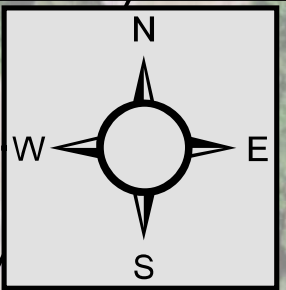
Town of Pinewood - Outfall 1 - Future 100-year Storm

Figure 1-20



Legend

- ◆ Outfall
- AOI #1
- Junctions**
 - Surcharged
 - Contained
- Conduits**
- Available Capacity Ratio**
 - < 0.5
 - 0.5 - 0.9
 - > 0.9



Legend

- ◆ Outfall
- AOI #1

Junctions

Hours flooded

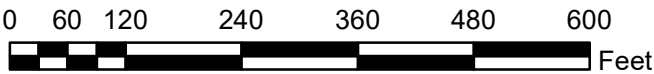
- < 0.5 hours
- < 4 hours
- < 8 hours
- 8+ hours

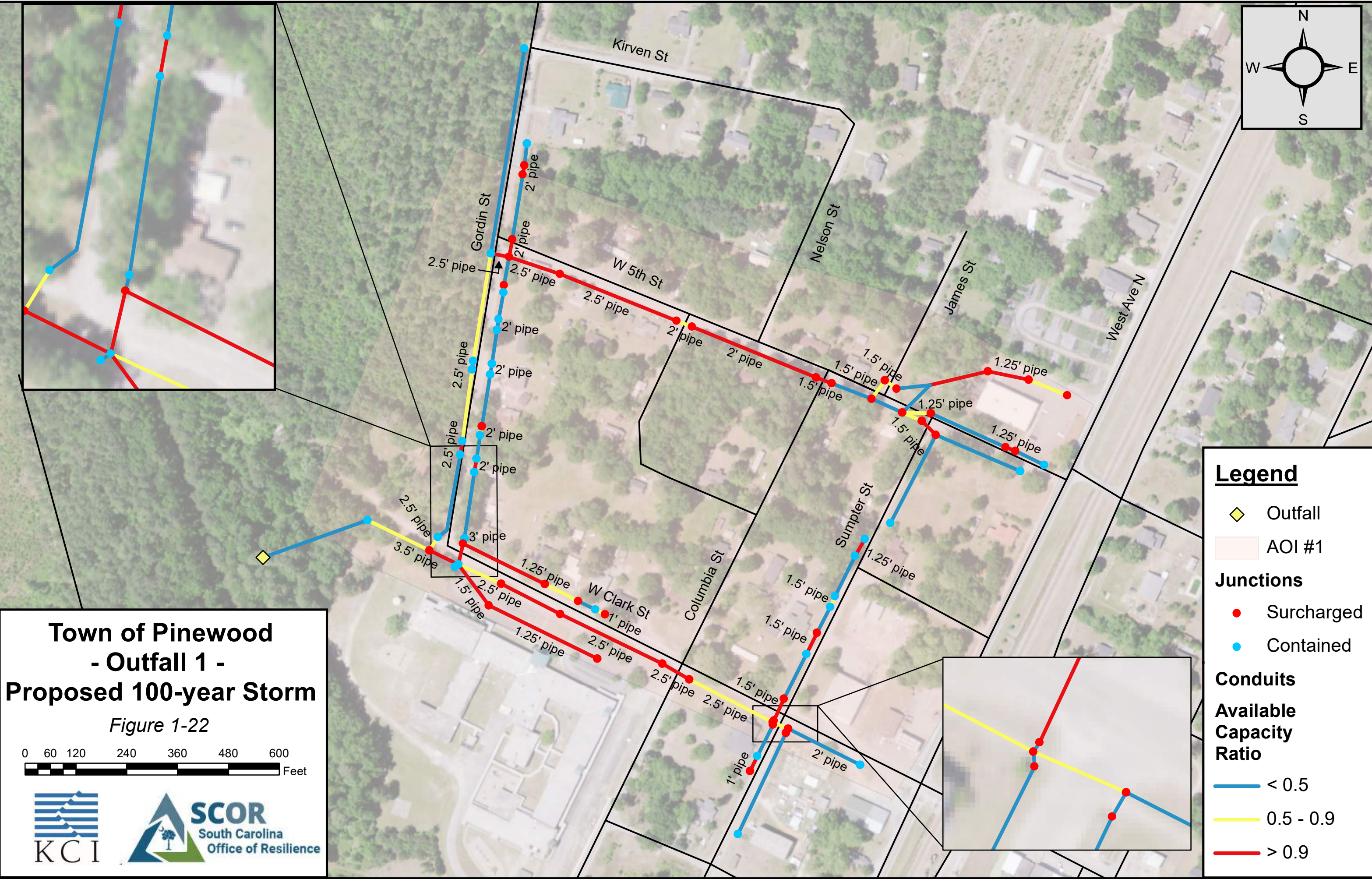
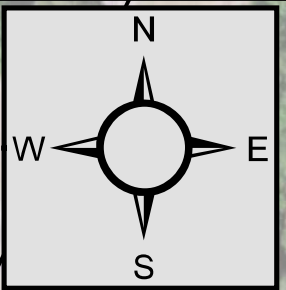
Conduits

Hours flooded

- < 0.5 hours
- < 4 hours
- < 8 hours
- 8+ hours

**Town of Pinewood
- Outfall 1 -
Proposed 100-year Storm**
Figure 1-21



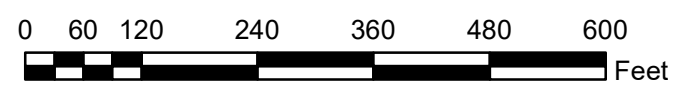


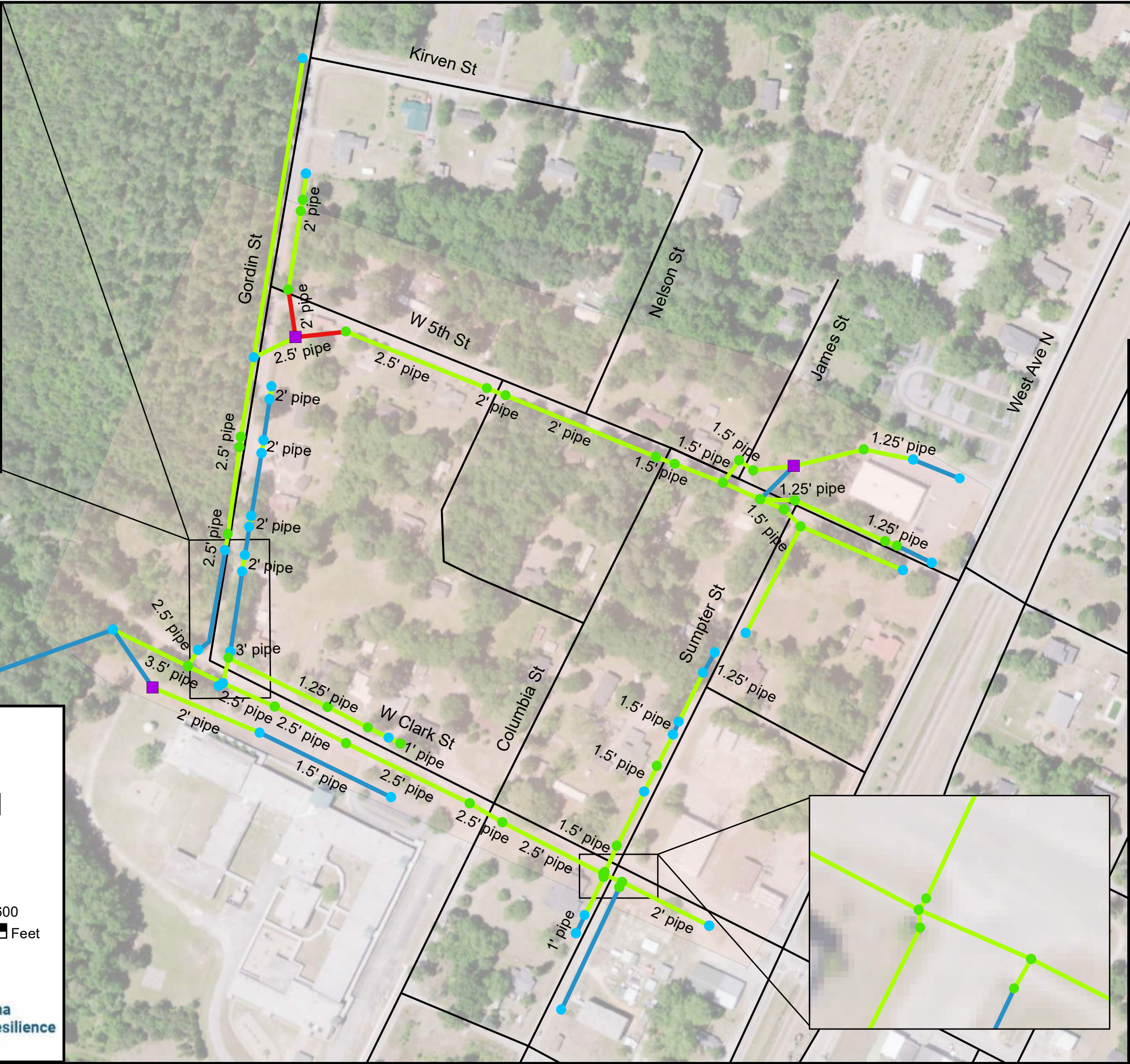
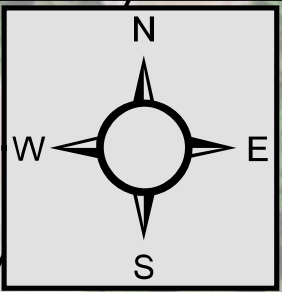
Legend

- ◆ Outfall
- AOI #1
- Junctions**
 - Surcharged
 - Contained
- Conduits**
- Available Capacity Ratio**
 - < 0.5
 - 0.5 - 0.9
 - > 0.9

**Town of Pinewood
- Outfall 1 -
Proposed 100-year Storm**

Figure 1-22





Legend

- ◇ Outfall
- AOI #1
- Storage Basins

Junctions

Hours flooded

- < 0.5 hours
- < 4 hours
- < 8 hours
- 8+ hours

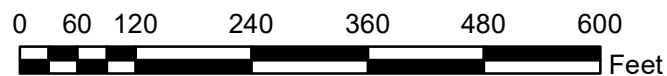
Conduits

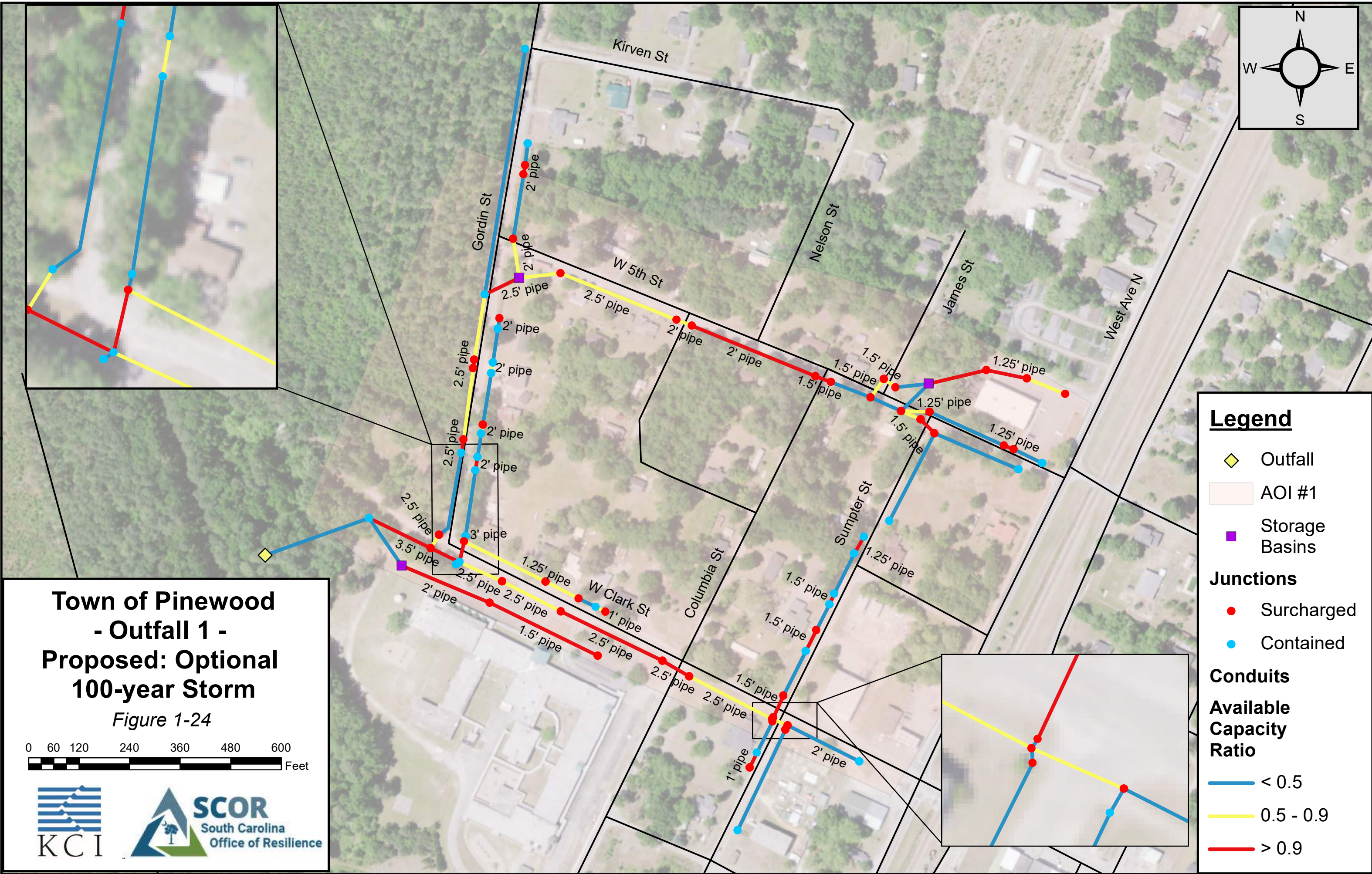
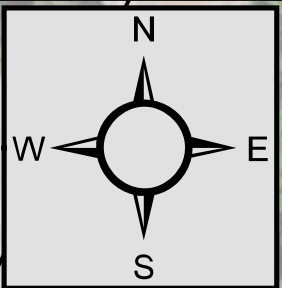
Hours flooded

- < 0.5 hours
- < 4 hours
- < 8 hours
- 8+ hours

**Town of Pinewood
- Outfall 1 -
Proposed: Optional
100-year Storm**

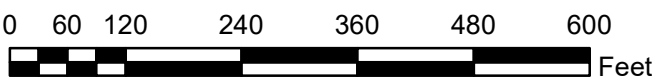
Figure 1-23





Town of Pinewood - Outfall 1 - Proposed: Optional 100-year Storm

Figure 1-24



Legend

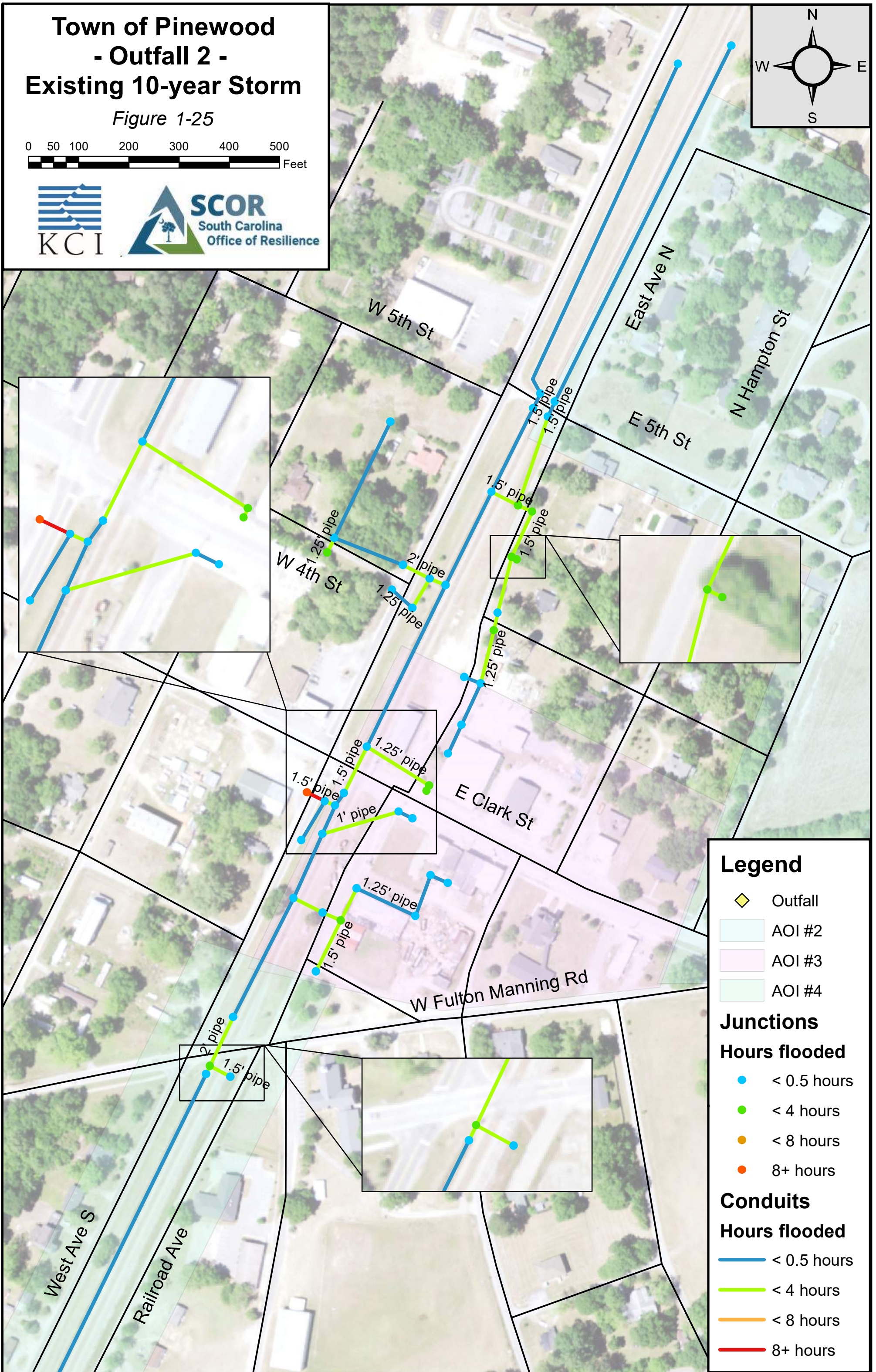
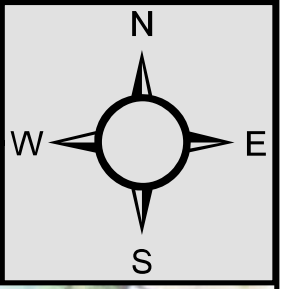
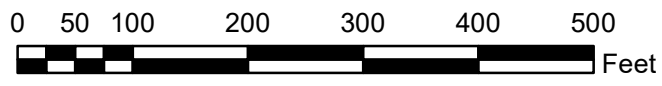
- ◇ Outfall
- AOI #1
- Storage Basins

- ### Junctions
- Surcharged
 - Contained

- ### Conduits
- #### Available Capacity Ratio
- < 0.5
 - 0.5 - 0.9
 - > 0.9

Town of Pinewood - Outfall 2 - Existing 10-year Storm

Figure 1-25



Legend

- Outfall
- AOI #2
- AOI #3
- AOI #4

Junctions

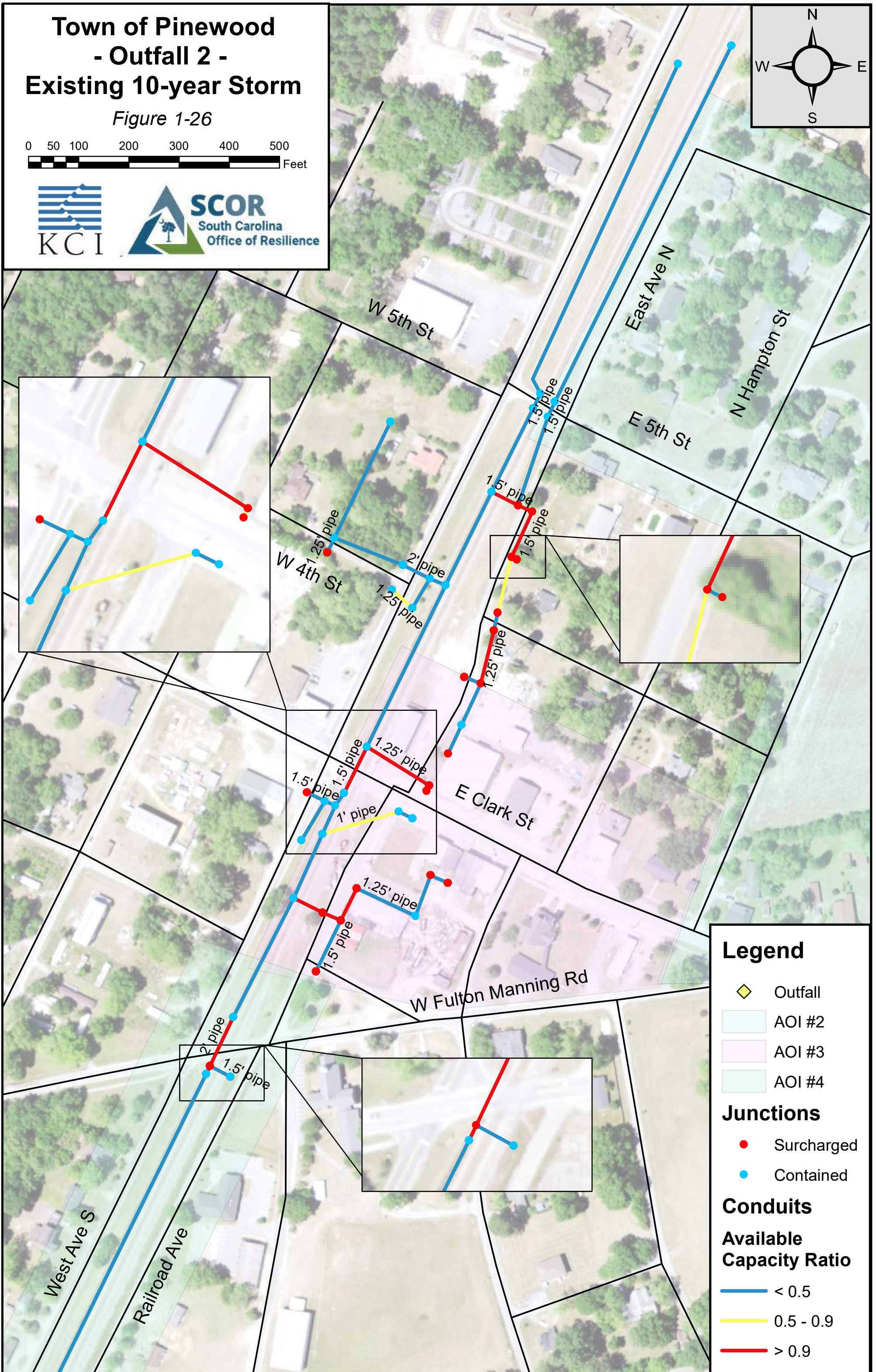
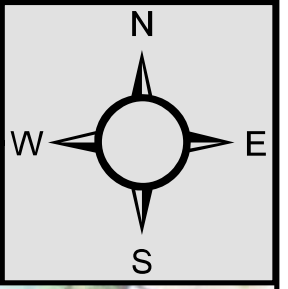
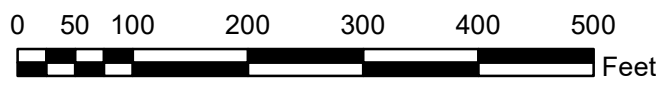
- ### Hours flooded
- < 0.5 hours
 - < 4 hours
 - < 8 hours
 - 8+ hours

Conduits

- ### Hours flooded
- < 0.5 hours
 - < 4 hours
 - < 8 hours
 - 8+ hours

Town of Pinewood - Outfall 2 - Existing 10-year Storm

Figure 1-26



Legend

- Outfall
- AOI #2
- AOI #3
- AOI #4

Junctions

- Surcharged
- Contained

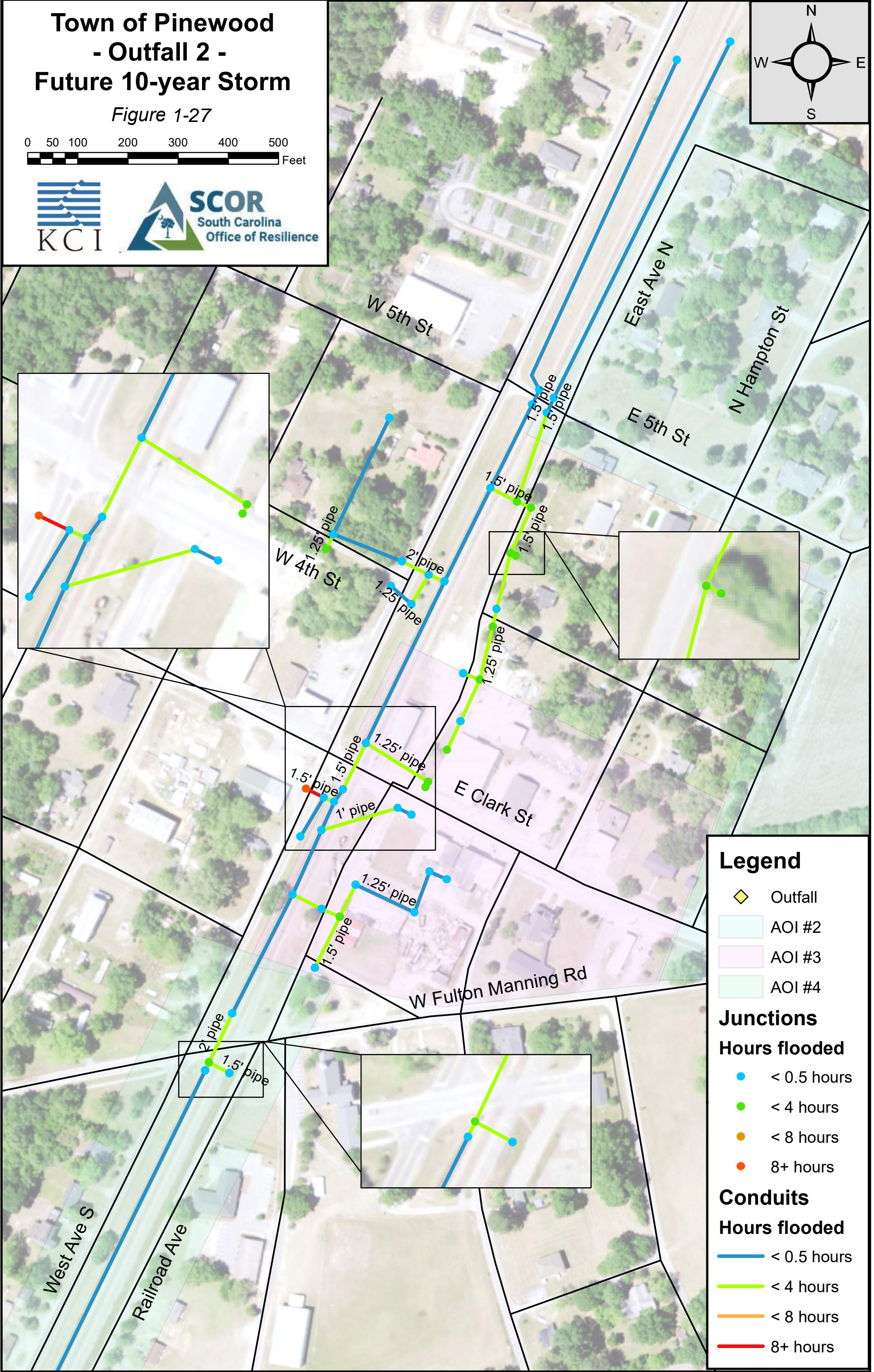
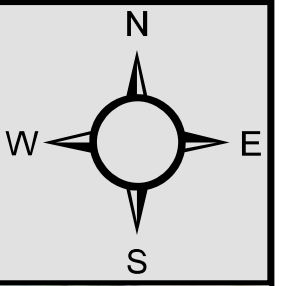
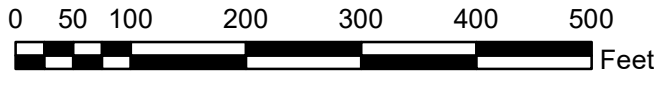
Conduits

Available Capacity Ratio

- < 0.5
- 0.5 - 0.9
- > 0.9

Town of Pinewood - Outfall 2 - Future 10-year Storm

Figure 1-27



Legend

- Outfall
- AOI #2
- AOI #3
- AOI #4

Junctions

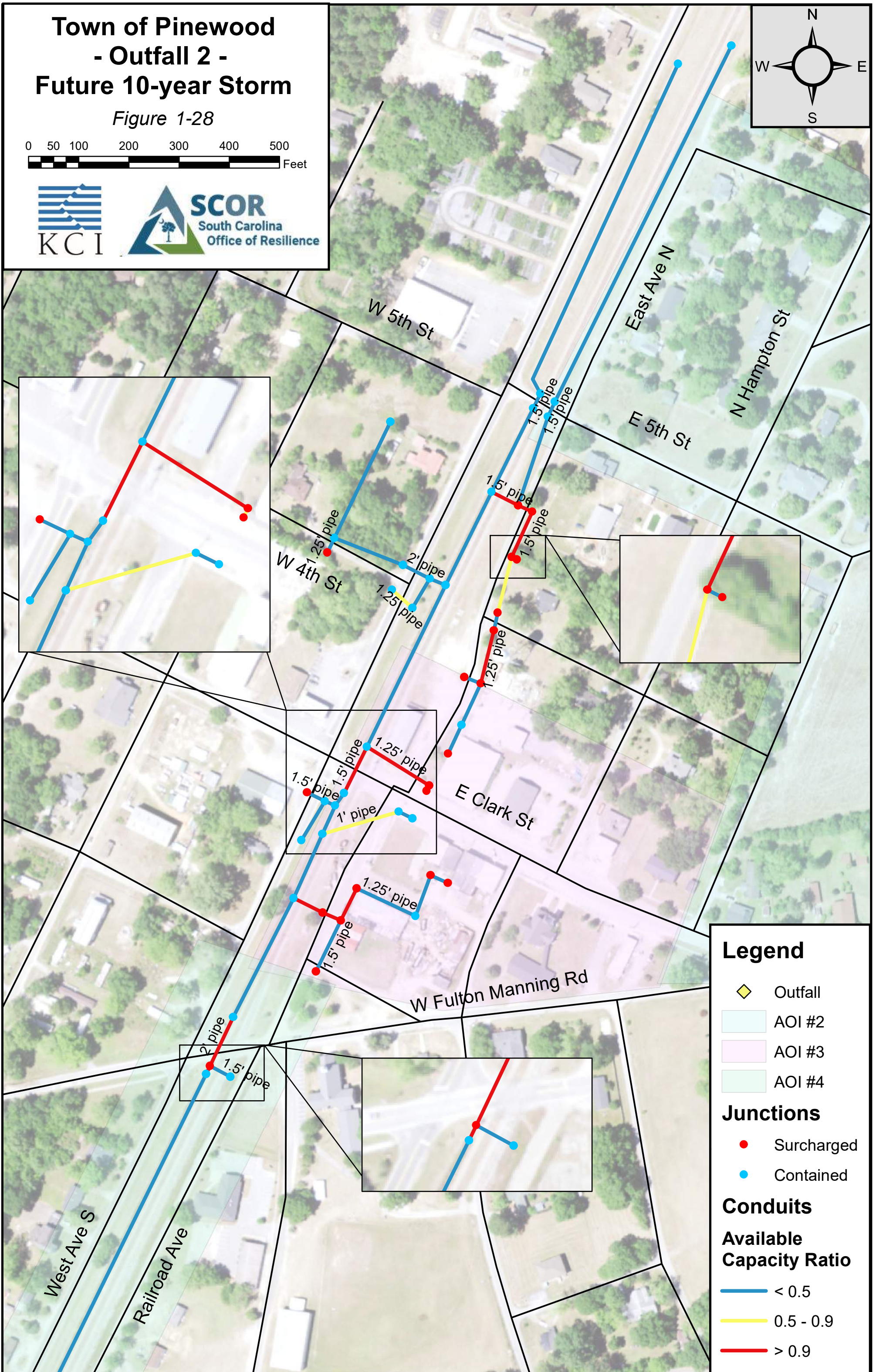
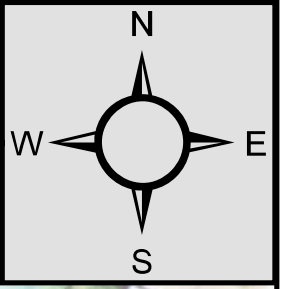
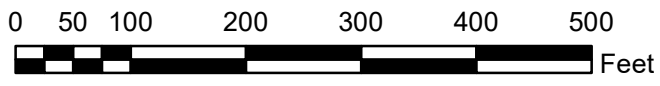
- ### Hours flooded
- < 0.5 hours
 - < 4 hours
 - < 8 hours
 - 8+ hours

Conduits

- ### Hours flooded
- < 0.5 hours
 - < 4 hours
 - < 8 hours
 - 8+ hours

Town of Pinewood - Outfall 2 - Future 10-year Storm

Figure 1-28



Legend

- Outfall
- AOI #2
- AOI #3
- AOI #4

Junctions

- Surcharged
- Contained

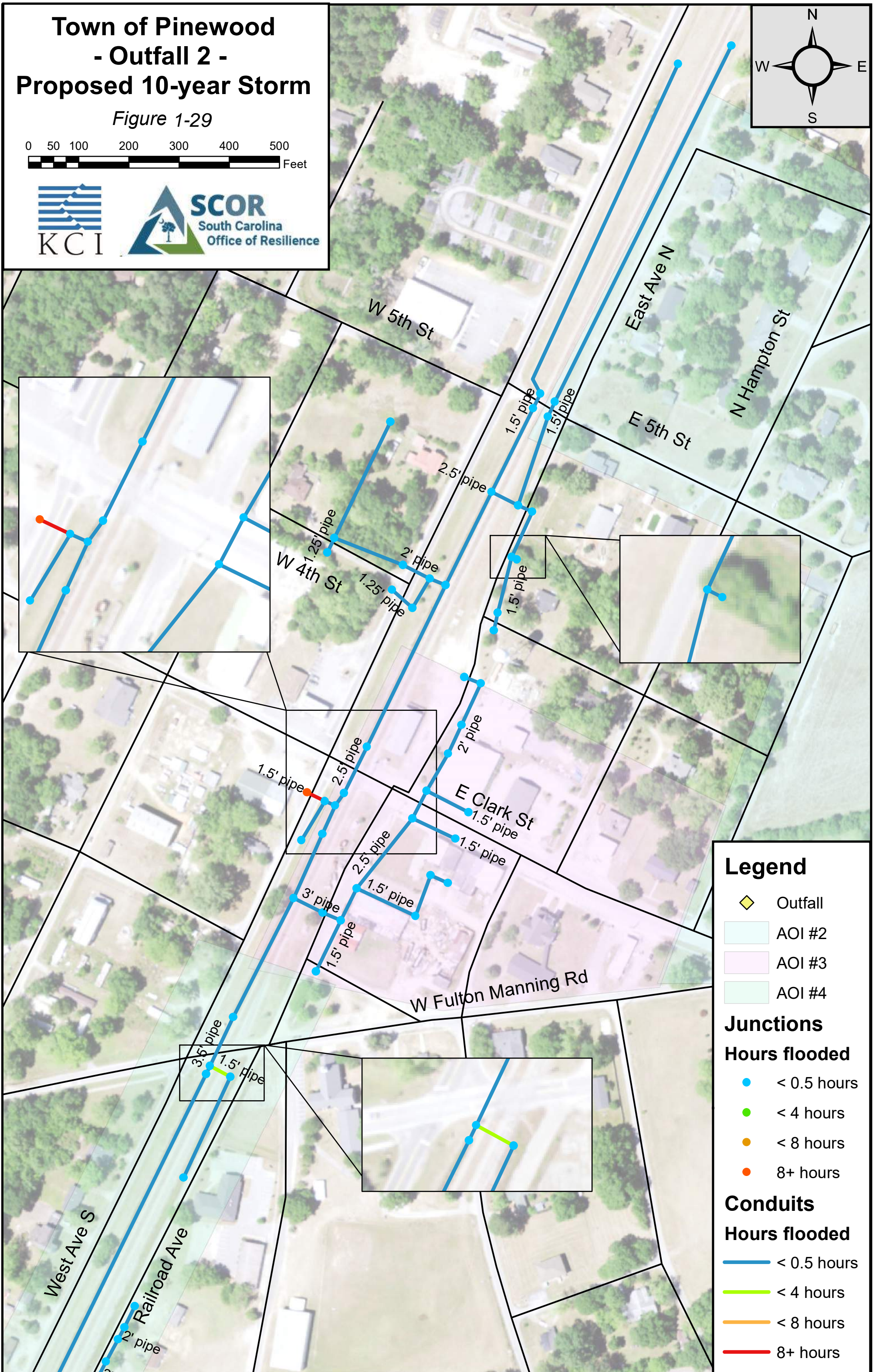
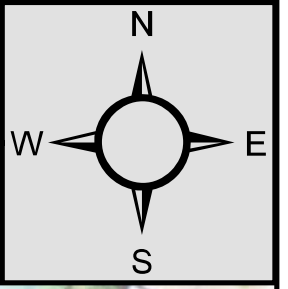
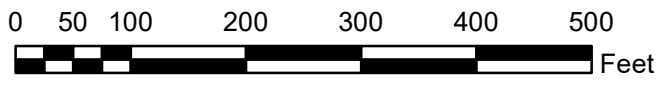
Conduits

Available Capacity Ratio

- < 0.5
- 0.5 - 0.9
- > 0.9

Town of Pinewood - Outfall 2 - Proposed 10-year Storm

Figure 1-29



Legend

- Outfall
- AOI #2
- AOI #3
- AOI #4

Junctions

Hours flooded

- < 0.5 hours
- < 4 hours
- < 8 hours
- 8+ hours

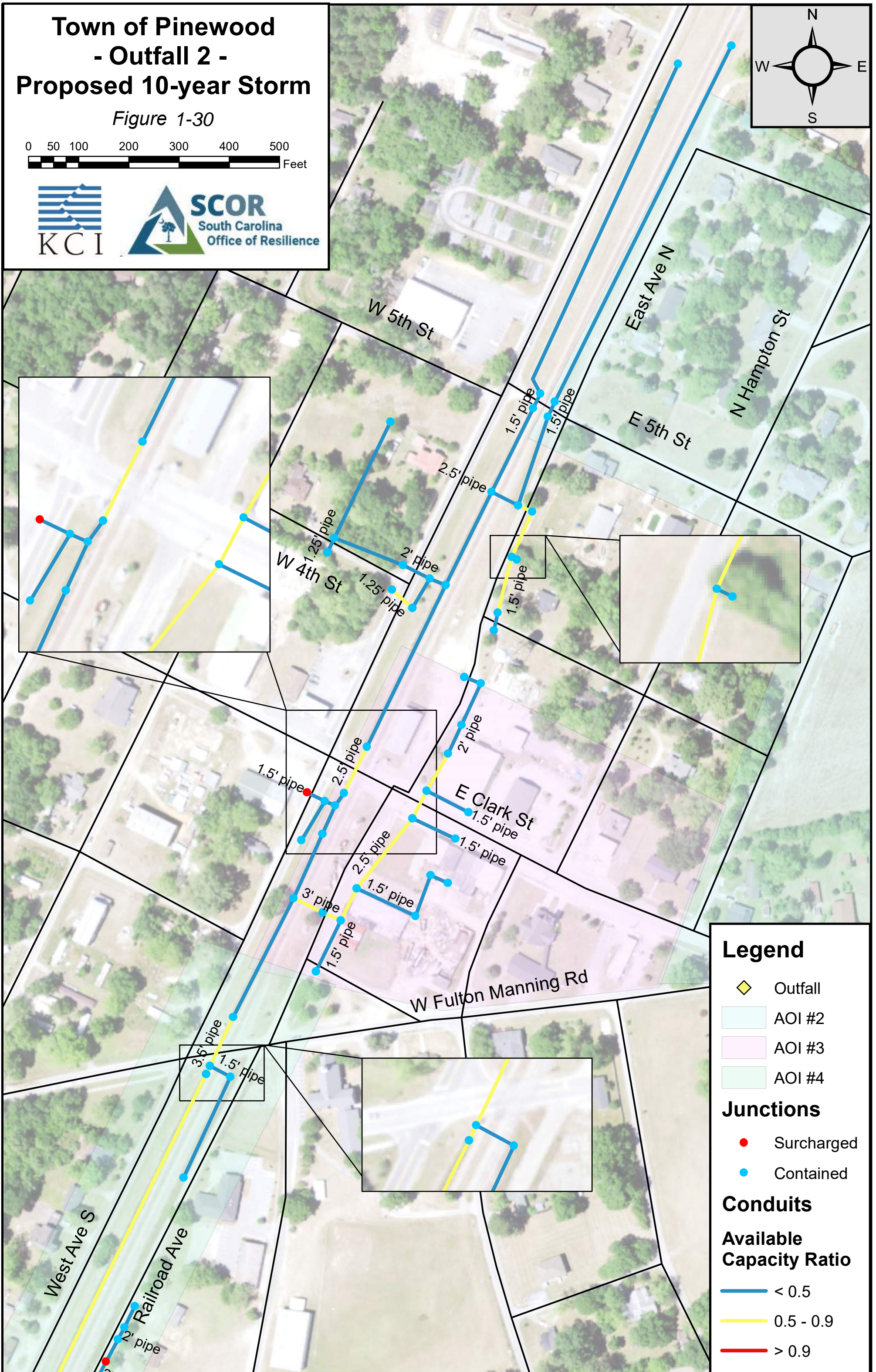
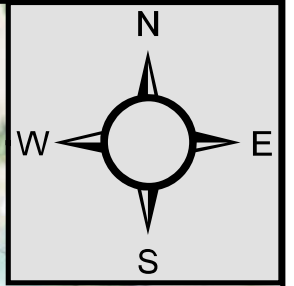
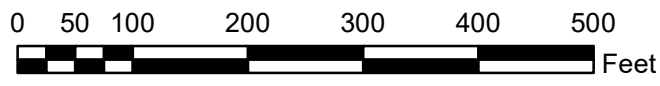
Conduits

Hours flooded

- < 0.5 hours
- < 4 hours
- < 8 hours
- 8+ hours

Town of Pinewood - Outfall 2 - Proposed 10-year Storm

Figure 1-30



Legend

- Outfall
- AOI #2
- AOI #3
- AOI #4

Junctions

- Surcharged
- Contained

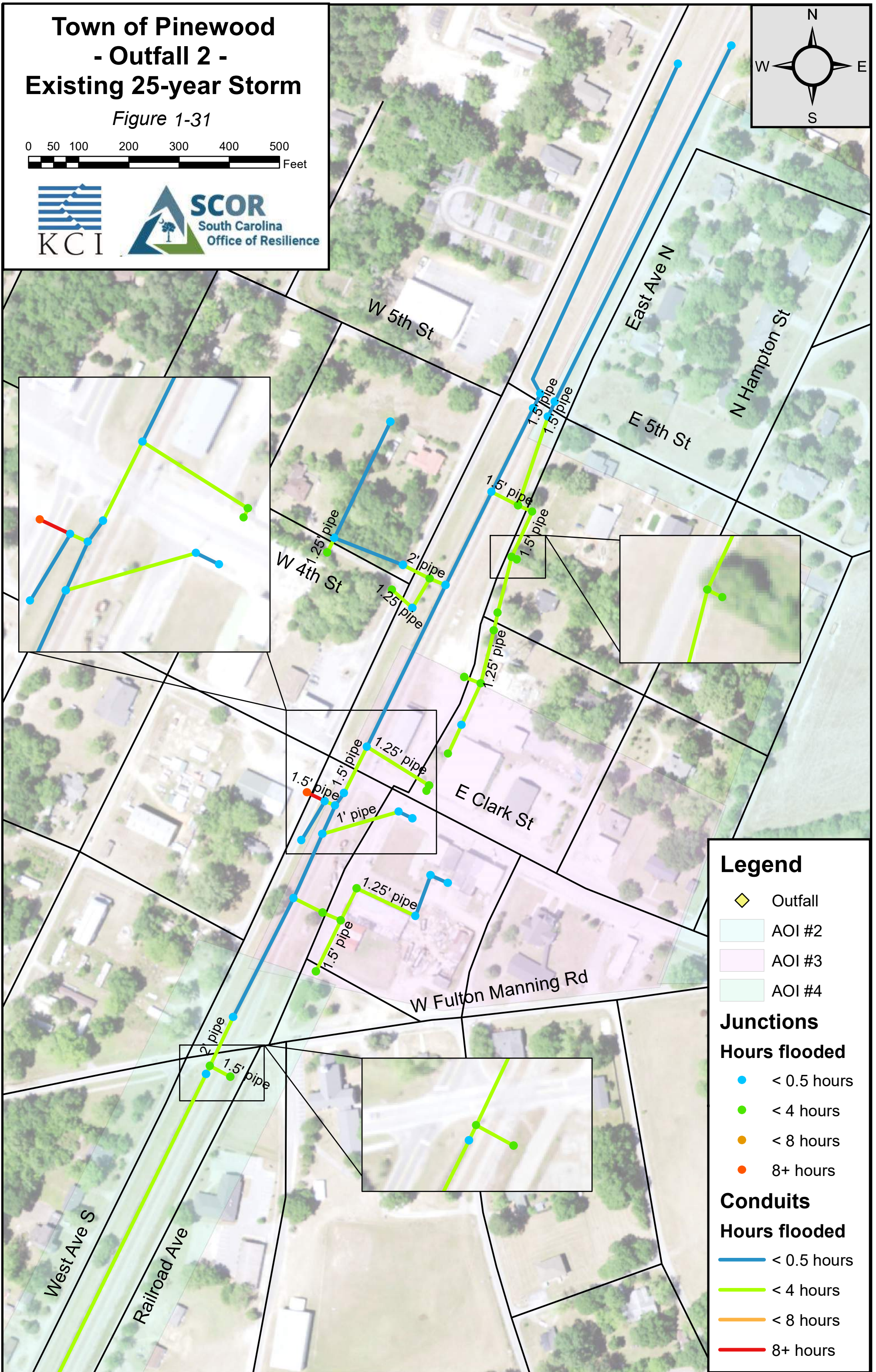
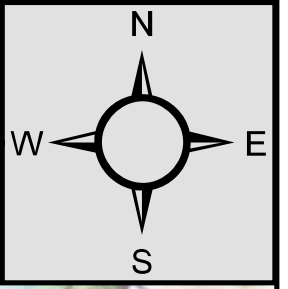
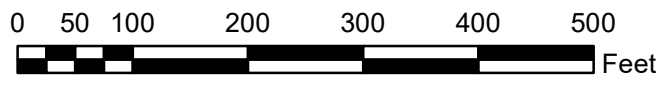
Conduits

Available Capacity Ratio

- < 0.5
- 0.5 - 0.9
- > 0.9

Town of Pinewood - Outfall 2 - Existing 25-year Storm

Figure 1-31



Legend

- Outfall
- AOI #2
- AOI #3
- AOI #4

Junctions

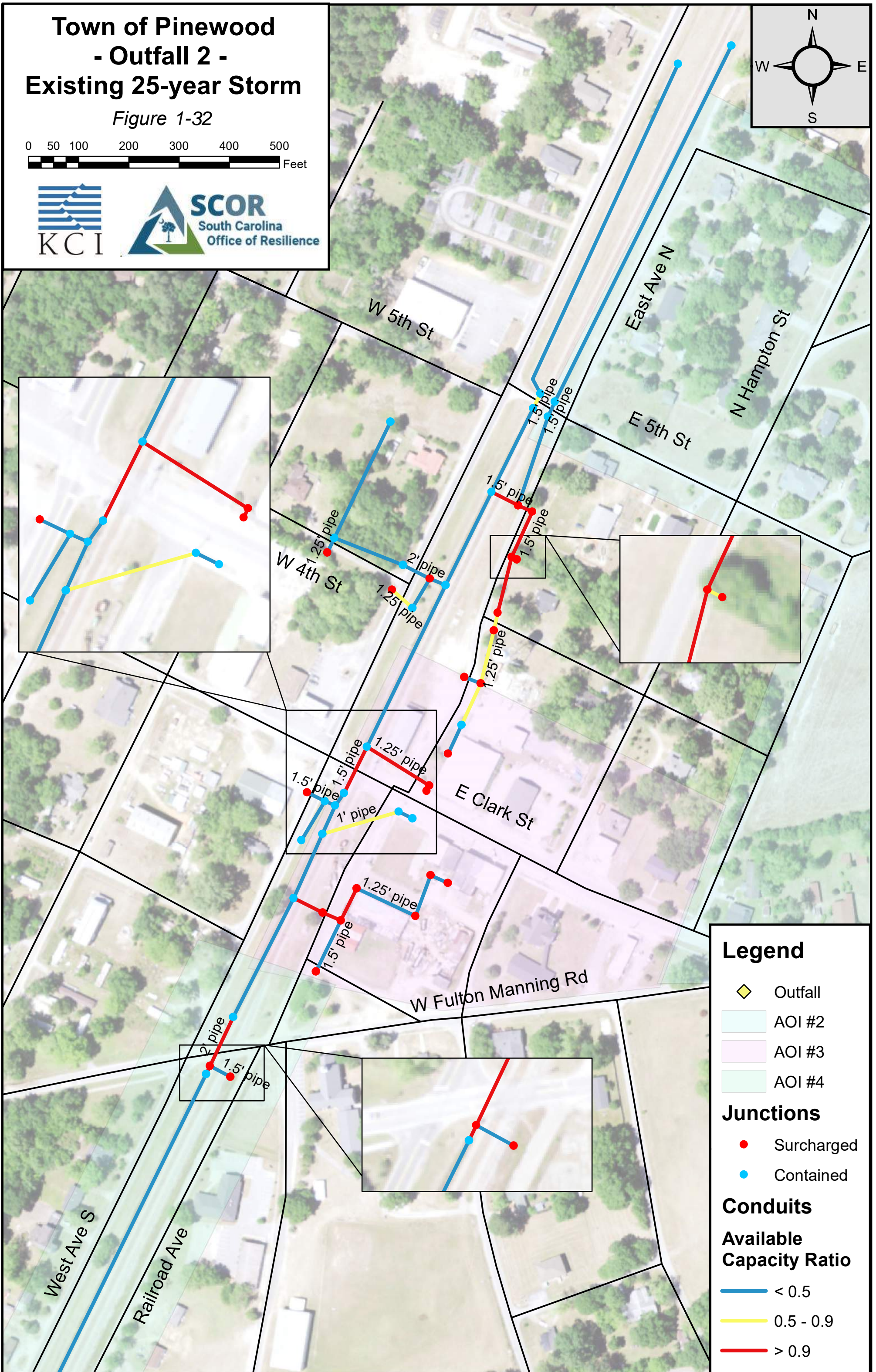
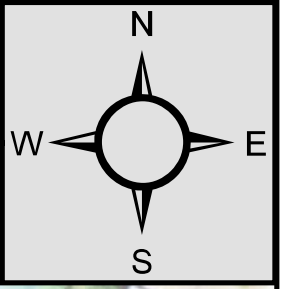
- ### Hours flooded
- < 0.5 hours
 - < 4 hours
 - < 8 hours
 - 8+ hours

Conduits

- ### Hours flooded
- < 0.5 hours
 - < 4 hours
 - < 8 hours
 - 8+ hours

Town of Pinewood - Outfall 2 - Existing 25-year Storm

Figure 1-32



Legend

- Outfall
- AOI #2
- AOI #3
- AOI #4

Junctions

- Surcharged
- Contained

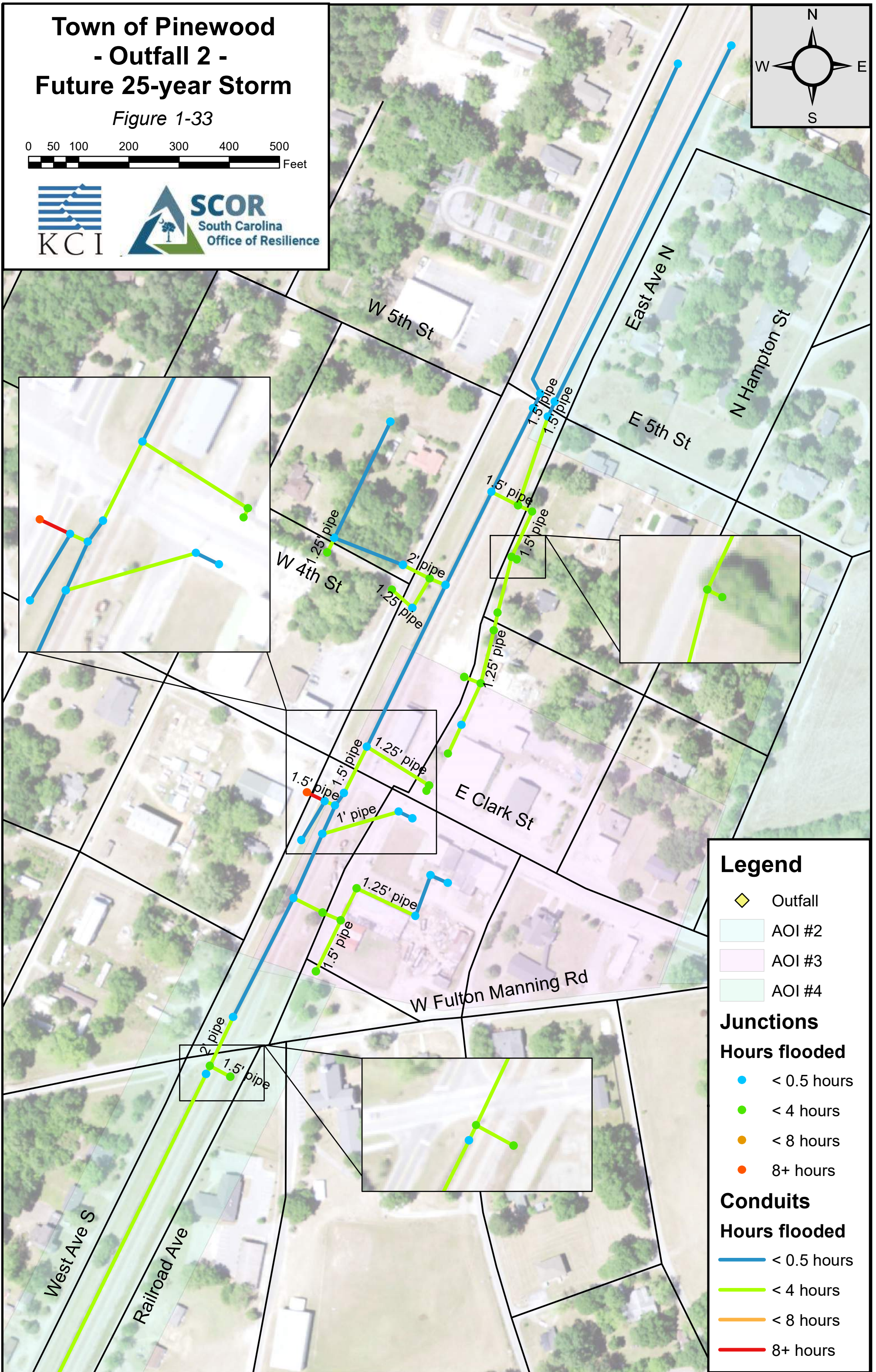
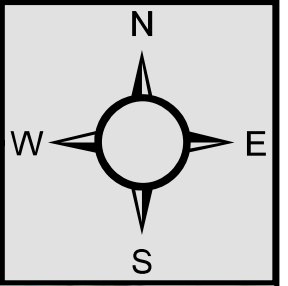
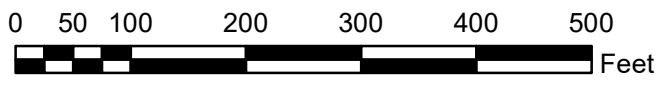
Conduits

Available Capacity Ratio

- < 0.5
- 0.5 - 0.9
- > 0.9

Town of Pinewood - Outfall 2 - Future 25-year Storm

Figure 1-33



Legend

- Outfall
- AOI #2
- AOI #3
- AOI #4

Junctions

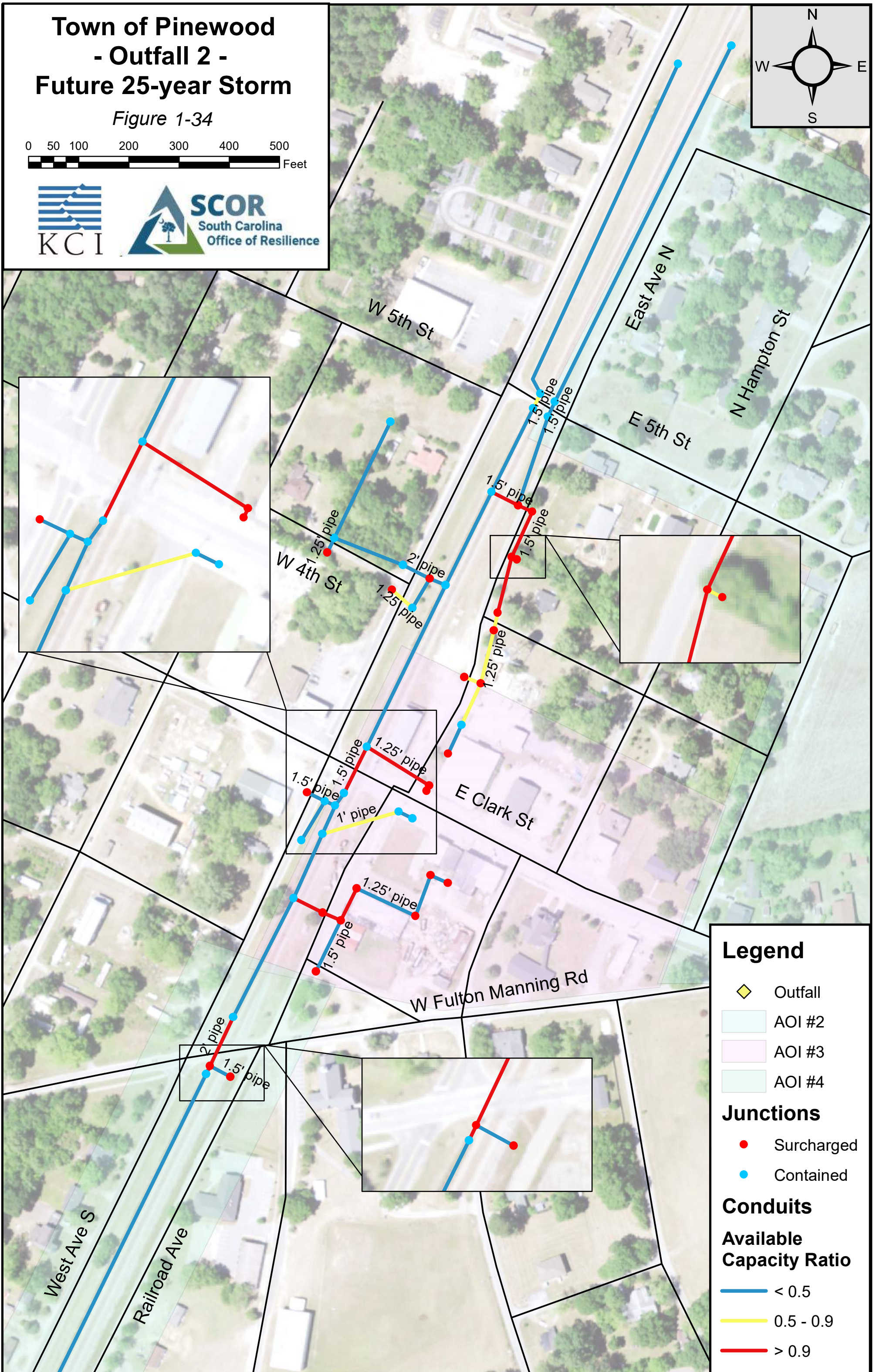
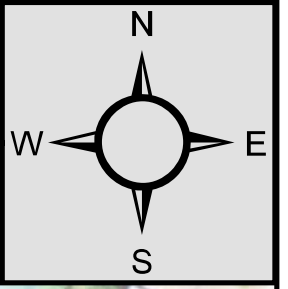
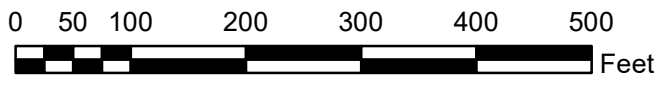
- Hours flooded**
- < 0.5 hours
 - < 4 hours
 - < 8 hours
 - 8+ hours

Conduits

- Hours flooded**
- < 0.5 hours
 - < 4 hours
 - < 8 hours
 - 8+ hours

Town of Pinewood - Outfall 2 - Future 25-year Storm

Figure 1-34



Legend

- Outfall
- AOI #2
- AOI #3
- AOI #4

Junctions

- Surcharged
- Contained

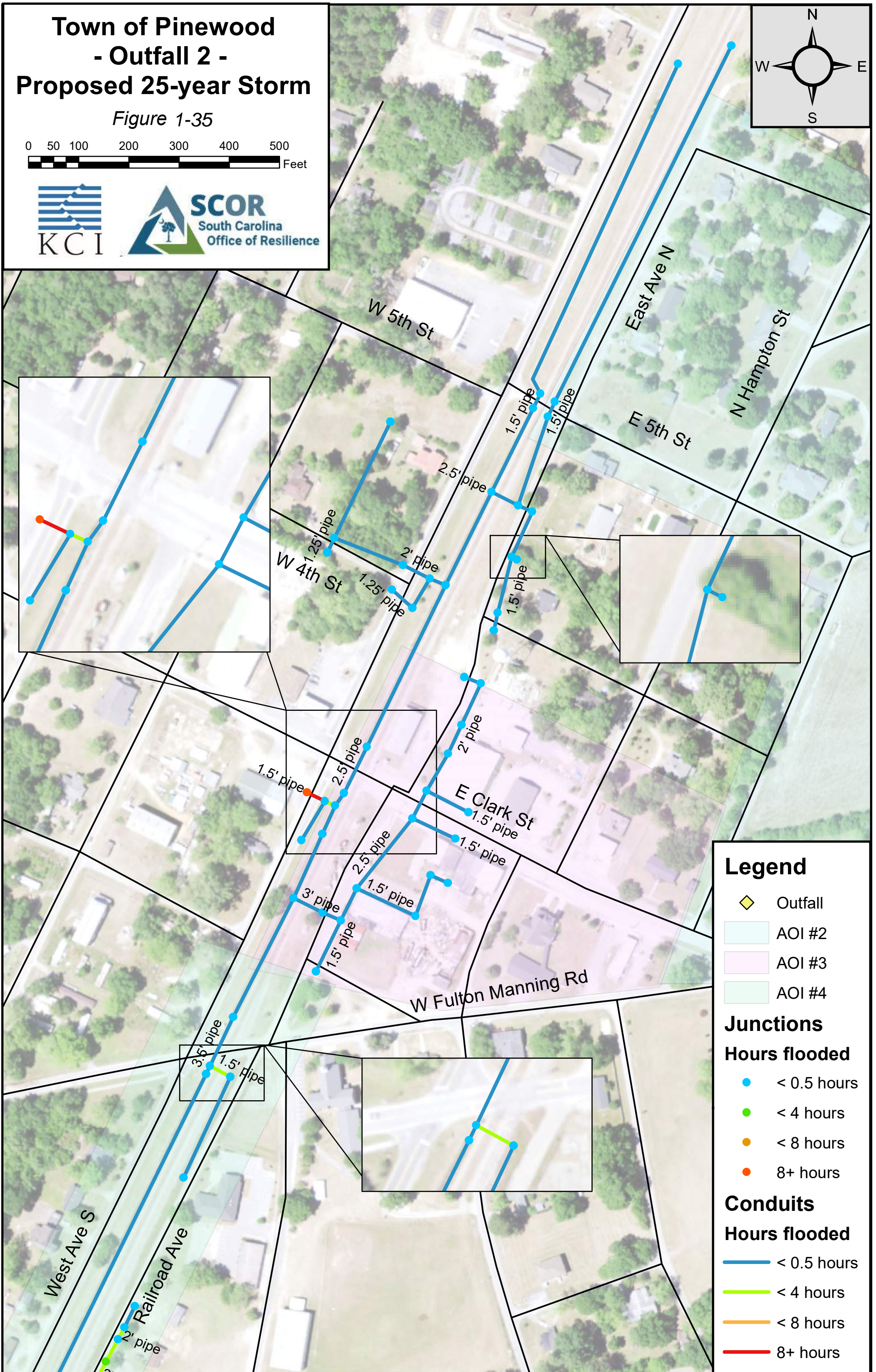
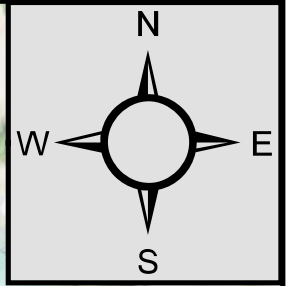
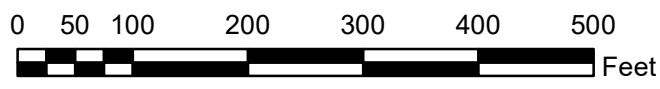
Conduits

Available Capacity Ratio

- < 0.5
- 0.5 - 0.9
- > 0.9

Town of Pinewood - Outfall 2 - Proposed 25-year Storm

Figure 1-35



Legend

- Outfall
- AOI #2
- AOI #3
- AOI #4

Junctions

Hours flooded

- < 0.5 hours
- < 4 hours
- < 8 hours
- 8+ hours

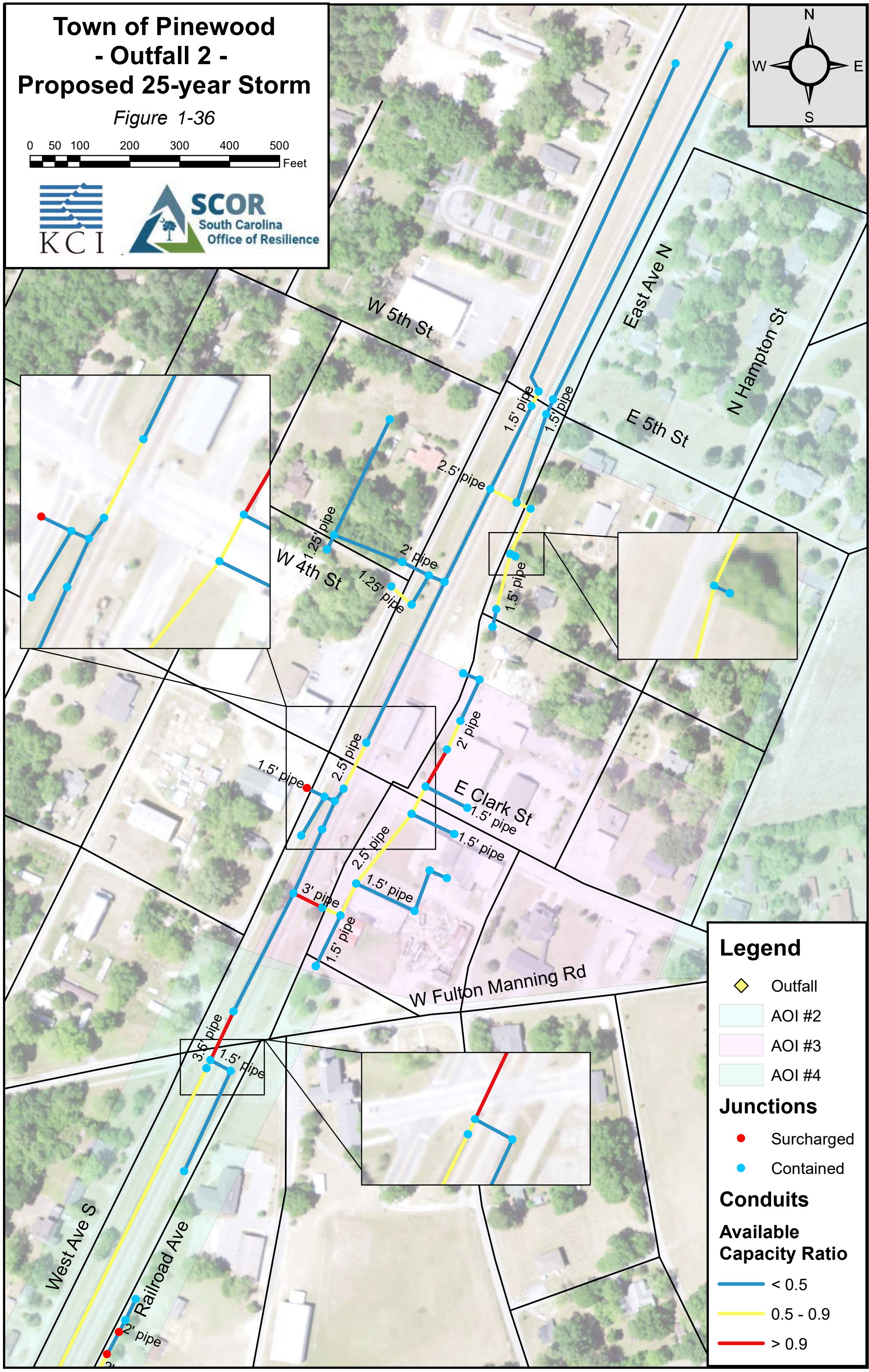
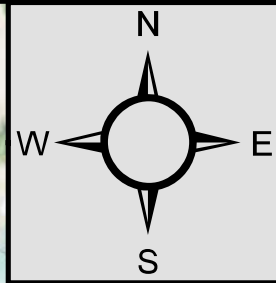
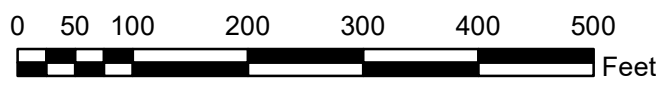
Conduits

Hours flooded

- < 0.5 hours
- < 4 hours
- < 8 hours
- 8+ hours

Town of Pinewood - Outfall 2 - Proposed 25-year Storm

Figure 1-36



Legend

- Outfall
- AOI #2
- AOI #3
- AOI #4

Junctions

- Surcharged
- Contained

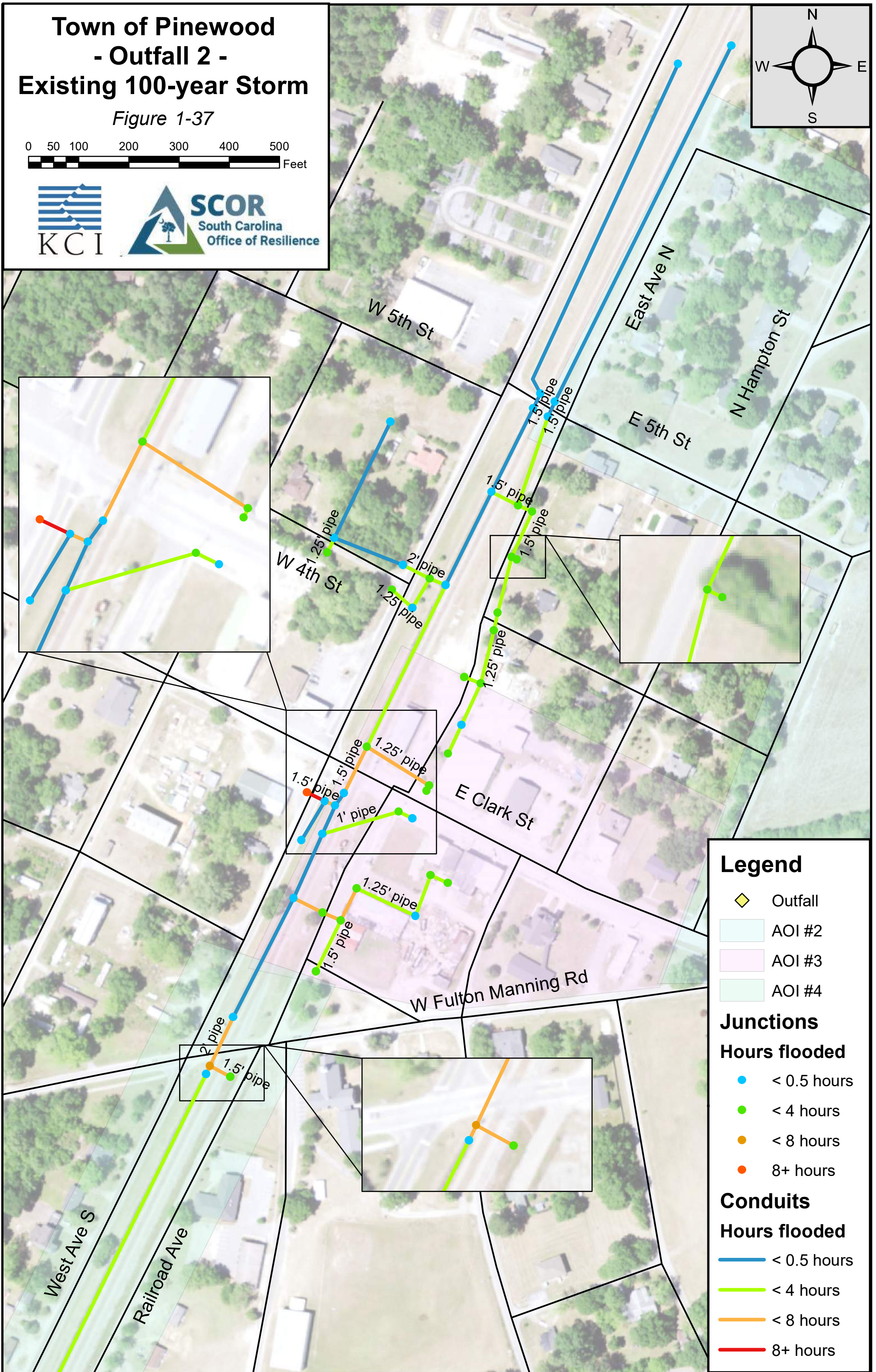
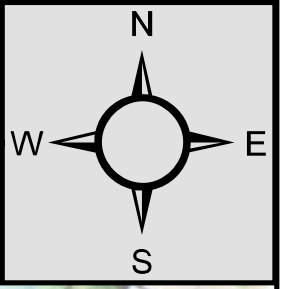
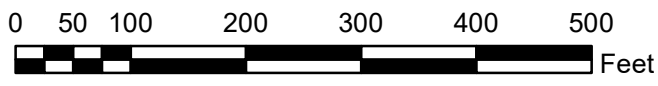
Conduits

Available Capacity Ratio

- < 0.5
- 0.5 - 0.9
- > 0.9

Town of Pinewood - Outfall 2 - Existing 100-year Storm

Figure 1-37



Legend

- Outfall
- AOI #2
- AOI #3
- AOI #4

Junctions

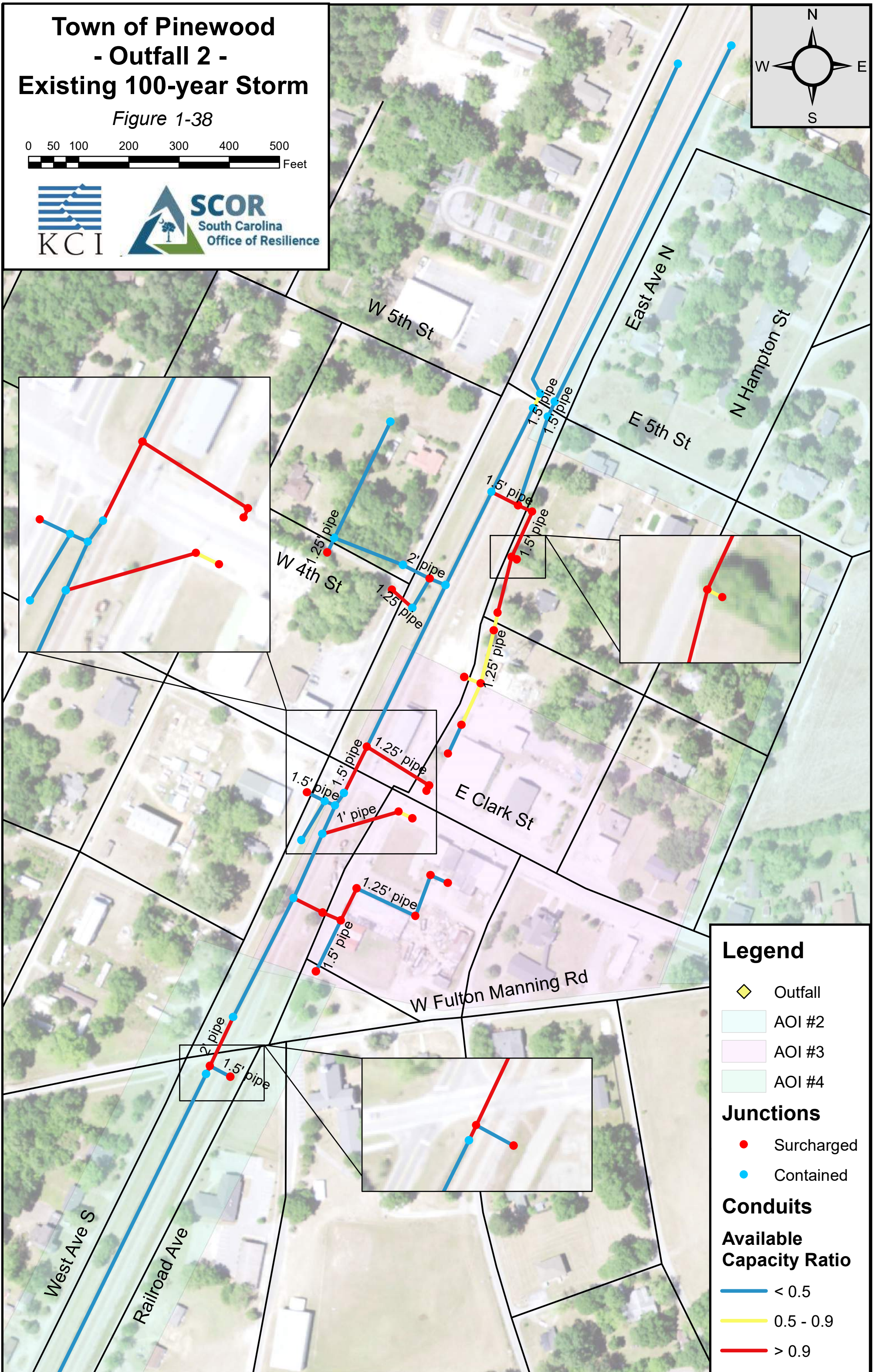
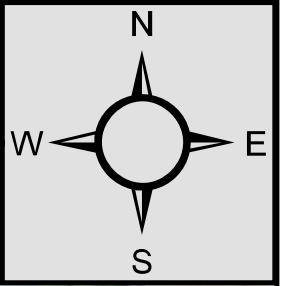
- Hours flooded**
- < 0.5 hours
 - < 4 hours
 - < 8 hours
 - 8+ hours

Conduits

- Hours flooded**
- < 0.5 hours
 - < 4 hours
 - < 8 hours
 - 8+ hours

Town of Pinewood - Outfall 2 - Existing 100-year Storm

Figure 1-38



Legend

- Outfall
- AOI #2
- AOI #3
- AOI #4

Junctions

- Surcharged
- Contained

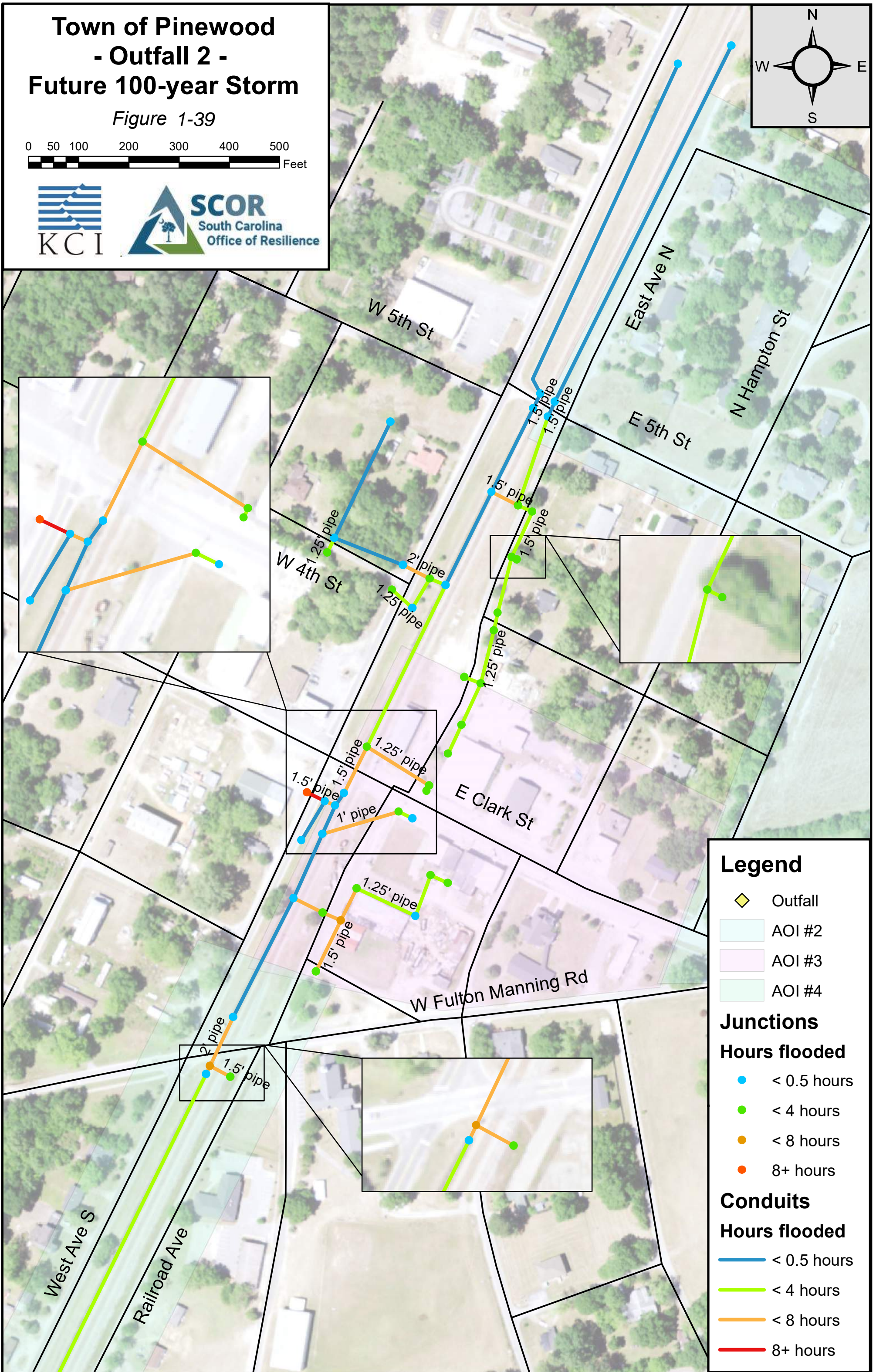
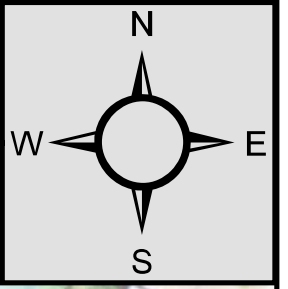
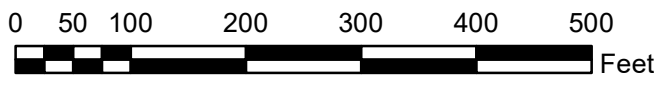
Conduits

Available Capacity Ratio

- < 0.5
- 0.5 - 0.9
- > 0.9

Town of Pinewood - Outfall 2 - Future 100-year Storm

Figure 1-39



Legend

- Outfall
- AOI #2
- AOI #3
- AOI #4

Junctions

Hours flooded

- < 0.5 hours
- < 4 hours
- < 8 hours
- 8+ hours

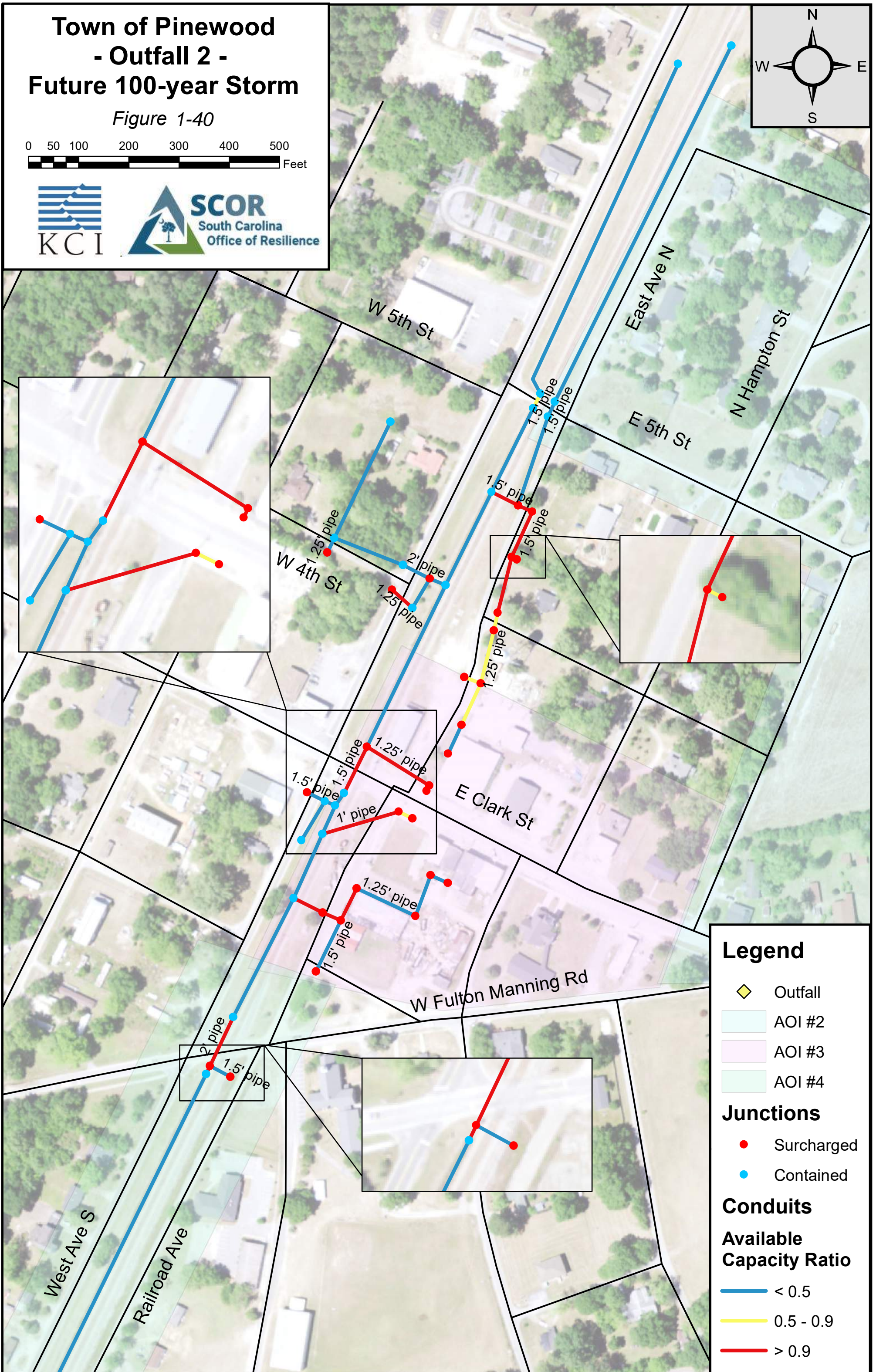
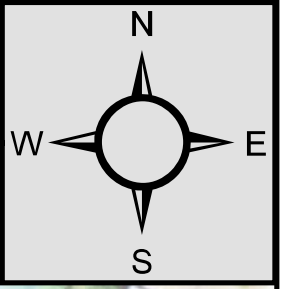
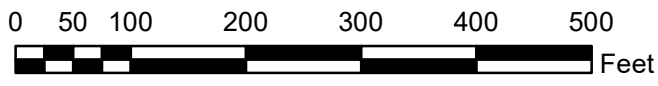
Conduits

Hours flooded

- < 0.5 hours
- < 4 hours
- < 8 hours
- 8+ hours

Town of Pinewood - Outfall 2 - Future 100-year Storm

Figure 1-40



Legend

- Outfall
- AOI #2
- AOI #3
- AOI #4

Junctions

- Surcharged
- Contained

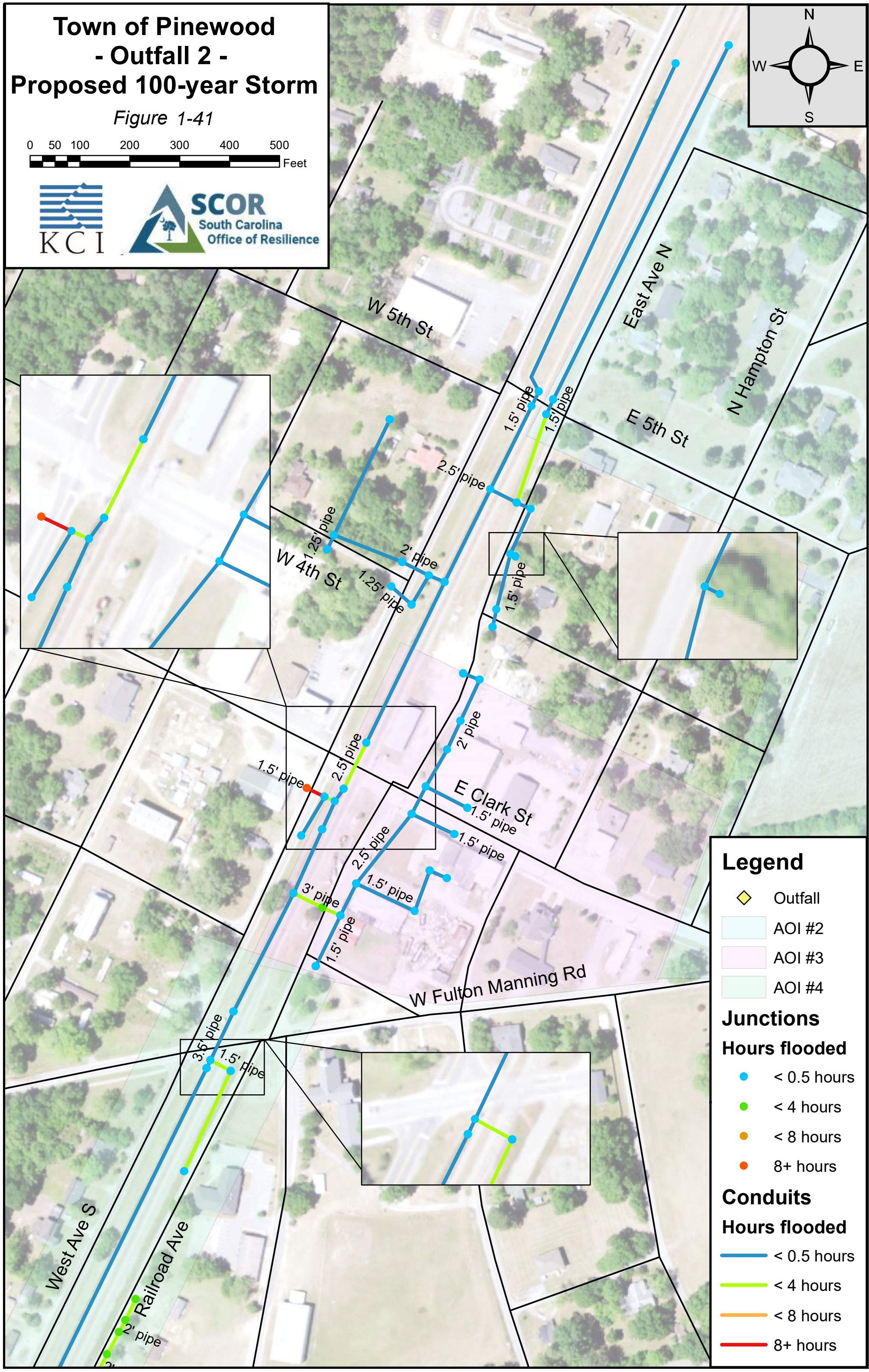
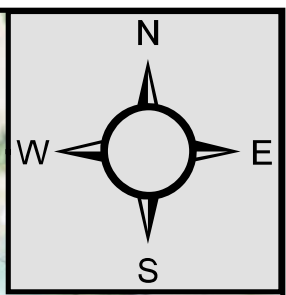
Conduits

Available Capacity Ratio

- < 0.5
- 0.5 - 0.9
- > 0.9

Town of Pinewood - Outfall 2 - Proposed 100-year Storm

Figure 1-41



Legend

- Outfall
- AOI #2
- AOI #3
- AOI #4

Junctions

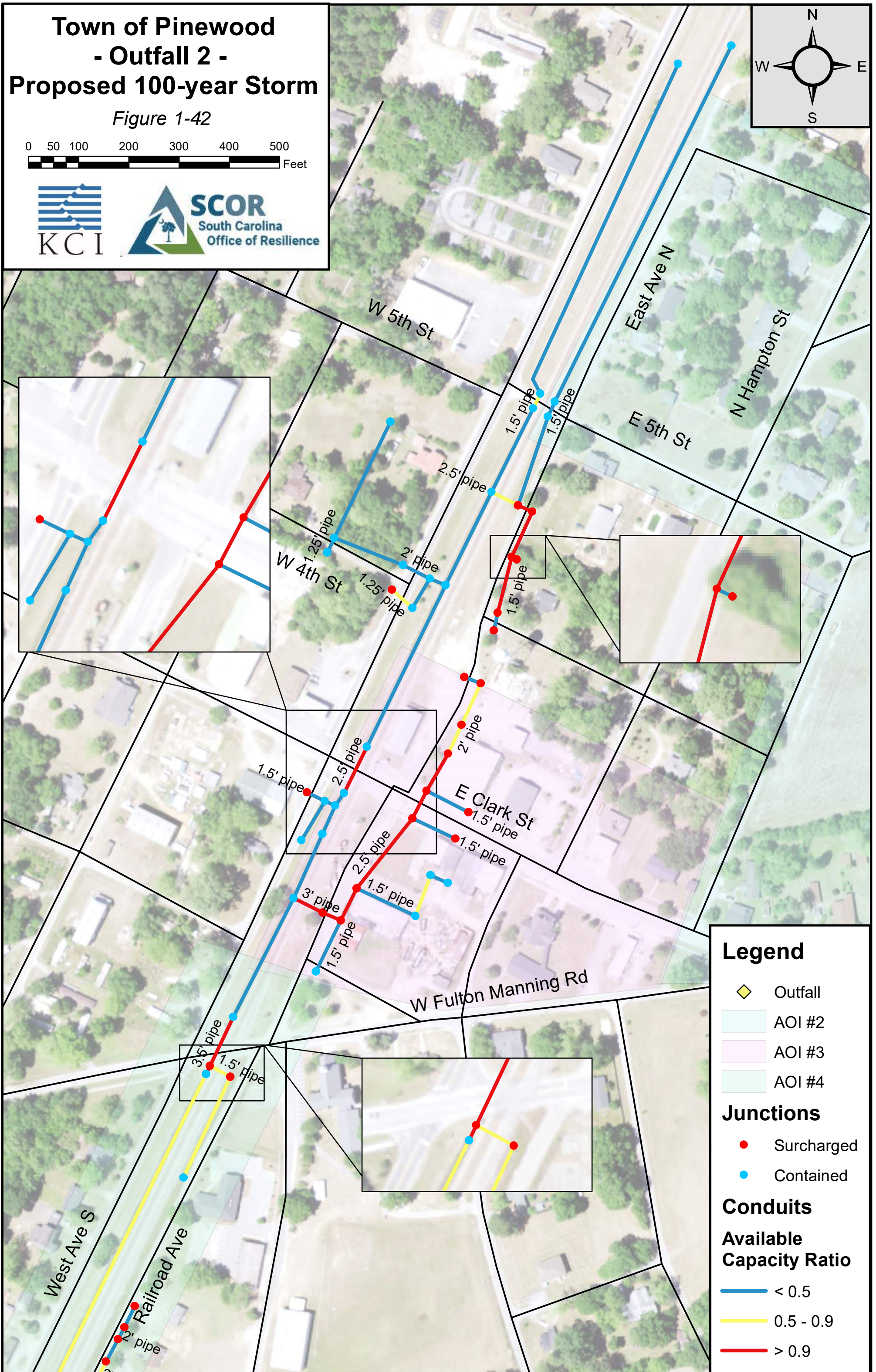
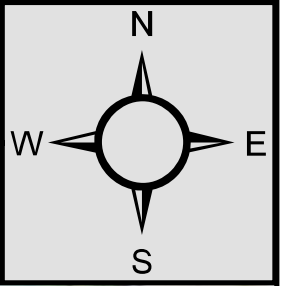
- Hours flooded**
- < 0.5 hours
 - < 4 hours
 - < 8 hours
 - 8+ hours

Conduits

- Hours flooded**
- < 0.5 hours
 - < 4 hours
 - < 8 hours
 - 8+ hours

Town of Pinewood - Outfall 2 - Proposed 100-year Storm

Figure 1-42

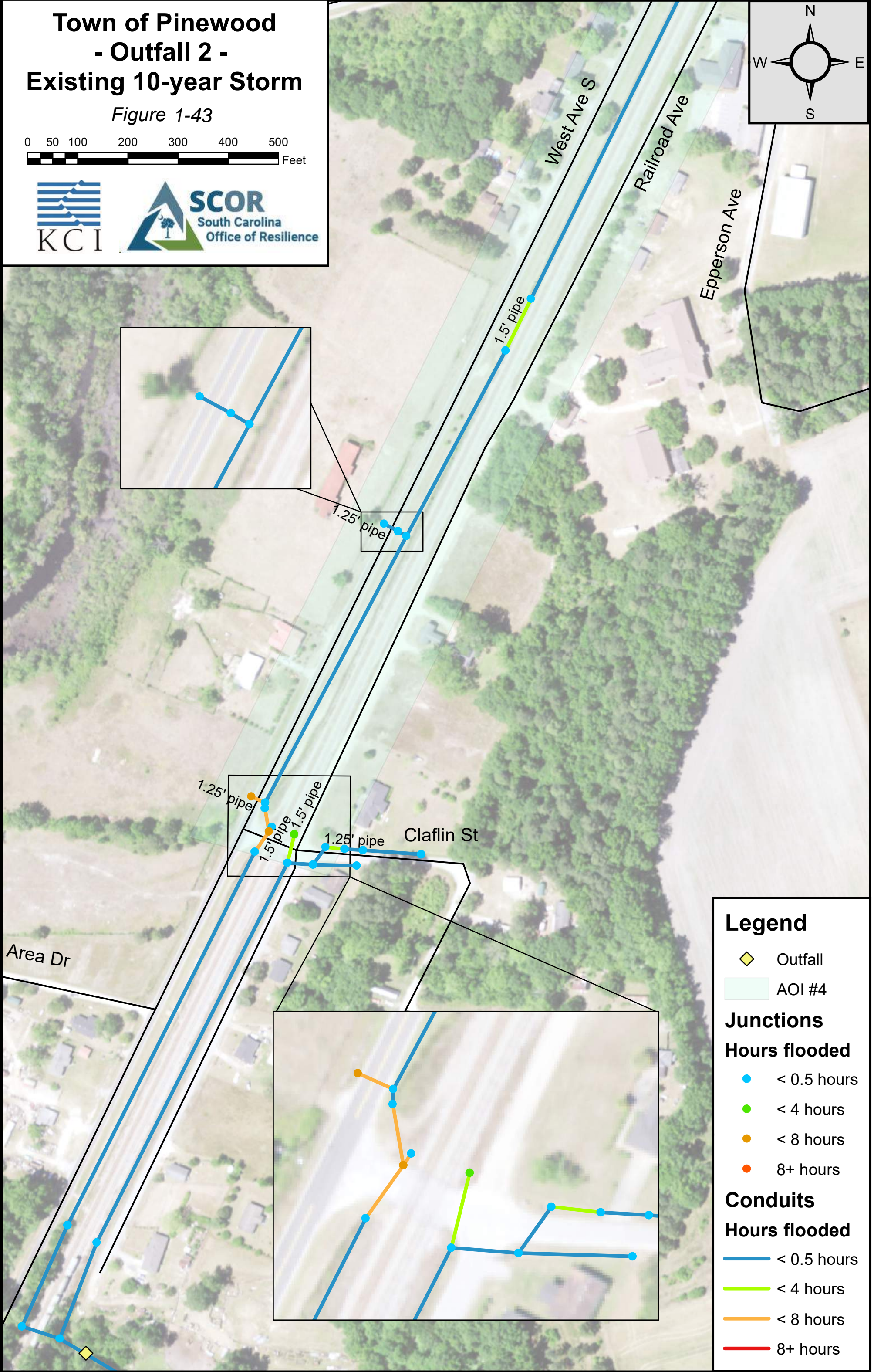
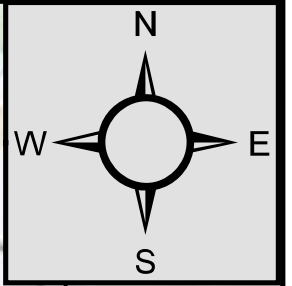
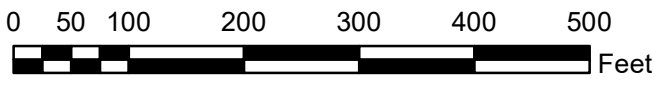


Legend

- Outfall
- AOI #2
- AOI #3
- AOI #4
- Junctions**
- Surcharged
- Contained
- Conduits**
- Available Capacity Ratio**
- < 0.5
- 0.5 - 0.9
- > 0.9

Town of Pinewood - Outfall 2 - Existing 10-year Storm

Figure 1-43



Legend

- Outfall
- AOI #4

Junctions

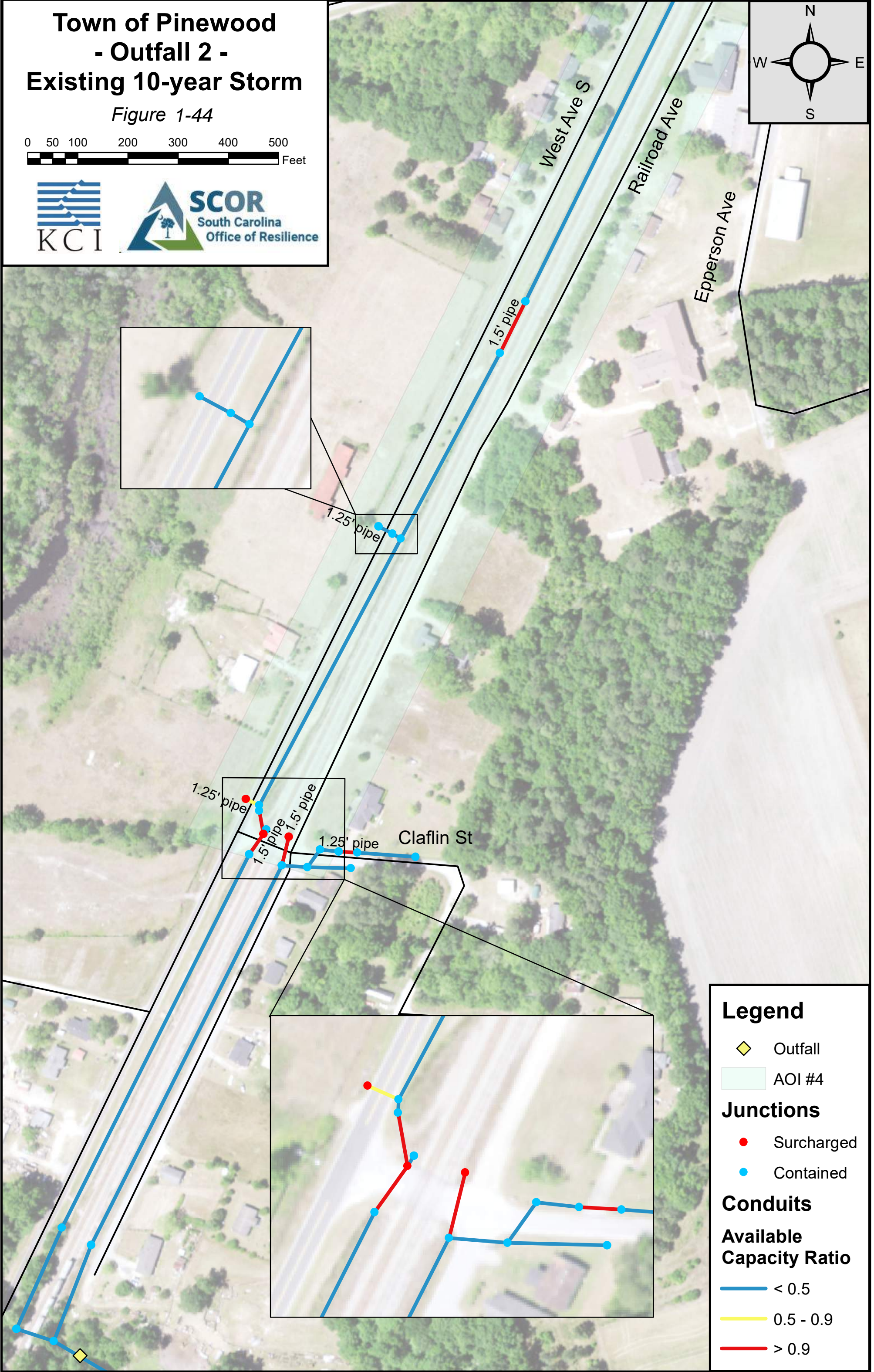
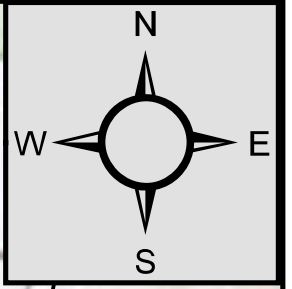
- ### Hours flooded
- < 0.5 hours
 - < 4 hours
 - < 8 hours
 - 8+ hours

Conduits

- ### Hours flooded
- < 0.5 hours
 - < 4 hours
 - < 8 hours
 - 8+ hours

Town of Pinewood - Outfall 2 - Existing 10-year Storm

Figure 1-44



Legend

- Outfall
- AOI #4

Junctions

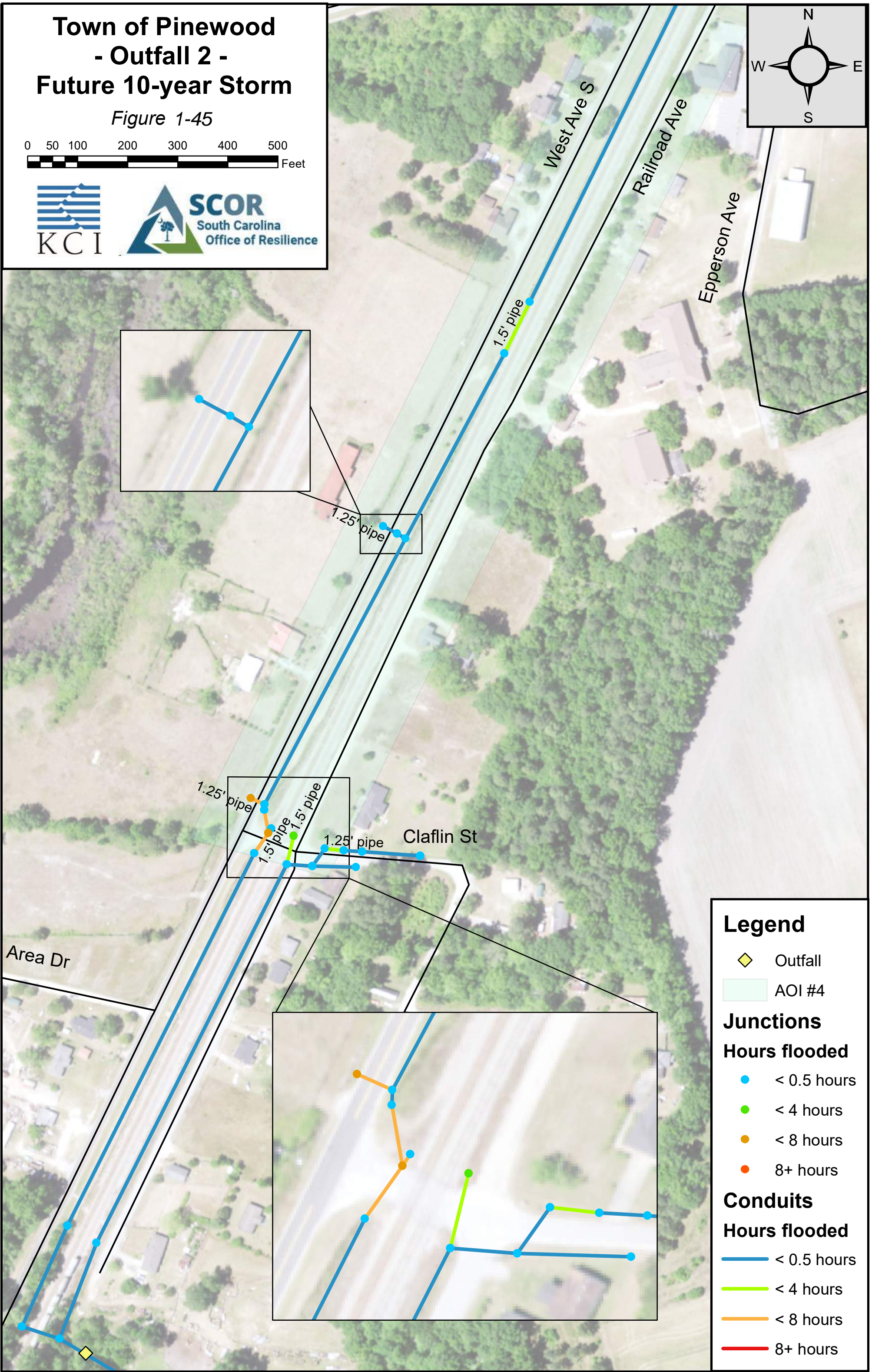
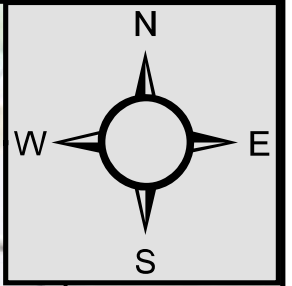
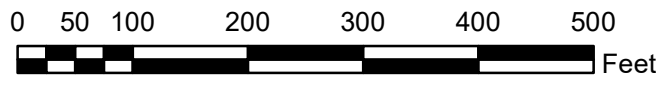
- Surcharged
- Contained

Conduits

- ### Available Capacity Ratio
- < 0.5
 - 0.5 - 0.9
 - > 0.9

Town of Pinewood - Outfall 2 - Future 10-year Storm

Figure 1-45



Legend

- Outfall
- AOI #4

Junctions

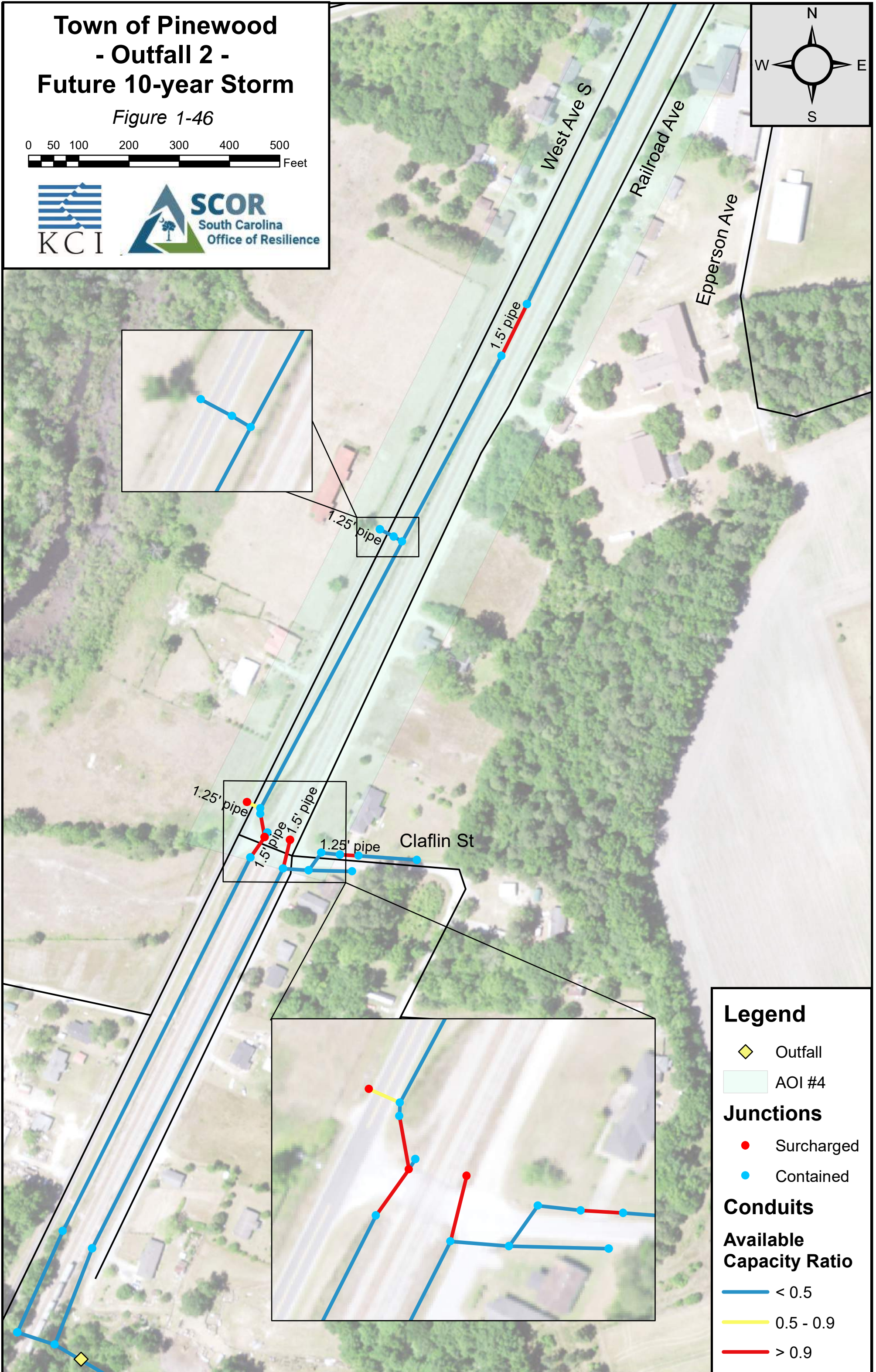
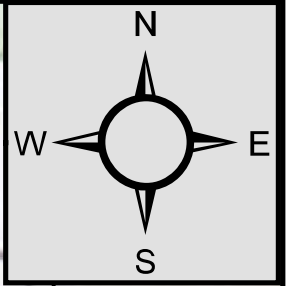
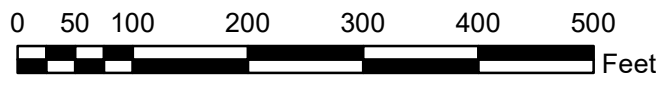
- ### Hours flooded
- < 0.5 hours
 - < 4 hours
 - < 8 hours
 - 8+ hours

Conduits

- ### Hours flooded
- < 0.5 hours
 - < 4 hours
 - < 8 hours
 - 8+ hours

Town of Pinewood - Outfall 2 - Future 10-year Storm

Figure 1-46



Legend

- Outfall
- AOI #4

Junctions

- Surcharged
- Contained

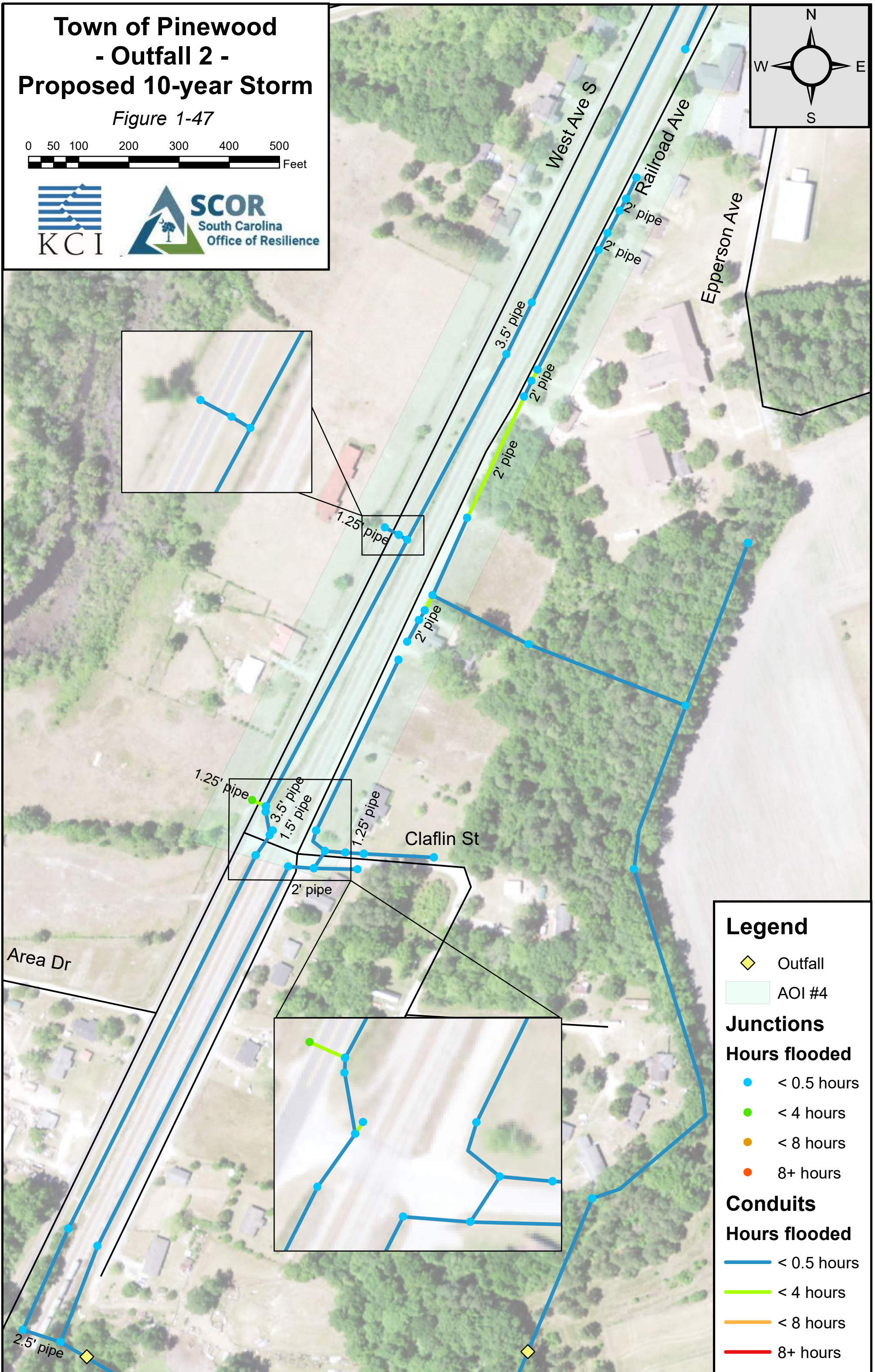
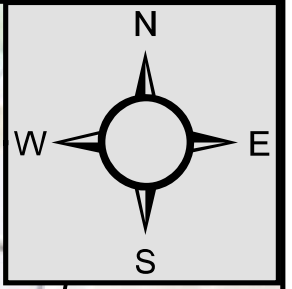
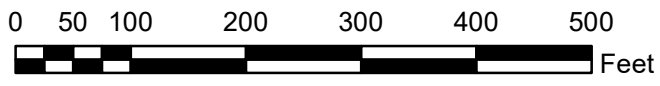
Conduits

Available Capacity Ratio

- < 0.5
- 0.5 - 0.9
- > 0.9

Town of Pinewood - Outfall 2 - Proposed 10-year Storm

Figure 1-47



Legend

- Outfall
- AOI #4

Junctions

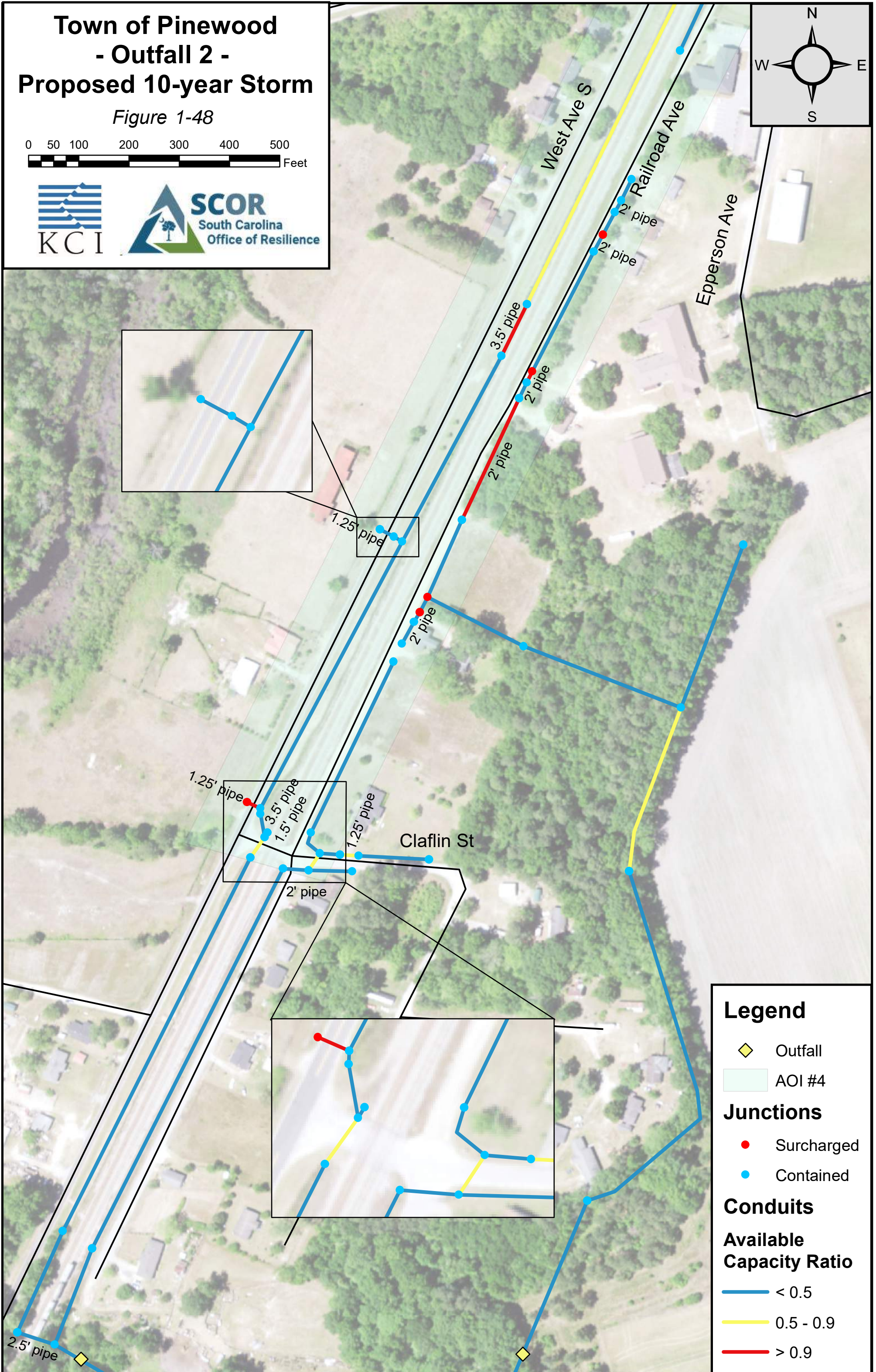
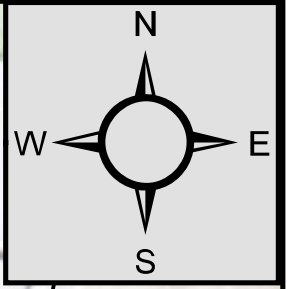
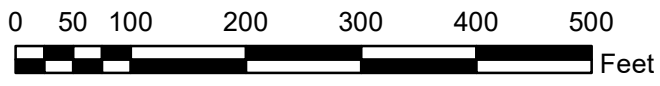
- Hours flooded**
- < 0.5 hours
 - < 4 hours
 - < 8 hours
 - 8+ hours

Conduits

- Hours flooded**
- < 0.5 hours
 - < 4 hours
 - < 8 hours
 - 8+ hours

Town of Pinewood - Outfall 2 - Proposed 10-year Storm

Figure 1-48

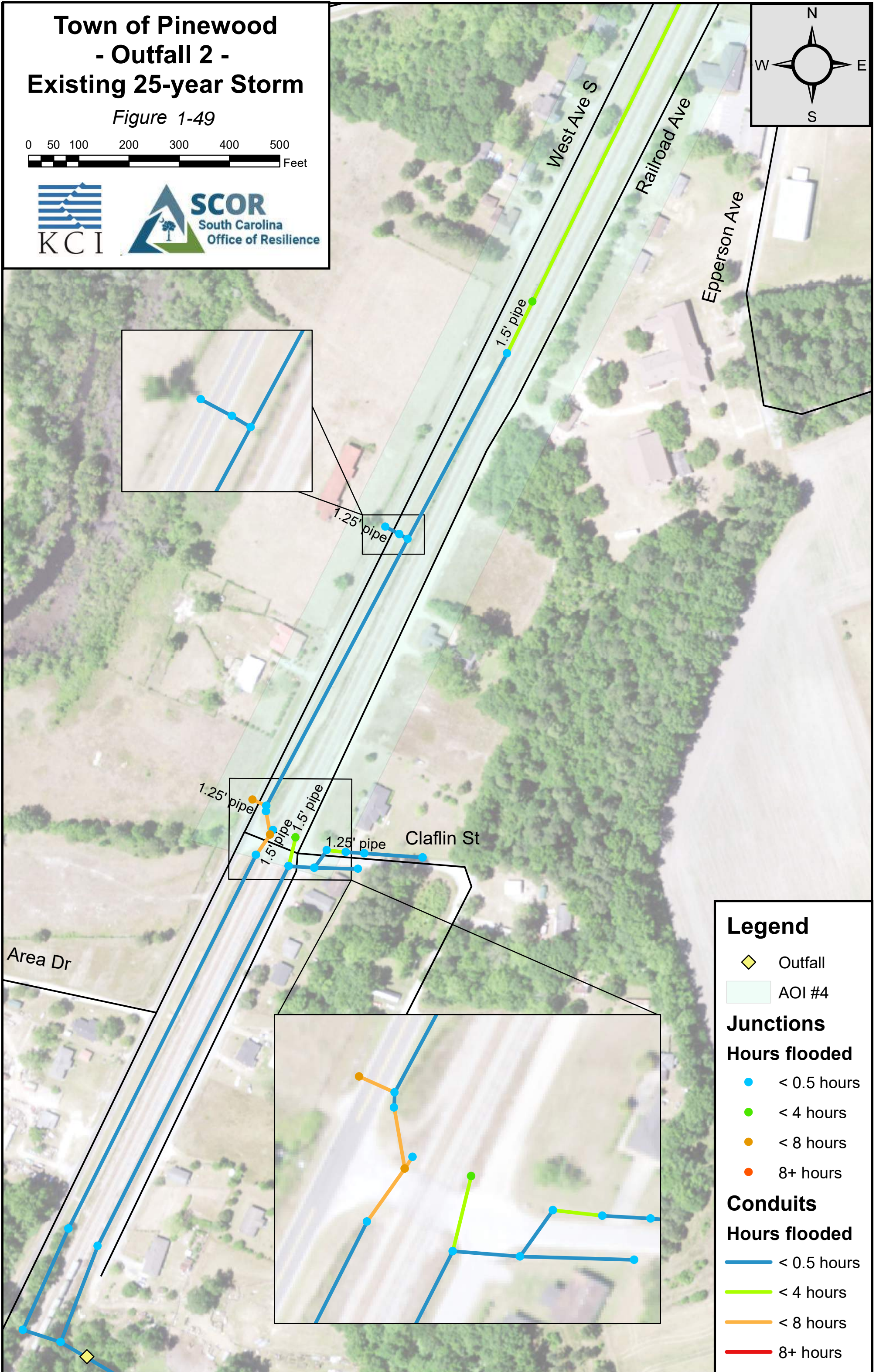
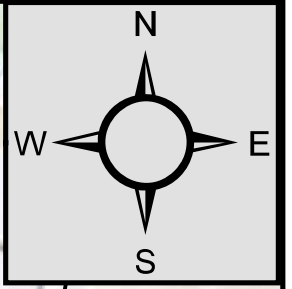
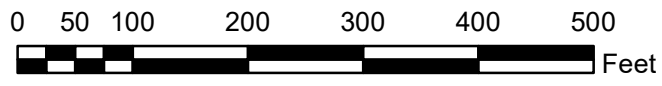


Legend

- Outfall
- AOI #4
- Junctions**
- Surcharged
- Contained
- Conduits**
- Available Capacity Ratio**
- < 0.5
- 0.5 - 0.9
- > 0.9

Town of Pinewood - Outfall 2 - Existing 25-year Storm

Figure 1-49



Legend

- Outfall
- AOI #4

Junctions

Hours flooded

- < 0.5 hours
- < 4 hours
- < 8 hours
- 8+ hours

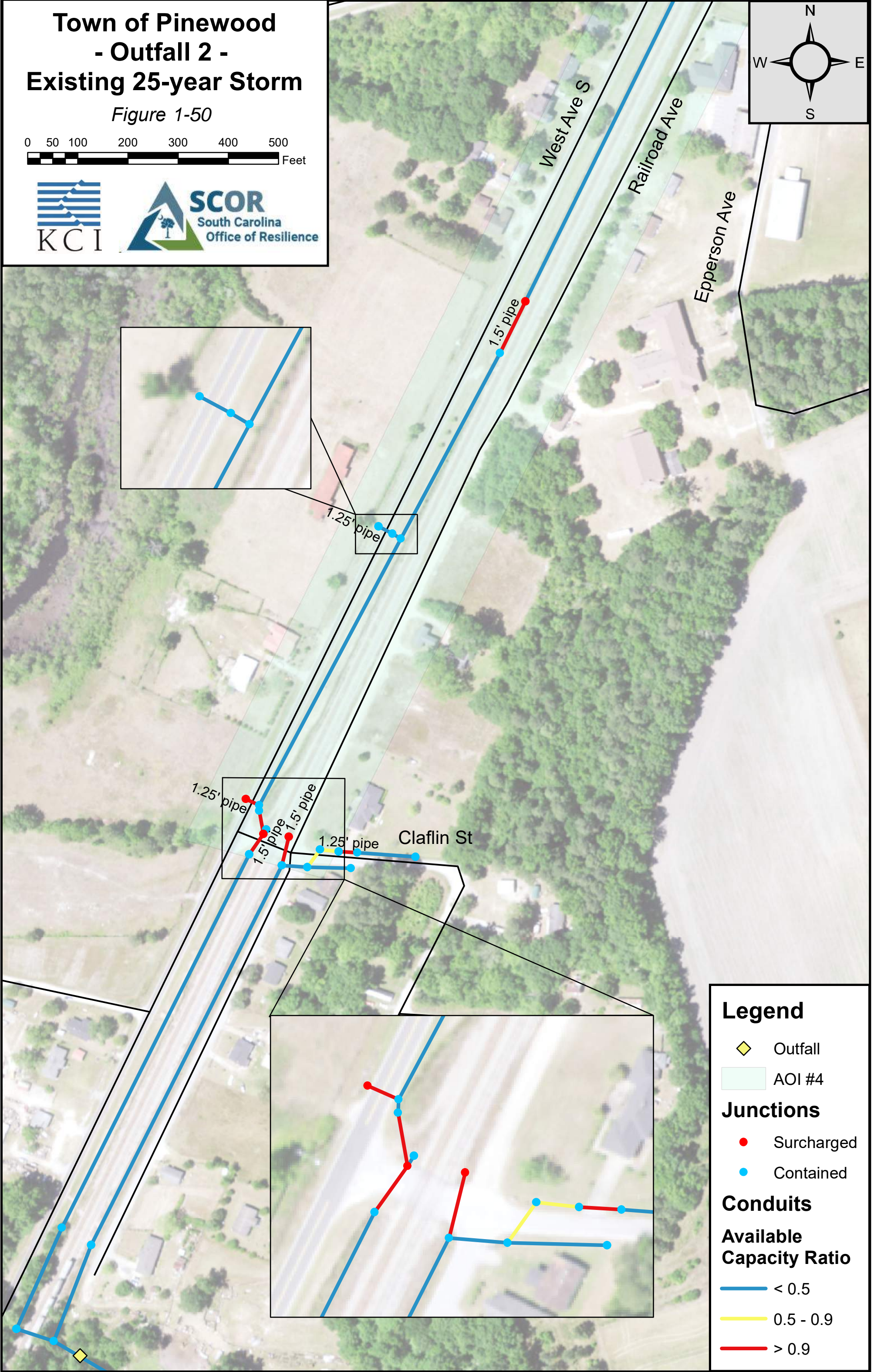
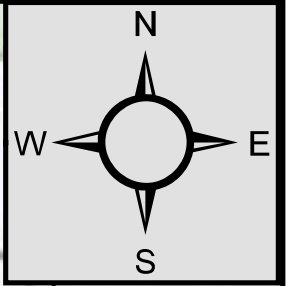
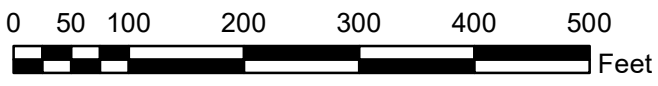
Conduits

Hours flooded

- < 0.5 hours
- < 4 hours
- < 8 hours
- 8+ hours

Town of Pinewood - Outfall 2 - Existing 25-year Storm

Figure 1-50



Legend

- Outfall
- AOI #4

Junctions

- Surcharged
- Contained

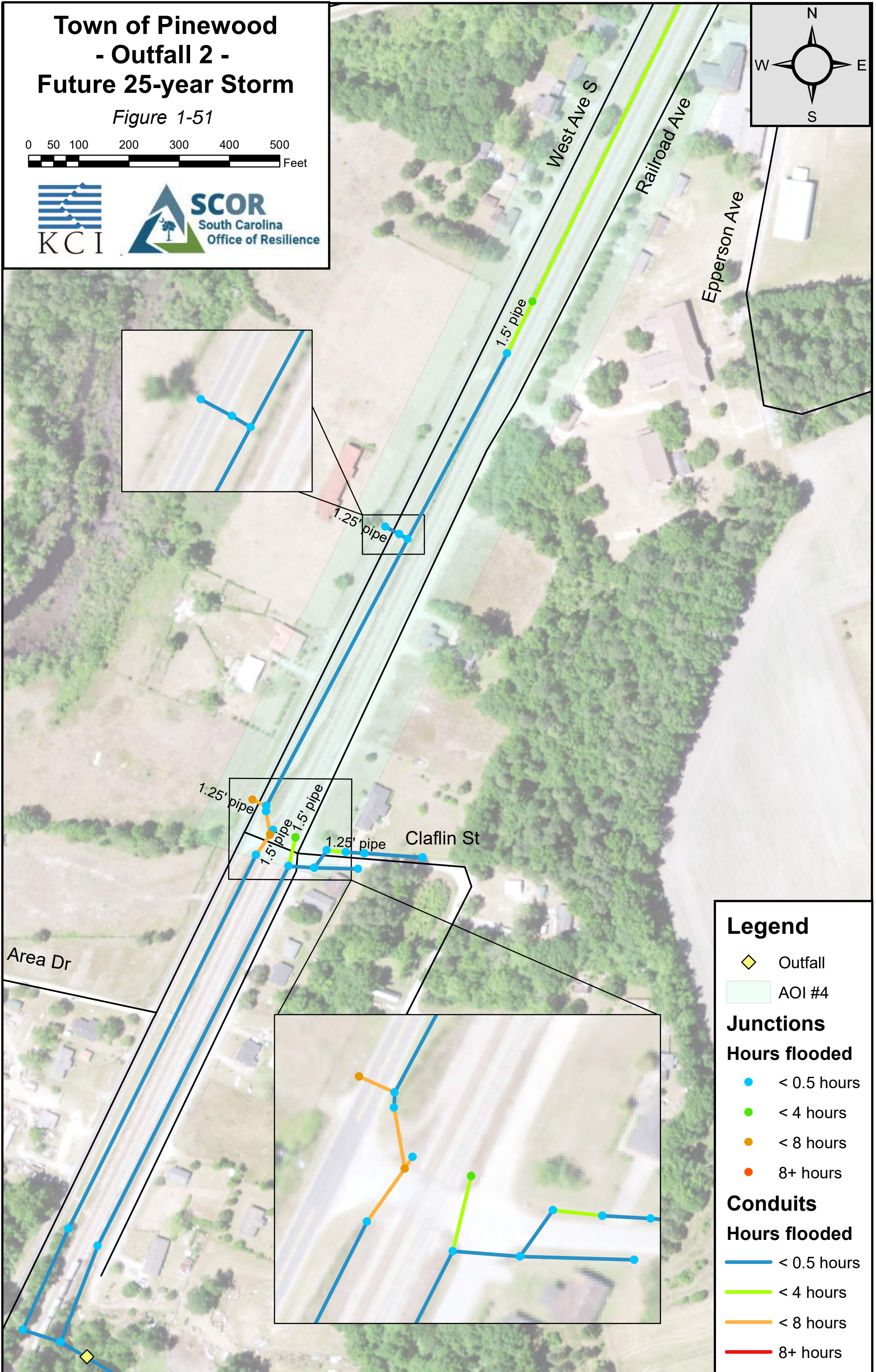
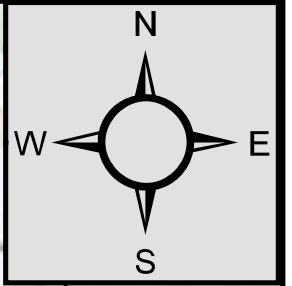
Conduits

Available Capacity Ratio

- < 0.5
- 0.5 - 0.9
- > 0.9

Town of Pinewood - Outfall 2 - Future 25-year Storm

Figure 1-51



Legend

- Outfall
- AOI #4

Junctions

Hours flooded

- < 0.5 hours
- < 4 hours
- < 8 hours
- 8+ hours

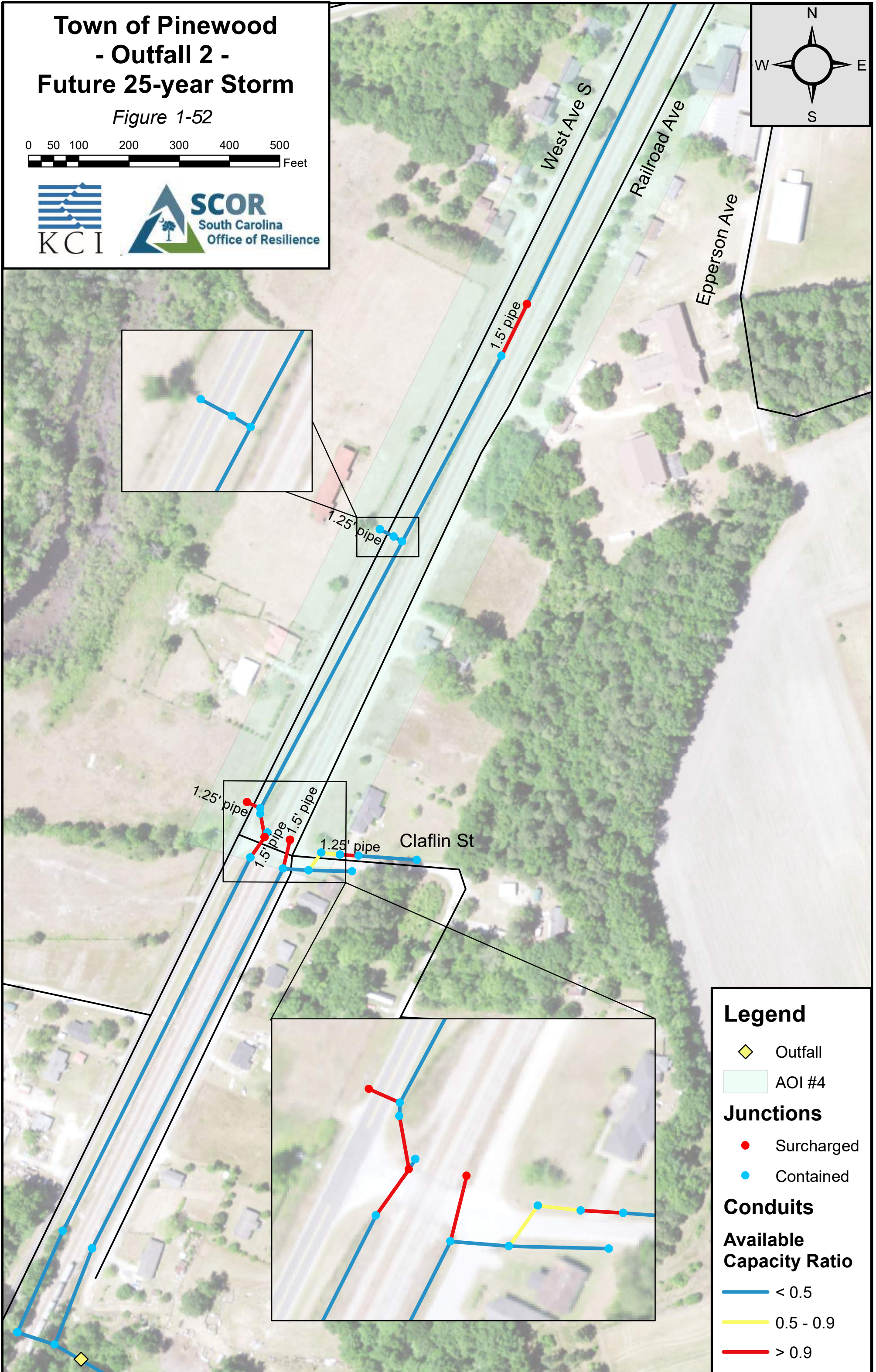
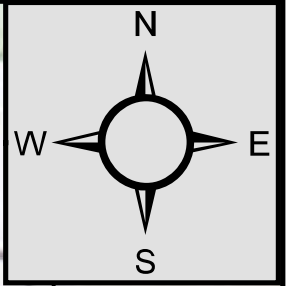
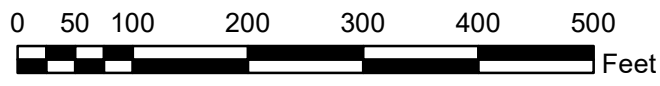
Conduits

Hours flooded

- < 0.5 hours
- < 4 hours
- < 8 hours
- 8+ hours

Town of Pinewood - Outfall 2 - Future 25-year Storm

Figure 1-52



Legend

- Outfall
- AOI #4

Junctions

- Surcharged
- Contained

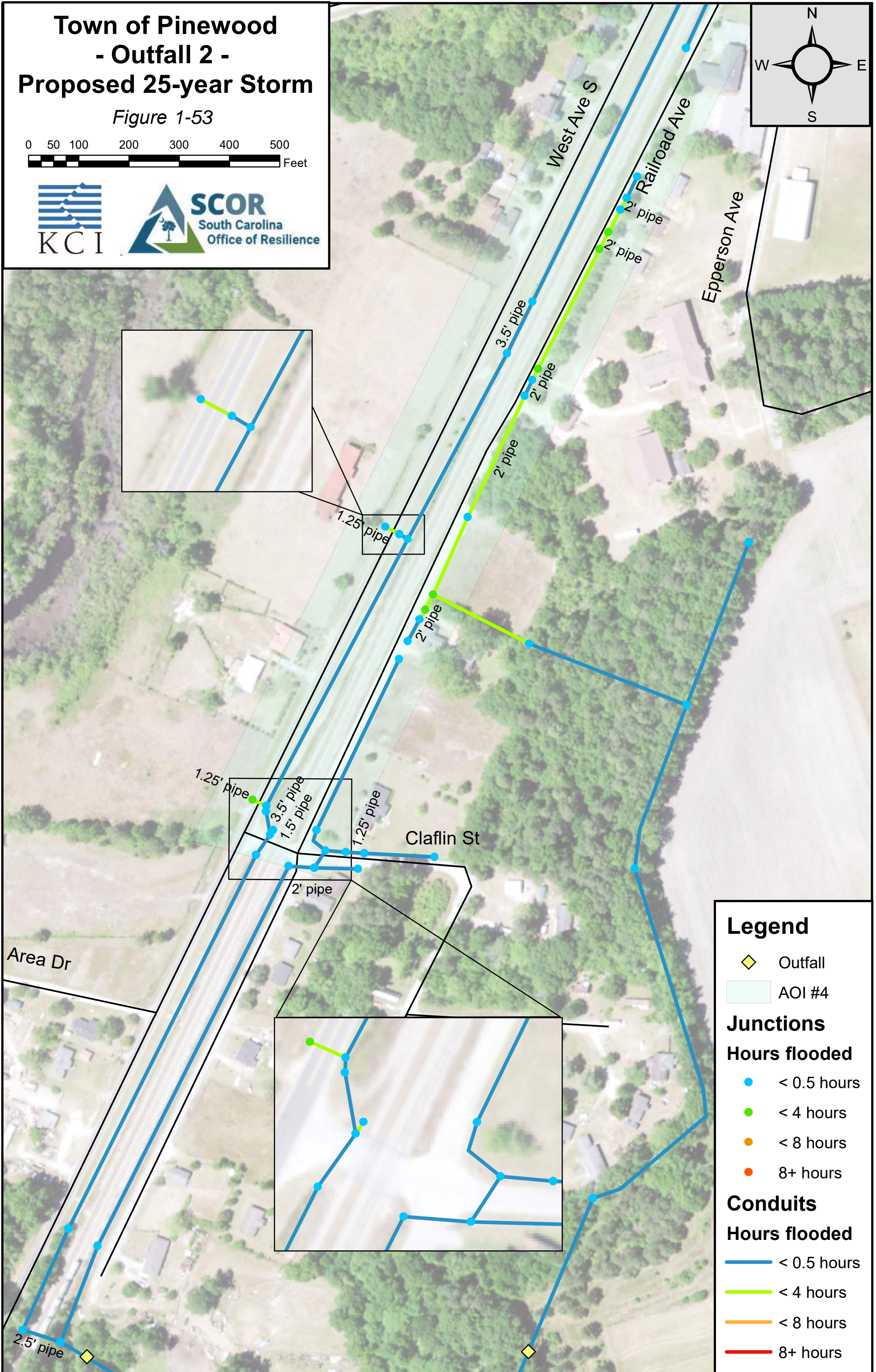
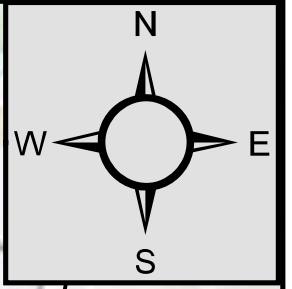
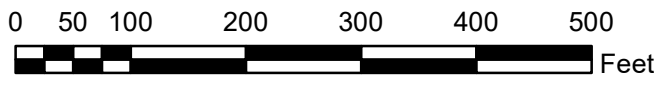
Conduits

Available Capacity Ratio

- < 0.5
- 0.5 - 0.9
- > 0.9

Town of Pinewood - Outfall 2 - Proposed 25-year Storm

Figure 1-53



Legend

- Outfall
- AOI #4

Junctions

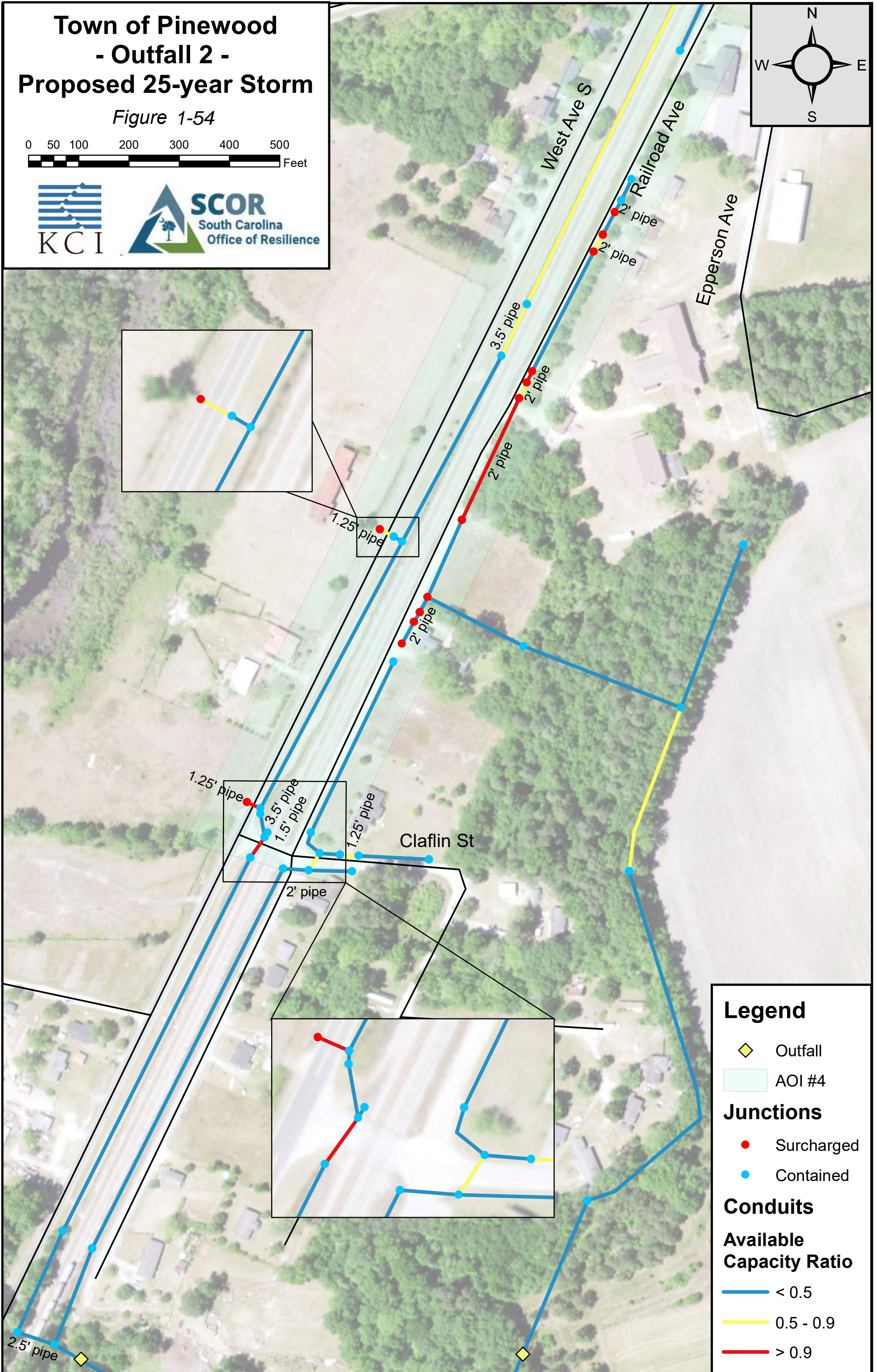
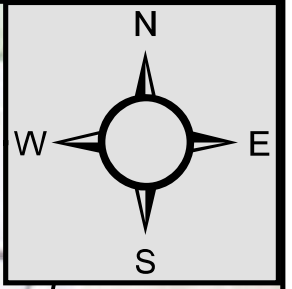
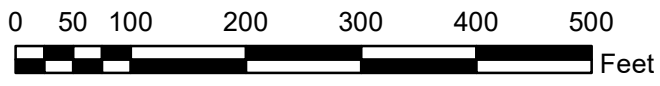
- ### Hours flooded
- < 0.5 hours
 - < 4 hours
 - < 8 hours
 - 8+ hours

Conduits

- ### Hours flooded
- < 0.5 hours
 - < 4 hours
 - < 8 hours
 - 8+ hours

Town of Pinewood - Outfall 2 - Proposed 25-year Storm

Figure 1-54

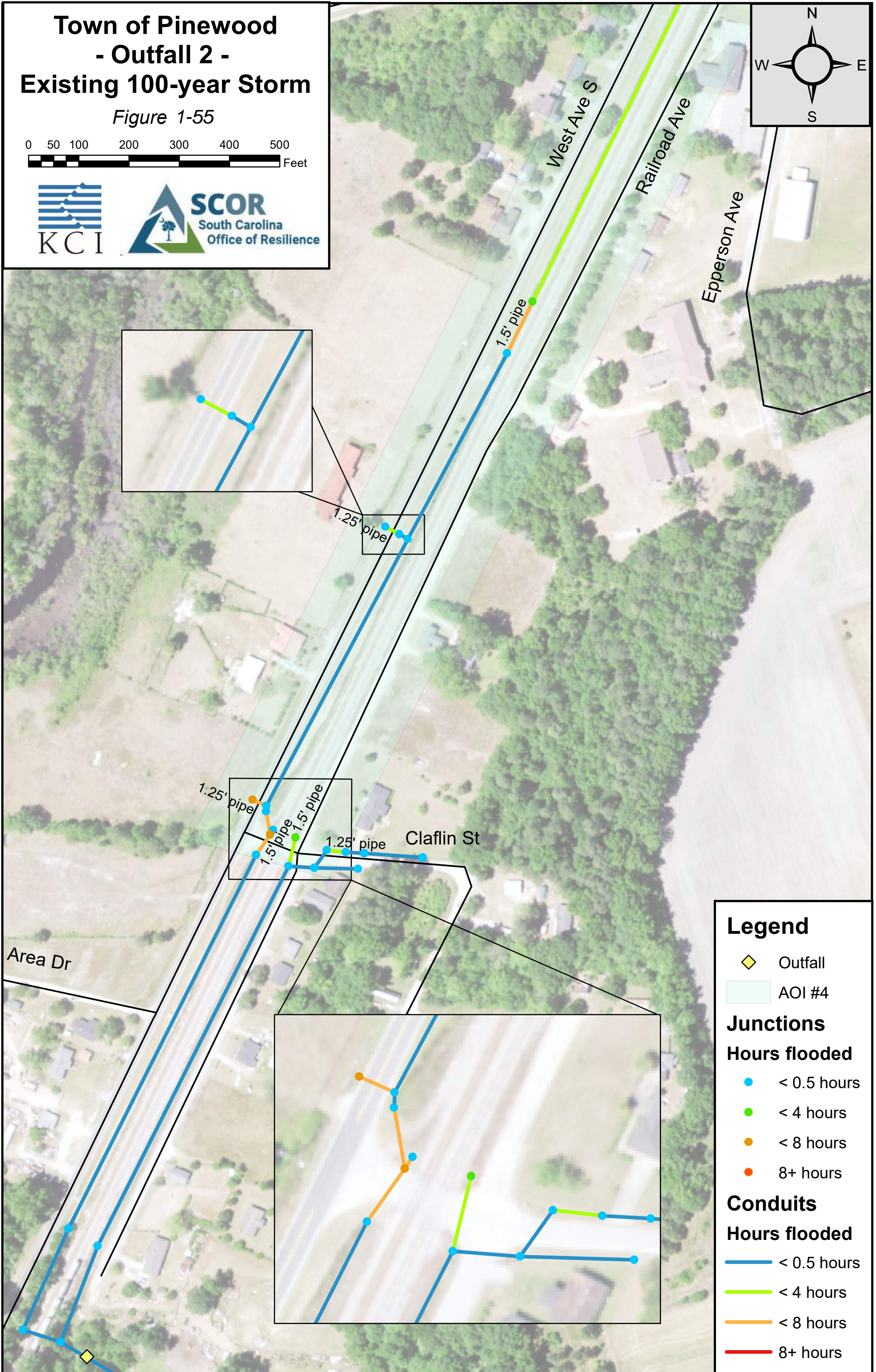
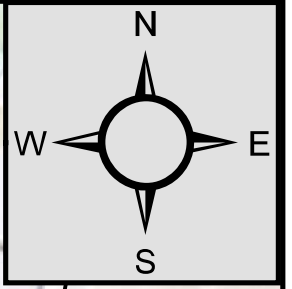
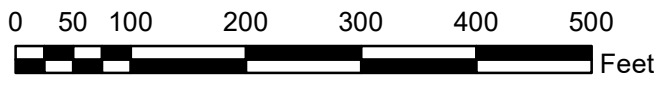


Legend

- Outfall
- AOI #4
- Junctions**
- Surcharged
- Contained
- Conduits**
- Available Capacity Ratio**
- < 0.5
- 0.5 - 0.9
- > 0.9

Town of Pinewood - Outfall 2 - Existing 100-year Storm

Figure 1-55



Legend

- Outfall
- AOI #4

Junctions

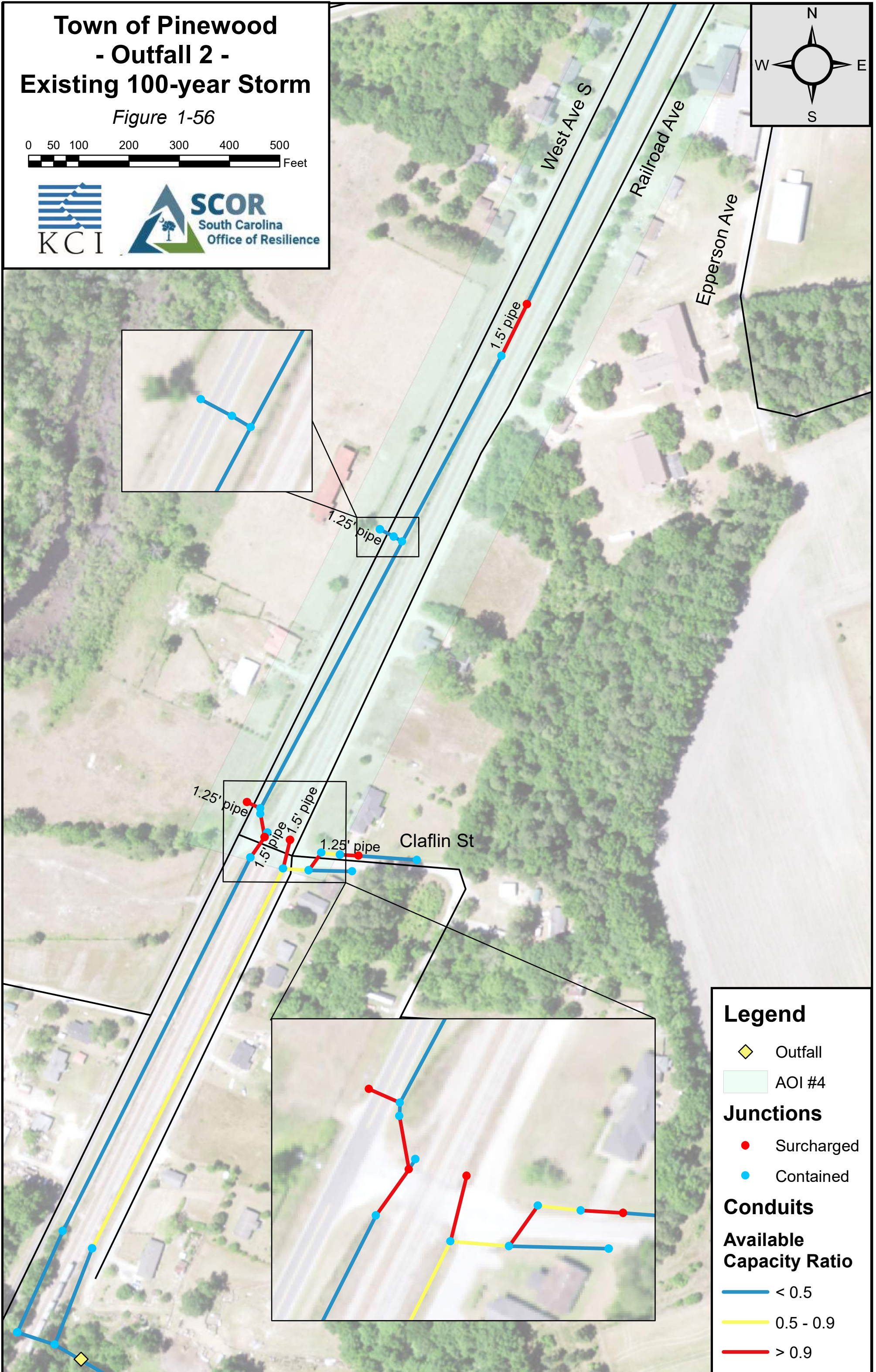
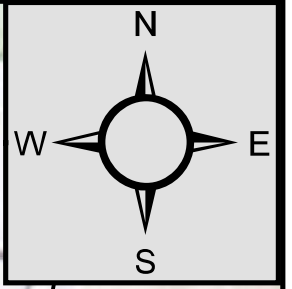
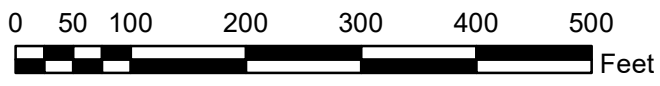
- ### Hours flooded
- < 0.5 hours
 - < 4 hours
 - < 8 hours
 - 8+ hours

Conduits

- ### Hours flooded
- < 0.5 hours
 - < 4 hours
 - < 8 hours
 - 8+ hours

Town of Pinewood - Outfall 2 - Existing 100-year Storm

Figure 1-56



Legend

- Outfall
- AOI #4

Junctions

- Surcharged
- Contained

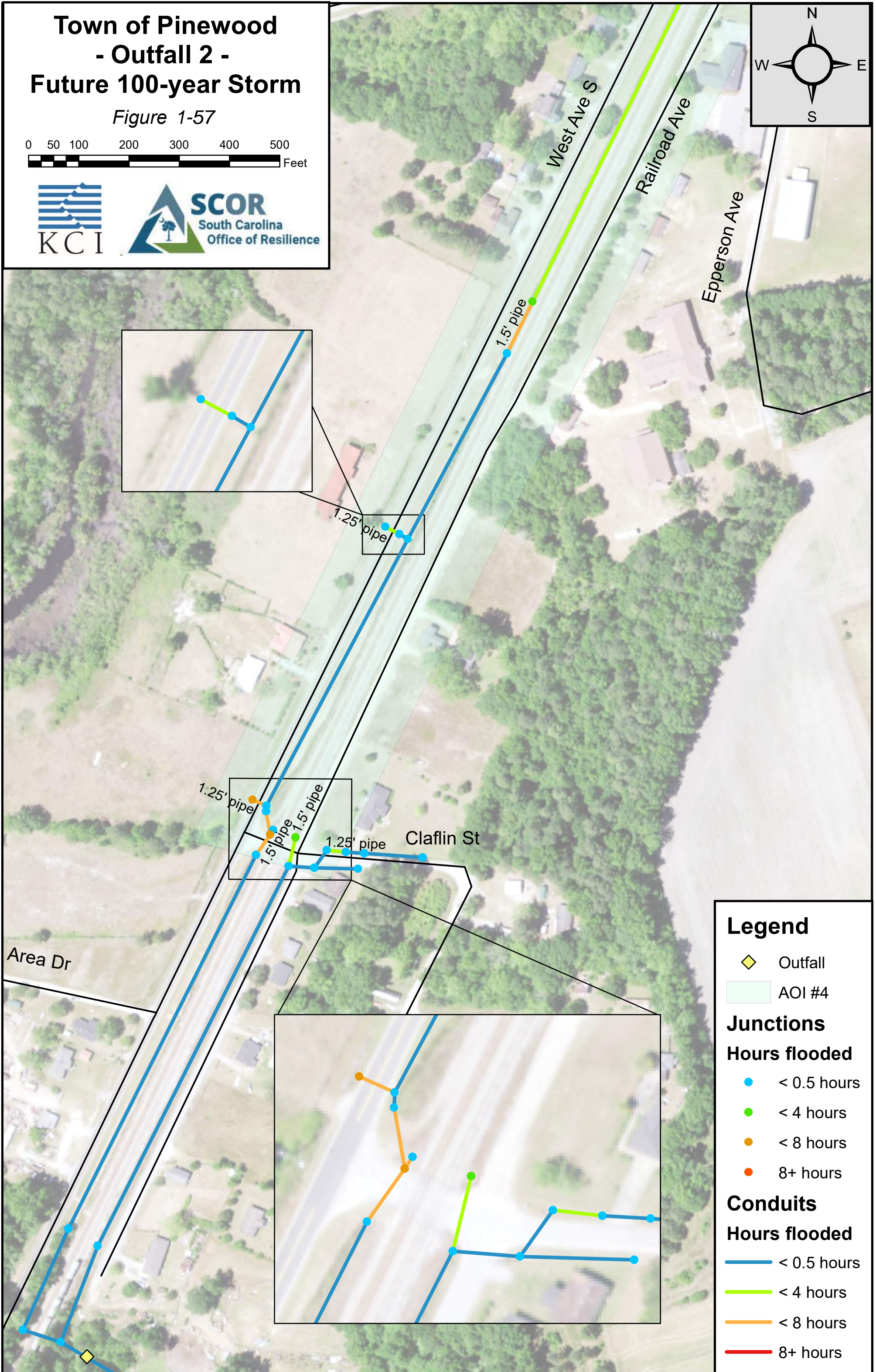
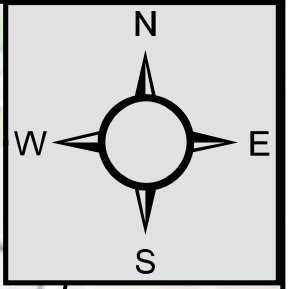
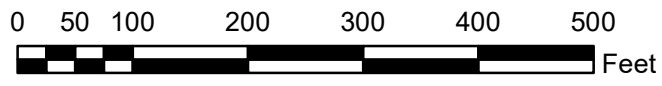
Conduits

Available Capacity Ratio

- < 0.5
- 0.5 - 0.9
- > 0.9

Town of Pinewood - Outfall 2 - Future 100-year Storm

Figure 1-57



Legend

- Outfall
- AOI #4

Junctions

Hours flooded

- < 0.5 hours
- < 4 hours
- < 8 hours
- 8+ hours

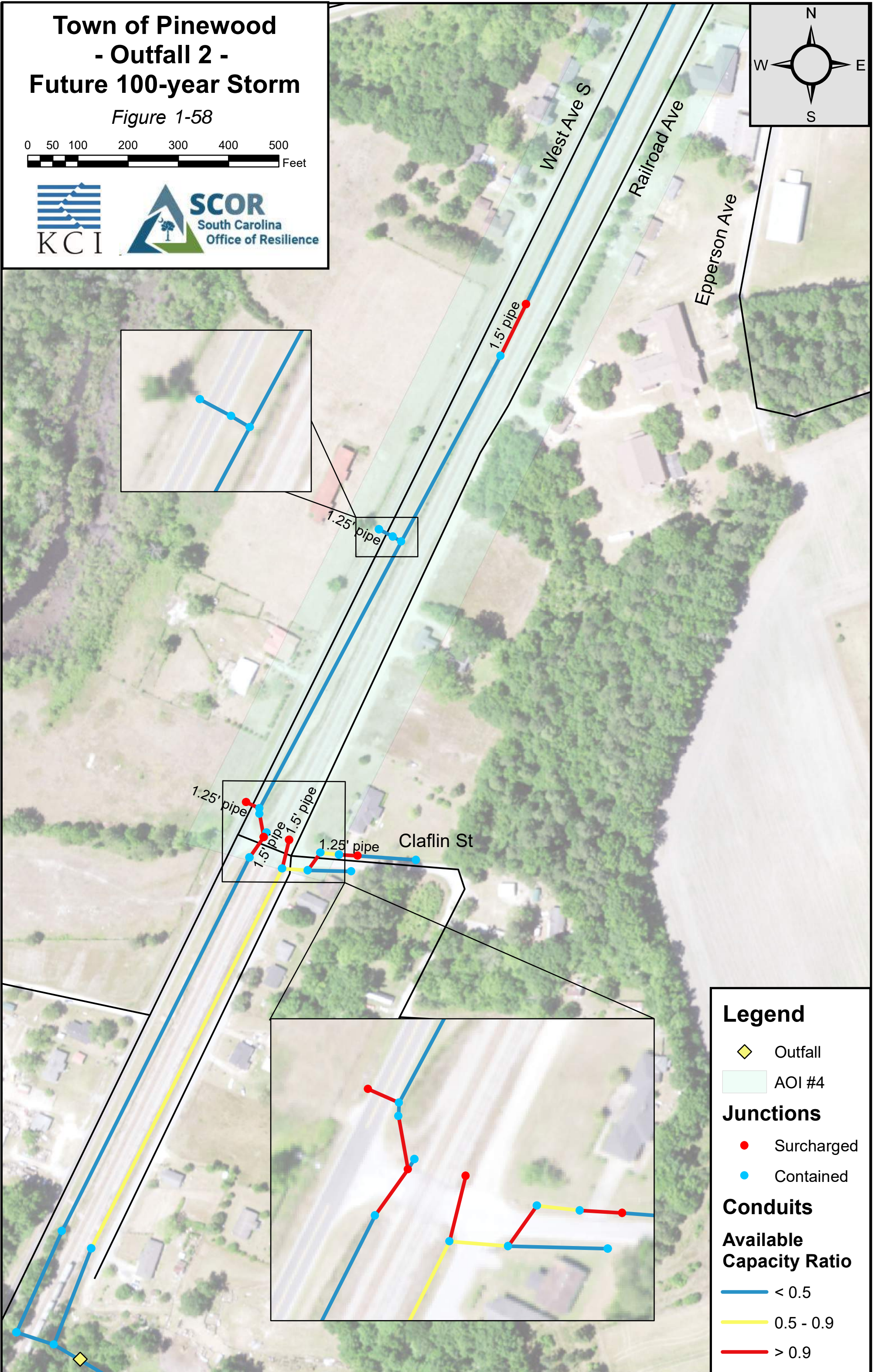
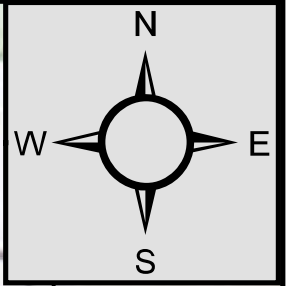
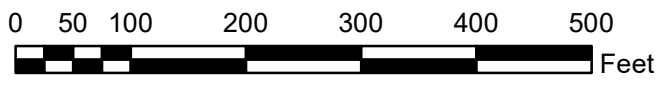
Conduits

Hours flooded

- < 0.5 hours
- < 4 hours
- < 8 hours
- 8+ hours

Town of Pinewood - Outfall 2 - Future 100-year Storm

Figure 1-58



Legend

- Outfall
- AOI #4

Junctions

- Surcharged
- Contained

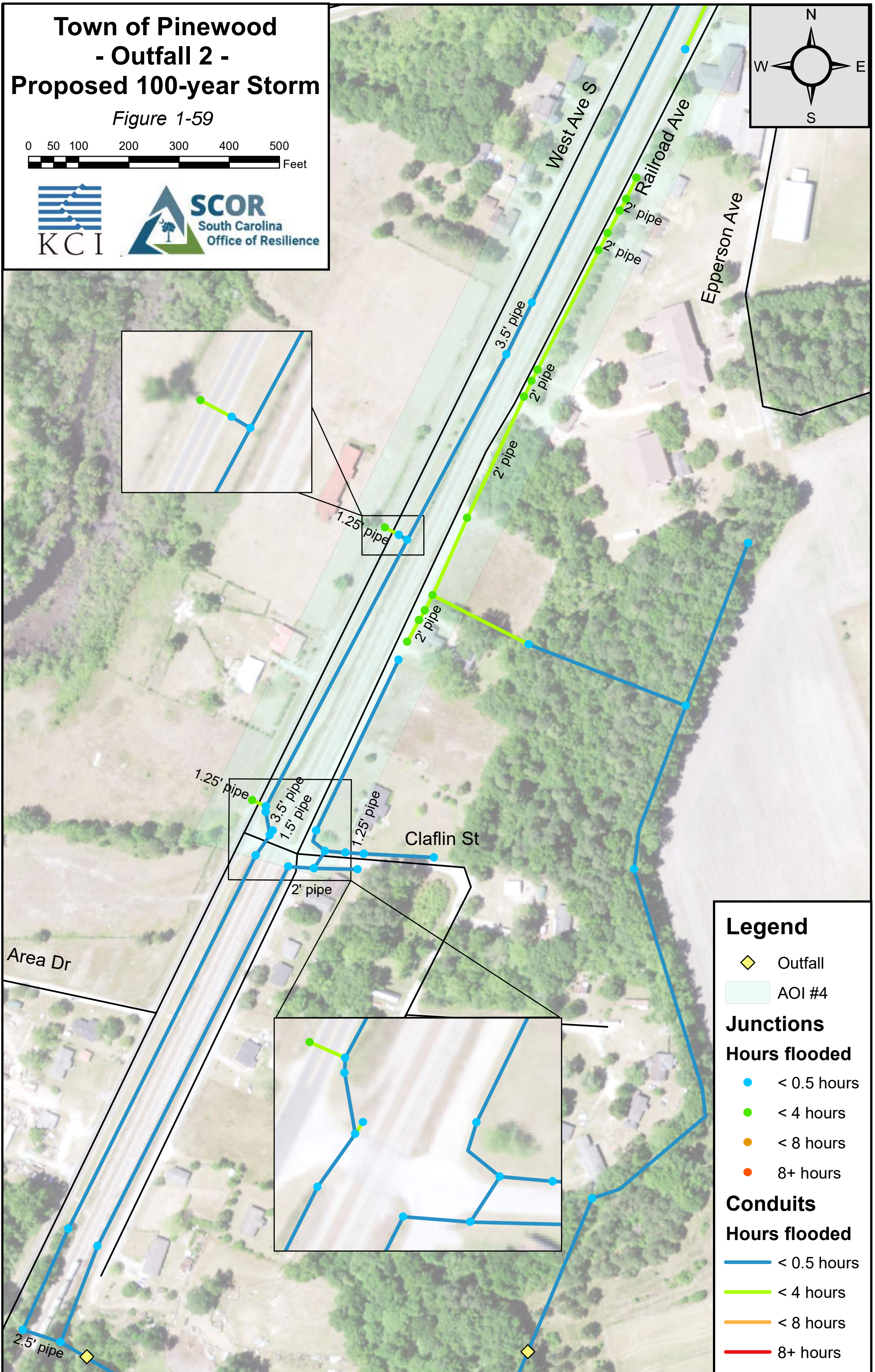
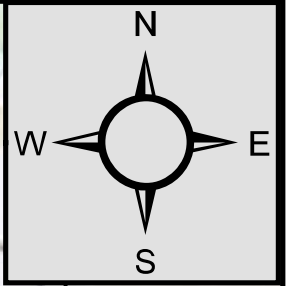
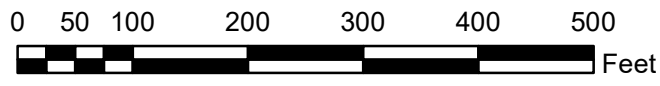
Conduits

Available Capacity Ratio

- < 0.5
- 0.5 - 0.9
- > 0.9

Town of Pinewood - Outfall 2 - Proposed 100-year Storm

Figure 1-59



Legend

- Outfall
- AOI #4

Junctions

Hours flooded

- < 0.5 hours
- < 4 hours
- < 8 hours
- 8+ hours

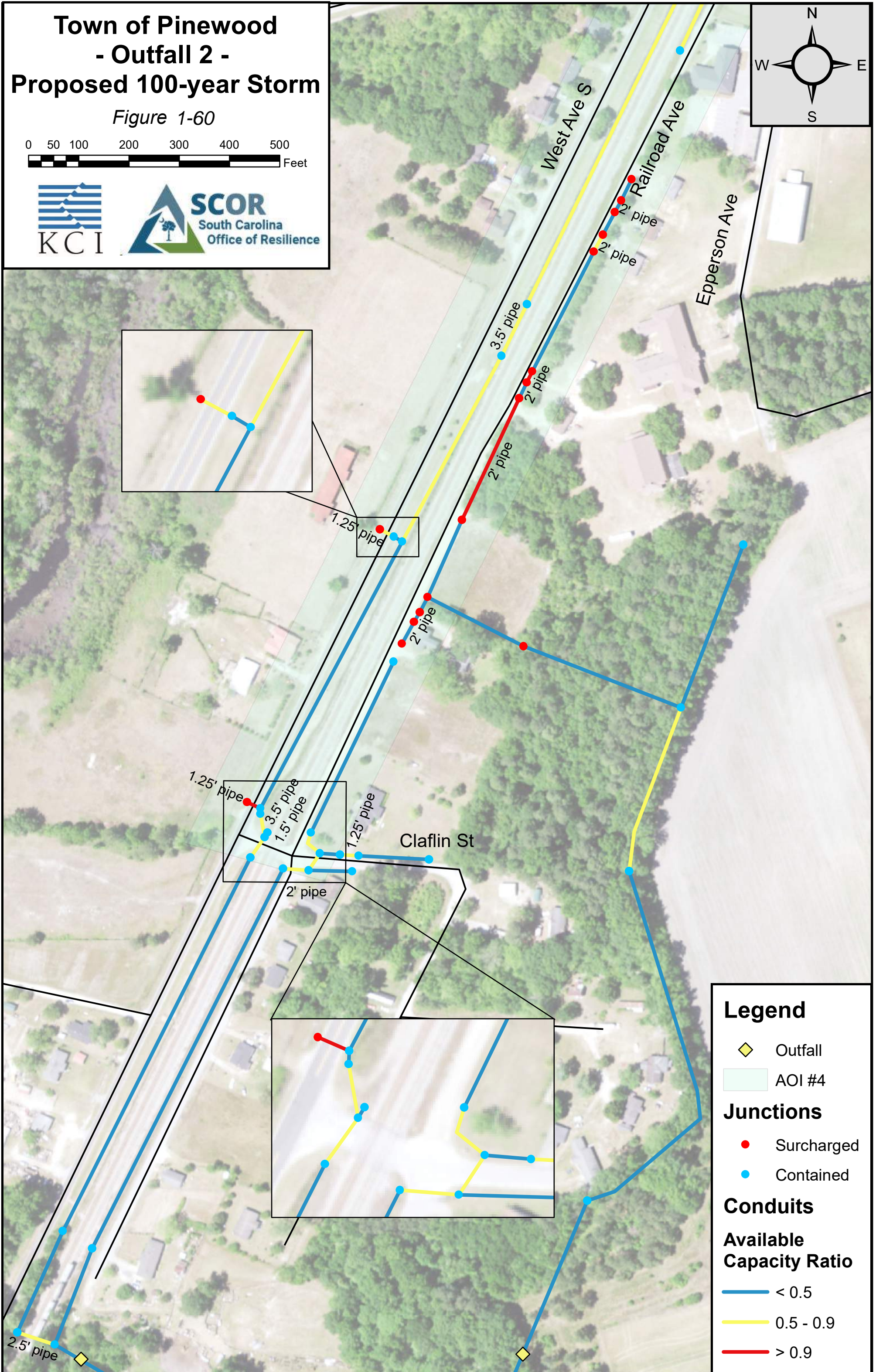
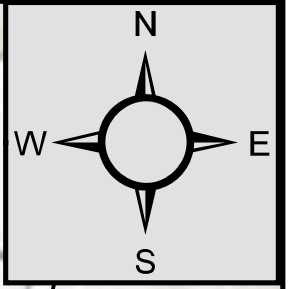
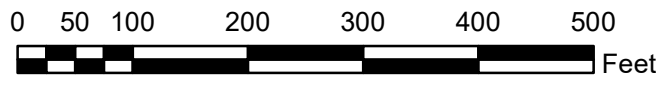
Conduits

Hours flooded

- < 0.5 hours
- < 4 hours
- < 8 hours
- 8+ hours

Town of Pinewood - Outfall 2 - Proposed 100-year Storm

Figure 1-60



Legend

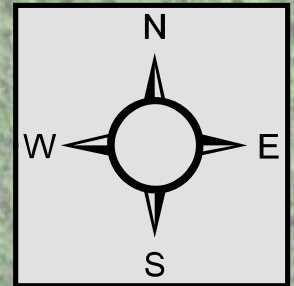
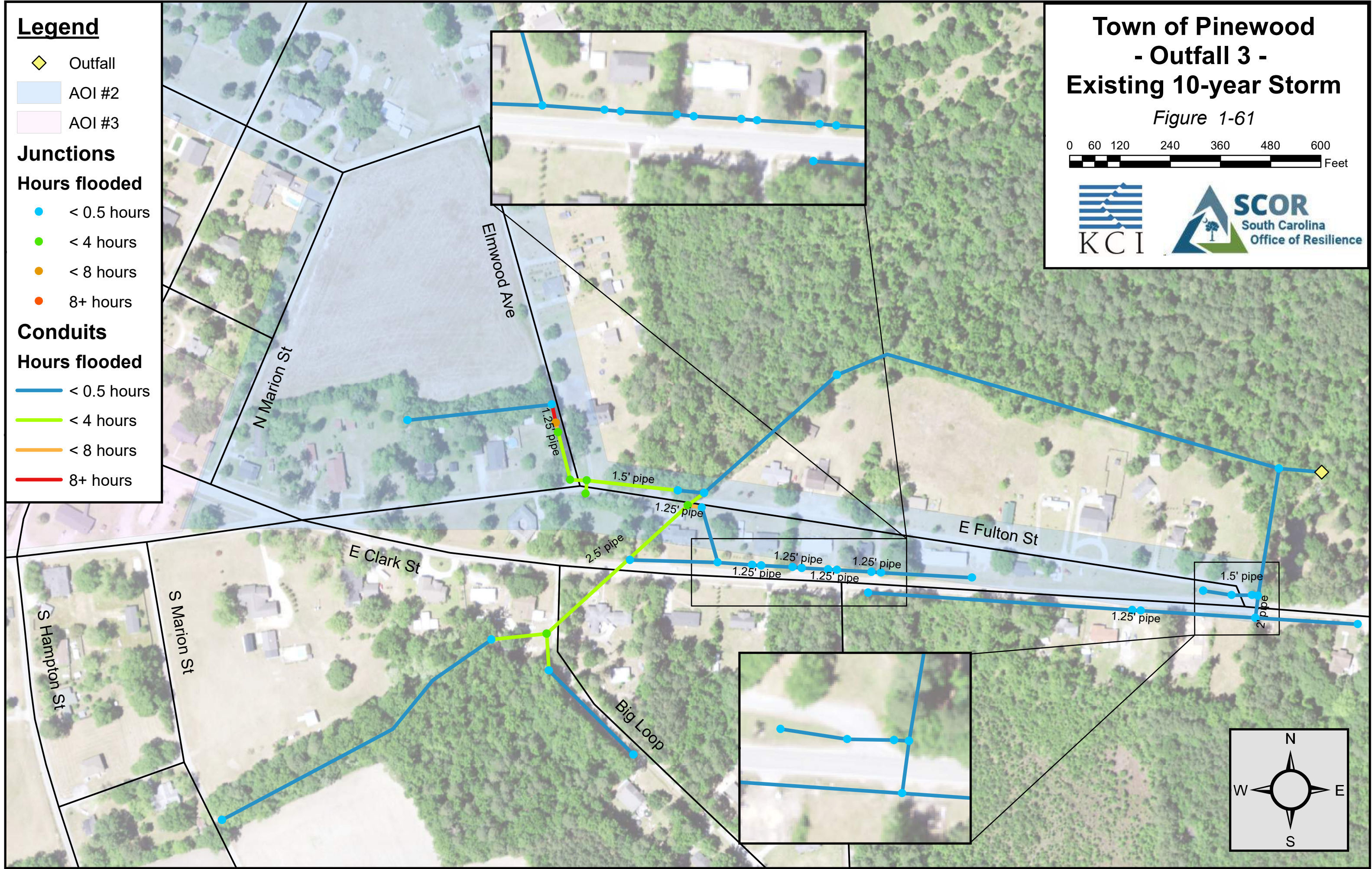
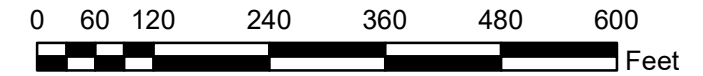
- Outfall
- AOI #4
- Junctions**
- Surcharged
- Contained
- Conduits**
- Available Capacity Ratio**
- < 0.5
- 0.5 - 0.9
- > 0.9

Legend

- ◆ Outfall
- AOI #2
- AOI #3
- Junctions**
- Hours flooded**
- < 0.5 hours
- < 4 hours
- < 8 hours
- 8+ hours
- Conduits**
- Hours flooded**
- < 0.5 hours
- < 4 hours
- < 8 hours
- 8+ hours

**Town of Pinewood
- Outfall 3 -
Existing 10-year Storm**

Figure 1-61



Legend

- ◆ Outfall
- AOI #2
- AOI #3

Junctions

- Surcharged
- Contained

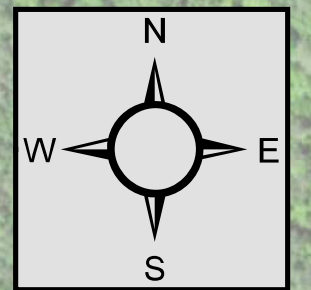
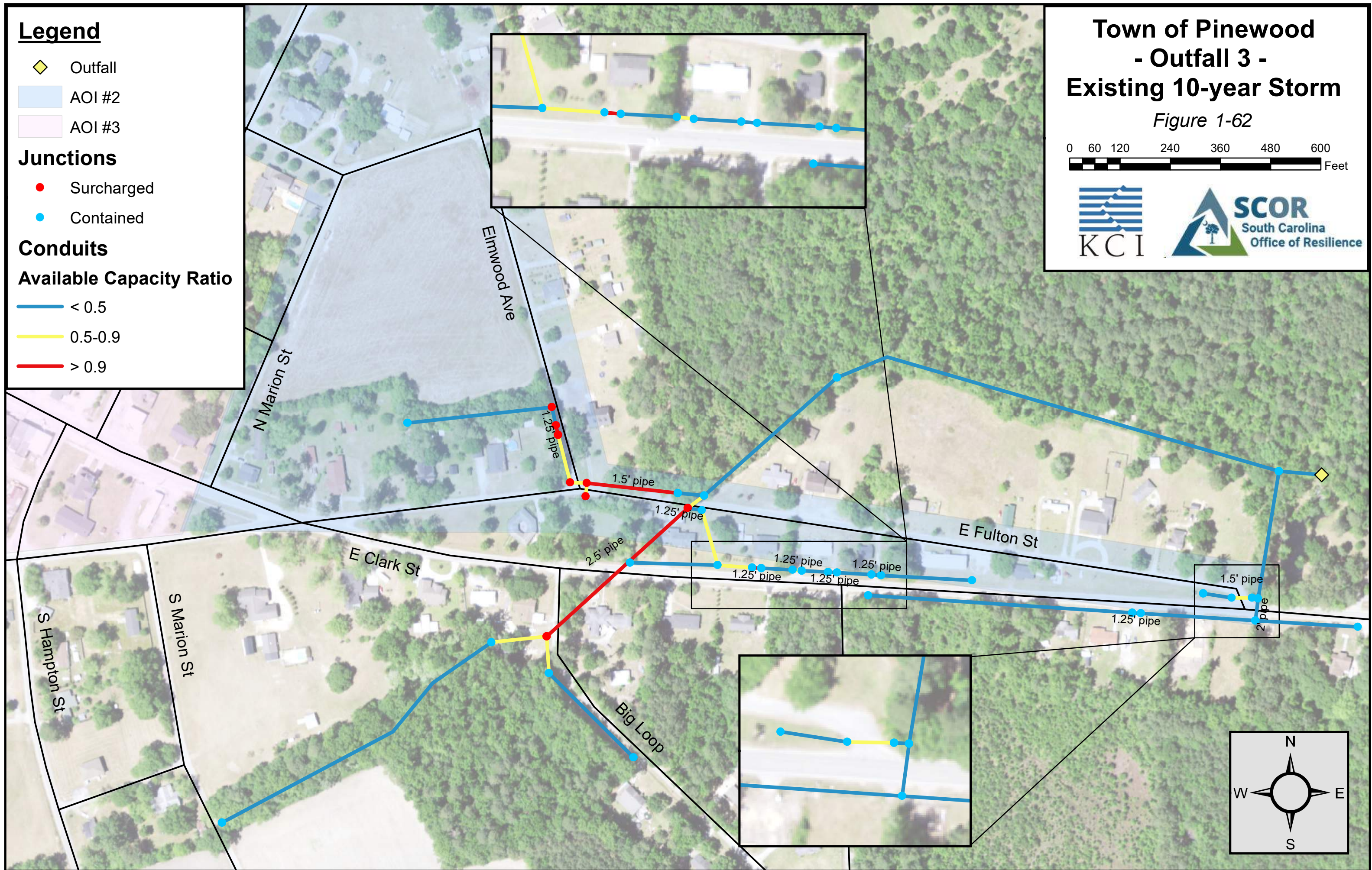
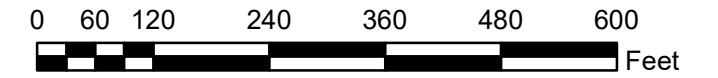
Conduits

Available Capacity Ratio

- < 0.5
- 0.5-0.9
- > 0.9

Town of Pinewood - Outfall 3 - Existing 10-year Storm

Figure 1-62



Legend

◆ Outfall

AOI #2

AOI #3

Junctions

Hours flooded

● < 0.5 hours

● < 4 hours

● < 8 hours

● 8+ hours

Conduits

Hours flooded

— < 0.5 hours

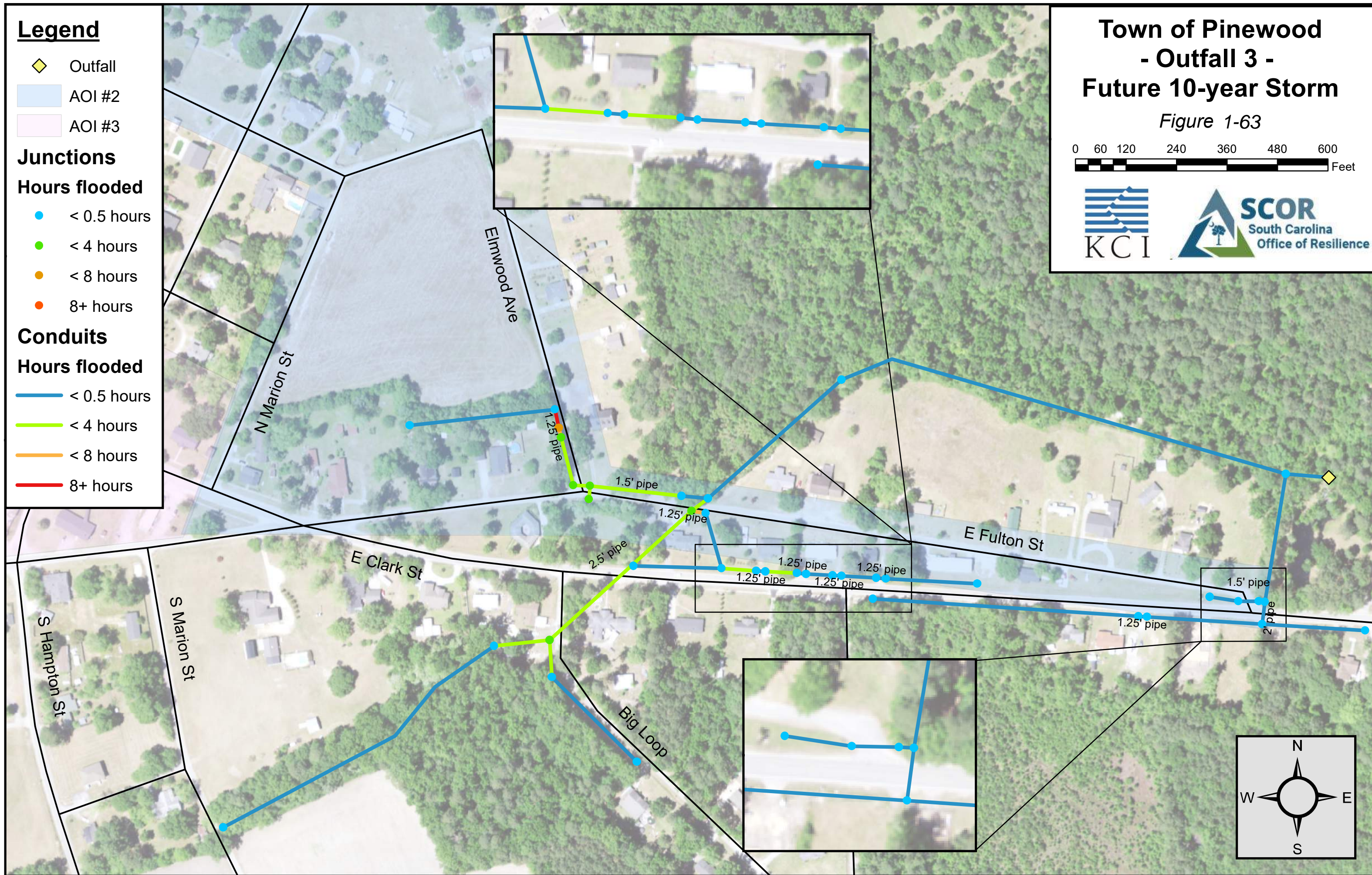
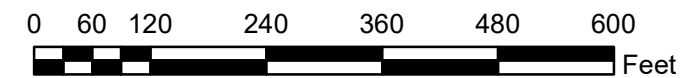
— < 4 hours

— < 8 hours

— 8+ hours

**Town of Pinewood
- Outfall 3 -
Future 10-year Storm**

Figure 1-63



Legend

- ◆ Outfall
- AOI #2
- AOI #3

Junctions

- Surcharged
- Contained

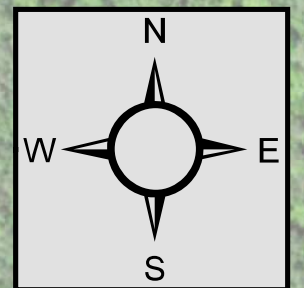
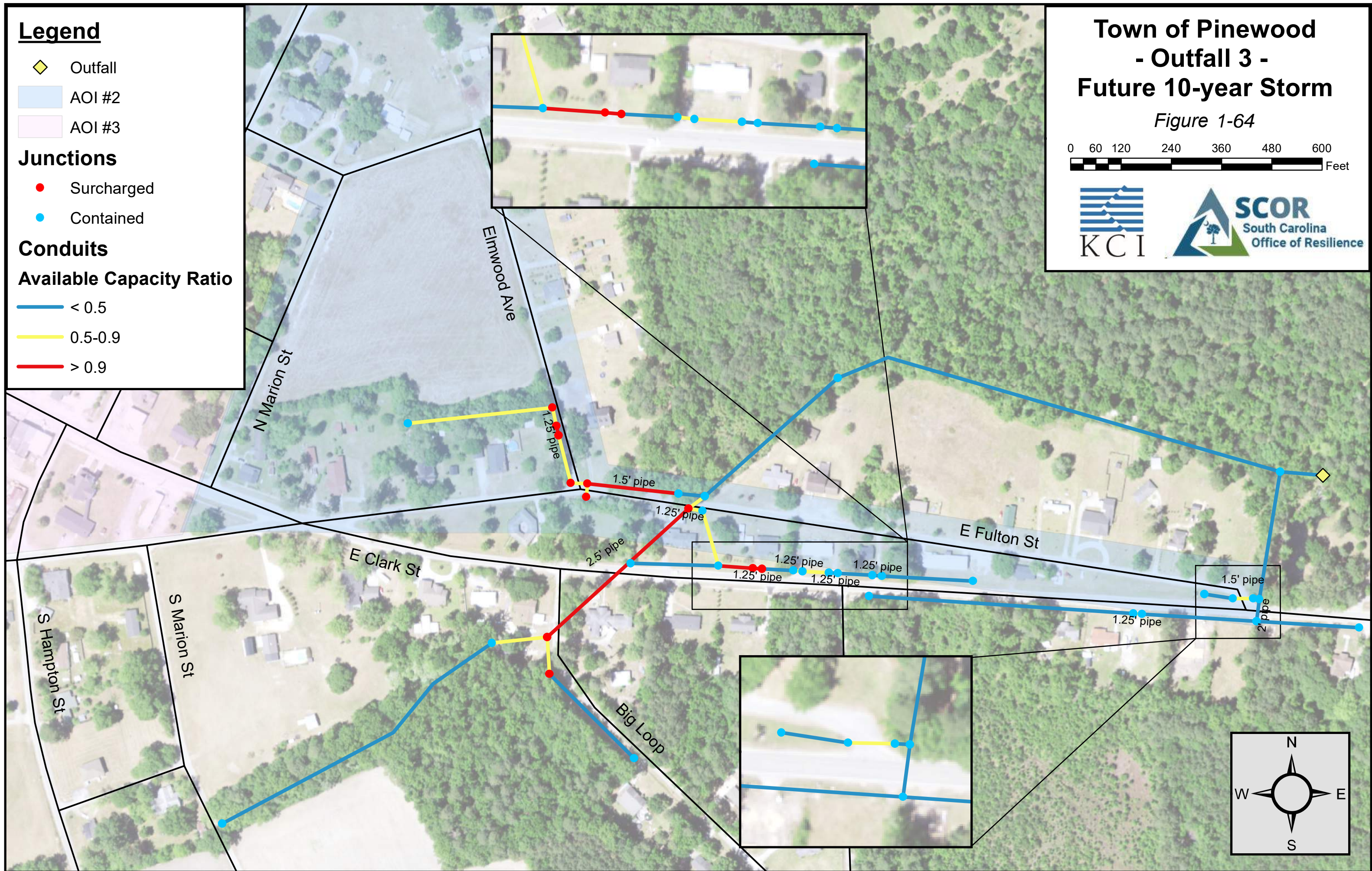
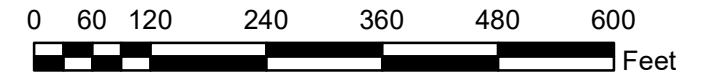
Conduits

Available Capacity Ratio

- < 0.5
- 0.5-0.9
- > 0.9

**Town of Pinewood
- Outfall 3 -
Future 10-year Storm**

Figure 1-64



Legend

◆ Outfall

AOI #2

AOI #3

Junctions

Hours flooded

● < 0.5 hours

● < 4 hours

● < 8 hours

● 8+ hours

Conduits

Hours flooded

— < 0.5 hours

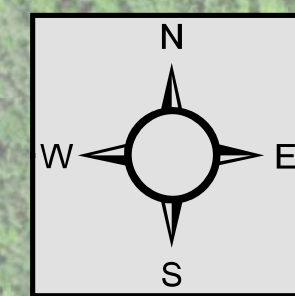
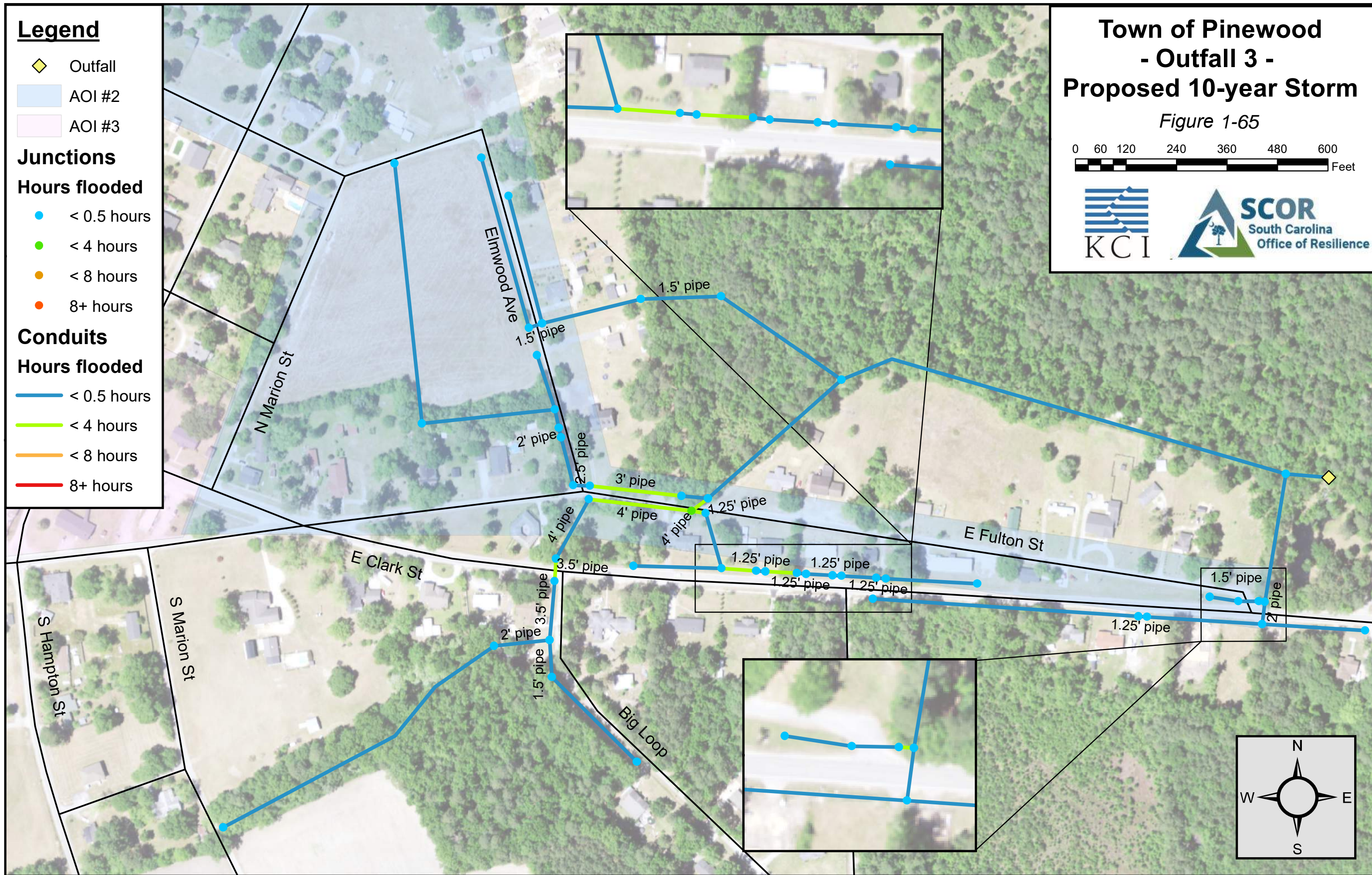
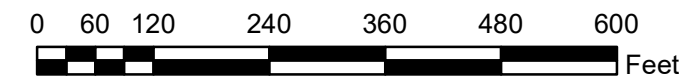
— < 4 hours

— < 8 hours

— 8+ hours

Town of Pinewood - Outfall 3 - Proposed 10-year Storm

Figure 1-65



Legend

◆ Outfall

AOI #2

AOI #3

Junctions

● Surcharged

● Contained

Conduits

Available Capacity Ratio

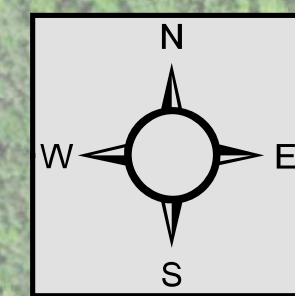
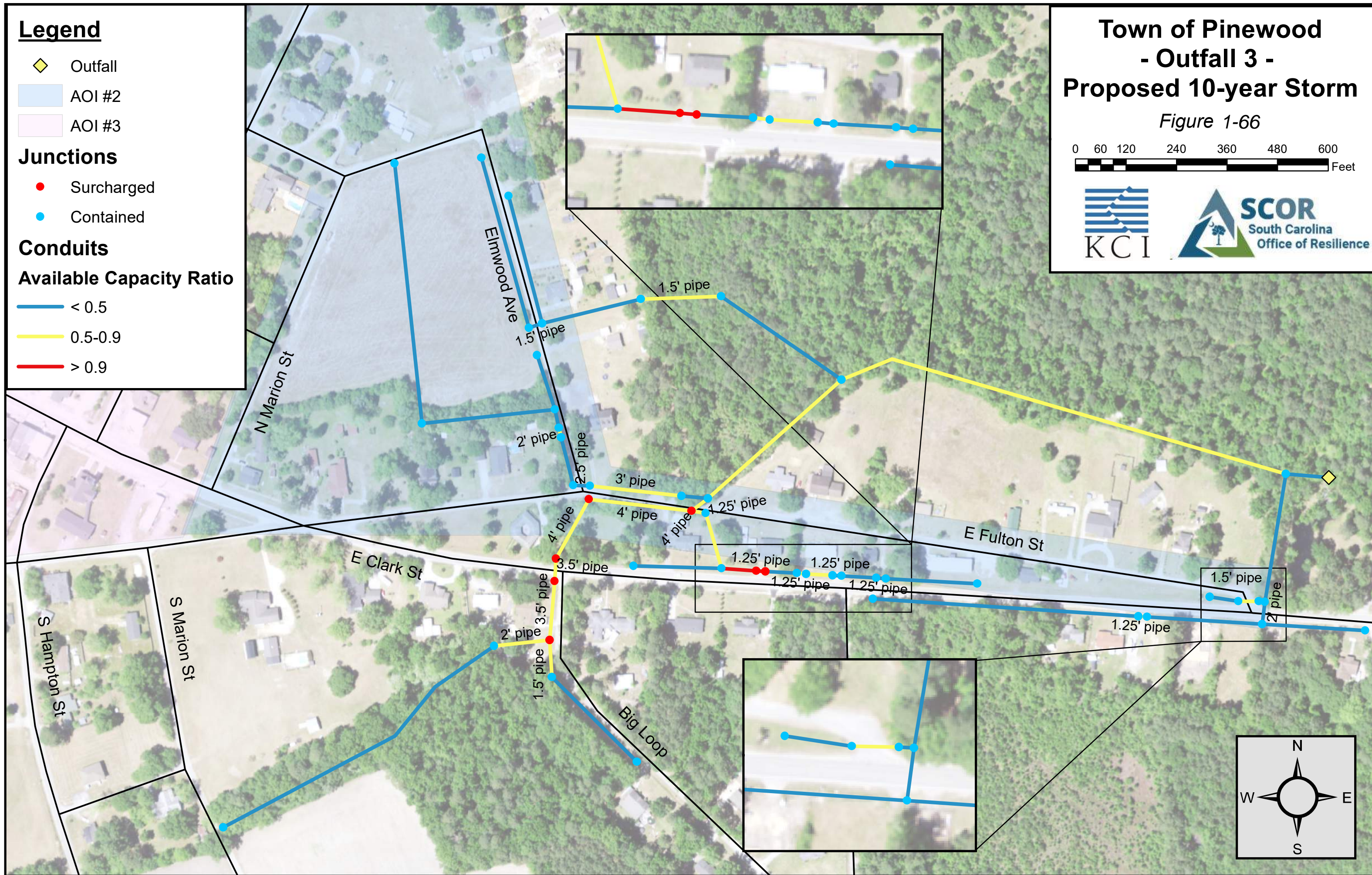
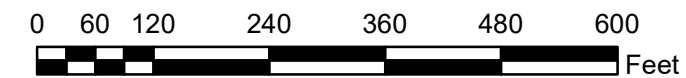
< 0.5

0.5-0.9

> 0.9

Town of Pinewood - Outfall 3 - Proposed 10-year Storm

Figure 1-66



Legend

◆ Outfall

AOI #2

AOI #3

Junctions

Hours flooded

● < 0.5 hours

● < 4 hours

● < 8 hours

● 8+ hours

Conduits

Hours flooded

— < 0.5 hours

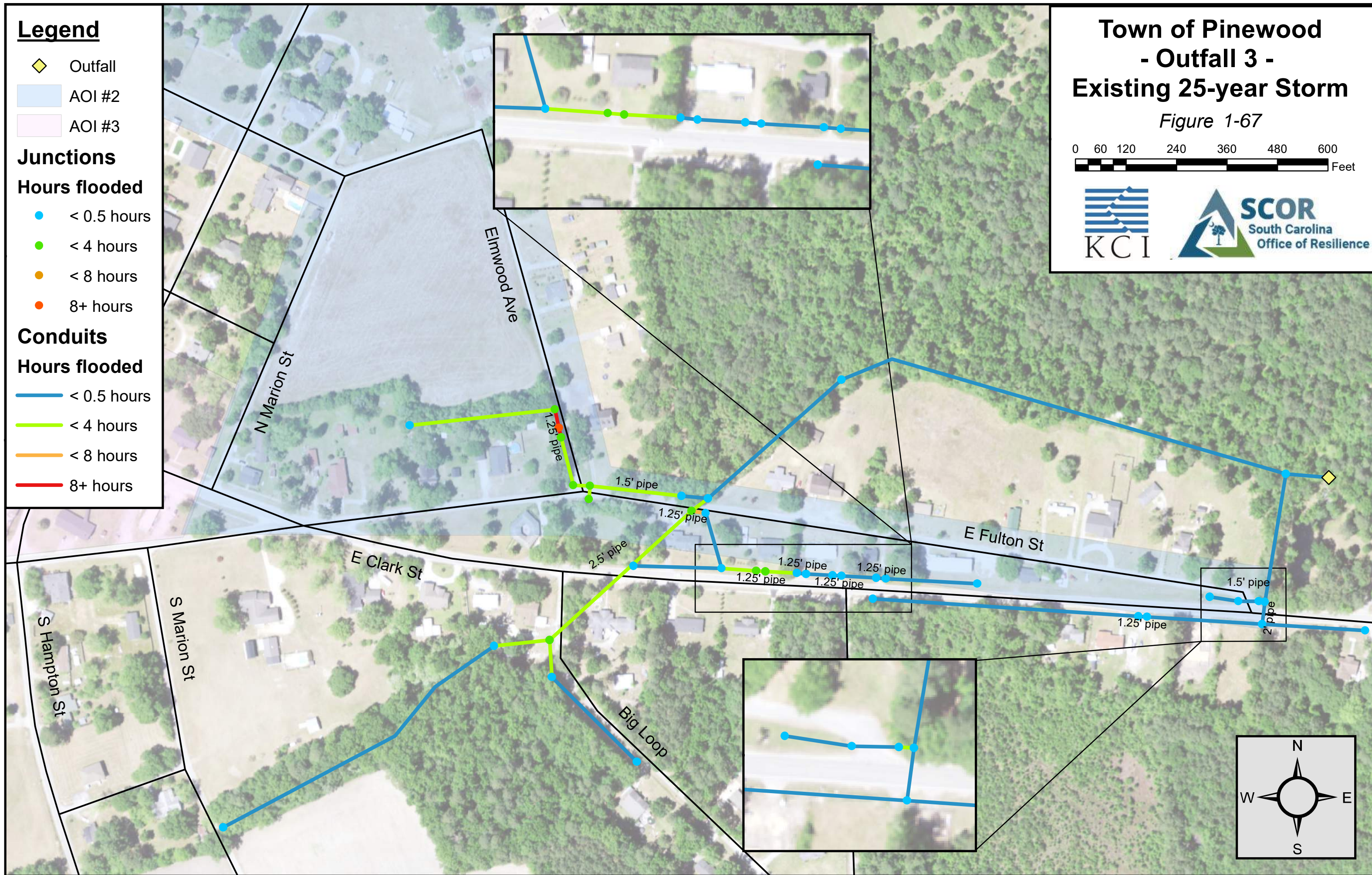
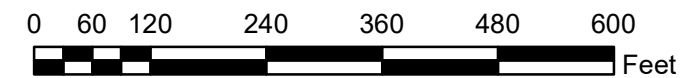
— < 4 hours

— < 8 hours

— 8+ hours

Town of Pinewood - Outfall 3 - Existing 25-year Storm

Figure 1-67



Legend

- ◆ Outfall
- AOI #2
- AOI #3

Junctions

- Surcharged
- Contained

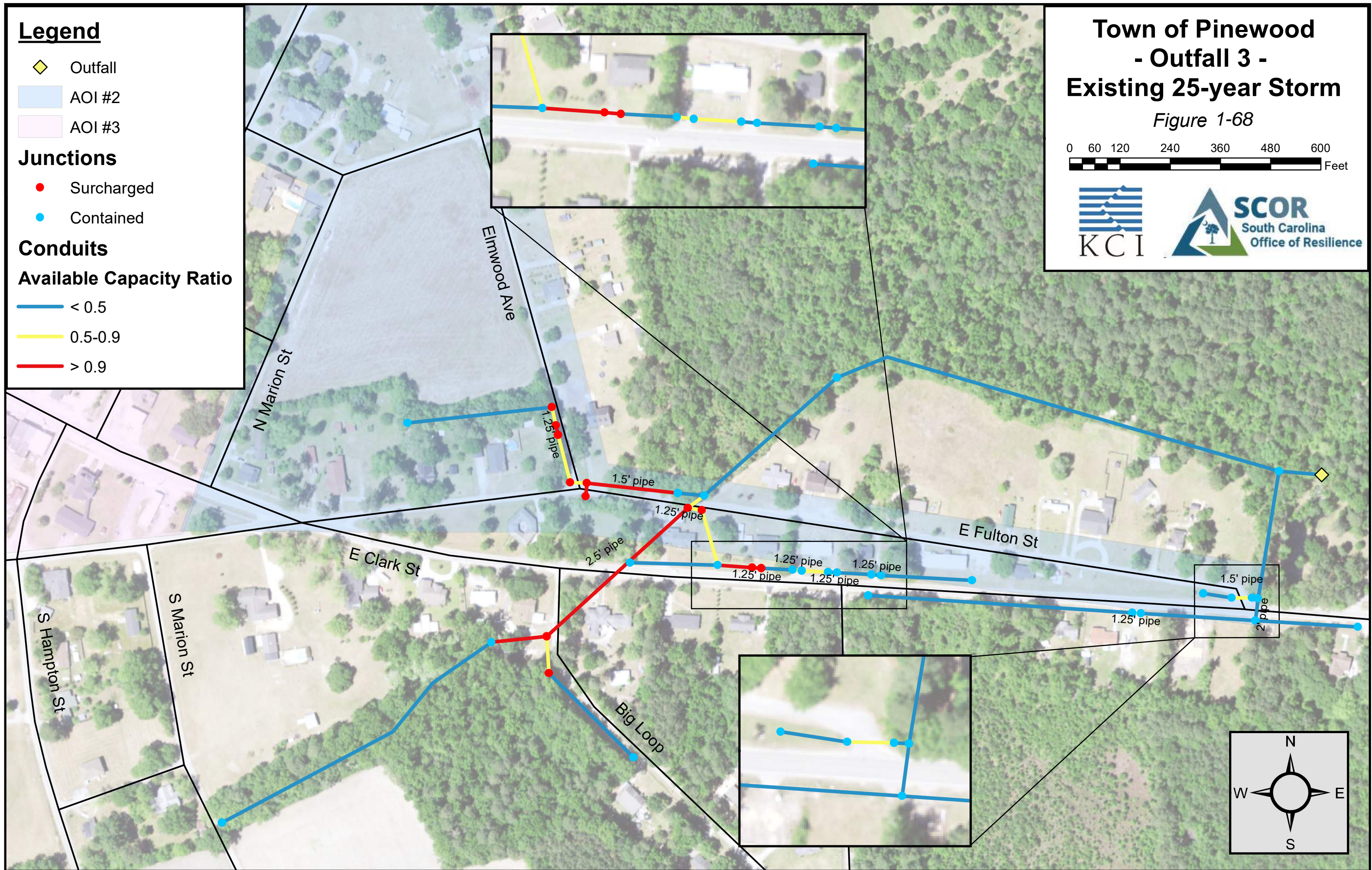
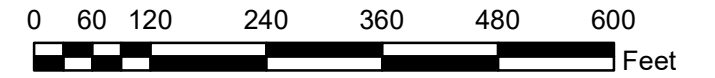
Conduits

Available Capacity Ratio

- < 0.5
- 0.5-0.9
- > 0.9

**Town of Pinewood
- Outfall 3 -
Existing 25-year Storm**

Figure 1-68



Legend

◆ Outfall

AOI #2

AOI #3

Junctions

Hours flooded

● < 0.5 hours

● < 4 hours

● < 8 hours

● 8+ hours

Conduits

Hours flooded

— < 0.5 hours

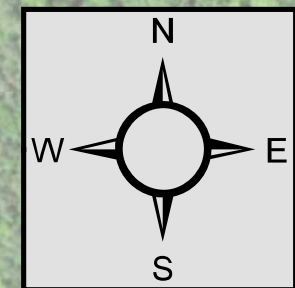
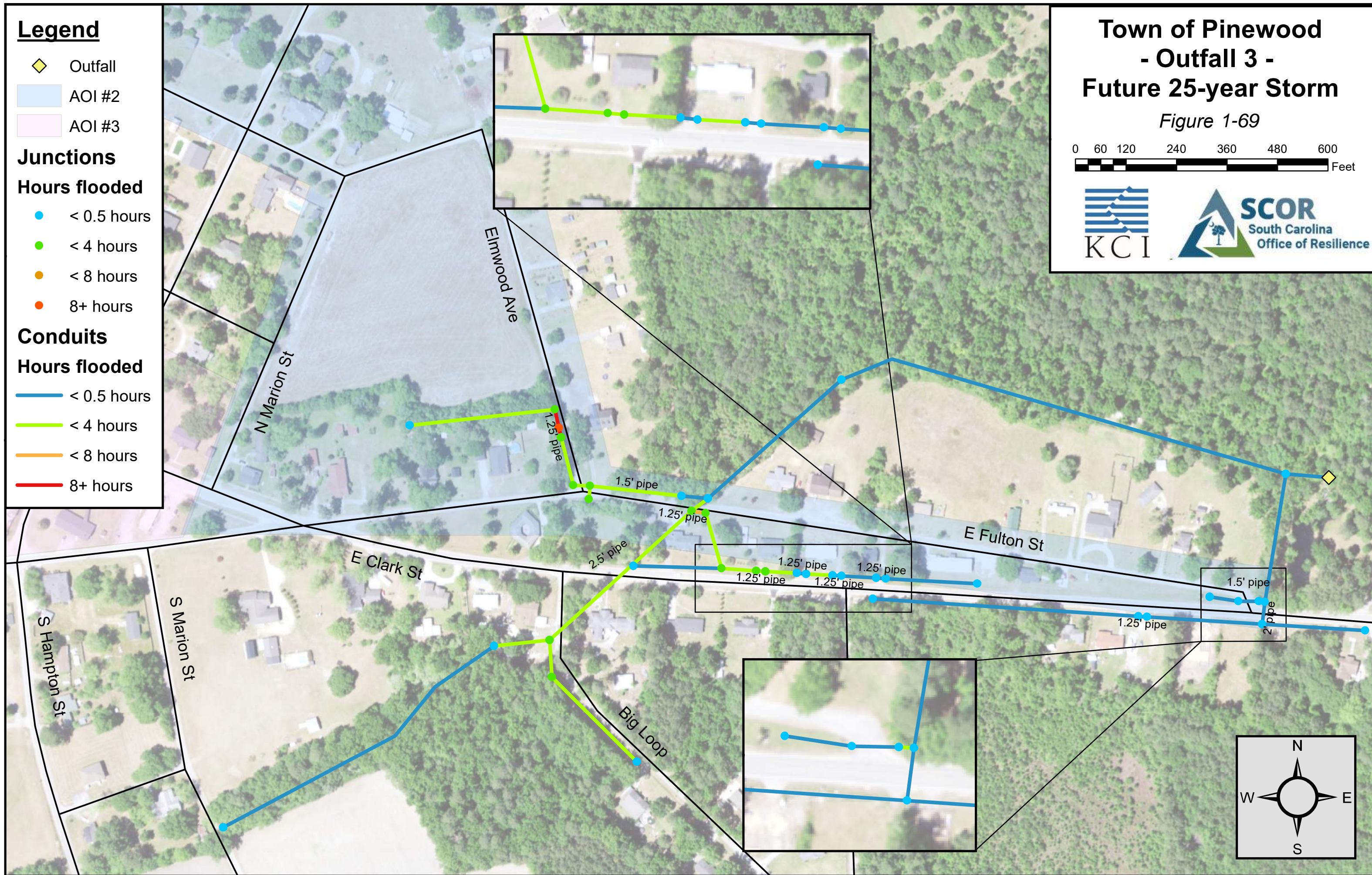
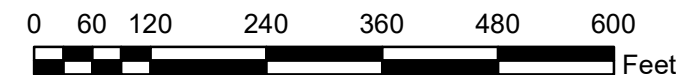
— < 4 hours

— < 8 hours

— 8+ hours

**Town of Pinewood
- Outfall 3 -
Future 25-year Storm**

Figure 1-69



Legend

- ◆ Outfall
- AOI #2
- AOI #3

Junctions

- Surcharged
- Contained

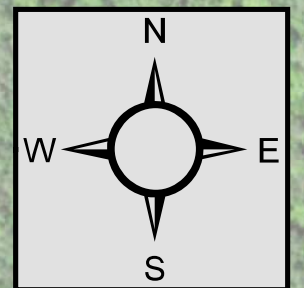
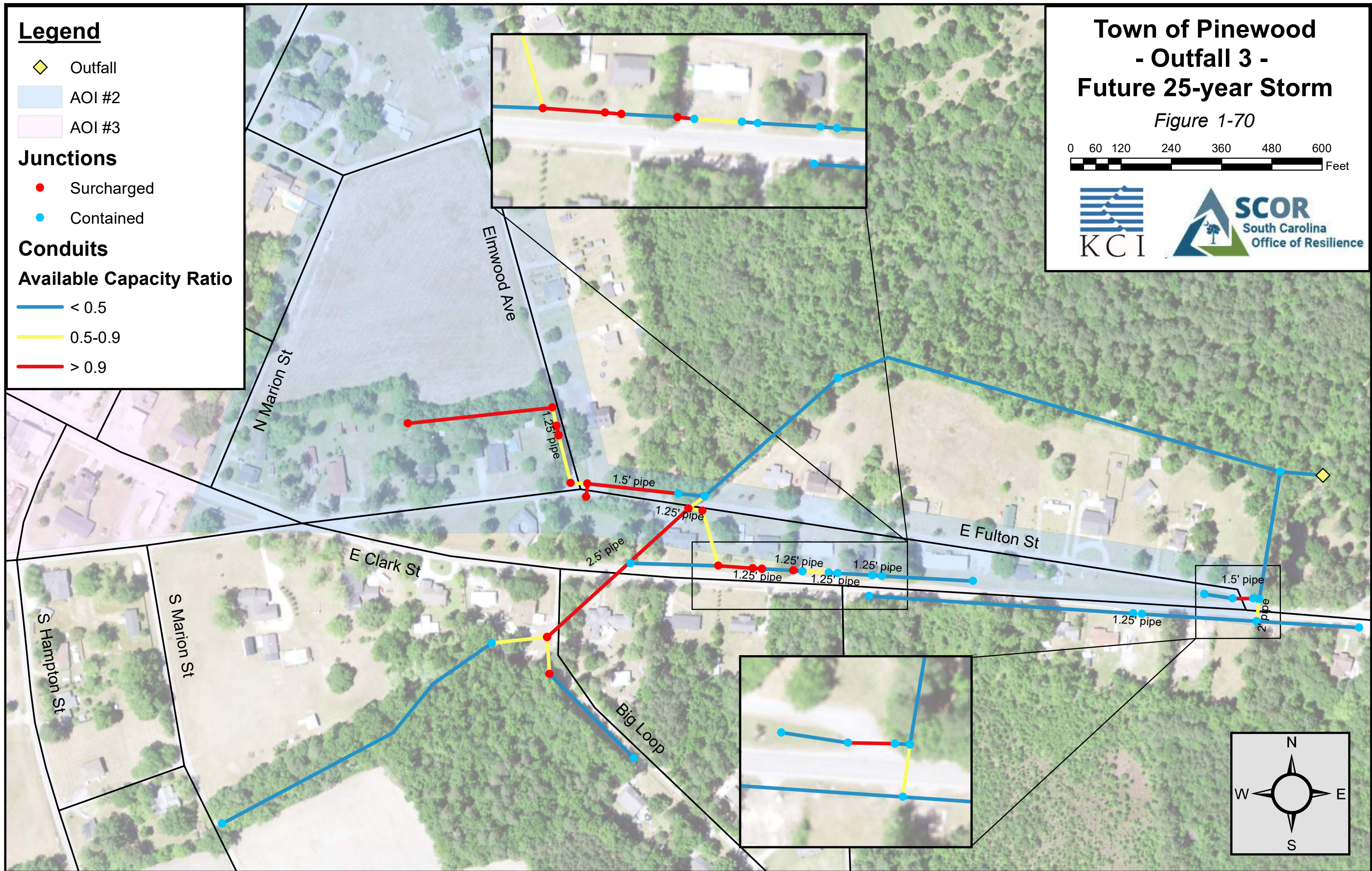
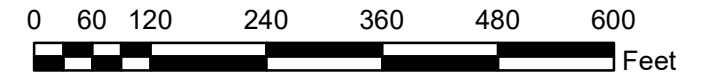
Conduits

Available Capacity Ratio

- < 0.5
- 0.5-0.9
- > 0.9

**Town of Pinewood
- Outfall 3 -
Future 25-year Storm**

Figure 1-70



Legend

◆ Outfall

AOI #2

AOI #3

Junctions

Hours flooded

● < 0.5 hours

● < 4 hours

● < 8 hours

● 8+ hours

Conduits

Hours flooded

— < 0.5 hours

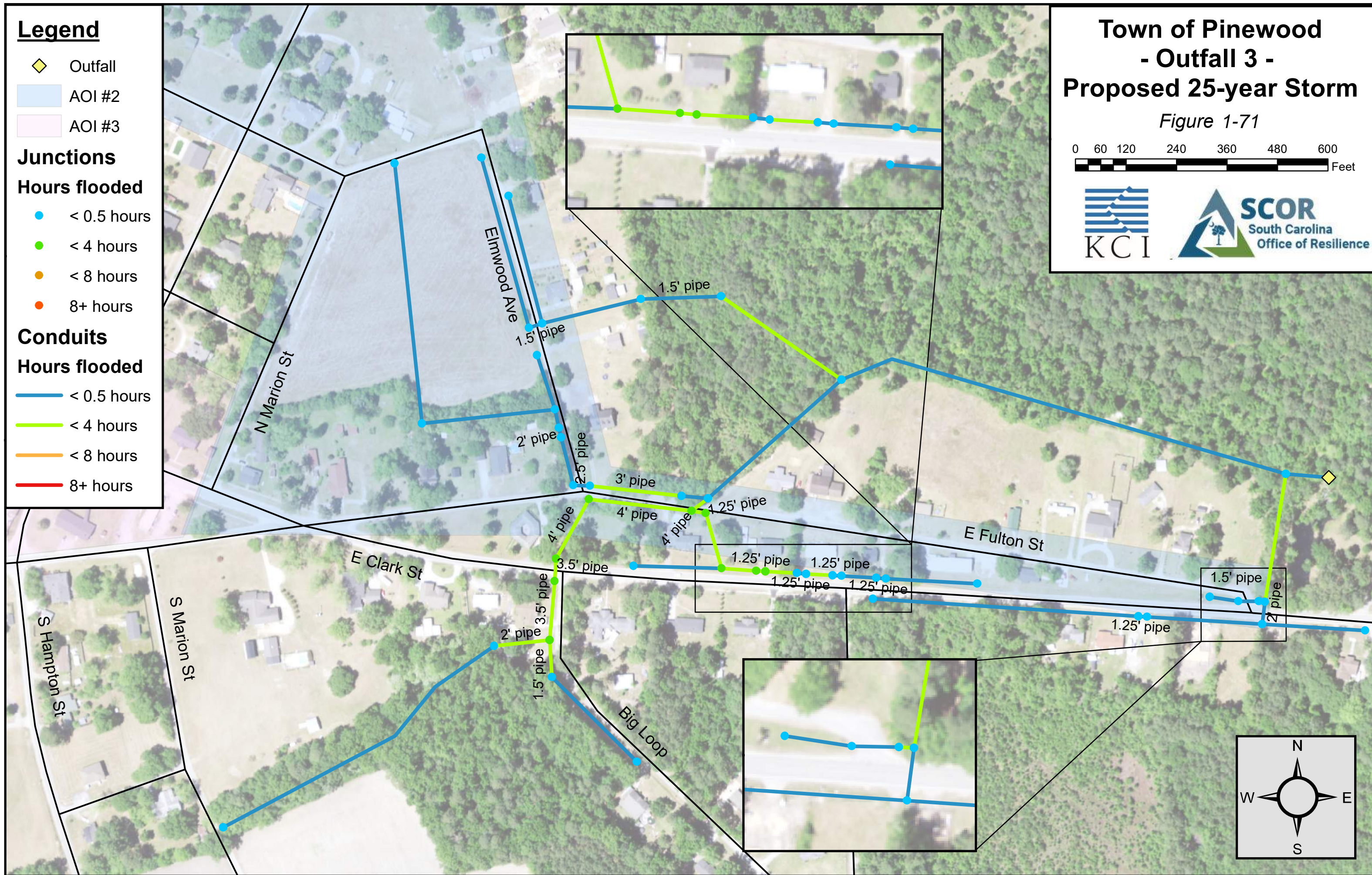
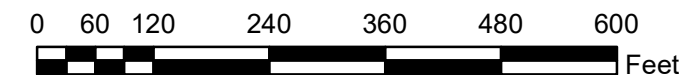
— < 4 hours

— < 8 hours

— 8+ hours

Town of Pinewood - Outfall 3 - Proposed 25-year Storm

Figure 1-71



Legend

- ◆ Outfall
- AOI #2
- AOI #3

Junctions

- Surcharged
- Contained

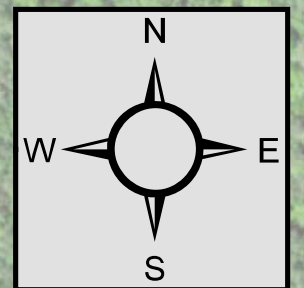
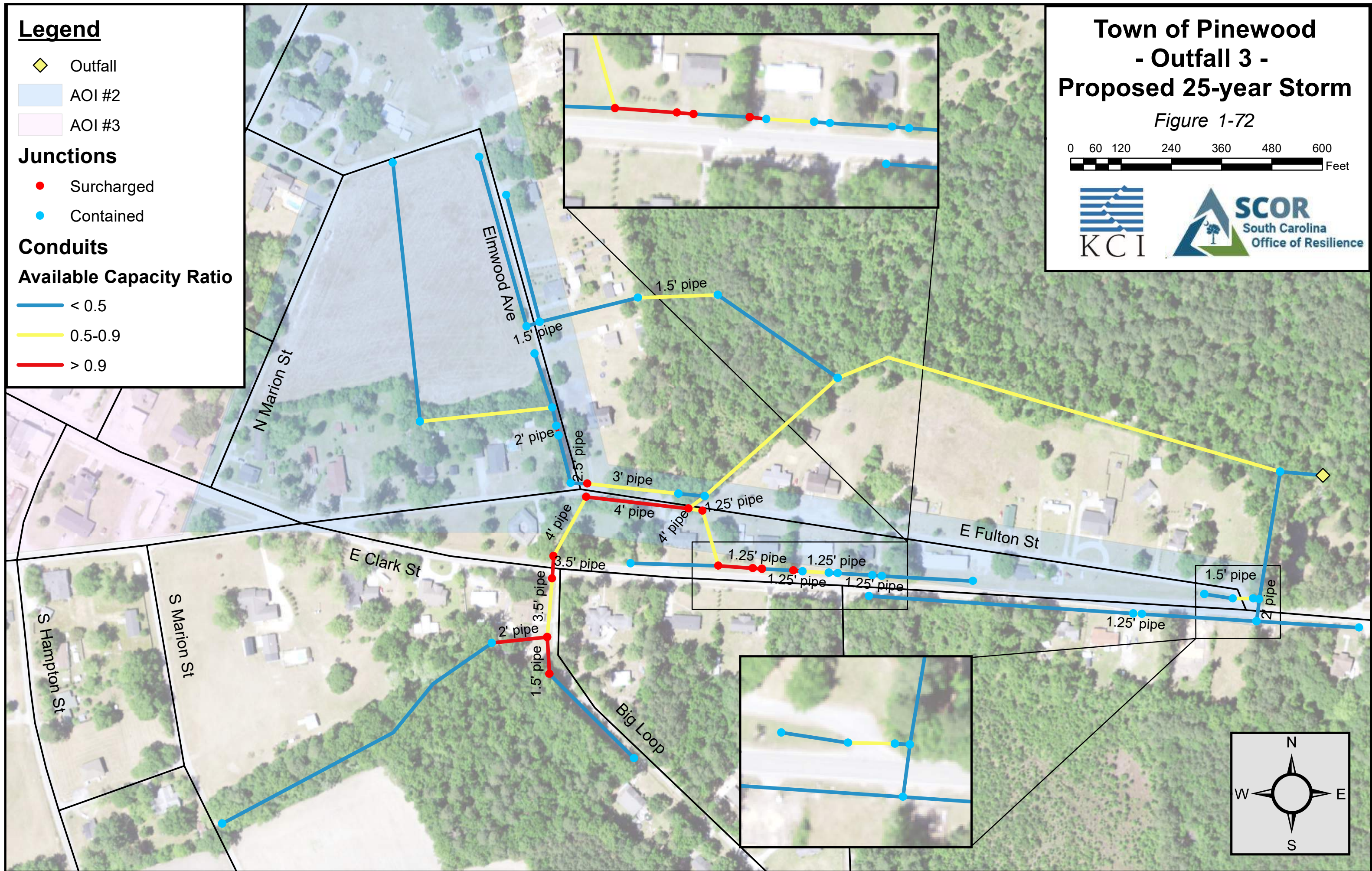
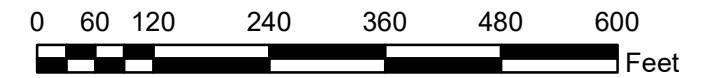
Conduits

Available Capacity Ratio

- < 0.5
- 0.5-0.9
- > 0.9

**Town of Pinewood
- Outfall 3 -
Proposed 25-year Storm**

Figure 1-72



Legend

◆ Outfall

AOI #2

AOI #3

Junctions

Hours flooded

● < 0.5 hours

● < 4 hours

● < 8 hours

● 8+ hours

Conduits

Hours flooded

— < 0.5 hours

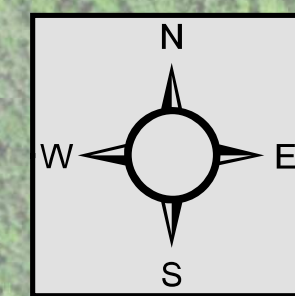
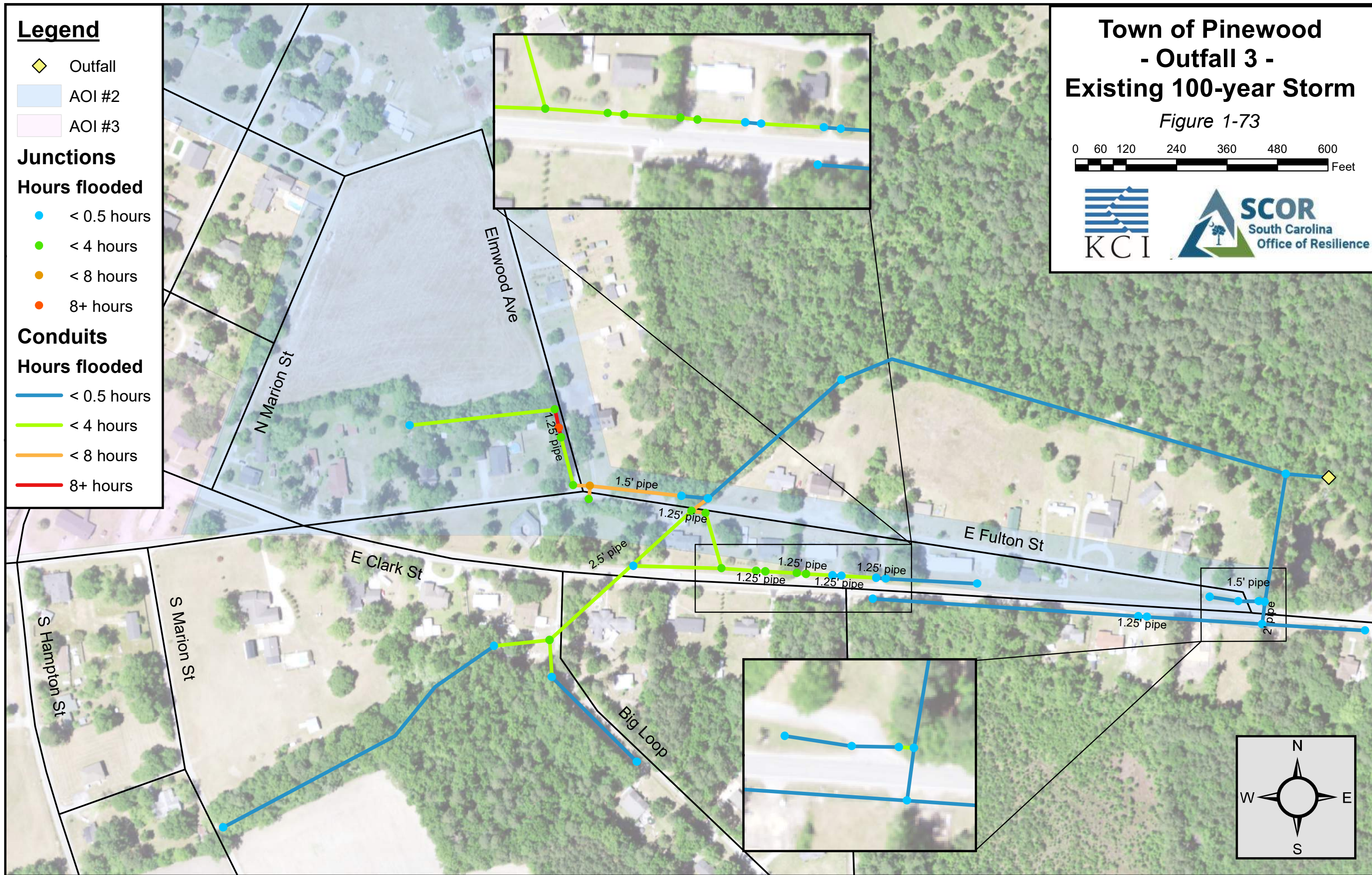
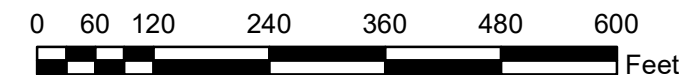
— < 4 hours

— < 8 hours

— 8+ hours

Town of Pinewood - Outfall 3 - Existing 100-year Storm

Figure 1-73



Legend

- ◆ Outfall
- AOI #2
- AOI #3

Junctions

- Surcharged
- Contained

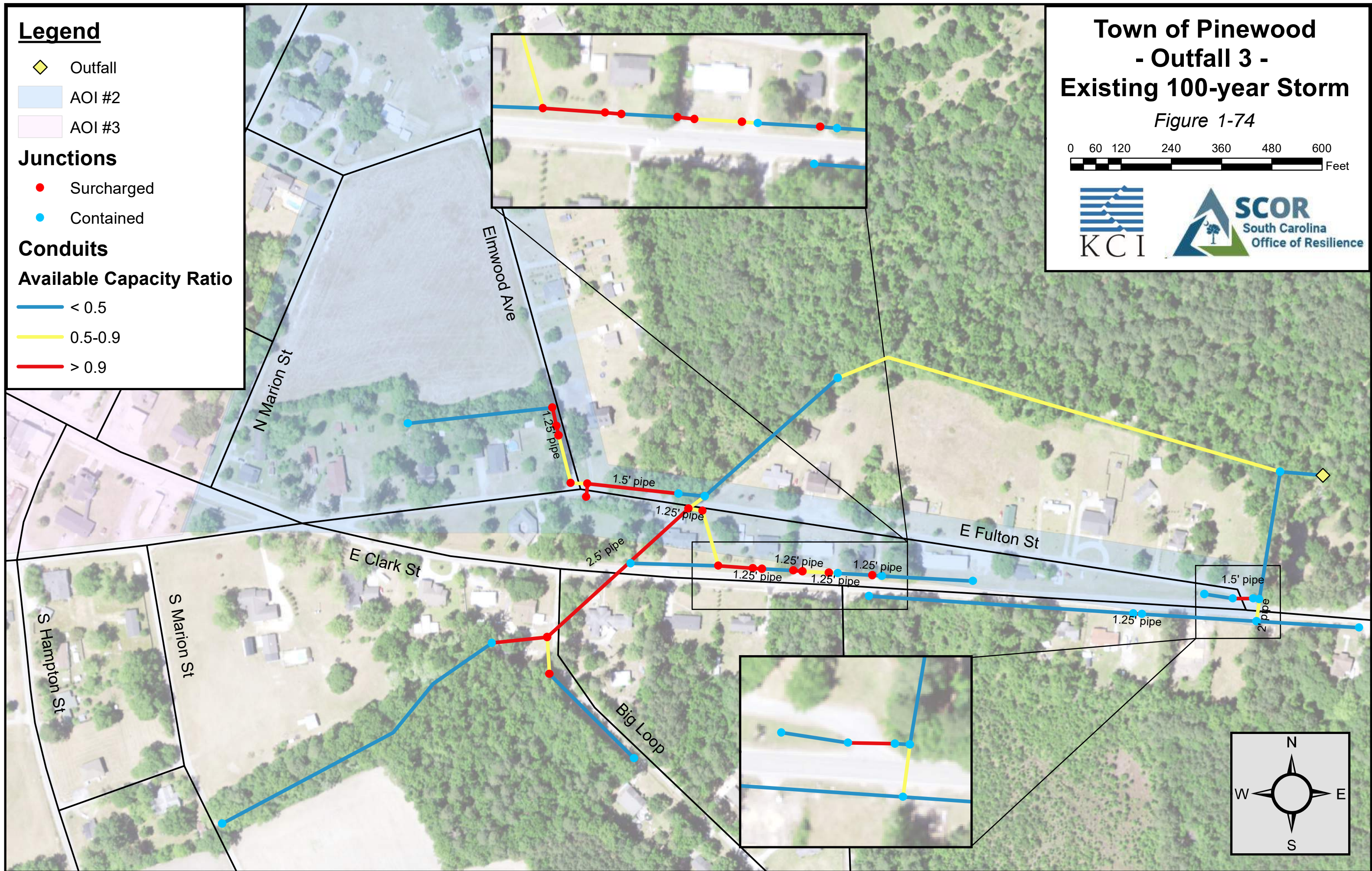
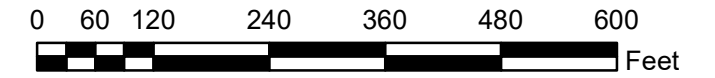
Conduits

Available Capacity Ratio

- < 0.5
- 0.5-0.9
- > 0.9

**Town of Pinewood
- Outfall 3 -
Existing 100-year Storm**

Figure 1-74

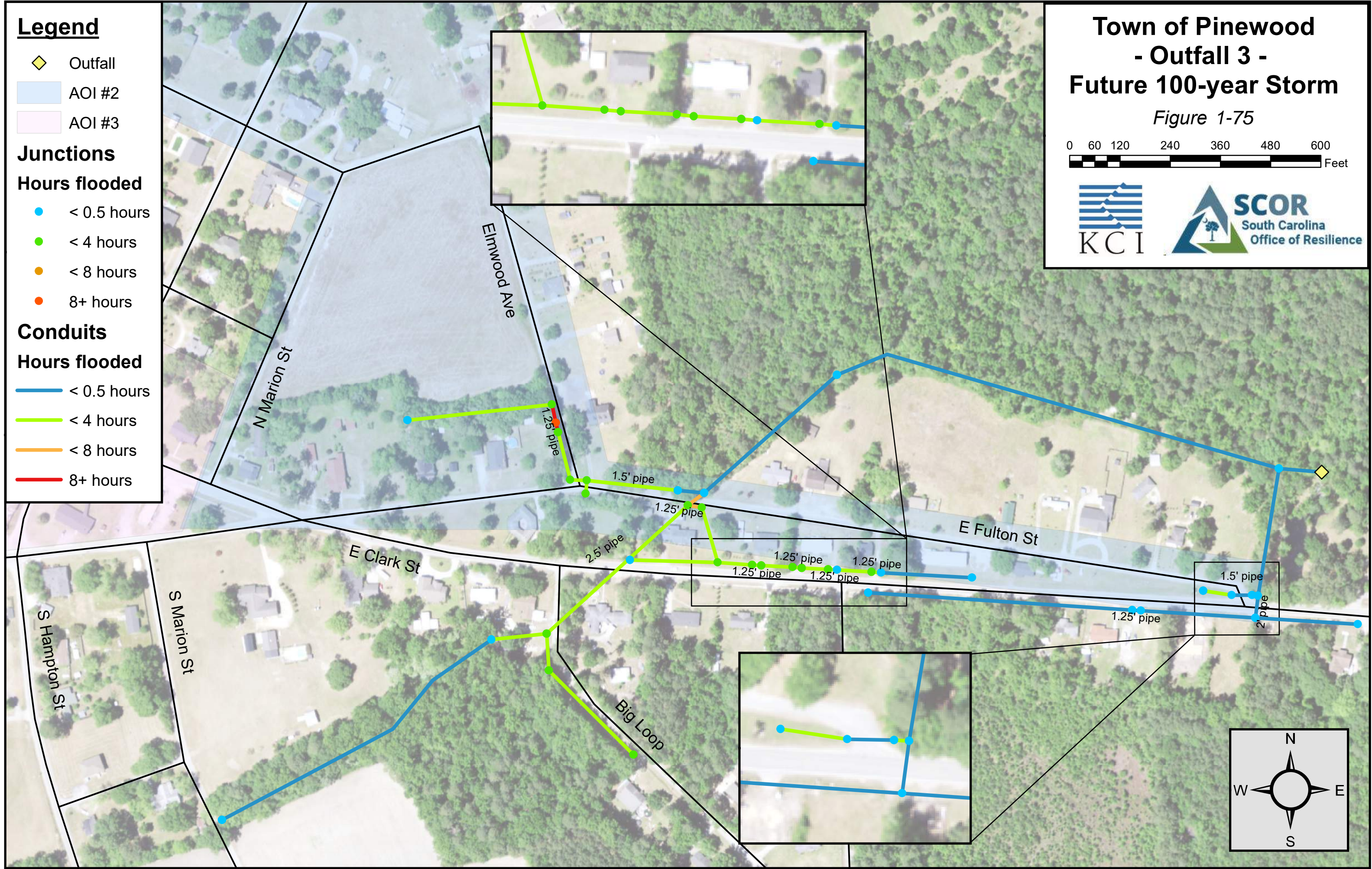


Legend

- ◆ Outfall
- AOI #2
- AOI #3
- Junctions**
- Hours flooded**
- < 0.5 hours
- < 4 hours
- < 8 hours
- 8+ hours
- Conduits**
- Hours flooded**
- < 0.5 hours
- < 4 hours
- < 8 hours
- 8+ hours

**Town of Pinewood
- Outfall 3 -
Future 100-year Storm**

Figure 1-75



Legend

- ◆ Outfall
- AOI #2
- AOI #3

Junctions

- Surcharged
- Contained

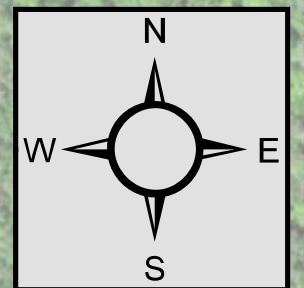
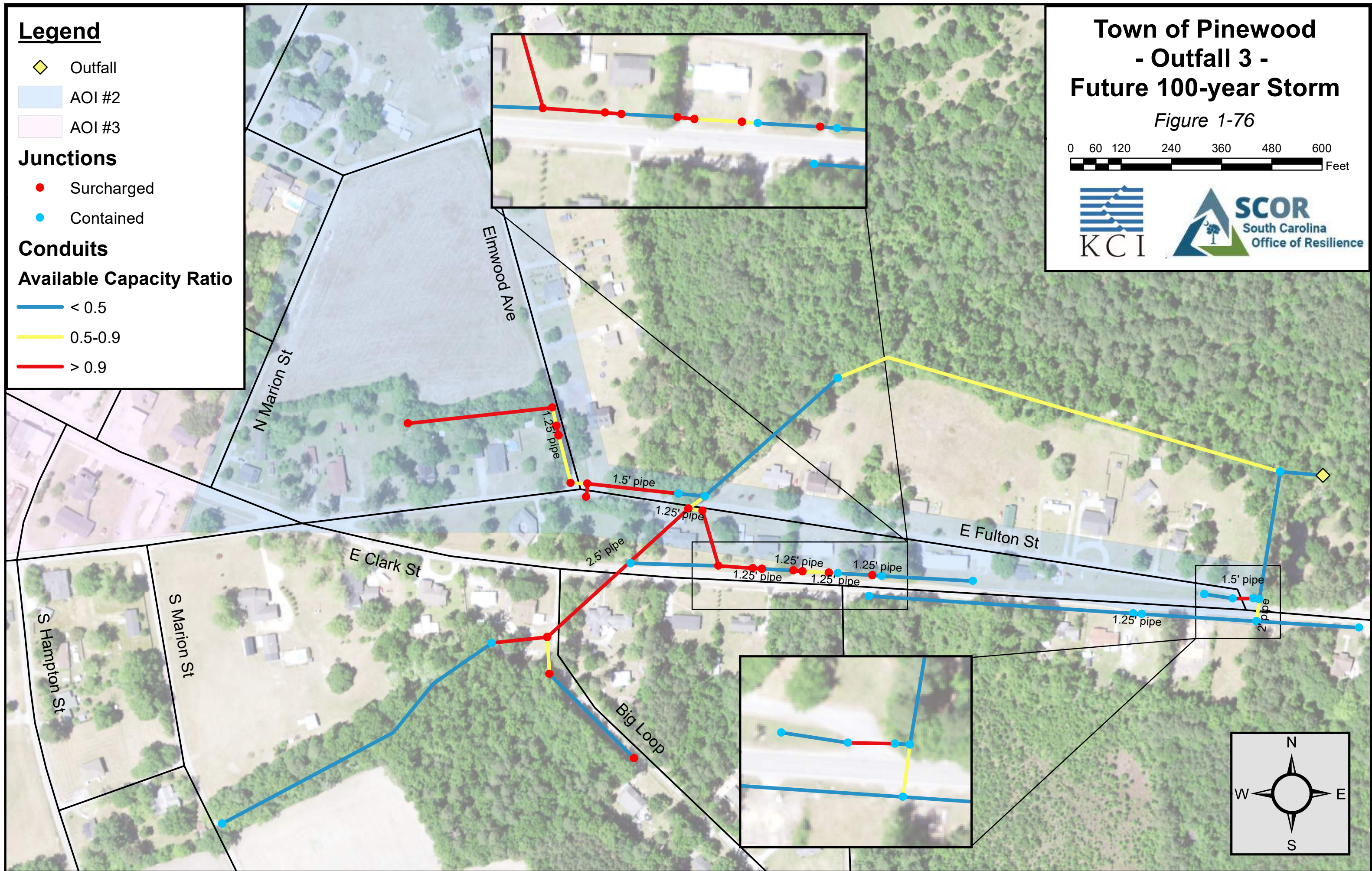
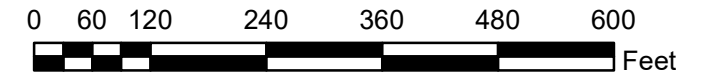
Conduits

Available Capacity Ratio

- < 0.5
- 0.5-0.9
- > 0.9

Town of Pinewood - Outfall 3 - Future 100-year Storm

Figure 1-76



Legend

◆ Outfall

AOI #2

AOI #3

Junctions

Hours flooded

● < 0.5 hours

● < 4 hours

● < 8 hours

● 8+ hours

Conduits

Hours flooded

— < 0.5 hours

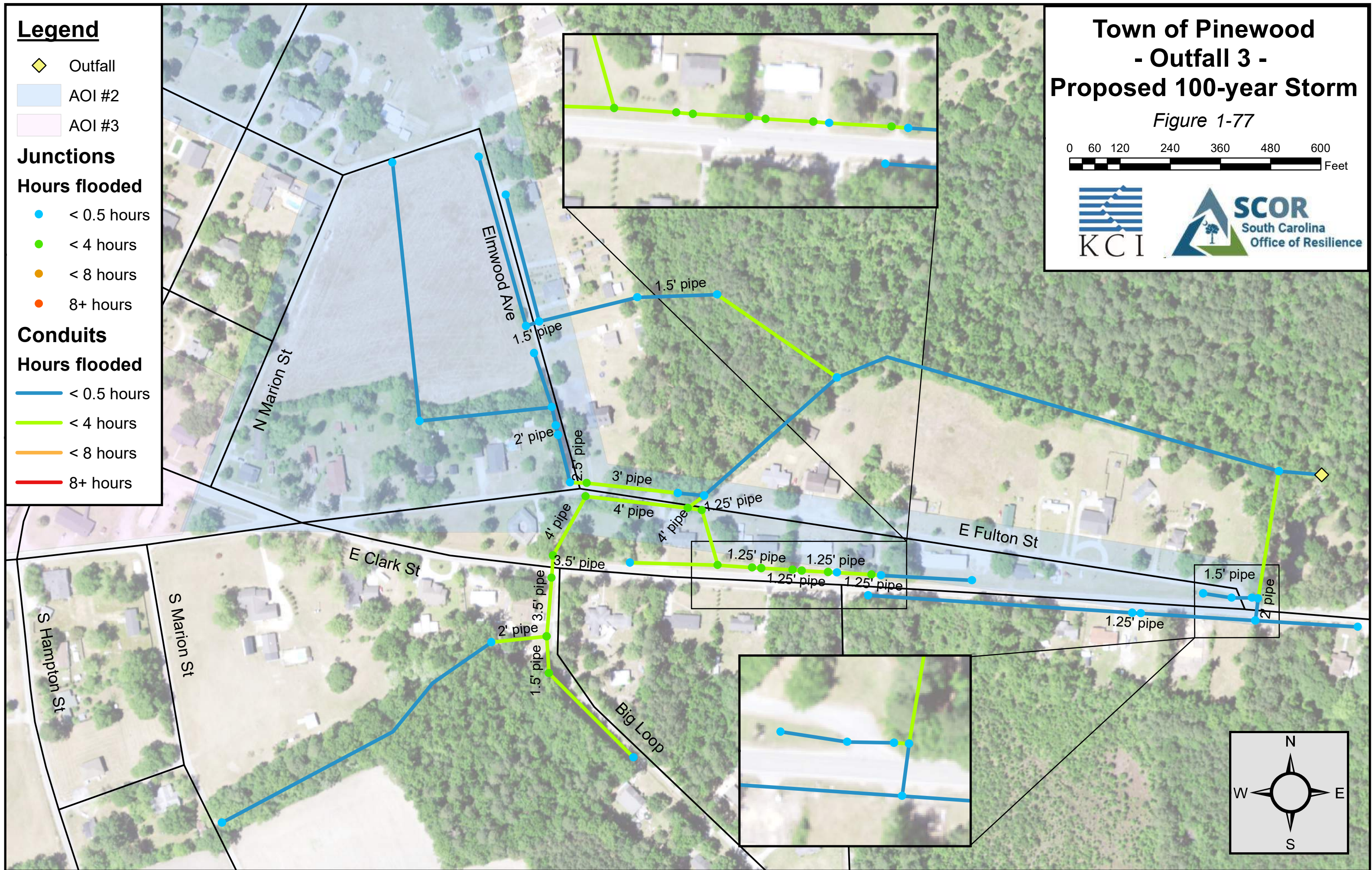
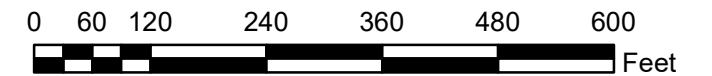
— < 4 hours

— < 8 hours

— 8+ hours

Town of Pinewood - Outfall 3 - Proposed 100-year Storm

Figure 1-77



Legend

- ◆ Outfall
- AOI #2
- AOI #3

Junctions

- Surcharged
- Contained

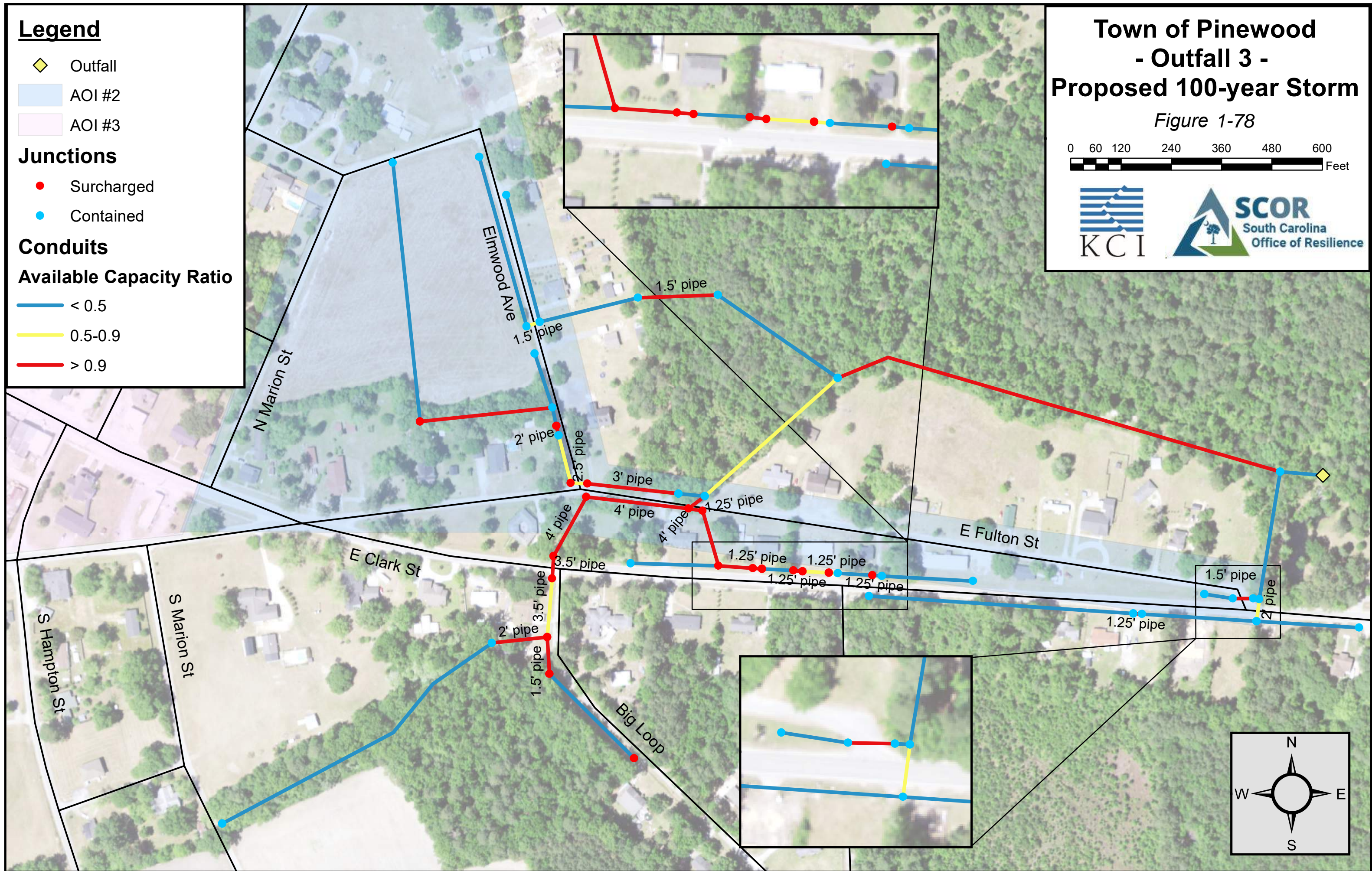
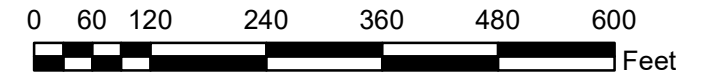
Conduits

Available Capacity Ratio

- < 0.5
- 0.5-0.9
- > 0.9

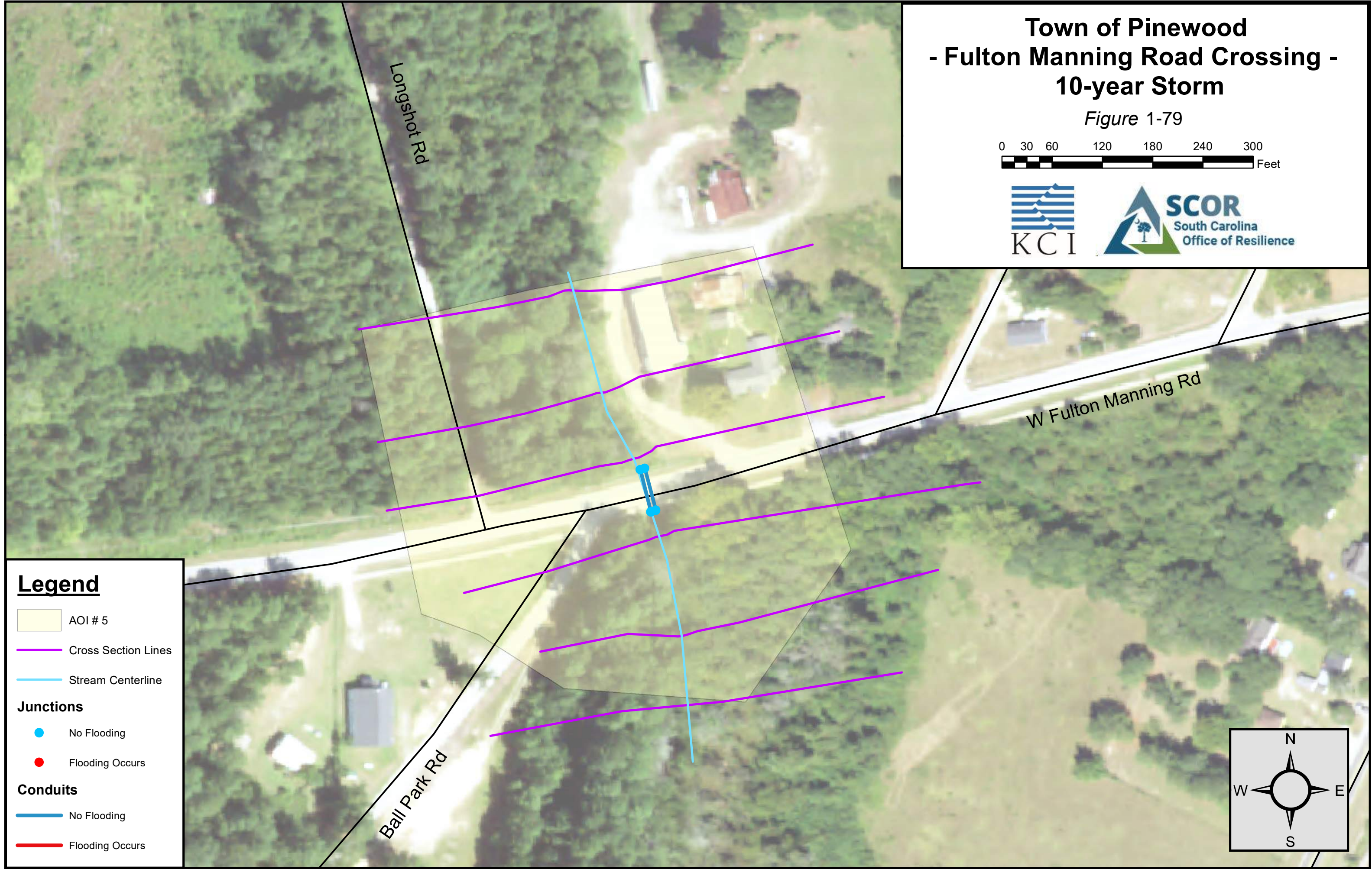
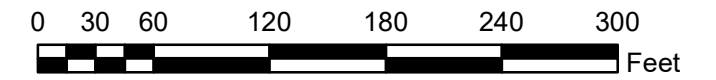
Town of Pinewood - Outfall 3 - Proposed 100-year Storm

Figure 1-78



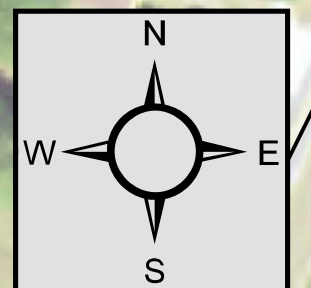
Town of Pinewood - Fulton Manning Road Crossing - 10-year Storm

Figure 1-79



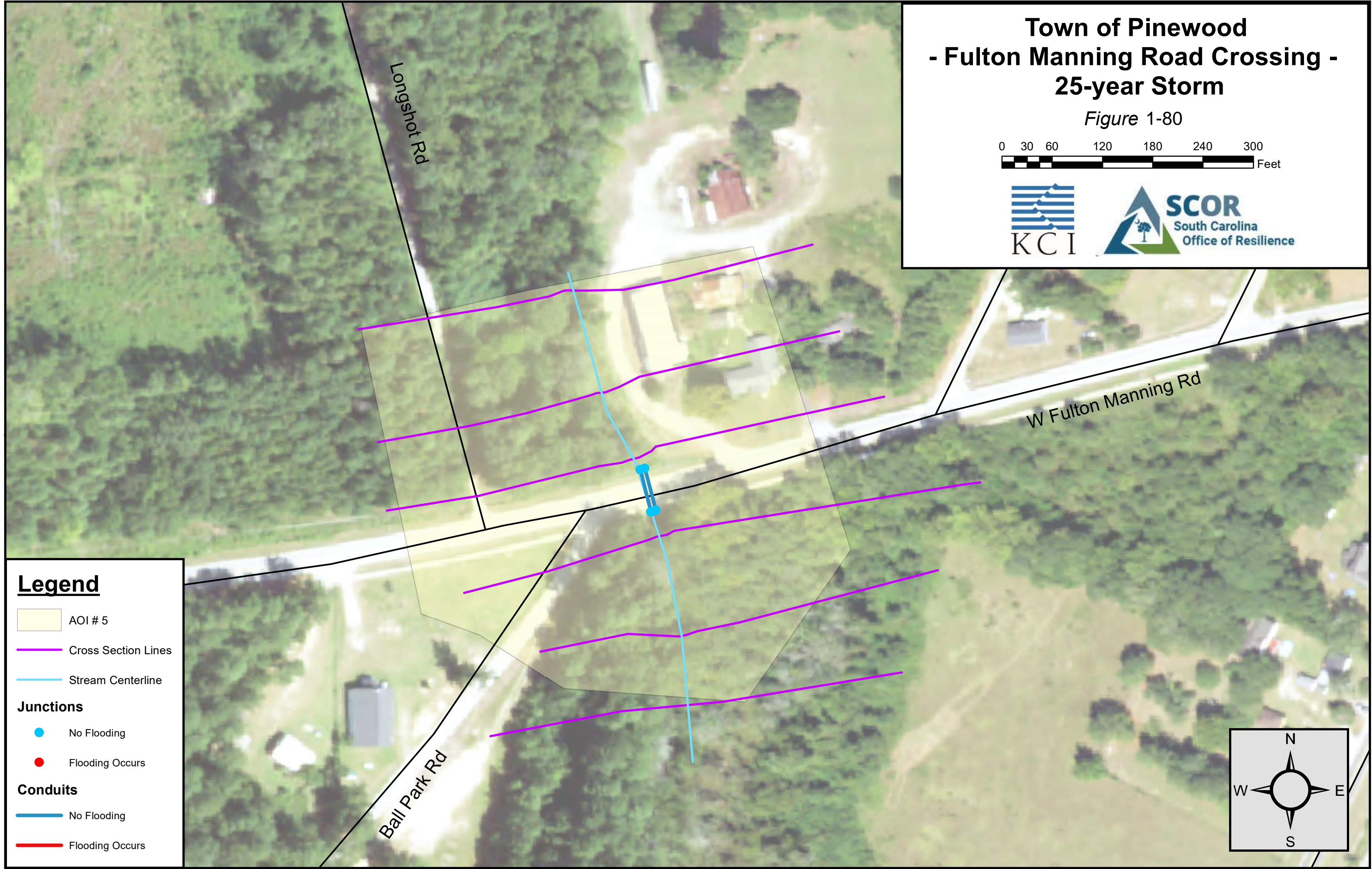
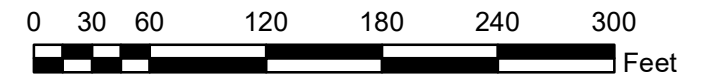
Legend

- AOI # 5
- Cross Section Lines
- Stream Centerline
- Junctions**
 - No Flooding
 - Flooding Occurs
- Conduits**
 - No Flooding
 - Flooding Occurs



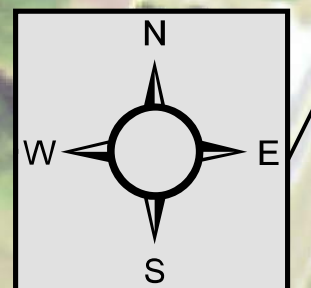
Town of Pinewood - Fulton Manning Road Crossing - 25-year Storm

Figure 1-80



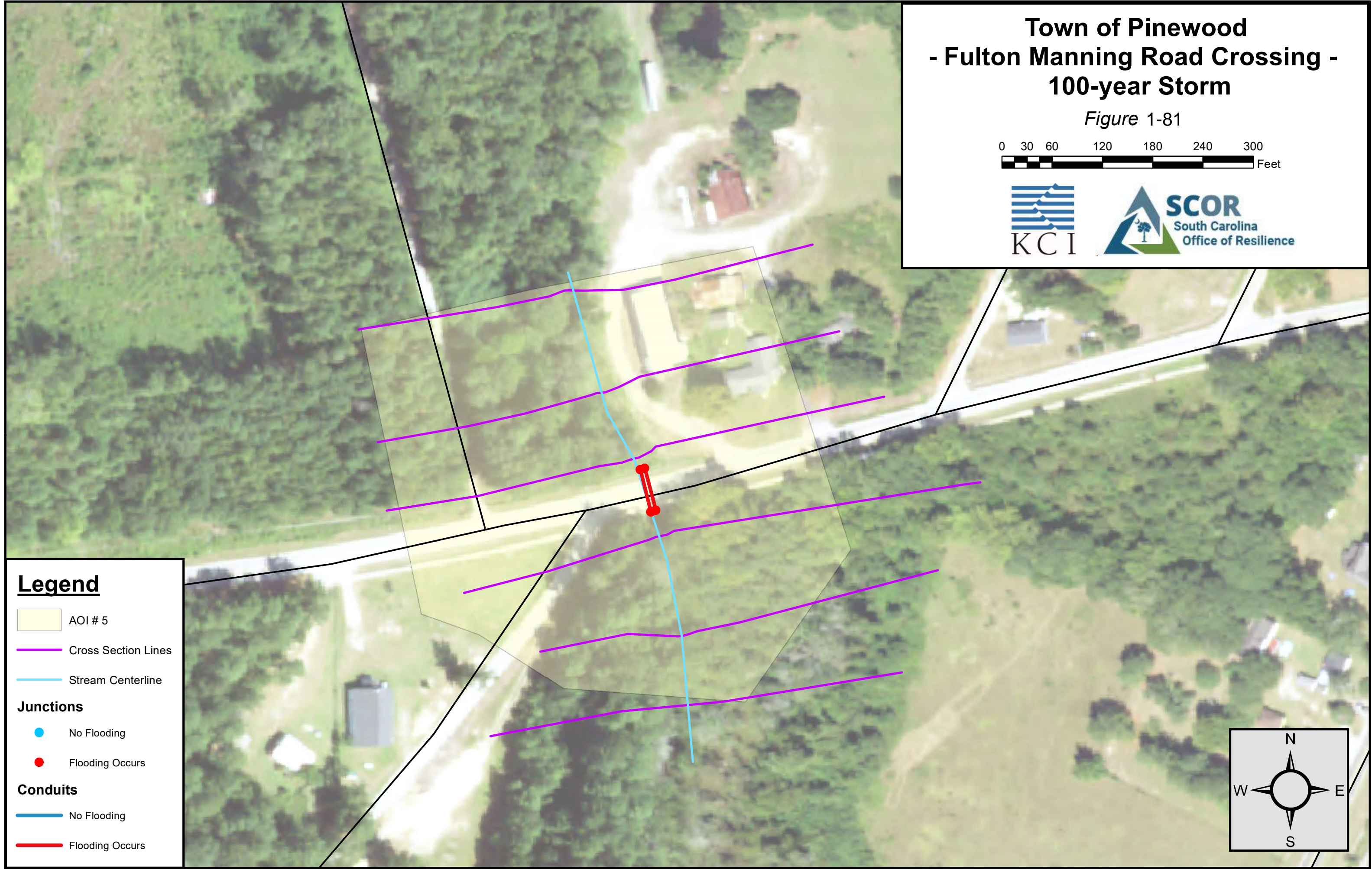
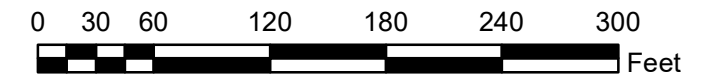
Legend

- AOI # 5
 - Cross Section Lines
 - Stream Centerline
- Junctions**
- No Flooding
 - Flooding Occurs
- Conduits**
- No Flooding
 - Flooding Occurs



Town of Pinewood - Fulton Manning Road Crossing - 100-year Storm

Figure 1-81



Legend

- AOI # 5
- Cross Section Lines
- Stream Centerline
- Junctions**
 - No Flooding
 - Flooding Occurs
- Conduits**
 - No Flooding
 - Flooding Occurs



Appendix E – Project BCAs & Prioritization

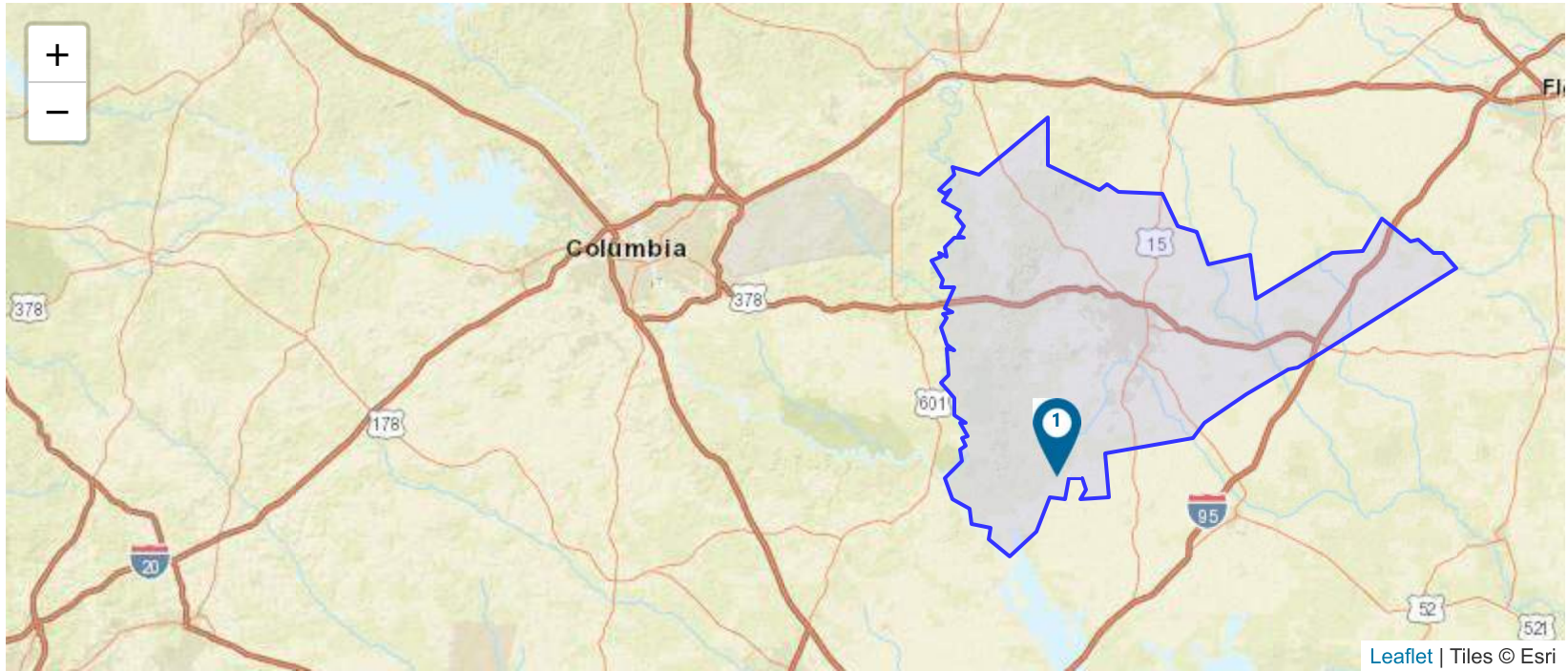


Benefit-Cost Calculator

V.6.0 (Build 20240510.2248 | Release Notes)

Benefit-Cost Analysis

Project Name: Pinewood Outfall 1



Map Marker	Mitigation Title	Property Type	Hazard	Discount Rate (%)	Benefits (B)	Costs (C)	BCR (B/C)
▲ 1	Drainage Improvement @ 200 W Clark St, Pinewood, South Carolina, 29125		DFA - Riverine Flood	3.1	\$ 3,181	\$ 1,531,324	0.00
TOTAL (SELECTED)					\$ 3,181	\$ 1,531,324	0.00
TOTAL					\$ 3,181	\$ 1,531,324	0.00

Property Configuration

Property Title:	Drainage Improvement @ 200 W Clark St, Pinewood, South Carolina, 29125
Property Location:	29125, Sumter, South Carolina
Property Coordinates:	33.74071797995862, -80.46637098326644
Hazard Type:	Riverine Flood
Mitigation Action Type:	Drainage Improvement
Property Type:	Roads & Bridges
Analysis Method Type:	Professional Expected Damages

Cost Estimation

Drainage Improvement @ 200 W Clark St, Pinewood, South Carolina, 29125

Discount Rate (%):	3.1%	Use Default:Yes
Project Useful Life (years):	50	
Project Cost:	\$1,518,700	
Number of Maintenance Years:	50	Use Default:Yes
Annual Maintenance Cost:	\$500	

Damage Analysis Parameters - Damage Frequency Assessment

Drainage Improvement @ 200 W Clark St, Pinewood, South Carolina, 29125

Year of Analysis was Conducted:	2024
Year Property was Built:	1902
Analysis Duration:	123 Use Default:Yes

Roads and Bridges Properties

Drainage Improvement @ 200 W Clark St, Pinewood, South Carolina, 29125

Estimated Number of One-Way Traffic Detour Trips per Day:	924
Additional Time per One-Way Detour Trip (minutes):	20
Number of Additional Miles:	0.5
Federal Rate (\$):	0.655 Use Default:Yes
Economic Loss Per Day of Loss of Function (\$):	11,849.53

Professional Expected Damages Before Mitigation

Drainage Improvement @ 200 W Clark St, Pinewood, South Carolina, 29125

Recurrence Interval (years)	ROADS AND BRIDGES	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
	Impact (days)	Category 1 (\$)	Category 2 (\$)	Category 3 (\$)	Number of Volunteers	Number of Days	Damages (\$)
50	0.5	0	0	0	1	1	6,216
100	0.5	0	0	0	1	2	6,310

Annualized Damages Before Mitigation

Drainage Improvement @ 200 W Clark St, Pinewood, South Carolina, 29125

Annualized Recurrence Interval (years)	Damages and Losses (\$)	Annualized Damages and Losses (\$)
50	6,216	63
100	6,310	63
	Sum Damages and Losses (\$)	Sum Annualized Damages and Losses (\$)
	12,527	126

Professional Expected Damages After Mitigation

Drainage Improvement @ 200 W Clark St, Pinewood, South Carolina, 29125

Recurrence Interval (years)	ROADS AND BRIDGES	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL
	Impact (days)	Category 1 (\$)	Category 2 (\$)	Category 3 (\$)	Number of Volunteers	Number of Days	Damages (\$)
50	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0

Annualized Damages After Mitigation

Drainage Improvement @ 200 W Clark St, Pinewood, South Carolina, 29125

Annualized Recurrence Interval (years)	Damages and Losses (\$)	Annualized Damages and Losses (\$)
50	0	0
100	0	0
Sum Damages and Losses (\$)		Sum Annualized Damages and Losses (\$)
	0	0

Standard Benefits - Ecosystem Services

Drainage Improvement @ 200 W Clark St, Pinewood, South Carolina, 29125

Total Project Area (acres):	0
Percentage of Urban Green Open Space:	0.00%
Percentage of Rural Green Open Space:	0.00%
Percentage of Riparian:	0.00%
Percentage of Coastal Wetlands:	0.00%
Percentage of Inland Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Coral Reefs:	0.00%
Percentage of Shellfish Reefs:	0.00%
Percentage of Beaches and Dunes:	0.00%
Expected Annual Ecosystem Services Benefits:	\$0

Benefits-Costs Summary

Drainage Improvement @ 200 W Clark St, Pinewood, South Carolina, 29125

Discount Rate (%): 3.1% Use Default:Yes

Total Standard Mitigation Benefits: \$3,181

Total Social Benefits: \$0

Total Mitigation Project Benefits: \$3,181

Total Mitigation Project Cost: \$1,531,324

Benefit Cost Ratio - Standard: 0.00

Benefit Cost Ratio - Standard + Social: 0.00



Benefit-Cost Calculator

V.6.0 (Build 20240510.2248 | Release Notes)

Benefit-Cost Analysis

Project Name: Pinewood Equipment Warehouse



Map Marker	Mitigation Title	Property Type	Hazard	Discount Rate (%)	Benefits (B)	Costs (C)	BCR (B/C)
▲ 1	Drainage Improvement @ 15 East Ave S, Pinewood, South Carolina, 29125		Riverine Flood	3.1	\$ 92,365	\$ 1,299,848	0.07
TOTAL (SELECTED)					\$ 92,365	\$ 1,299,848	0.07
TOTAL					\$ 92,365	\$ 1,299,848	0.07

Property Configuration

Property Title:	Drainage Improvement @ 15 East Ave S, Pinewood, South Carolina, 29125
Property Location:	29125, Sumter, South Carolina
Property Coordinates:	33.73941400728161, -80.46312198995759
Hazard Type:	Riverine Flood
Mitigation Action Type:	Drainage Improvement
Property Type:	Non-Residential Building
Analysis Method Type:	Modeled Damages

Cost Estimation

Drainage Improvement @ 15 East Ave S, Pinewood, South Carolina, 29125

Discount Rate (%):	3.1%	Use Default:Yes
Project Useful Life (years):	50	
Project Cost:	\$1,274,600	
Number of Maintenance Years:	50	Use Default:Yes
Annual Maintenance Cost:	\$1,000	

Hazard Probabilities Parameters - Flood

Drainage Improvement @ 15 East Ave S, Pinewood, South Carolina, 29125

Lowest Floor Elevation of the Property (ft):	190
Streambed Elevation at the Property Location (ft):	187
Use Default Recurrence Intervals:	Use Defau No

Discharge

Drainage Improvement @ 15 East Ave S, Pinewood, South Carolina, 29125

BEFORE MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Discharge (cfs)
10	188.5	3.35
25	189.1	3.5
50	189.7	3.6
100	191	3.76

AFTER MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Discharge (cfs)
10	187.9	4.14
25	188.7	4.21
50	189.2	4.35
100	189	4.49

Estimated Annual Damages by Category

Drainage Improvement @ 15 East Ave S, Pinewood, South Carolina, 29125

Before Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building (\$)	Contents (\$)	Displacement (\$)	Loss of Function (\$)
-2.82	1.11	\$ 0	\$ 0	\$ 0	\$ 0
-2.51	2	\$ 0	\$ 0	\$ 0	\$ 0
-2	4.97	\$ 4	\$ 0	\$ 0	\$ 0
-1.98	5	\$ 292	\$ 0	\$ 0	\$ 0
-1.69	8	\$ 104	\$ 0	\$ 0	\$ 0
-1.52	10.16	\$ 189	\$ 0	\$ 0	\$ 0
-0.98	20	\$ 33	\$ 0	\$ 0	\$ 0
-0.84	23.66	\$ 45	\$ 0	\$ 0	\$ 0
-0.63	30	\$ 51	\$ 0	\$ 0	\$ 0
-0.36	40	\$ 18	\$ 0	\$ 0	\$ 0
-0.26	44.42	\$ 42	\$ 0	\$ 0	\$ 0
0	58.29	\$ 5	\$ 0	\$ 0	\$ 0
0.03	60	\$ 39	\$ 19	\$ 0	\$ 0
0.19	70	\$ 54	\$ 48	\$ 0	\$ 0
0.34	80	\$ 59	\$ 58	\$ 0	\$ 0
0.46	90	\$ 238	\$ 258	\$ 0	\$ 0
0.94	134.51	\$ 250	\$ 281	\$ 0	\$ 0
1.45	200	\$ 228	\$ 252	\$ 0	\$ 0
2.01	300	\$ 137	\$ 153	\$ 0	\$ 0
2.43	400	\$ 1,950	\$ 1,250	\$ 0	\$ 0
Total (\$)		\$ 3,739	\$ 2,321	\$ 0	\$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building (\$)	Contents (\$)	Displacement (\$)	Loss of Function (\$)
-2.73	1.11	\$ 0	\$ 0	\$ 0	\$ 0
-2.43	2	\$ 0	\$ 0	\$ 0	\$ 0
-2.09	5	\$ 0	\$ 0	\$ 0	\$ 0
-2	6.77	\$ 89	\$ 0	\$ 0	\$ 0
Total (\$)		\$ 1,692	\$ 709	\$ 0	\$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building (\$)	Contents (\$)	Displacement (\$)	Loss of Function (\$)
-1.92	8	\$ 123	\$ 0	\$ 0	\$ 0
-1.83	10.71	\$ 141	\$ 0	\$ 0	\$ 0
-1.63	17.47	\$ 28	\$ 0	\$ 0	\$ 0
-1.58	20	\$ 65	\$ 0	\$ 0	\$ 0
-1.42	30	\$ 32	\$ 0	\$ 0	\$ 0
-1.32	40	\$ 25	\$ 0	\$ 0	\$ 0
-1.2	53.56	\$ 8	\$ 0	\$ 0	\$ 0
-1.15	60	\$ 9	\$ 0	\$ 0	\$ 0
-1.07	70	\$ 7	\$ 0	\$ 0	\$ 0
-1.03	80	\$ 5	\$ 0	\$ 0	\$ 0
-0.98	90	\$ 29	\$ 0	\$ 0	\$ 0
-0.61	196.57	\$ 0	\$ 0	\$ 0	\$ 0
-0.62	200	\$ 10	\$ 0	\$ 0	\$ 0
-0.41	300	\$ 6	\$ 0	\$ 0	\$ 0
-0.27	400	\$ 9	\$ 0	\$ 0	\$ 0
0	705.22	\$ 1,106	\$ 709	\$ 0	\$ 0
Total (\$)		\$ 1,692	\$ 709	\$ 0	\$ 0

Building Information

Drainage Improvement @ 15 East Ave S, Pinewood, South Carolina, 29125

Non-Residential Occupancy Type: Select Non-Residential Building Use

Building Type: Warehouse-Non-Refrig

Building Is Engineered: No

NFIP: No

Standard Benefits - Building

Drainage Improvement @ 15 East Ave S, Pinewood, South Carolina, 29125

Depth Damage Curve:	Warehouse, Non-Refrig (Default)	Use Default:Yes
Building Size (sq.ft):	6,500	
Building Replacement Value (BRV) (\$/sq.ft):	\$100	Use Default:Yes
BRV Distributional Weight Multiplier:	1.2	
Demolition Threshold (%):	50.00%	Use Default: No
Expected Annual Losses due to Building Damages before Mitigation:	\$3,739	
Expected Annual Losses due to Building Damages after Mitigation:	\$1,692	
Expected Annual Benefits - Building:	\$2,047	

Depth Damage Curve - Building

Drainage Improvement @ 15 East Ave S, Pinewood, South Carolina, 29125

Flood Depth (ft)	BEFORE MITIGATION				AFTER MITIGATION			
	Percent (%)	Damage Value (\$)	NFIP (\$)	ICC Fees (\$)	Percent (%)	Damage Value (\$)	NFIP (\$)	ICC Fees (\$)
-2	0.5	3,900	0	0	0.5	3,900	0	0
-1	0.5	3,900	0	0	0.5	3,900	0	0
0	1.1	8,580	0	0	1.1	8,580	0	0
1	11.8	92,040	0	0	11.8	92,040	0	0
2	19.9	155,220	0	0	19.9	155,220	0	0
3	25.4	198,120	0	0	25.4	198,120	0	0
4	31.4	244,920	0	0	31.4	244,920	0	0
5	34.2	266,760	0	0	34.2	266,760	0	0
6	39	304,200	0	0	39	304,200	0	0
7	41.8	326,040	0	0	41.8	326,040	0	0
8	45.7	356,460	0	0	45.7	356,460	0	0
9	50.4	780,000	0	0	50.4	780,000	0	0
10	51.7	780,000	0	0	51.7	780,000	0	0
11	51.7	780,000	0	0	51.7	780,000	0	0
12	51.7	780,000	0	0	51.7	780,000	0	0
13	51.7	780,000	0	0	51.7	780,000	0	0
14	51.7	780,000	0	0	51.7	780,000	0	0
15	51.7	780,000	0	0	51.7	780,000	0	0
16	51.7	780,000	0	0	51.7	780,000	0	0

Standard Benefits - Contents

Drainage Improvement @ 15 East Ave S, Pinewood, South Carolina, 29125

Contents Value in Dollars: **\$500,000** Use Default: *No*

Expected Annual Losses due to Content Damages before Mitigation: \$2,321

Expected Annual Losses due to Content Damages after Mitigation: \$709

Expected Annual Benefits - Content: \$1,612

Depth Damage Curve - Contents

Drainage Improvement @ 15 East Ave S, Pinewood, South Carolina, 29125

Flood Depth (ft)	BEFORE MITIGATION		AFTER MITIGATION	
	Percent (%)	Damage Value (\$)	Percent (%)	Damage Value (\$)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	21	105,000	21	105,000
2	34	170,000	34	170,000
3	47	235,000	47	235,000
4	57	285,000	57	285,000
5	66	330,000	66	330,000
6	74	370,000	74	370,000
7	81	405,000	81	405,000
8	88	440,000	88	440,000
9	92	460,000	92	460,000
10	94	470,000	94	470,000
11	94	470,000	94	470,000
12	94	470,000	94	470,000
13	94	470,000	94	470,000
14	94	470,000	94	470,000
15	94	470,000	94	470,000
16	94	470,000	94	470,000

Standard Benefits - Displacement

Drainage Improvement @ 15 East Ave S, Pinewood, South Carolina, 29125

Monthly Displacement Cost (\$/sq.ft/month):	0	Use Default:Yes
One-Time Displacement Cost (\$/sq.ft):	0	Use Default:Yes
Expected Annual Losses due to Displacement Damages before mitigation:	\$0	
Expected Annual Losses due to Displacement Damages after Mitigation:	\$0	
Expected Annual Losses - Displacement:	\$0	

Depth Damage Curve - Displacement

Drainage Improvement @ 15 East Ave S, Pinewood, South Carolina, 29125

Flood Depth (ft)	BEFORE MITIGATION		AFTER MITIGATION	
	Days	Damage Value (\$)	Days	Damage Value (\$)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	0	45	0
2	90	0	90	0
3	135	0	135	0
4	180	0	180	0
5	225	0	225	0
6	270	0	270	0
7	315	0	315	0
8	360	0	360	0
9	405	0	405	0
10	450	0	450	0
11	450	0	450	0
12	450	0	450	0
13	450	0	450	0
14	450	0	450	0
15	450	0	450	0
16	450	0	450	0

Standard Benefits - Loss of Function/Loss of Income

Drainage Improvement @ 15 East Ave S, Pinewood, South Carolina, 29125

Annual Operating Budget: \$0

Loss of Function/Loss of Income Per Day: \$0

Expected Annual Losses due to Loss of
Function/Loss of Income before mitigation: \$0

Expected Annual Losses due to Loss of
Function/Loss of Income after mitigation: \$0

Expected Annual Benefits - Expected
Annual Benefits - Loss of Function/Loss of
Income: \$0

Depth Damage Curve - Loss of Function/Loss of Income
 Drainage Improvement @ 15 East Ave S, Pinewood, South Carolina, 29125

Flood Depth (ft)	BEFORE MITIGATION		AFTER MITIGATION	
	Days	Damage Value (\$)	Days	Damage Value (\$)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	0	45	0
2	90	0	90	0
3	135	0	135	0
4	180	0	180	0
5	225	0	225	0
6	270	0	270	0
7	315	0	315	0
8	360	0	360	0
9	405	0	405	0
10	450	0	450	0
11	450	0	450	0
12	450	0	450	0
13	450	0	450	0
14	450	0	450	0
15	450	0	450	0
16	450	0	450	0

Standard Benefits - Volunteer Costs

Drainage Improvement @ 15 East Ave S, Pinewood, South Carolina, 29125

Number of Volunteers (volunteers/event):	0
Number of Days of Lodging:	0
Expected Annual Volunteer Benefits:	\$0

Standard Benefits - Ecosystem Services

Drainage Improvement @ 15 East Ave S, Pinewood, South Carolina, 29125

Total Project Area (acres):	0
Percentage of Urban Green Open Space:	0.00%
Percentage of Rural Green Open Space:	0.00%
Percentage of Riparian:	0.00%
Percentage of Coastal Wetlands:	0.00%
Percentage of Inland Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Coral Reefs:	0.00%
Percentage of Shellfish Reefs:	0.00%
Percentage of Beaches and Dunes:	0.00%
Expected Annual Ecosystem Services Benefits:	\$0

Benefits-Costs Summary

Drainage Improvement @ 15 East Ave S, Pinewood, South Carolina, 29125

Discount Rate (%):	3.1%	Use Default:Yes
Total Standard Mitigation Benefits:	\$92,365	
Total Social Benefits:	\$0	
Total Mitigation Project Benefits:	\$92,365	
Total Mitigation Project Cost:	\$1,299,848	
Benefit Cost Ratio - Standard:	0.07	
Benefit Cost Ratio - Standard + Social:	0.07	



Benefit-Cost Calculator

V.6.0 (Build 20240510.2248 | Release Notes)

Benefit-Cost Analysis

Project Name: 94 Elmwood



Map Marker	Mitigation Title	Property Type	Hazard	Discount Rate (%)	Benefits (B)	Costs (C)	BCR (B/C)
▲ 1	Drainage Improvement @ 94 Elmwood Ave, Pinewood, South Carolina, 29125		Riverine Flood	3.1	\$ 53,450	\$ 140,456	0.38
TOTAL (SELECTED)					\$ 53,450	\$ 140,456	0.38
TOTAL					\$ 53,450	\$ 140,456	0.38

Property Configuration

Property Title:	Drainage Improvement @ 94 Elmwood Ave, Pinewood, South Carolina, 29125
Property Location:	29125, Sumter, South Carolina
Property Coordinates:	33.7401100, -80.4586130
Hazard Type:	Riverine Flood
Mitigation Action Type:	Drainage Improvement
Property Type:	Residential Building
Analysis Method Type:	Modeled Damages

Cost Estimation

Drainage Improvement @ 94 Elmwood Ave, Pinewood, South Carolina, 29125

Discount Rate (%):	3.1%	Use Default:Yes
Project Useful Life (years):	50	
Project Cost:	\$137,300	
Number of Maintenance Years:	50	Use Default:Yes
Annual Maintenance Cost:	\$125	

Hazard Probabilities Parameters - Flood

Drainage Improvement @ 94 Elmwood Ave, Pinewood, South Carolina, 29125

Lowest Floor Elevation of the Property (ft): 187.2

Streambed Elevation at the Property Location (ft): 183

Use Default Recurrence Intervals: Use Defau **No**

Discharge

Drainage Improvement @ 94 Elmwood Ave, Pinewood, South Carolina, 29125

BEFORE MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Discharge (cfs)
10	185.4	15.9
25	186.2	17.3
50	187	18.51
100	188	19.76

AFTER MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Discharge (cfs)
10	184.3	4.2
25	185.2	4.9
50	186.1	5.8
100	187	6.2

Estimated Annual Damages by Category

Drainage Improvement @ 94 Elmwood Ave, Pinewood, South Carolina, 29125

Before Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building (\$)	Contents (\$)	Displacement (\$)	Loss of Function (\$)
-3.77	1.11	\$ 0	\$ 0	\$ 0	\$ 0
-3.19	2	\$ 0	\$ 0	\$ 0	\$ 0
-2.41	5	\$ 0	\$ 0	\$ 0	\$ 0
-1.99	8	\$ 0	\$ 0	\$ 0	\$ 0
-2	8.14	\$ 48	\$ 0	\$ 0	\$ 0
-1.78	10.17	\$ 99	\$ 0	\$ 0	\$ 0
-1.15	20	\$ 14	\$ 0	\$ 0	\$ 0
-0.99	23.11	\$ 38	\$ 0	\$ 0	\$ 0
-0.72	30	\$ 76	\$ 39	\$ 0	\$ 0
-0.43	40	\$ 71	\$ 40	\$ 0	\$ 0
-0.19	49.86	\$ 57	\$ 34	\$ 0	\$ 0
0	59.06	\$ 5	\$ 3	\$ 0	\$ 0
0.02	60	\$ 50	\$ 32	\$ 2	\$ 0
0.2	70	\$ 40	\$ 28	\$ 5	\$ 0
0.35	80	\$ 33	\$ 25	\$ 7	\$ 0
0.49	90	\$ 64	\$ 51	\$ 18	\$ 0
0.8	115.47	\$ 121	\$ 101	\$ 46	\$ 0
1.5	200	\$ 75	\$ 60	\$ 34	\$ 0
2.05	300	\$ 44	\$ 34	\$ 22	\$ 0
2.46	400	\$ 540	\$ 270	\$ 235	\$ 0
Total (\$)		\$ 1,378	\$ 718	\$ 368	\$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building (\$)	Contents (\$)	Displacement (\$)	Loss of Function (\$)
-4.11	1.11	\$ 0	\$ 0	\$ 0	\$ 0
-3.86	2	\$ 0	\$ 0	\$ 0	\$ 0
-3.35	5	\$ 0	\$ 0	\$ 0	\$ 0
-3.03	8	\$ 0	\$ 0	\$ 0	\$ 0
Total (\$)		\$ 878	\$ 472	\$ 283	\$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building (\$)	Contents (\$)	Displacement (\$)	Loss of Function (\$)
-2.84	10.2	\$ 0	\$ 0	\$ 0	\$ 0
-2.23	20	\$ 0	\$ 0	\$ 0	\$ 0
-2.13	22.07	\$ 0	\$ 0	\$ 0	\$ 0
-2	25.31	\$ 12	\$ 0	\$ 0	\$ 0
-1.81	30	\$ 17	\$ 0	\$ 0	\$ 0
-1.45	40	\$ 22	\$ 0	\$ 0	\$ 0
-0.93	60	\$ 0	\$ 0	\$ 0	\$ 0
-0.91	60.12	\$ 12	\$ 4	\$ 0	\$ 0
-0.71	70	\$ 16	\$ 8	\$ 0	\$ 0
-0.51	80	\$ 17	\$ 10	\$ 0	\$ 0
-0.33	90	\$ 6	\$ 4	\$ 0	\$ 0
-0.25	93.66	\$ 29	\$ 17	\$ 0	\$ 0
0	110.55	\$ 100	\$ 73	\$ 0	\$ 0
1.06	200	\$ 64	\$ 53	\$ 27	\$ 0
1.89	300	\$ 43	\$ 34	\$ 21	\$ 0
2.53	400	\$ 540	\$ 270	\$ 235	\$ 0
Total (\$)		\$ 878	\$ 472	\$ 283	\$ 0

Building Information

Drainage Improvement @ 94 Elmwood Ave, Pinewood, South Carolina, 29125

Building Type: One Story

Foundation Type:

Building Has Basement: No

NFIP: No

Standard Benefits - Building

Drainage Improvement @ 94 Elmwood Ave, Pinewood, South Carolina, 29125

Depth Damage Curve:	USACE - Wilmington: one story	Use Default:Yes
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Building Size (sq.ft):	1,800
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Building Replacement Value (BRV) (\$/sq.ft):	\$100	Use Default:Yes
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BRV Distributional Weight Multiplier:	1.2
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Demolition Threshold (%):	50.00%	Use Default:Yes
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Expected Annual Losses due to Building Damages before Mitigation:	\$1,378
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Expected Annual Losses due to Building Damages after Mitigation:	\$878
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Expected Annual Benefits - Building:	\$499
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Depth Damage Curve - Building

Drainage Improvement @ 94 Elmwood Ave, Pinewood, South Carolina, 29125

Flood Depth (ft)	BEFORE MITIGATION				AFTER MITIGATION			
	Percent (%)	Damage Value (\$)	NFIP (\$)	ICC Fees (\$)	Percent (%)	Damage Value (\$)	NFIP (\$)	ICC Fees (\$)
-2	0.9	1,944	0	0	0.9	1,944	0	0
-1	1	2,160	0	0	1	2,160	0	0
0	9.3	20,088	0	0	9.3	20,088	0	0
1	13.6	29,376	0	0	13.6	29,376	0	0
2	23.3	50,328	0	0	23.3	50,328	0	0
3	27.6	59,616	0	0	27.6	59,616	0	0
4	31.8	68,688	0	0	31.8	68,688	0	0
5	36.1	77,976	0	0	36.1	77,976	0	0
6	39.3	84,888	0	0	39.3	84,888	0	0
7	42.6	92,016	0	0	42.6	92,016	0	0
8	45.8	98,928	0	0	45.8	98,928	0	0
9	49.1	106,056	0	0	49.1	106,056	0	0
10	52.3	216,000	0	0	52.3	216,000	0	0
11	56.3	216,000	0	0	56.3	216,000	0	0
12	60.4	216,000	0	0	60.4	216,000	0	0
13	64.4	216,000	0	0	64.4	216,000	0	0
14	68.5	216,000	0	0	68.5	216,000	0	0
15	72.5	216,000	0	0	72.5	216,000	0	0
16	80	216,000	0	0	80	216,000	0	0

Standard Benefits - Contents

Drainage Improvement @ 94 Elmwood Ave, Pinewood, South Carolina, 29125

Contents Value in Dollars: \$0 Use Default:Yes

Utilities Elevated: No

Expected Annual Losses due to Content Damages before Mitigation: \$718

Expected Annual Losses due to Content Damages after Mitigation: \$472

Expected Annual Benefits - Content: \$246

Depth Damage Curve - Contents

Drainage Improvement @ 94 Elmwood Ave, Pinewood, South Carolina, 29125

Flood Depth (ft)	BEFORE MITIGATION		AFTER MITIGATION	
	Percent (%)	Damage Value (\$)	Percent (%)	Damage Value (\$)
-2	0	0	0	0
-1	0	0	0	0
0	11.2	12,096	11.2	12,096
1	24	25,920	24	25,920
2	36.4	39,312	36.4	39,312
3	42.9	46,332	42.9	46,332
4	46	49,680	46	49,680
5	52	56,160	52	56,160
6	58.9	63,612	58.9	63,612
7	65.8	71,064	65.8	71,064
8	72.7	78,516	72.7	78,516
9	79.6	85,968	79.6	85,968
10	86.5	93,420	86.5	93,420
11	88.3	95,364	88.3	95,364
12	90.1	97,308	90.1	97,308
13	91.9	99,252	91.9	99,252
14	93.7	101,196	93.7	101,196
15	95.5	103,140	95.5	103,140
16	100	108,000	100	108,000

Standard Benefits - Displacement

Drainage Improvement @ 94 Elmwood Ave, Pinewood, South Carolina, 29125

Lodging Per Diem:	\$107	Use Default:Yes
Meals Per Diem:	\$59	Use Default:Yes
Population Affected:	3	
Duration of Displacement (days):	365	Use Default:Yes
Total Residential Displacement Cost:	\$257	
Expected Annual Losses due to Displacement Damages before mitigation:	\$368	
Expected Annual Losses due to Displacement Damages after Mitigation:	\$283	
Expected Annual Losses - Displacement:	\$85	

Depth Damage Curve - Displacement

Drainage Improvement @ 94 Elmwood Ave, Pinewood, South Carolina, 29125

Flood Depth (ft)	BEFORE MITIGATION		AFTER MITIGATION	
	Days	Damage Value (\$)	Days	Damage Value (\$)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	11,565	45	11,565
2	90	23,130	90	23,130
3	135	34,695	135	34,695
4	180	46,260	180	46,260
5	225	57,825	225	57,825
6	270	69,390	270	69,390
7	315	80,955	315	80,955
8	360	92,520	360	92,520
9	405	104,085	405	104,085
10	450	115,650	450	115,650
11	495	127,215	495	127,215
12	540	138,780	540	138,780
13	585	150,345	585	150,345
14	630	161,910	630	161,910
15	675	173,475	675	173,475
16	720	185,040	720	185,040

Additional Benefits - Street Maintenance

Drainage Improvement @ 94 Elmwood Ave, Pinewood, South Carolina, 29125

Total Annual Street Maintenance Budget:	\$0
Total Number of Street Miles Maintained:	0
Street Miles that will not require future maintenance:	0
Expected Annual Benefits - Street Maintenance:	\$0

Standard Benefits - Volunteer Costs

Drainage Improvement @ 94 Elmwood Ave, Pinewood, South Carolina, 29125

Number of Volunteers (volunteers/event):	1
Number of Days of Lodging:	1
Expected Annual Volunteer Benefits:	\$305

Standard Benefits - Ecosystem Services

Drainage Improvement @ 94 Elmwood Ave, Pinewood, South Carolina, 29125

Total Project Area (acres):	0
Percentage of Urban Green Open Space:	0.00%
Percentage of Rural Green Open Space:	0.00%
Percentage of Riparian:	0.00%
Percentage of Coastal Wetlands:	0.00%
Percentage of Inland Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Coral Reefs:	0.00%
Percentage of Shellfish Reefs:	0.00%
Percentage of Beaches and Dunes:	0.00%
Expected Annual Ecosystem Services Benefits:	\$0

Additional Benefits - Social

Drainage Improvement @ 94 Elmwood Ave, Pinewood, South Carolina, 29125

Number of Workers:	2
Expected Annual Social Benefits:	\$24,801

Benefits-Costs Summary

Drainage Improvement @ 94 Elmwood Ave, Pinewood, South Carolina, 29125

Discount Rate (%): 3.1% Use Default:Yes

Total Standard Mitigation Benefits: \$28,649

Total Social Benefits: \$24,801

Total Mitigation Project Benefits: \$53,450

Total Mitigation Project Cost: \$140,456

Benefit Cost Ratio - Standard: 0.20

Benefit Cost Ratio - Standard + Social: 0.38



Benefit-Cost Calculator

V.6.0 (Build 20240510.2248 | Release Notes)

Benefit-Cost Analysis

Project Name: 95 Elmwood



Map Marker	Mitigation Title	Property Type	Hazard	Discount Rate (%)	Benefits (B)	Costs (C)	BCR (B/C)
▲ 1	Drainage Improvement @ 95 Elmwood Ave, Pinewood, South Carolina, 29125		Riverine Flood	3.1	\$ 33,490	\$ 140,456	0.24
TOTAL (SELECTED)					\$ 33,490	\$ 140,456	0.24
TOTAL					\$ 33,490	\$ 140,456	0.24

Property Configuration

Property Title: Drainage Improvement @ 95 Elmwood Ave, Pinewood, South Carolina, 29125

Property Location: 29125, Sumter, South Carolina

Property Coordinates: 33.7403550016416, -80.45774499907053

Hazard Type: Riverine Flood

Mitigation Action Type: Drainage Improvement

Property Type: Residential Building

Analysis Method Type: Modeled Damages

Cost Estimation

Drainage Improvement @ 95 Elmwood Ave, Pinewood, South Carolina, 29125

Discount Rate (%): 3.1% Use Default:Yes

Project Useful Life (years): 50

Project Cost: \$137,300

Number of Maintenance Years: 50 Use Default:Yes

Annual Maintenance Cost: \$125

Hazard Probabilities Parameters - Flood

Drainage Improvement @ 95 Elmwood Ave, Pinewood, South Carolina, 29125

Lowest Floor Elevation of the Property (ft): 187.2

Streambed Elevation at the Property Location (ft): 183

Use Default Recurrence Intervals: Use Defau **No**

Discharge

Drainage Improvement @ 95 Elmwood Ave, Pinewood, South Carolina, 29125

BEFORE MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Discharge (cfs)
10	185.4	15.9
25	186.2	17.3
50	187	18.51
100	188	19.76

AFTER MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Discharge (cfs)
10	184.3	4.2
25	185.2	4.9
50	186.1	5.8
100	187	6.2

Estimated Annual Damages by Category

Drainage Improvement @ 95 Elmwood Ave, Pinewood, South Carolina, 29125

Before Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building (\$)	Contents (\$)	Displacement (\$)	Loss of Function (\$)
-3.77	1.11	\$ 0	\$ 0	\$ 0	\$ 0
-3.19	2	\$ 0	\$ 0	\$ 0	\$ 0
-2.41	5	\$ 0	\$ 0	\$ 0	\$ 0
-1.99	8	\$ 0	\$ 0	\$ 0	\$ 0
-2	8.14	\$ 27	\$ 0	\$ 0	\$ 0
-1.78	10.17	\$ 55	\$ 0	\$ 0	\$ 0
-1.15	20	\$ 8	\$ 0	\$ 0	\$ 0
-0.99	23.11	\$ 21	\$ 0	\$ 0	\$ 0
-0.72	30	\$ 42	\$ 22	\$ 0	\$ 0
-0.43	40	\$ 39	\$ 22	\$ 0	\$ 0
-0.19	49.86	\$ 32	\$ 19	\$ 0	\$ 0
0	59.06	\$ 3	\$ 2	\$ 0	\$ 0
0.02	60	\$ 28	\$ 18	\$ 1	\$ 0
0.2	70	\$ 22	\$ 16	\$ 4	\$ 0
0.35	80	\$ 19	\$ 14	\$ 5	\$ 0
0.49	90	\$ 35	\$ 28	\$ 14	\$ 0
0.8	115.47	\$ 67	\$ 56	\$ 37	\$ 0
1.5	200	\$ 42	\$ 33	\$ 27	\$ 0
2.05	300	\$ 24	\$ 19	\$ 17	\$ 0
2.46	400	\$ 300	\$ 150	\$ 189	\$ 0
Total (\$)		\$ 765	\$ 399	\$ 296	\$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building (\$)	Contents (\$)	Displacement (\$)	Loss of Function (\$)
-4.11	1.11	\$ 0	\$ 0	\$ 0	\$ 0
-3.86	2	\$ 0	\$ 0	\$ 0	\$ 0
-3.35	5	\$ 0	\$ 0	\$ 0	\$ 0
-3.03	8	\$ 0	\$ 0	\$ 0	\$ 0
Total (\$)		\$ 488	\$ 262	\$ 228	\$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building (\$)	Contents (\$)	Displacement (\$)	Loss of Function (\$)
-2.84	10.2	\$ 0	\$ 0	\$ 0	\$ 0
-2.23	20	\$ 0	\$ 0	\$ 0	\$ 0
-2.13	22.07	\$ 0	\$ 0	\$ 0	\$ 0
-2	25.31	\$ 7	\$ 0	\$ 0	\$ 0
-1.81	30	\$ 9	\$ 0	\$ 0	\$ 0
-1.45	40	\$ 12	\$ 0	\$ 0	\$ 0
-0.93	60	\$ 0	\$ 0	\$ 0	\$ 0
-0.91	60.12	\$ 7	\$ 2	\$ 0	\$ 0
-0.71	70	\$ 9	\$ 4	\$ 0	\$ 0
-0.51	80	\$ 10	\$ 5	\$ 0	\$ 0
-0.33	90	\$ 4	\$ 2	\$ 0	\$ 0
-0.25	93.66	\$ 16	\$ 9	\$ 0	\$ 0
0	110.55	\$ 56	\$ 40	\$ 0	\$ 0
1.06	200	\$ 36	\$ 29	\$ 22	\$ 0
1.89	300	\$ 24	\$ 19	\$ 17	\$ 0
2.53	400	\$ 300	\$ 150	\$ 189	\$ 0
Total (\$)		\$ 488	\$ 262	\$ 228	\$ 0

Building Information

Drainage Improvement @ 95 Elmwood Ave, Pinewood, South Carolina, 29125

Building Type: One Story

Foundation Type:

Building Has Basement: No

NFIP: No

Standard Benefits - Building

Drainage Improvement @ 95 Elmwood Ave, Pinewood, South Carolina, 29125

Depth Damage Curve:	USACE - Wilmington: one story	Use Default:Yes
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Building Size (sq.ft):	1,000
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Building Replacement Value (BRV) (\$/sq.ft):	\$100	Use Default:Yes
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BRV Distributional Weight Multiplier:	1.2
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Demolition Threshold (%):	50.00%	Use Default:Yes
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Expected Annual Losses due to Building Damages before Mitigation:	\$765
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Expected Annual Losses due to Building Damages after Mitigation:	\$488
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Expected Annual Benefits - Building:	\$277
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Depth Damage Curve - Building

Drainage Improvement @ 95 Elmwood Ave, Pinewood, South Carolina, 29125

Flood Depth (ft)	BEFORE MITIGATION				AFTER MITIGATION			
	Percent (%)	Damage Value (\$)	NFIP (\$)	ICC Fees (\$)	Percent (%)	Damage Value (\$)	NFIP (\$)	ICC Fees (\$)
-2	0.9	1,080	0	0	0.9	1,080	0	0
-1	1	1,200	0	0	1	1,200	0	0
0	9.3	11,160	0	0	9.3	11,160	0	0
1	13.6	16,320	0	0	13.6	16,320	0	0
2	23.3	27,960	0	0	23.3	27,960	0	0
3	27.6	33,120	0	0	27.6	33,120	0	0
4	31.8	38,160	0	0	31.8	38,160	0	0
5	36.1	43,320	0	0	36.1	43,320	0	0
6	39.3	47,160	0	0	39.3	47,160	0	0
7	42.6	51,120	0	0	42.6	51,120	0	0
8	45.8	54,960	0	0	45.8	54,960	0	0
9	49.1	58,920	0	0	49.1	58,920	0	0
10	52.3	120,000	0	0	52.3	120,000	0	0
11	56.3	120,000	0	0	56.3	120,000	0	0
12	60.4	120,000	0	0	60.4	120,000	0	0
13	64.4	120,000	0	0	64.4	120,000	0	0
14	68.5	120,000	0	0	68.5	120,000	0	0
15	72.5	120,000	0	0	72.5	120,000	0	0
16	80	120,000	0	0	80	120,000	0	0

Standard Benefits - Contents

Drainage Improvement @ 95 Elmwood Ave, Pinewood, South Carolina, 29125

Contents Value in Dollars: \$0 Use Default:Yes

Utilities Elevated: No

Expected Annual Losses due to Content Damages before Mitigation: \$399

Expected Annual Losses due to Content Damages after Mitigation: \$262

Expected Annual Benefits - Content: \$137

Depth Damage Curve - Contents

Drainage Improvement @ 95 Elmwood Ave, Pinewood, South Carolina, 29125

Flood Depth (ft)	BEFORE MITIGATION		AFTER MITIGATION	
	Percent (%)	Damage Value (\$)	Percent (%)	Damage Value (\$)
-2	0	0	0	0
-1	0	0	0	0
0	11.2	6,720	11.2	6,720
1	24	14,400	24	14,400
2	36.4	21,840	36.4	21,840
3	42.9	25,740	42.9	25,740
4	46	27,600	46	27,600
5	52	31,200	52	31,200
6	58.9	35,340	58.9	35,340
7	65.8	39,480	65.8	39,480
8	72.7	43,620	72.7	43,620
9	79.6	47,760	79.6	47,760
10	86.5	51,900	86.5	51,900
11	88.3	52,980	88.3	52,980
12	90.1	54,060	90.1	54,060
13	91.9	55,140	91.9	55,140
14	93.7	56,220	93.7	56,220
15	95.5	57,300	95.5	57,300
16	100	60,000	100	60,000

Standard Benefits - Displacement

Drainage Improvement @ 95 Elmwood Ave, Pinewood, South Carolina, 29125

Lodging Per Diem:	\$107	Use Default:Yes
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Meals Per Diem:	\$59	Use Default:Yes
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Population Affected:	2	
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Duration of Displacement (days):	365	Use Default:Yes
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Total Residential Displacement Cost:	\$207	
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Expected Annual Losses due to Displacement Damages before mitigation:	\$296	
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Expected Annual Losses due to Displacement Damages after Mitigation:	\$228	
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Expected Annual Losses - Displacement:	\$68	
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Depth Damage Curve - Displacement

Drainage Improvement @ 95 Elmwood Ave, Pinewood, South Carolina, 29125

Flood Depth (ft)	BEFORE MITIGATION		AFTER MITIGATION	
	Days	Damage Value (\$)	Days	Damage Value (\$)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	9,315	45	9,315
2	90	18,630	90	18,630
3	135	27,945	135	27,945
4	180	37,260	180	37,260
5	225	46,575	225	46,575
6	270	55,890	270	55,890
7	315	65,205	315	65,205
8	360	74,520	360	74,520
9	405	83,835	405	83,835
10	450	93,150	450	93,150
11	495	102,465	495	102,465
12	540	111,780	540	111,780
13	585	121,095	585	121,095
14	630	130,410	630	130,410
15	675	139,725	675	139,725
16	720	149,040	720	149,040

Additional Benefits - Street Maintenance

Drainage Improvement @ 95 Elmwood Ave, Pinewood, South Carolina, 29125

Total Annual Street Maintenance Budget:	\$0
Total Number of Street Miles Maintained:	0
Street Miles that will not require future maintenance:	0
Expected Annual Benefits - Street Maintenance:	\$0

Standard Benefits - Volunteer Costs

Drainage Improvement @ 95 Elmwood Ave, Pinewood, South Carolina, 29125

Number of Volunteers (volunteers/event):	1
Number of Days of Lodging:	1
Expected Annual Volunteer Benefits:	\$305

Standard Benefits - Ecosystem Services

Drainage Improvement @ 95 Elmwood Ave, Pinewood, South Carolina, 29125

Total Project Area (acres):	0
Percentage of Urban Green Open Space:	0.00%
Percentage of Rural Green Open Space:	0.00%
Percentage of Riparian:	0.00%
Percentage of Coastal Wetlands:	0.00%
Percentage of Inland Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Coral Reefs:	0.00%
Percentage of Shellfish Reefs:	0.00%
Percentage of Beaches and Dunes:	0.00%
Expected Annual Ecosystem Services Benefits:	\$0

Additional Benefits - Social

Drainage Improvement @ 95 Elmwood Ave, Pinewood, South Carolina, 29125

Number of Workers:	1
Expected Annual Social Benefits:	\$13,622

Benefits-Costs Summary

Drainage Improvement @ 95 Elmwood Ave, Pinewood, South Carolina, 29125

Discount Rate (%): 3.1% Use Default:Yes

Total Standard Mitigation Benefits: \$19,868

Total Social Benefits: \$13,622

Total Mitigation Project Benefits: \$33,490

Total Mitigation Project Cost: \$140,456

Benefit Cost Ratio - Standard: 0.14

Benefit Cost Ratio - Standard + Social: 0.24



Benefit-Cost Calculator

V.6.0 (Build 20240510.2248 | Release Notes)

Benefit-Cost Analysis

Project Name: 100 Elmwood



Map Marker	Mitigation Title	Property Type	Hazard	Discount Rate (%)	Benefits (B)	Costs (C)	BCR (B/C)
▲ 1	Drainage Improvement @ 33.7404200; -80.4587270		Riverine Flood	3.1	\$ 70,539	\$ 140,456	0.50
TOTAL (SELECTED)					\$ 70,539	\$ 140,456	0.50
TOTAL					\$ 70,539	\$ 140,456	0.50

Property Configuration

Property Title: Drainage Improvement @ 33.7404200; -80.4587270

Property Location: 29125, Sumter, South Carolina

Property Coordinates: 33.74042000330073, -80.45872702284657

Hazard Type: Riverine Flood

Mitigation Action Type: Drainage Improvement

Property Type: Residential Building

Analysis Method Type: Modeled Damages

Cost Estimation

Drainage Improvement @ 33.7404200; -80.4587270

Discount Rate (%): 3.1% Use Default:Yes

Project Useful Life (years): 50

Project Cost: \$137,300

Number of Maintenance Years: 50 Use Default:Yes

Annual Maintenance Cost: \$125

Hazard Probabilities Parameters - Flood

Drainage Improvement @ 33.7404200; -80.4587270

Lowest Floor Elevation of the Property (ft): 187.5

Streambed Elevation at the Property Location (ft): 183

Use Default Recurrence Intervals: Use Defau **No**

Discharge

Drainage Improvement @ 33.7404200; -80.4587270

BEFORE MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Discharge (cfs)
10	185.8	15.9
25	186.6	17.3
50	187.4	18.51
100	188.5	19.76

AFTER MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Discharge (cfs)
10	184.1	4.2
25	184.9	4.9
50	185.8	5.8
100	186.7	6.2

Estimated Annual Damages by Category
 Drainage Improvement @ 33.7404200; -80.4587270

Before Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building (\$)	Contents (\$)	Displacement (\$)	Loss of Function (\$)
-3.93	1.11	\$ 0	\$ 0	\$ 0	\$ 0
-3.24	2	\$ 0	\$ 0	\$ 0	\$ 0
-2.39	5	\$ 0	\$ 0	\$ 0	\$ 0
-2	7.57	\$ 14	\$ 0	\$ 0	\$ 0
-1.93	8	\$ 56	\$ 0	\$ 0	\$ 0
-1.7	10.17	\$ 106	\$ 0	\$ 0	\$ 0
-1.02	20	\$ 21	\$ 0	\$ 0	\$ 0
-0.87	23.11	\$ 65	\$ 27	\$ 0	\$ 0
-0.59	30	\$ 102	\$ 56	\$ 0	\$ 0
-0.28	40	\$ 88	\$ 52	\$ 0	\$ 0
-0.03	49.86	\$ 17	\$ 10	\$ 0	\$ 0
0	52.01	\$ 56	\$ 36	\$ 0	\$ 0
0.16	60	\$ 56	\$ 39	\$ 8	\$ 0
0.34	70	\$ 45	\$ 34	\$ 10	\$ 0
0.5	80	\$ 37	\$ 29	\$ 11	\$ 0
0.64	90	\$ 71	\$ 59	\$ 26	\$ 0
0.94	115.47	\$ 136	\$ 114	\$ 63	\$ 0
1.65	200	\$ 83	\$ 66	\$ 44	\$ 0
2.19	300	\$ 47	\$ 37	\$ 27	\$ 0
2.59	400	\$ 570	\$ 285	\$ 280	\$ 0
Total (\$)		\$ 1,573	\$ 844	\$ 470	\$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building (\$)	Contents (\$)	Displacement (\$)	Loss of Function (\$)
-4.44	1.11	\$ 0	\$ 0	\$ 0	\$ 0
-4.23	2	\$ 0	\$ 0	\$ 0	\$ 0
-3.8	5	\$ 0	\$ 0	\$ 0	\$ 0
-3.54	8	\$ 0	\$ 0	\$ 0	\$ 0
Total (\$)		\$ 762	\$ 397	\$ 317	\$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building (\$)	Contents (\$)	Displacement (\$)	Loss of Function (\$)
-3.37	10.2	\$ 0	\$ 0	\$ 0	\$ 0
-2.8	20	\$ 0	\$ 0	\$ 0	\$ 0
-2.69	22.07	\$ 0	\$ 0	\$ 0	\$ 0
-2.39	30	\$ 0	\$ 0	\$ 0	\$ 0
-2.06	40	\$ 0	\$ 0	\$ 0	\$ 0
-2	42.1	\$ 15	\$ 0	\$ 0	\$ 0
-1.54	60	\$ 0	\$ 0	\$ 0	\$ 0
-1.52	60.12	\$ 5	\$ 0	\$ 0	\$ 0
-1.32	70	\$ 4	\$ 0	\$ 0	\$ 0
-1.11	80	\$ 4	\$ 0	\$ 0	\$ 0
-0.92	90	\$ 2	\$ 0	\$ 0	\$ 0
-0.88	93.66	\$ 42	\$ 19	\$ 0	\$ 0
0	157.22	\$ 32	\$ 21	\$ 0	\$ 0
0.46	200	\$ 52	\$ 41	\$ 18	\$ 0
1.31	300	\$ 37	\$ 30	\$ 19	\$ 0
1.98	400	\$ 570	\$ 285	\$ 280	\$ 0
Total (\$)		\$ 762	\$ 397	\$ 317	\$ 0

Building Information

Drainage Improvement @ 33.7404200; -80.4587270

Building Type: One Story

Foundation Type:

Building Has Basement: No

NFIP: No

Standard Benefits - Building

Drainage Improvement @ 33.7404200; -80.4587270

Depth Damage Curve:	USACE - Wilmington: one story	Use Default:Yes
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Building Size (sq.ft):	1,900
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Building Replacement Value (BRV) (\$/sq.ft):	\$100	Use Default:Yes
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BRV Distributional Weight Multiplier:	1.2
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Demolition Threshold (%):	50.00%	Use Default:Yes
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Expected Annual Losses due to Building Damages before Mitigation:	\$1,573
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Expected Annual Losses due to Building Damages after Mitigation:	\$762
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Expected Annual Benefits - Building:	\$810
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Depth Damage Curve - Building

Drainage Improvement @ 33.7404200; -80.4587270

Flood Depth (ft)	BEFORE MITIGATION				AFTER MITIGATION			
	Percent (%)	Damage Value (\$)	NFIP (\$)	ICC Fees (\$)	Percent (%)	Damage Value (\$)	NFIP (\$)	ICC Fees (\$)
-2	0.9	2,052	0	0	0.9	2,052	0	0
-1	1	2,280	0	0	1	2,280	0	0
0	9.3	21,204	0	0	9.3	21,204	0	0
1	13.6	31,008	0	0	13.6	31,008	0	0
2	23.3	53,124	0	0	23.3	53,124	0	0
3	27.6	62,928	0	0	27.6	62,928	0	0
4	31.8	72,504	0	0	31.8	72,504	0	0
5	36.1	82,308	0	0	36.1	82,308	0	0
6	39.3	89,604	0	0	39.3	89,604	0	0
7	42.6	97,128	0	0	42.6	97,128	0	0
8	45.8	104,424	0	0	45.8	104,424	0	0
9	49.1	111,948	0	0	49.1	111,948	0	0
10	52.3	228,000	0	0	52.3	228,000	0	0
11	56.3	228,000	0	0	56.3	228,000	0	0
12	60.4	228,000	0	0	60.4	228,000	0	0
13	64.4	228,000	0	0	64.4	228,000	0	0
14	68.5	228,000	0	0	68.5	228,000	0	0
15	72.5	228,000	0	0	72.5	228,000	0	0
16	80	228,000	0	0	80	228,000	0	0

Standard Benefits - Contents

Drainage Improvement @ 33.7404200; -80.4587270

Contents Value in Dollars: \$0 Use Default:Yes

Utilities Elevated: No

Expected Annual Losses due to Content Damages before Mitigation: \$844

Expected Annual Losses due to Content Damages after Mitigation: \$397

Expected Annual Benefits - Content: \$447

Depth Damage Curve - Contents

Drainage Improvement @ 33.7404200; -80.4587270

Flood Depth (ft)	BEFORE MITIGATION		AFTER MITIGATION	
	Percent (%)	Damage Value (\$)	Percent (%)	Damage Value (\$)
-2	0	0	0	0
-1	0	0	0	0
0	11.2	12,768	11.2	12,768
1	24	27,360	24	27,360
2	36.4	41,496	36.4	41,496
3	42.9	48,906	42.9	48,906
4	46	52,440	46	52,440
5	52	59,280	52	59,280
6	58.9	67,146	58.9	67,146
7	65.8	75,012	65.8	75,012
8	72.7	82,878	72.7	82,878
9	79.6	90,744	79.6	90,744
10	86.5	98,610	86.5	98,610
11	88.3	100,662	88.3	100,662
12	90.1	102,714	90.1	102,714
13	91.9	104,766	91.9	104,766
14	93.7	106,818	93.7	106,818
15	95.5	108,870	95.5	108,870
16	100	114,000	100	114,000

Standard Benefits - Displacement

Drainage Improvement @ 33.7404200; -80.4587270

Lodging Per Diem:	\$107	Use Default:Yes
Meals Per Diem:	\$59	Use Default:Yes
Population Affected:	4	
Duration of Displacement (days):	365	Use Default:Yes
Total Residential Displacement Cost:	\$307	
Expected Annual Losses due to Displacement Damages before mitigation:	\$470	
Expected Annual Losses due to Displacement Damages after Mitigation:	\$317	
Expected Annual Losses - Displacement:	\$153	

Depth Damage Curve - Displacement

Drainage Improvement @ 33.7404200; -80.4587270

Flood Depth (ft)	BEFORE MITIGATION		AFTER MITIGATION	
	Days	Damage Value (\$)	Days	Damage Value (\$)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	13,815	45	13,815
2	90	27,630	90	27,630
3	135	41,445	135	41,445
4	180	55,260	180	55,260
5	225	69,075	225	69,075
6	270	82,890	270	82,890
7	315	96,705	315	96,705
8	360	110,520	360	110,520
9	405	124,335	405	124,335
10	450	138,150	450	138,150
11	495	151,965	495	151,965
12	540	165,780	540	165,780
13	585	179,595	585	179,595
14	630	193,410	630	193,410
15	675	207,225	675	207,225
16	720	221,040	720	221,040

Additional Benefits - Street Maintenance

Drainage Improvement @ 33.7404200; -80.4587270

Total Annual Street Maintenance Budget: \$0

Total Number of Street Miles Maintained: 0

Street Miles that will not require future maintenance: 0

Expected Annual Benefits - Street Maintenance: \$0

Standard Benefits - Volunteer Costs

Drainage Improvement @ 33.7404200; -80.4587270

Number of Volunteers (volunteers/event):	1
Number of Days of Lodging:	1
Expected Annual Volunteer Benefits:	\$305

Standard Benefits - Ecosystem Services

Drainage Improvement @ 33.7404200; -80.4587270

Total Project Area (acres):	0
Percentage of Urban Green Open Space:	0.00%
Percentage of Rural Green Open Space:	0.00%
Percentage of Riparian:	0.00%
Percentage of Coastal Wetlands:	0.00%
Percentage of Inland Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Coral Reefs:	0.00%
Percentage of Shellfish Reefs:	0.00%
Percentage of Beaches and Dunes:	0.00%
Expected Annual Ecosystem Services Benefits:	\$0

Additional Benefits - Social

Drainage Improvement @ 33.7404200; -80.4587270

Number of Workers:	2
Expected Annual Social Benefits:	\$27,244

Benefits-Costs Summary

Drainage Improvement @ 33.7404200; -80.4587270

Discount Rate (%):	3.1%	Use Default:Yes
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Total Standard Mitigation Benefits:	\$43,295
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Total Social Benefits:	\$27,244
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Total Mitigation Project Benefits:	\$70,539
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Total Mitigation Project Cost:	\$140,456
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Benefit Cost Ratio - Standard:	0.31
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Benefit Cost Ratio - Standard + Social:	0.50
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Benefit-Cost Calculator

V.6.0 (Build 20240510.2248 | Release Notes)

Benefit-Cost Analysis

Project Name: 104 Elmwood



Map Marker	Mitigation Title	Property Type	Hazard	Discount Rate (%)	Benefits (B)	Costs (C)	BCR (B/C)
▲ 1	Drainage Improvement @ 104 Elmwood Ave, Pinewood, South Carolina, 29125		Riverine Flood	3.1	\$ 48,981	\$ 140,456	0.35
TOTAL (SELECTED)					\$ 48,981	\$ 140,456	0.35
TOTAL					\$ 48,981	\$ 140,456	0.35

Property Configuration

Property Title: Drainage Improvement @ 104 Elmwood Ave, Pinewood, South Carolina, 29125

Property Location: 29125, Sumter, South Carolina

Property Coordinates: 33.74068499716962, -80.4588150328299

Hazard Type: Riverine Flood

Mitigation Action Type: Drainage Improvement

Property Type: Residential Building

Analysis Method Type: Modeled Damages

Cost Estimation

Drainage Improvement @ 104 Elmwood Ave, Pinewood, South Carolina, 29125

Discount Rate (%): 3.1% Use Default:Yes

Project Useful Life (years): 50

Project Cost: \$137,300

Number of Maintenance Years: 50 Use Default:Yes

Annual Maintenance Cost: \$125

Hazard Probabilities Parameters - Flood

Drainage Improvement @ 104 Elmwood Ave, Pinewood, South Carolina, 29125

Lowest Floor Elevation of the Property (ft): 188.5

Streambed Elevation at the Property Location (ft): 184

Use Default Recurrence Intervals: Use Default **No**

Discharge

Drainage Improvement @ 104 Elmwood Ave, Pinewood, South Carolina, 29125

BEFORE MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Discharge (cfs)
10	186.4	15.9
25	187.2	17.3
50	188	18.51
100	189	19.76

AFTER MITIGATION

Recurrence Interval (years)	Surface Elevation (ft)	Discharge (cfs)
10	184.5	4.2
25	185.4	4.9
50	186.3	5.8
100	187.2	6.2

Estimated Annual Damages by Category

Drainage Improvement @ 104 Elmwood Ave, Pinewood, South Carolina, 29125

Before Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building (\$)	Contents (\$)	Displacement (\$)	Loss of Function (\$)
-4.07	1.11	\$ 0	\$ 0	\$ 0	\$ 0
-3.49	2	\$ 0	\$ 0	\$ 0	\$ 0
-2.71	5	\$ 0	\$ 0	\$ 0	\$ 0
-2.3	8	\$ 0	\$ 0	\$ 0	\$ 0
-2.08	10.17	\$ 0	\$ 0	\$ 0	\$ 0
-2	11.31	\$ 77	\$ 0	\$ 0	\$ 0
-1.45	20	\$ 14	\$ 0	\$ 0	\$ 0
-1.29	23.11	\$ 21	\$ 0	\$ 0	\$ 0
-1.02	30	\$ 32	\$ 0	\$ 0	\$ 0
-0.73	40	\$ 44	\$ 22	\$ 0	\$ 0
-0.49	49.86	\$ 44	\$ 25	\$ 0	\$ 0
-0.28	60	\$ 39	\$ 23	\$ 0	\$ 0
-0.1	70	\$ 23	\$ 14	\$ 0	\$ 0
0	76.52	\$ 12	\$ 7	\$ 0	\$ 0
0.05	80	\$ 29	\$ 19	\$ 2	\$ 0
0.19	90	\$ 57	\$ 41	\$ 9	\$ 0
0.5	115.47	\$ 105	\$ 85	\$ 33	\$ 0
1.2	200	\$ 65	\$ 53	\$ 28	\$ 0
1.75	300	\$ 40	\$ 32	\$ 19	\$ 0
2.16	400	\$ 540	\$ 270	\$ 235	\$ 0
Total (\$)		\$ 1,143	\$ 592	\$ 324	\$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building (\$)	Contents (\$)	Displacement (\$)	Loss of Function (\$)
-4.49	1.11	\$ 0	\$ 0	\$ 0	\$ 0
-4.44	2	\$ 0	\$ 0	\$ 0	\$ 0
-4.23	5	\$ 0	\$ 0	\$ 0	\$ 0
-4.06	8	\$ 0	\$ 0	\$ 0	\$ 0
Total (\$)		\$ 729	\$ 388	\$ 289	\$ 0

After Mitigation

Flood Depth (ft)	Recurrence Interval (yr)	Building (\$)	Contents (\$)	Displacement (\$)	Loss of Function (\$)
-3.92	10.2	\$ 0	\$ 0	\$ 0	\$ 0
-3.44	20	\$ 0	\$ 0	\$ 0	\$ 0
-3.35	22.07	\$ 0	\$ 0	\$ 0	\$ 0
-3.03	30	\$ 0	\$ 0	\$ 0	\$ 0
-2.68	40	\$ 0	\$ 0	\$ 0	\$ 0
-2.06	60	\$ 0	\$ 0	\$ 0	\$ 0
-2.04	60.12	\$ 0	\$ 0	\$ 0	\$ 0
-2	62.14	\$ 4	\$ 0	\$ 0	\$ 0
-1.78	70	\$ 4	\$ 0	\$ 0	\$ 0
-1.52	80	\$ 3	\$ 0	\$ 0	\$ 0
-1.26	90	\$ 1	\$ 0	\$ 0	\$ 0
-1.19	93.66	\$ 26	\$ 0	\$ 0	\$ 0
0	150.8	\$ 39	\$ 28	\$ 0	\$ 0
0.86	200	\$ 64	\$ 53	\$ 27	\$ 0
2.32	300	\$ 49	\$ 37	\$ 28	\$ 0
3.54	400	\$ 540	\$ 270	\$ 235	\$ 0
Total (\$)		\$ 729	\$ 388	\$ 289	\$ 0

Building Information

Drainage Improvement @ 104 Elmwood Ave, Pinewood, South Carolina, 29125

Building Type: One Story

Foundation Type:

Building Has Basement: No

NFIP: No

Standard Benefits - Building

Drainage Improvement @ 104 Elmwood Ave, Pinewood, South Carolina, 29125

Depth Damage Curve:	USACE - Wilmington: one story	Use Default:Yes
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Building Size (sq.ft):	1,800
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Building Replacement Value (BRV) (\$/sq.ft):	\$100	Use Default:Yes
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BRV Distributional Weight Multiplier:	1.2
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Demolition Threshold (%):	50.00%	Use Default:Yes
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Expected Annual Losses due to Building Damages before Mitigation:	\$1,143
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Expected Annual Losses due to Building Damages after Mitigation:	\$729
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Expected Annual Benefits - Building:	\$414
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Depth Damage Curve - Building

Drainage Improvement @ 104 Elmwood Ave, Pinewood, South Carolina, 29125

Flood Depth (ft)	BEFORE MITIGATION				AFTER MITIGATION			
	Percent (%)	Damage Value (\$)	NFIP (\$)	ICC Fees (\$)	Percent (%)	Damage Value (\$)	NFIP (\$)	ICC Fees (\$)
-2	0.9	1,944	0	0	0.9	1,944	0	0
-1	1	2,160	0	0	1	2,160	0	0
0	9.3	20,088	0	0	9.3	20,088	0	0
1	13.6	29,376	0	0	13.6	29,376	0	0
2	23.3	50,328	0	0	23.3	50,328	0	0
3	27.6	59,616	0	0	27.6	59,616	0	0
4	31.8	68,688	0	0	31.8	68,688	0	0
5	36.1	77,976	0	0	36.1	77,976	0	0
6	39.3	84,888	0	0	39.3	84,888	0	0
7	42.6	92,016	0	0	42.6	92,016	0	0
8	45.8	98,928	0	0	45.8	98,928	0	0
9	49.1	106,056	0	0	49.1	106,056	0	0
10	52.3	216,000	0	0	52.3	216,000	0	0
11	56.3	216,000	0	0	56.3	216,000	0	0
12	60.4	216,000	0	0	60.4	216,000	0	0
13	64.4	216,000	0	0	64.4	216,000	0	0
14	68.5	216,000	0	0	68.5	216,000	0	0
15	72.5	216,000	0	0	72.5	216,000	0	0
16	80	216,000	0	0	80	216,000	0	0

Standard Benefits - Contents

Drainage Improvement @ 104 Elmwood Ave, Pinewood, South Carolina, 29125

Contents Value in Dollars: \$0 Use Default:Yes

Utilities Elevated: No

Expected Annual Losses due to Content Damages before Mitigation: \$592

Expected Annual Losses due to Content Damages after Mitigation: \$388

Expected Annual Benefits - Content: \$204

Depth Damage Curve - Contents

Drainage Improvement @ 104 Elmwood Ave, Pinewood, South Carolina, 29125

Flood Depth (ft)	BEFORE MITIGATION		AFTER MITIGATION	
	Percent (%)	Damage Value (\$)	Percent (%)	Damage Value (\$)
-2	0	0	0	0
-1	0	0	0	0
0	11.2	12,096	11.2	12,096
1	24	25,920	24	25,920
2	36.4	39,312	36.4	39,312
3	42.9	46,332	42.9	46,332
4	46	49,680	46	49,680
5	52	56,160	52	56,160
6	58.9	63,612	58.9	63,612
7	65.8	71,064	65.8	71,064
8	72.7	78,516	72.7	78,516
9	79.6	85,968	79.6	85,968
10	86.5	93,420	86.5	93,420
11	88.3	95,364	88.3	95,364
12	90.1	97,308	90.1	97,308
13	91.9	99,252	91.9	99,252
14	93.7	101,196	93.7	101,196
15	95.5	103,140	95.5	103,140
16	100	108,000	100	108,000

Standard Benefits - Displacement

Drainage Improvement @ 104 Elmwood Ave, Pinewood, South Carolina, 29125

Lodging Per Diem:	\$107	Use Default:Yes
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Meals Per Diem:	\$59	Use Default:Yes
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Population Affected:	3	
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Duration of Displacement (days):	365	Use Default:Yes
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Total Residential Displacement Cost:	\$257	
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Expected Annual Losses due to Displacement Damages before mitigation:	\$324	
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Expected Annual Losses due to Displacement Damages after Mitigation:	\$289	
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Expected Annual Losses - Displacement:	\$35	
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Depth Damage Curve - Displacement

Drainage Improvement @ 104 Elmwood Ave, Pinewood, South Carolina, 29125

Flood Depth (ft)	BEFORE MITIGATION		AFTER MITIGATION	
	Days	Damage Value (\$)	Days	Damage Value (\$)
-2	0	0	0	0
-1	0	0	0	0
0	0	0	0	0
1	45	11,565	45	11,565
2	90	23,130	90	23,130
3	135	34,695	135	34,695
4	180	46,260	180	46,260
5	225	57,825	225	57,825
6	270	69,390	270	69,390
7	315	80,955	315	80,955
8	360	92,520	360	92,520
9	405	104,085	405	104,085
10	450	115,650	450	115,650
11	495	127,215	495	127,215
12	540	138,780	540	138,780
13	585	150,345	585	150,345
14	630	161,910	630	161,910
15	675	173,475	675	173,475
16	720	185,040	720	185,040

Additional Benefits - Street Maintenance

Drainage Improvement @ 104 Elmwood Ave, Pinewood, South Carolina, 29125

Total Annual Street Maintenance Budget:	\$0
Total Number of Street Miles Maintained:	0
Street Miles that will not require future maintenance:	0
Expected Annual Benefits - Street Maintenance:	\$0

Standard Benefits - Volunteer Costs

Drainage Improvement @ 104 Elmwood Ave, Pinewood, South Carolina, 29125

Number of Volunteers (volunteers/event):	1
Number of Days of Lodging:	1
Expected Annual Volunteer Benefits:	\$305

Standard Benefits - Ecosystem Services

Drainage Improvement @ 104 Elmwood Ave, Pinewood, South Carolina, 29125

Total Project Area (acres):	0
Percentage of Urban Green Open Space:	0.00%
Percentage of Rural Green Open Space:	0.00%
Percentage of Riparian:	0.00%
Percentage of Coastal Wetlands:	0.00%
Percentage of Inland Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Coral Reefs:	0.00%
Percentage of Shellfish Reefs:	0.00%
Percentage of Beaches and Dunes:	0.00%
Expected Annual Ecosystem Services Benefits:	\$0

Additional Benefits - Social

Drainage Improvement @ 104 Elmwood Ave, Pinewood, South Carolina, 29125

Number of Workers:	2
Expected Annual Social Benefits:	\$24,801

Benefits-Costs Summary

Drainage Improvement @ 104 Elmwood Ave, Pinewood, South Carolina, 29125

Discount Rate (%):	3.1%	Use Default:Yes
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Total Standard Mitigation Benefits:	\$24,180
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Total Social Benefits:	\$24,801
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Total Mitigation Project Benefits:	\$48,981
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Total Mitigation Project Cost:	\$140,456
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Benefit Cost Ratio - Standard:	0.17
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Benefit Cost Ratio - Standard + Social:	0.35
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Outfall 1 Phase 1

Category	Evaluation Criteria	Raw Score	Crossing Analysis (Marked with "X")
Proximity to Critical Facility (School, Hospital, Fire, Police, etc.)	Project is located on main route to critical facility within 0.25 miles	5	X
	Project is located on main route to critical facility within 0.5 miles	3	
	Project is located on main route to critical facility within 1 mile	1	
	Not on main route or No critical facility within a mile	0	
Property Flooding (Based on Future Condition)	Critical Facility is flooding	5	
	Multiple buildings are flooding	3	
	1 building is flooding	1	
	No buildings flooding	0	X
Roadway Flooding (Based on 25 YR Future Condition)	Roadway is overtopped and ≥ 6 " above the roadway elevation	5	X
	Roadway is overtopped but <6 " above roadway elevation	3	
	Roadway does not meet LOS but does not overtop	1	
	Roadway meets LOS	0	
Existing Conditions	No existing drainage or Structures in poor condition/significant erosion	5	
	Structures in fair condition/moderate erosion	3	X
	Structures in good condition/minimal or no erosion	0	
Implementation Constraints	Minor constraints - only minor/local/state permits required, no roadway raising, no new easements required, no apparent utilities located nearby	5	
	Moderate constraints - requires some State and Federal permits that are easy to obtain (Nationwide permit, FEMA No-Rise, etc.), road raising in sparse area, small easement required, some utilities located nearby but routine relocation	3	X
	Severe constraints - Extensive permitting required (LOMR, etc.), road raising in dense area, significant coordination and easements or acquisitions required, extensive utility relocation required	0	
Roadway Type	Interstate/State Route/Secondary/One-Way/ Sole Entrance	5	
	Main/Collector Road	3	
	Minor Road	0	X

Total Raw Score	16
Project Cost	\$ 543,100.00

Total Score /Project Cost	2.95
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Outfall 1 Phase 1 - Optional

Category	Evaluation Criteria	Raw Score	Crossing Analysis (Marked with "X")
Proximity to Critical Facility (School, Hospital, Fire, Police, etc.)	Project is located on main route to critical facility within 0.25 miles	5	X
	Project is located on main route to critical facility within 0.5 miles	3	
	Project is located on main route to critical facility within 1 mile	1	
	Not on main route or No critical facility within a mile	0	
Property Flooding (Based on Future Condition)	Critical Facility is flooding	5	
	Multiple buildings are flooding	3	
	1 building is flooding	1	
	No buildings flooding	0	X
Roadway Flooding (Based on 25 YR Future Condition)	Roadway is overtopped and ≥ 6 " above the roadway elevation	5	X
	Roadway is overtopped but <6 " above roadway elevation	3	
	Roadway does not meet LOS but does not overtop	1	
	Roadway meets LOS	0	
Existing Conditions	No existing drainage or Structures in poor condition/significant erosion	5	
	Structures in fair condition/moderate erosion	3	X
	Structures in good condition/minimal or no erosion	0	
Implementation Constraints	Minor constraints - only minor/local/state permits required, no roadway raising, no new easements required, no apparent utilities located nearby	5	
	Moderate constraints - requires some State and Federal permits that are easy to obtain (Nationwide permit, FEMA No-Rise, etc.), road raising in sparse area, small easement required, some utilities located nearby but routine relocation	3	
	Severe constraints - Extensive permitting required (LOMR, etc.), road raising in dense area, significant coordination and easements or acquisitions required, extensive utility relocation required	0	X
Roadway Type	Interstate/State Route/Secondary/One-Way/ Sole Entrance	5	
	Main/Collector Road	3	
	Minor Road	0	X

Total Raw Score	13
Project Cost	\$ 569,100.00

Total Score /Project Cost	2.28
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Outfall 1 Phase 2

Category	Evaluation Criteria	Raw Score	Crossing Analysis (Marked with "X")
Proximity to Critical Facility (School, Hospital, Fire, Police, etc.)	Project is located on main route to critical facility within 0.25 miles	5	X
	Project is located on main route to critical facility within 0.5 miles	3	
	Project is located on main route to critical facility within 1 mile	1	
	Not on main route or No critical facility within a mile	0	
Property Flooding (Based on Future Condition)	Critical Facility is flooding	5	
	Multiple buildings are flooding	3	
	1 building is flooding	1	
	No buildings flooding	0	X
Roadway Flooding (Based on 25 YR Future Condition)	Roadway is overtopped and ≥ 6 " above the roadway elevation	5	X
	Roadway is overtopped but <6 " above roadway elevation	3	
	Roadway does not meet LOS but does not overtop	1	
	Roadway meets LOS	0	
Existing Conditions	No existing drainage or Structures in poor condition/significant erosion	5	
	Structures in fair condition/moderate erosion	3	X
	Structures in good condition/minimal or no erosion	0	
Implementation Constraints	Minor constraints - only minor/local/state permits required, no roadway raising, no new easements required, no apparent utilities located nearby	5	X
	Moderate constraints - requires some State and Federal permits that are easy to obtain (Nationwide permit, FEMA No-Rise, etc.), road raising in sparse area, small easement required, some utilities located nearby but routine relocation	3	
	Severe constraints - Extensive permitting required (LOMR, etc.), road raising in dense area, significant coordination and easements or acquisitions required, extensive utility relocation required	0	
Roadway Type	Interstate/State Route/Secondary/One-Way/ Sole Entrance	5	
	Main/Collector Road	3	
	Minor Road	0	X

Total Raw Score	18
Project Cost	\$ 975,600.00

Total Score /Project Cost	1.85
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Outfall 1 Phase 2 - Optional

Category	Evaluation Criteria	Raw Score	Crossing Analysis (Marked with "X")
Proximity to Critical Facility (School, Hospital, Fire, Police, etc.)	Project is located on main route to critical facility within 0.25 miles	5	X
	Project is located on main route to critical facility within 0.5 miles	3	
	Project is located on main route to critical facility within 1 mile	1	
	Not on main route or No critical facility within a mile	0	
Property Flooding (Based on Future Condition)	Critical Facility is flooding	5	
	Multiple buildings are flooding	3	
	1 building is flooding	1	
	No buildings flooding	0	X
Roadway Flooding (Based on 25 YR Future Condition)	Roadway is overtopped and ≥ 6 " above the roadway elevation	5	X
	Roadway is overtopped but <6 " above roadway elevation	3	
	Roadway does not meet LOS but does not overtop	1	
	Roadway meets LOS	0	
Existing Conditions	No existing drainage or Structures in poor condition/significant erosion	5	
	Structures in fair condition/moderate erosion	3	X
	Structures in good condition/minimal or no erosion	0	
Implementation Constraints	Minor constraints - only minor/local/state permits required, no roadway raising, no new easements required, no apparent utilities located nearby	5	X
	Moderate constraints - requires some State and Federal permits that are easy to obtain (Nationwide permit, FEMA No-Rise, etc.), road raising in sparse area, small easement required, some utilities located nearby but routine relocation	3	
	Severe constraints - Extensive permitting required (LOMR, etc.), road raising in dense area, significant coordination and easements or acquisitions required, extensive utility relocation required	0	
Roadway Type	Interstate/State Route/Secondary/One-Way/ Sole Entrance	5	
	Main/Collector Road	3	
	Minor Road	0	X

Total Raw Score	18
Project Cost	\$ 1,284,600.00

Total Score /Project Cost	1.40
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Outfall 2 Downtown

Category	Evaluation Criteria	Raw Score	Crossing Analysis (Marked with "X")
Proximity to Critical Facility (School, Hospital, Fire, Police, etc.)	Project is located on main route to critical facility within 0.25 miles	5	X
	Project is located on main route to critical facility within 0.5 miles	3	
	Project is located on main route to critical facility within 1 mile	1	
	Not on main route or No critical facility within a mile	0	
Property Flooding (Based on Future Condition)	Critical Facility is flooding	5	
	Multiple buildings are flooding	3	
	1 building is flooding	1	X
	No buildings flooding	0	
Roadway Flooding (Based on 25 YR Future Condition)	Roadway is overtopped and ≥ 6 " above the roadway elevation	5	
	Roadway is overtopped but <6 " above roadway elevation	3	
	Roadway does not meet LOS but does not overtop	1	X
	Roadway meets LOS	0	
Existing Conditions	No existing drainage or Structures in poor condition/significant erosion	5	
	Structures in fair condition/moderate erosion	3	X
	Structures in good condition/minimal or no erosion	0	
Implementation Constraints	Minor constraints - only minor/local/state permits required, no roadway raising, no new easements required, no apparent utilities located nearby	5	
	Moderate constraints - requires some State and Federal permits that are easy to obtain (Nationwide permit, FEMA No-Rise, etc.), road raising in sparse area, small easement required, some utilities located nearby but routine relocation	3	
	Severe constraints - Extensive permitting required (LOMR, etc.), road raising in dense area, significant coordination and easements or acquisitions required, extensive utility relocation required	0	X
Roadway Type	Interstate/State Route/Secondary/One-Way/ Sole Entrance	5	
	Main/Collector Road	3	X
	Minor Road	0	

Total Raw Score	13
Project Cost	\$ 1,274,600.00

Total Score /Project Cost	1.02
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Outfall 2 Downtown - Optional

Category	Evaluation Criteria	Raw Score	Crossing Analysis (Marked with "X")
Proximity to Critical Facility (School, Hospital, Fire, Police, etc.)	Project is located on main route to critical facility within 0.25 miles	5	X
	Project is located on main route to critical facility within 0.5 miles	3	
	Project is located on main route to critical facility within 1 mile	1	
	Not on main route or No critical facility within a mile	0	
Property Flooding (Based on Future Condition)	Critical Facility is flooding	5	
	Multiple buildings are flooding	3	
	1 building is flooding	1	X
	No buildings flooding	0	
Roadway Flooding (Based on 25 YR Future Condition)	Roadway is overtopped and ≥ 6 " above the roadway elevation	5	
	Roadway is overtopped but <6 " above roadway elevation	3	
	Roadway does not meet LOS but does not overtop	1	X
	Roadway meets LOS	0	
Existing Conditions	No existing drainage or Structures in poor condition/significant erosion	5	
	Structures in fair condition/moderate erosion	3	X
	Structures in good condition/minimal or no erosion	0	
Implementation Constraints	Minor constraints - only minor/local/state permits required, no roadway raising, no new easements required, no apparent utilities located nearby	5	
	Moderate constraints - requires some State and Federal permits that are easy to obtain (Nationwide permit, FEMA No-Rise, etc.), road raising in sparse area, small easement required, some utilities located nearby but routine relocation	3	
	Severe constraints - Extensive permitting required (LOMR, etc.), road raising in dense area, significant coordination and easements or acquisitions required, extensive utility relocation required	0	X
Roadway Type	Interstate/State Route/Secondary/One-Way/ Sole Entrance	5	
	Main/Collector Road	3	X
	Minor Road	0	

Total Raw Score	13
Project Cost	\$ 1,325,800.00

Total Score /Project Cost	0.98
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Outfall 2 Railroad Ave

Category	Evaluation Criteria	Raw Score	Crossing Analysis (Marked with "X")
Proximity to Critical Facility (School, Hospital, Fire, Police, etc.)	Project is located on main route to critical facility within 0.25 miles	5	
	Project is located on main route to critical facility within 0.5 miles	3	
	Project is located on main route to critical facility within 1 mile	1	
	Not on main route or No critical facility within a mile	0	X
Property Flooding (Based on Future Condition)	Critical Facility is flooding	5	
	Multiple buildings are flooding	3	
	1 building is flooding	1	
	No buildings flooding	0	X
Roadway Flooding (Based on 25 YR Future Condition)	Roadway is overtopped and ≥ 6 " above the roadway elevation	5	X
	Roadway is overtopped but <6 " above roadway elevation	3	
	Roadway does not meet LOS but does not overtop	1	
	Roadway meets LOS	0	
Existing Conditions	No existing drainage or Structures in poor condition/significant erosion	5	X
	Structures in fair condition/moderate erosion	3	
	Structures in good condition/minimal or no erosion	0	
Implementation Constraints	Minor constraints - only minor/local/state permits required, no roadway raising, no new easements required, no apparent utilities located nearby	5	
	Moderate constraints - requires some State and Federal permits that are easy to obtain (Nationwide permit, FEMA No-Rise, etc.), road raising in sparse area, small easement required, some utilities located nearby but routine relocation	3	X
	Severe constraints - Extensive permitting required (LOMR, etc.), road raising in dense area, significant coordination and easements or acquisitions required, extensive utility relocation required	0	
Roadway Type	Interstate/State Route/Secondary/One-Way/ Sole Entrance	5	X
	Main/Collector Road	3	
	Minor Road	0	

Total Raw Score	18
Project Cost	\$ 837,600.00

Total Score /Project Cost	2.15
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Outfall 3 Phase 1

Category	Evaluation Criteria	Raw Score	Crossing Analysis (Marked with "X")
Proximity to Critical Facility (School, Hospital, Fire, Police, etc.)	Project is located on main route to critical facility within 0.25 miles	5	
	Project is located on main route to critical facility within 0.5 miles	3	
	Project is located on main route to critical facility within 1 mile	1	
	Not on main route or No critical facility within a mile	0	X
Property Flooding (Based on Future Condition)	Critical Facility is flooding	5	
	Multiple buildings are flooding	3	X
	1 building is flooding	1	
	No buildings flooding	0	
Roadway Flooding (Based on 25 YR Future Condition)	Roadway is overtopped and ≥ 6 " above the roadway elevation	5	X
	Roadway is overtopped but <6 " above roadway elevation	3	
	Roadway does not meet LOS but does not overtop	1	
	Roadway meets LOS	0	
Existing Conditions	No existing drainage or Structures in poor condition/significant erosion	5	X
	Structures in fair condition/moderate erosion	3	
	Structures in good condition/minimal or no erosion	0	
Implementation Constraints	Minor constraints - only minor/local/state permits required, no roadway raising, no new easements required, no apparent utilities located nearby	5	
	Moderate constraints - requires some State and Federal permits that are easy to obtain (Nationwide permit, FEMA No-Rise, etc.), road raising in sparse area, small easement required, some utilities located nearby but routine relocation	3	X
	Severe constraints - Extensive permitting required (LOMR, etc.), road raising in dense area, significant coordination and easements or acquisitions required, extensive utility relocation required	0	
Roadway Type	Interstate/State Route/Secondary/One-Way/ Sole Entrance	5	
	Main/Collector Road	3	
	Minor Road	0	X

Total Raw Score	16
Project Cost	\$ 549,200.00

Total Score /Project Cost	2.91
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Outfall 3 Phase 2

Category	Evaluation Criteria	Raw Score	Crossing Analysis (Marked with "X")
Proximity to Critical Facility (School, Hospital, Fire, Police, etc.)	Project is located on main route to critical facility within 0.25 miles	5	
	Project is located on main route to critical facility within 0.5 miles	3	X
	Project is located on main route to critical facility within 1 mile	1	
	Not on main route or No critical facility within a mile	0	
Property Flooding (Based on Future Condition)	Critical Facility is flooding	5	
	Multiple buildings are flooding	3	
	1 building is flooding	1	X
	No buildings flooding	0	
Roadway Flooding (Based on 25 YR Future Condition)	Roadway is overtopped and ≥ 6 " above the roadway elevation	5	
	Roadway is overtopped but <6 " above roadway elevation	3	X
	Roadway does not meet LOS but does not overtop	1	
	Roadway meets LOS	0	
Existing Conditions	No existing drainage or Structures in poor condition/significant erosion	5	
	Structures in fair condition/moderate erosion	3	X
	Structures in good condition/minimal or no erosion	0	
Implementation Constraints	Minor constraints - only minor/local/state permits required, no roadway raising, no new easements required, no apparent utilities located nearby	5	
	Moderate constraints - requires some State and Federal permits that are easy to obtain (Nationwide permit, FEMA No-Rise, etc.), road raising in sparse area, small easement required, some utilities located nearby but routine relocation	3	X
	Severe constraints - Extensive permitting required (LOMR, etc.), road raising in dense area, significant coordination and easements or acquisitions required, extensive utility relocation required	0	
Roadway Type	Interstate/State Route/Secondary/One-Way/ Sole Entrance	5	X
	Main/Collector Road	3	
	Minor Road	0	

Total Raw Score	18
Project Cost	\$ 631,000.00

Total Score /Project Cost	2.85
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Appendix F – Flooding Questionnaire Results



Town of Pinewood Flooding Questionnaire Submission

420 S Marion St

Submitted: September 28, 2023 7:17 PM

Submission Info

What best describes you? *Contractor*

How long have you been a resident / business owner in Pinewood? *0 years*

What storm water problem directly affects your home/business? *Standing Water*

Have you ever experienced flooding on your property during a storm? *Yes*

If yes, please describe the type of flooding: *Yard Flooding*

If yes, please describe the frequency of flooding:

Have you ever noticed flooded streets in your neighborhood?

If yes, please describe the type of stormwater problems that you have observed related to streets:

Please let us know if you'd like to share additional information with the Town. *Point created by KCI based on City provided information*



Town of Pinewood Flooding Questionnaire Submission

445 S Hampton St, Pinewood, SC, 29125, USA

Submitted: November 16, 2023 6:55 PM

Submission Info

What best describes you?	<i>Contractor</i>
How long have you been a resident / business owner in Pinewood?	<i>0 years</i>
What storm water problem directly affects your home/business?	<i>Clogged Drains/Inlets/Pipes</i>
Have you ever experienced flooding on your property during a storm?	<i>No</i>
If yes, please describe the type of flooding:	
If yes, please describe the frequency of flooding:	
Have you ever noticed flooded streets in your neighborhood?	<i>No</i>
If yes, please describe the type of stormwater problems that you have observed related to streets:	
Please let us know if you'd like to share additional information with the Town.	<i>Reported by KCI based on Pinewood City information.</i>



Town of Pinewood Flooding Questionnaire Submission

Bacon Hill Rd & S Hampton St, Pinewood, SC, 29125, USA

Submitted: November 16, 2023 6:00 PM

Submission Info

What best describes you?	<i>Contractor</i>
How long have you been a resident / business owner in Pinewood?	<i>0 years</i>
What storm water problem directly affects your home/business?	<i>Overflowing Drainage Ditches</i>
Have you ever experienced flooding on your property during a storm?	<i>No</i>
If yes, please describe the type of flooding:	
If yes, please describe the frequency of flooding:	
Have you ever noticed flooded streets in your neighborhood?	<i>Yes</i>
If yes, please describe the type of stormwater problems that you have observed related to streets:	<i>Other Pond flood causes backwater.</i>
Please let us know if you'd like to share additional information with the Town.	<i>Reported by KCI based on Pinewood City information.</i>



Town of Pinewood Flooding Questionnaire Submission

E Fulton St & Elmwood Ave, Pinewood, SC, 29125, USA

Submitted: November 16, 2023 6:53 PM

Submission Info

What best describes you?	<i>Contractor</i>
How long have you been a resident / business owner in Pinewood?	<i>0 years</i>
What storm water problem directly affects your home/business?	<i>Flooding</i>
Have you ever experienced flooding on your property during a storm?	<i>Yes</i>
If yes, please describe the type of flooding:	<i>Yard Flooding</i>
If yes, please describe the frequency of flooding:	<i>More than once a year</i>
Have you ever noticed flooded streets in your neighborhood?	<i>Yes</i>
If yes, please describe the type of stormwater problems that you have observed related to streets:	<i>Overtopping (stream overflowing onto roadway)</i>
Please let us know if you'd like to share additional information with the Town.	<i>Reported by KCI based on Pinewood City information.</i>



Town of Pinewood Flooding Questionnaire Submission

E Fulton St, Pinewood, SC, 29125, USA

Submitted: October 12, 2023 6:03 PM

Submission Info

What best describes you?	<i>Contractor</i>
How long have you been a resident / business owner in Pinewood?	<i>0 years</i>
What storm water problem directly affects your home/business?	<i>Clogged Drains/Inlets/Pipes</i>
Have you ever experienced flooding on your property during a storm?	<i>No</i>
If yes, please describe the type of flooding:	
If yes, please describe the frequency of flooding:	
Have you ever noticed flooded streets in your neighborhood?	<i>No</i>
If yes, please describe the type of stormwater problems that you have observed related to streets:	
Please let us know if you'd like to share additional information with the Town.	<i>Survey created by KCI based on data provided by the Town</i>



Town of Pinewood Flooding Questionnaire Submission

Elmwood Ave, Pinewood, SC, 29125, USA

Submitted: September 28, 2023 8:16 PM

Submission Info

What best describes you?

Contractor

How long have you been a resident / business owner in Pinewood?

0 years

What storm water problem directly affects your home/business?

Overflowing Drainage Ditches

Have you ever experienced flooding on your property during a storm?

If yes, please describe the type of flooding:

If yes, please describe the frequency of flooding:

Have you ever noticed flooded streets in your neighborhood?

Yes

If yes, please describe the type of stormwater problems that you have observed related to streets:

Overtopping (stream overflowing onto roadway)

Please let us know if you'd like to share additional information with the Town.

Point created by KCI based on City provided information



Town of Pinewood Flooding Questionnaire Submission

Epperson Ave, Pinewood, SC, 29125, USA

Submitted: November 16, 2023 7:00 PM

Submission Info

What best describes you?	<i>Contractor</i>
How long have you been a resident / business owner in Pinewood?	<i>0 years</i>
What storm water problem directly affects your home/business?	<i>Overflowing Drainage Ditches</i>
Have you ever experienced flooding on your property during a storm?	<i>No</i>
If yes, please describe the type of flooding:	
If yes, please describe the frequency of flooding:	
Have you ever noticed flooded streets in your neighborhood?	<i>Yes</i>
If yes, please describe the type of stormwater problems that you have observed related to streets:	<i>Stormwater runoff covering all or part of the road</i>
Please let us know if you'd like to share additional information with the Town.	<i>Reported by KCI based on Pinewood City information.</i>



Town of Pinewood Flooding Questionnaire Submission

McBride St, Pinewood, SC, 29125, USA

Submitted: September 28, 2023 7:43 PM

Submission Info

What best describes you?

Contractor

**How long have you been a resident /
business owner in Pinewood?**

0 years

**What storm water problem directly
affects your home/business?**

Turbidity (cloud/murky water)

**Have you ever experienced flooding
on your property during a storm?**

**If yes, please describe the type of
flooding:**

**If yes, please describe the frequency
of flooding:**

**Have you ever noticed flooded streets
in your neighborhood?**

**If yes, please describe the type of
stormwater problems that you have
observed related to streets:**

**Please let us know if you'd like to
share additional information with the
Town.**

*Point created by KCI based on City
provided information*



Town of Pinewood Flooding Questionnaire Submission

Reynolds Rd & N Hampton St, Pinewood, SC, 29125, USA

Submitted: November 16, 2023 6:39 PM

Submission Info

What best describes you?	<i>Contractor</i>
How long have you been a resident / business owner in Pinewood?	<i>0 years</i>
What storm water problem directly affects your home/business?	<i>Flooding</i>
Have you ever experienced flooding on your property during a storm?	<i>No</i>
If yes, please describe the type of flooding:	
If yes, please describe the frequency of flooding:	
Have you ever noticed flooded streets in your neighborhood?	<i>Yes</i>
If yes, please describe the type of stormwater problems that you have observed related to streets:	<i>Overtopping (stream overflowing onto roadway)</i>
Please let us know if you'd like to share additional information with the Town.	<i>Reported by KCI based on Pinewood City information.</i>



Town of Pinewood Flooding Questionnaire Submission

S Marion St, Pinewood, SC, 29125, USA

Submitted: September 28, 2023 7:24 PM

Submission Info

What best describes you?

Contractor

**How long have you been a resident /
business owner in Pinewood?**

0 years

**What storm water problem directly
affects your home/business?**

Clogged Drains/Inlets/Pipes

**Have you ever experienced flooding
on your property during a storm?**

**If yes, please describe the type of
flooding:**

**If yes, please describe the frequency
of flooding:**

**Have you ever noticed flooded streets
in your neighborhood?**

**If yes, please describe the type of
stormwater problems that you have
observed related to streets:**

**Please let us know if you'd like to
share additional information with the
Town.**

*Point created by KCI based on City
provided information*



Town of Pinewood Flooding Questionnaire Submission





Town of Pinewood Flooding Questionnaire Submission

W 5th St & McBride St, Pinewood, SC, 29125, USA

Submitted: November 16, 2023 6:32 PM

Submission Info

What best describes you?	<i>Contractor</i>
How long have you been a resident / business owner in Pinewood?	<i>0 years</i>
What storm water problem directly affects your home/business?	<i>Other Inaccessible stormdrain ditches during rain events</i>
Have you ever experienced flooding on your property during a storm?	<i>No</i>
If yes, please describe the type of flooding:	
If yes, please describe the frequency of flooding:	
Have you ever noticed flooded streets in your neighborhood?	<i>Yes</i>
If yes, please describe the type of stormwater problems that you have observed related to streets:	<i>Stormwater runoff covering all or part of the road</i>
Please let us know if you'd like to share additional information with the Town.	<i>Reported by KCI based on Pinewood City information.</i>



Town of Pinewood Flooding Questionnaire Submission

W Fulton St & Longshot Rd, Pinewood, SC, 29125, USA

Submitted: November 16, 2023 6:48 PM

Submission Info

What best describes you?	<i>Contractor</i>
How long have you been a resident / business owner in Pinewood?	<i>0 years</i>
What storm water problem directly affects your home/business?	<i>Flooding</i>
Have you ever experienced flooding on your property during a storm?	<i>No</i>
If yes, please describe the type of flooding:	
If yes, please describe the frequency of flooding:	
Have you ever noticed flooded streets in your neighborhood?	<i>Yes</i>
If yes, please describe the type of stormwater problems that you have observed related to streets:	<i>Overtopping (stream overflowing onto roadway)</i>
Please let us know if you'd like to share additional information with the Town.	<i>Reported by KCI based on Pinewood City information.</i>



Town of Pinewood Flooding Questionnaire Submission

W Fulton St & S Columbia St, Pinewood, SC, 29125, USA

Submitted: November 16, 2023 6:46 PM

Submission Info

What best describes you?	<i>Contractor</i>
How long have you been a resident / business owner in Pinewood?	<i>0 years</i>
What storm water problem directly affects your home/business?	<i>Overflowing Drainage Ditches</i>
Have you ever experienced flooding on your property during a storm?	<i>No</i>
If yes, please describe the type of flooding:	
If yes, please describe the frequency of flooding:	
Have you ever noticed flooded streets in your neighborhood?	<i>Yes</i>
If yes, please describe the type of stormwater problems that you have observed related to streets:	<i>Overtopping (stream overflowing onto roadway)</i>
Please let us know if you'd like to share additional information with the Town.	<i>Mentioned flooding does not occur since ditches had been cleared. Reported by KCI based on Pinewood City information.</i>



Town of Pinewood Flooding Questionnaire Submission

16 E Clark St, Pinewood, SC, 29125, USA

Submitted: October 12, 2023 6:11 PM

Submission Info

What best describes you?	<i>Contractor</i>
How long have you been a resident / business owner in Pinewood?	<i>0 years</i>
What storm water problem directly affects your home/business?	<i>Flooding</i>
Have you ever experienced flooding on your property during a storm?	<i>Yes</i>
If yes, please describe the type of flooding:	<i>Utility/Storage Unit Flooding</i>
If yes, please describe the frequency of flooding:	<i>Every time it rains</i>
Have you ever noticed flooded streets in your neighborhood?	<i>Yes</i>
If yes, please describe the type of stormwater problems that you have observed related to streets:	<i>Overtopping (stream overflowing onto roadway)</i>
Please let us know if you'd like to share additional information with the Town.	<i>Survey created by KCI based on data provided by the Town</i>



Town of Pinewood Flooding Questionnaire Submission

85 Big Loop, Pinewood, SC, 29125, USA

Submitted: September 28, 2023 8:34 PM

Submission Info

What best describes you?	<i>Contractor</i>
How long have you been a resident / business owner in Pinewood?	<i>0 years</i>
What storm water problem directly affects your home/business?	<i>Flooding</i>
Have you ever experienced flooding on your property during a storm?	<i>Yes</i>
If yes, please describe the type of flooding:	<i>Yard Flooding</i>
If yes, please describe the frequency of flooding:	
Have you ever noticed flooded streets in your neighborhood?	
If yes, please describe the type of stormwater problems that you have observed related to streets:	
Please let us know if you'd like to share additional information with the Town.	<i>Point created by KCI based on City provided information</i>



Town of Pinewood Flooding Questionnaire Submission

115 East Ave N, Pinewood, SC, 29125, USA

Submitted: October 12, 2023 6:12 PM

Submission Info

What best describes you?	<i>Contractor</i>
How long have you been a resident / business owner in Pinewood?	<i>0 years</i>
What storm water problem directly affects your home/business?	<i>Flooding</i>
Have you ever experienced flooding on your property during a storm?	<i>Yes</i>
If yes, please describe the type of flooding:	<i>Crawlspace Flooding</i>
If yes, please describe the frequency of flooding:	<i>More than once a year</i>
Have you ever noticed flooded streets in your neighborhood?	<i>No</i>
If yes, please describe the type of stormwater problems that you have observed related to streets:	
Please let us know if you'd like to share additional information with the Town.	<i>Survey created by KCI based on data provided by the Town</i>



Town of Pinewood Flooding Questionnaire Submission

115 East Ave N, Pinewood, SC, 29125, USA

Submitted: October 12, 2023 6:15 PM

Submission Info

What best describes you?	<i>Contractor</i>
How long have you been a resident / business owner in Pinewood?	<i>0 years</i>
What storm water problem directly affects your home/business?	<i>Flooding</i>
Have you ever experienced flooding on your property during a storm?	<i>Yes</i>
If yes, please describe the type of flooding:	<i>Yard Flooding</i>
If yes, please describe the frequency of flooding:	<i>More than once a year</i>
Have you ever noticed flooded streets in your neighborhood?	<i>Yes</i>
If yes, please describe the type of stormwater problems that you have observed related to streets:	<i>Stormwater runoff covering all or part of the road</i>
Please let us know if you'd like to share additional information with the Town.	<i>Survey created by KCI based on data provided by the Town</i>



Town of Pinewood Flooding Questionnaire Submission

135 W Fulton St, Pinewood, SC, 29125, USA

Submitted: September 28, 2023 7:39 PM

Submission Info

What best describes you?	<i>Contractor</i>
How long have you been a resident / business owner in Pinewood?	<i>0 years</i>
What storm water problem directly affects your home/business?	<i>Flooding</i>
Have you ever experienced flooding on your property during a storm?	<i>Yes</i>
If yes, please describe the type of flooding:	<i>Street Flooding</i>
If yes, please describe the frequency of flooding:	<i>Other Described as "Rare Flooding"</i>
Have you ever noticed flooded streets in your neighborhood?	
If yes, please describe the type of stormwater problems that you have observed related to streets:	
Please let us know if you'd like to share additional information with the Town.	<i>Point created by KCI based on City provided information</i>



Town of Pinewood Flooding Questionnaire Submission

201 E Clark St, Pinewood, SC, 29125, USA

Submitted: October 16, 2023 4:12 PM

Submission Info

What best describes you?	<i>Resident</i>
How long have you been a resident / business owner in Pinewood?	<i>30 years</i>
What storm water problem directly affects your home/business?	<i>Standing Water</i>
Have you ever experienced flooding on your property during a storm?	<i>Yes</i>
If yes, please describe the type of flooding:	<i>Yard Flooding</i>
If yes, please describe the frequency of flooding:	<i>Only during major storm events like hurricanes or tropical storms</i>
Have you ever noticed flooded streets in your neighborhood?	<i>Yes</i>
If yes, please describe the type of stormwater problems that you have observed related to streets:	<i>Accumulation of sediment on road</i>
Please let us know if you'd like to share additional information with the Town.	



Town of Pinewood Flooding Questionnaire Submission

201 E Clark St, Pinewood, SC, 29125, USA

Submitted: November 16, 2023 6:28 PM

Submission Info

What best describes you?	<i>Contractor</i>
How long have you been a resident / business owner in Pinewood?	<i>0 years</i>
What storm water problem directly affects your home/business?	<i>Standing Water</i>
Have you ever experienced flooding on your property during a storm?	<i>Yes</i>
If yes, please describe the type of flooding:	<i>Yard Flooding</i>
If yes, please describe the frequency of flooding:	<i>Every 2-3 years</i>
Have you ever noticed flooded streets in your neighborhood?	<i>No</i>
If yes, please describe the type of stormwater problems that you have observed related to streets:	
Please let us know if you'd like to share additional information with the Town.	<i>Reported by KCI based on Pinewood City information.</i>



Town of Pinewood Flooding Questionnaire Submission

329 S Hampton St, Pinewood, SC, 29125, USA

Submitted: November 16, 2023 6:57 PM

Submission Info

What best describes you?	<i>Contractor</i>
How long have you been a resident / business owner in Pinewood?	<i>0 years</i>
What storm water problem directly affects your home/business?	<i>Overflowing Drainage Ditches</i>
Have you ever experienced flooding on your property during a storm?	<i>No</i>
If yes, please describe the type of flooding:	
If yes, please describe the frequency of flooding:	
Have you ever noticed flooded streets in your neighborhood?	<i>No</i>
If yes, please describe the type of stormwater problems that you have observed related to streets:	
Please let us know if you'd like to share additional information with the Town.	<i>Reported by KCI based on Pinewood City information.</i>



Town of Pinewood Flooding Questionnaire Submission

401 Railroad Ave, Pinewood, SC, 29125, USA

Submitted: October 12, 2023 5:57 PM

Submission Info

What best describes you? *Contractor*

How long have you been a resident / business owner in Pinewood? *0 years*

What storm water problem directly affects your home/business? *Flooding*

Have you ever experienced flooding on your property during a storm? *Yes*

If yes, please describe the type of flooding: *Street Flooding*

If yes, please describe the frequency of flooding: *Other
During 1-2" rain*

Have you ever noticed flooded streets in your neighborhood? *Yes*

If yes, please describe the type of stormwater problems that you have observed related to streets:

Please let us know if you'd like to share additional information with the Town. *Survey created by KCI based on data provided by the Town*



Town of Pinewood Flooding Questionnaire Submission

409 E Fulton St, Pinewood, SC, 29125, USA

Submitted: September 28, 2023 8:28 PM

Submission Info

What best describes you? *Contractor*

How long have you been a resident / business owner in Pinewood? *0 years*

What storm water problem directly affects your home/business? *Erosion*

Have you ever experienced flooding on your property during a storm? *No*

If yes, please describe the type of flooding:

If yes, please describe the frequency of flooding:

Have you ever noticed flooded streets in your neighborhood? *No*

If yes, please describe the type of stormwater problems that you have observed related to streets:

Please let us know if you'd like to share additional information with the Town.

Sinkholes forming on roadway

Point created by KCI based on City provided information



Town of Pinewood Flooding Questionnaire Submission

411 E Fulton St, Pinewood, SC, 29125, USA

Submitted: September 28, 2023 8:27 PM

Submission Info

What best describes you? *Contractor*

How long have you been a resident / business owner in Pinewood? *0 years*

What storm water problem directly affects your home/business? *Standing Water*

Have you ever experienced flooding on your property during a storm?

If yes, please describe the type of flooding:

If yes, please describe the frequency of flooding:

Have you ever noticed flooded streets in your neighborhood?

If yes, please describe the type of stormwater problems that you have observed related to streets:

Please let us know if you'd like to share additional information with the Town. *Point created by KCI based on City provided information*



Town of Pinewood Flooding Questionnaire Submission

420 S Marion St

Submitted: September 28, 2023 7:07 PM

Submission Info

What best describes you? *Contractor*

How long have you been a resident / business owner in Pinewood? *0 years*

What storm water problem directly affects your home/business? *Flooding*

Have you ever experienced flooding on your property during a storm?

If yes, please describe the type of flooding:

If yes, please describe the frequency of flooding:

Have you ever noticed flooded streets in your neighborhood?

If yes, please describe the type of stormwater problems that you have observed related to streets:

Please let us know if you'd like to share additional information with the Town. *Point added by KCI based on City provided data*



Appendix G – Detailed Scopes of Work



Detailed Scope of Work – Town of Pinewood Elmwood Avenue Stormwater Improvements (Outfall 3 – Phase 1)

Project Background

In August 2023, the Town of Pinewood and the South Carolina Office of Resilience (SCOR) completed a Town-wide Stormwater Master Plan. The master planning effort provided the Town with an inventory of the existing drainage system, recommendations for improvements and a prioritized list of capital projects. There were nine (9) potential projects identified.

The Elmwood Avenue Stormwater Improvements was identified in the Master Plan as Outfall 3 – Phase 1. There is recent construction along Elmwood and Marion Street with new slab-on-grade homes. There is no existing drainage ditches or pipes along Elmwood Avenue. Residents have already complained of the lack of drainage causing yard flooding with the potential of residential flooding as well.

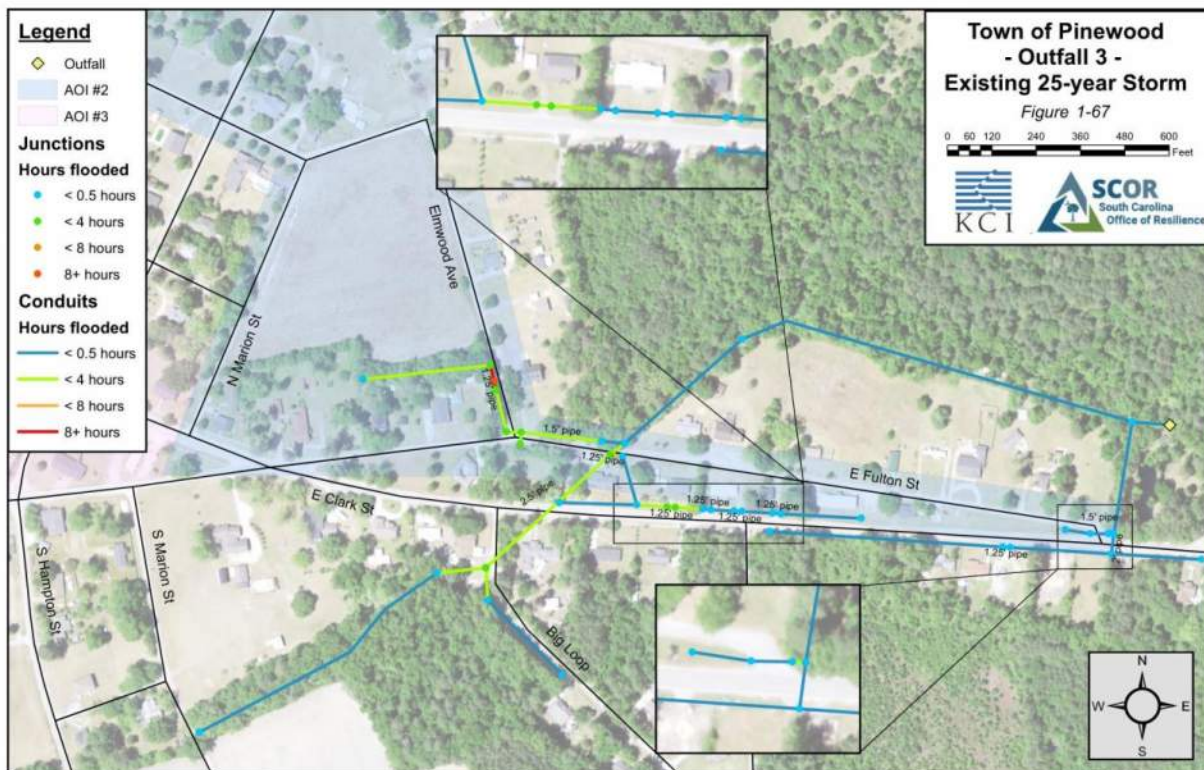


Figure 1. Existing 25-YR Level of Service

The master plan recommendations included adding swales along Elmwood Avenue with driveway pipes. There is also a potential for adding a bioswale in the backyards of the properties between Elmwood Avenue and Marion Street. The proposed bioswale would tie to an existing ditch and stormwater network on west side of Elmwood Avenue. The existing 18” pipes would be replaced



with 24" and 30" RCPs under Elmwood Avenue, also replacing an existing drop inlet (DI) and pipe with a 36" RCP. Additionally, the project would add proposed swales on both sides of Elmwood Avenue and tie to a proposed outfall ditch between 95 and 103 Elmwood Avenue. Refer to Figure 2 for proposed improvements.

Project Location

The Elmwood Avenue Stormwater Improvements project is located in Pinewood, SC. The neighborhood is located on the northeast part of Town along E Fulton Street just past downtown.

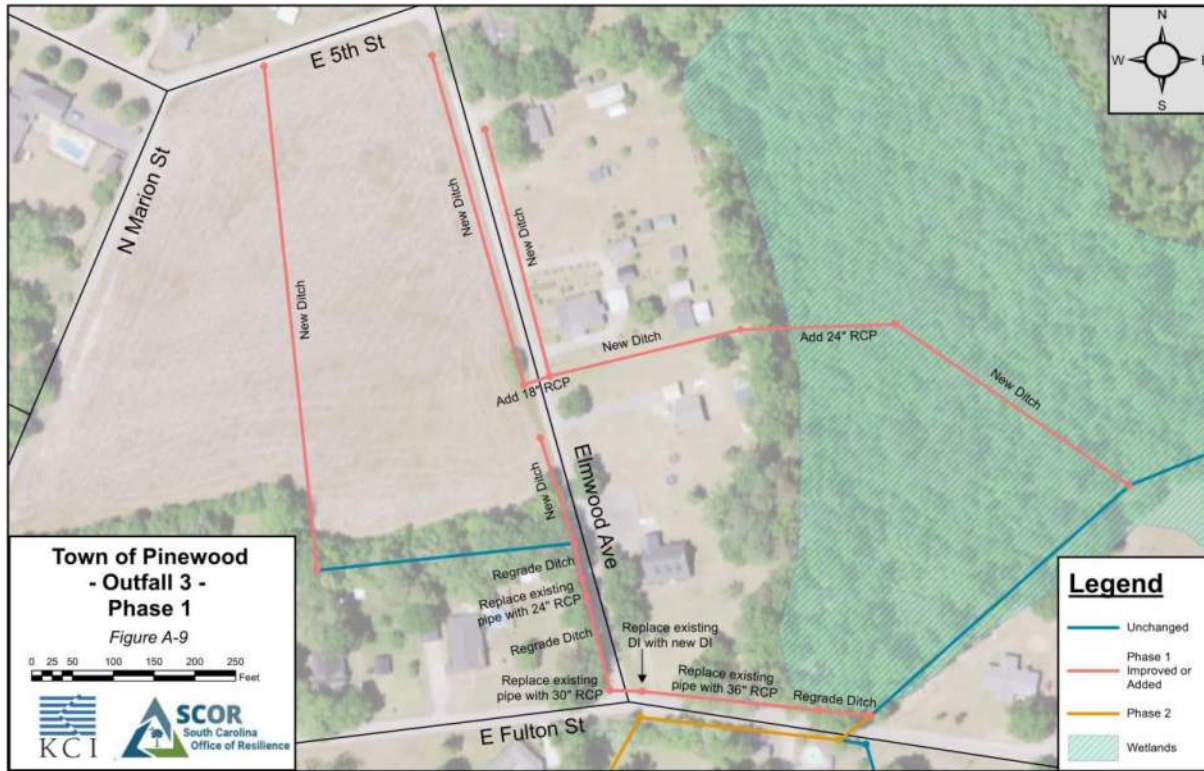


Figure 2. Elmwood Avenue Project Location

Scope of Work

The following summarizes the requested professional services:

Task 1 – Data Gathering and Survey

- Review all available information pertaining to the project, including, but not limited to: previous drainage studies, associated master drainage plans, flood event documentation, existing maps, proposed development, proposed infrastructure improvements, etc.
- Conduct a detailed topographic survey of the project area to support the drainage design.
- Additional services may include:
 - Stream and wetland determinations
 - Subsurface investigations



Appendix G - Detailed Scopes of Work

- Storm drain inspections via CCTV

Task 2 – 30% Design

- Develop design criteria in accordance with Town and SCOR guidelines
- Developing design plans for preliminary (30%) design. Plan may include, but not limited to:
 - Hydrology and Hydraulic Modeling
 - Detailed design plans and relevant details
 - Roadway typical and cross sections
- Develop a design basis memorandum that communicates the engineering key elements of the design, including modeling results
- Develop a utility conflict matrix that highlights utilities within the project area and potential conflicts
- Develop preliminary engineer's Opinion of Probable Cost (OPCs)
- Prepare a Categorical Exclusion (CE) or Environmental Assessment (EA) document following guidelines set forth in SCOR's *NEPA Environmental Review Guidance for SCOR ASIP Projects*.



Detailed Scope of Work – Town of Pinewood W 5th Street and Gordin Street Stormwater Improvements (Outfall 1 – Phase 1) and W Clark Street Stormwater Improvements (Outfall 1 – Phase 2)

Project Background

In August 2023, the Town of Pinewood and the South Carolina Office of Resilience (SCOR) completed a Town-wide Stormwater Master Plan. The master planning effort provided the Town with an inventory of the existing drainage system, recommendations for improvements and a prioritized list of capital projects. There were nine (9) potential projects identified.

The W 5th Street and Gordin Street Stormwater Improvements were identified in the Master Plan as Outfall 1 – Phase 1. The existing drainage ditches and pipes along W 5th Street are undersized and causing street and yard flooding. The W 5th Street drainage then drains to a large ditch along the east side of Gordin Street. The drainage system is comprised of reinforced concrete pipe (RCP) and open channel ditches. Model results show that the majority of the system does not meet the desired 25-year level of service.

The W Clark Street Stormwater Improvements were identified in the Master Plan as Outfall 1 – Phase 2. The existing drainage ditches and pipes along W Clark Street are undersized and causing street and yard flooding. Additionally, standing water occurs during heavy rainfall events in the Manchester Elementary School parking lot, disrupting school drop off and causing significant delays for school operations. The drainage system is comprised of open-channel ditches, reinforced concrete pipe (RCP) and drop inlets. Model results show that the system does not meet the desired 25-year level of service.

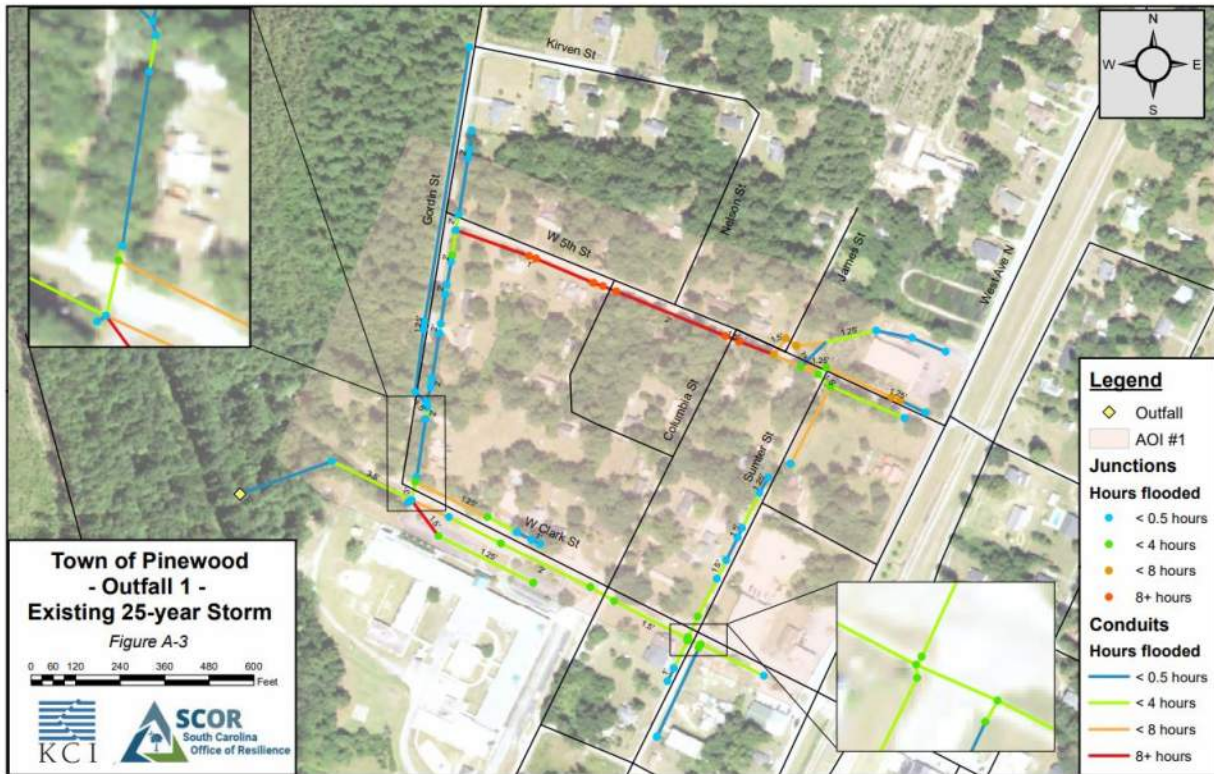


Figure 3. Existing 25-YR Level of Service

The master plan recommendations for Phase 1 includes upgrading the drainage system along W 5th Street, replacing with 30" RCP pipes and adding new yard drop inlets (DIs). The system would then cross under Gordin Street and discharge into a new ditch located on the west side of Gordin Street. The proposed ditch would convey stormwater to the south under W Clark Street with a 30" RCP to tie to the existing ditch along W Clark Street to the ultimate outfall. Refer to Figure 4 for proposed improvements.

The master plan recommendations for Phase 2 includes upgrading the drainage system along W Clark Street, replacing the drop inlets and replacing the existing pipes with 24", 30" and 42" RCPs. Refer to Figure 5 for proposed improvements.

Project Location

Both improvement projects are located in Pinewood, SC. The neighborhood is located on the northwest part of Town close to the Manchester Elementary School.

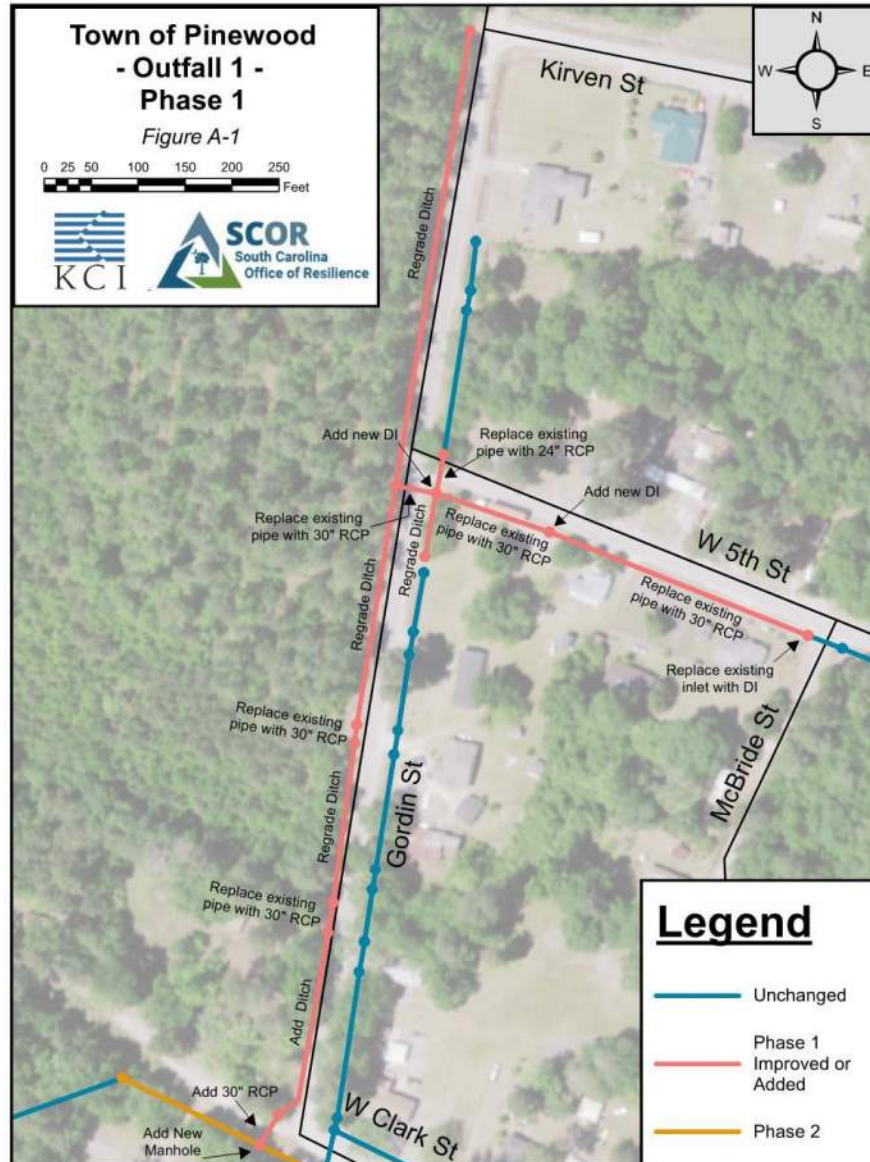


Figure 4. W 5th St and Gordin St (Phase 1) Project Location



Appendix G - Detailed Scopes of Work

- Develop a design basis memorandum that communicates the engineering key elements of the design, including modeling results
- Develop a utility conflict matrix that highlights utilities within the project area and potential conflicts
- Develop preliminary engineer's Opinion of Probable Cost (OPCs)
- Prepare a Categorical Exclusion (CE) or Environmental Assessment (EA) document following guidelines set forth in SCOR's *NEPA Environmental Review Guidance for SCOR ASIP Projects*.



Detailed Scope of Work – Town of Pinewood Railroad Avenue Stormwater Improvements (Outfall 2 – Railroad)

Project Background

In August 2023, the Town of Pinewood and the South Carolina Office of Resilience (SCOR) completed a Town-wide Stormwater Master Plan. The master planning effort provided the Town with an inventory of the existing drainage system, recommendations for improvements and a prioritized list of capital projects. There were nine (9) potential projects identified.

The Railroad Avenue Stormwater Improvements was identified in the Master Plan as Outfall 2 – Railroad. Railroad Avenue is currently a dirt road located on the east side of the CSX railroad. There is no existing drainage ditches or pipes along Railroad Avenue. Residents have already complained of the lack of drainage causing yard flooding and standing water on Railroad Avenue blocking access to their properties.

The master plan recommendations includes adding a ditch along the east side of Railroad Avenue with driveway pipes. Additionally, the project includes paving Railroad Avenue from E Fulton Street to Claflin Street. Refer to Figure 6 and Figure 7 for proposed improvements.

Project Location

The Railroad Avenue Stormwater Improvements project is located in Pinewood, SC. The project is located on the southeast part of Town between E Fulton Street and Claflin Street.

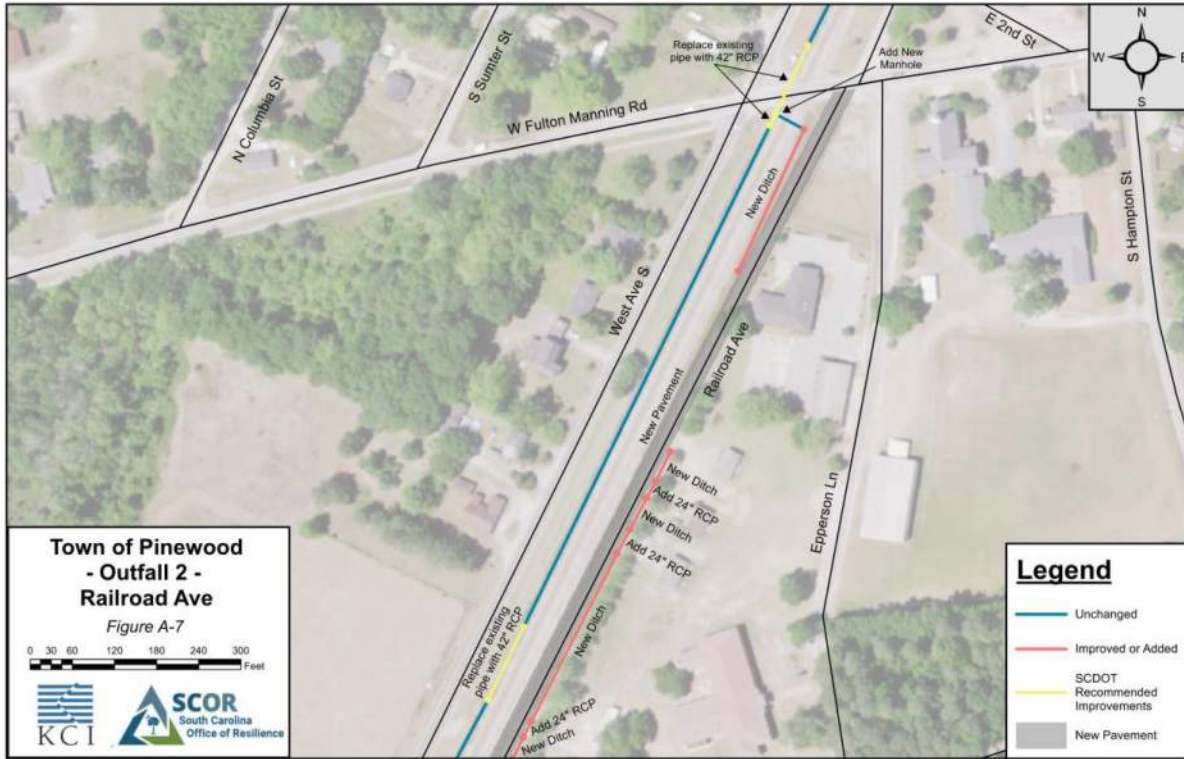


Figure 6. Railroad Avenue Project Location

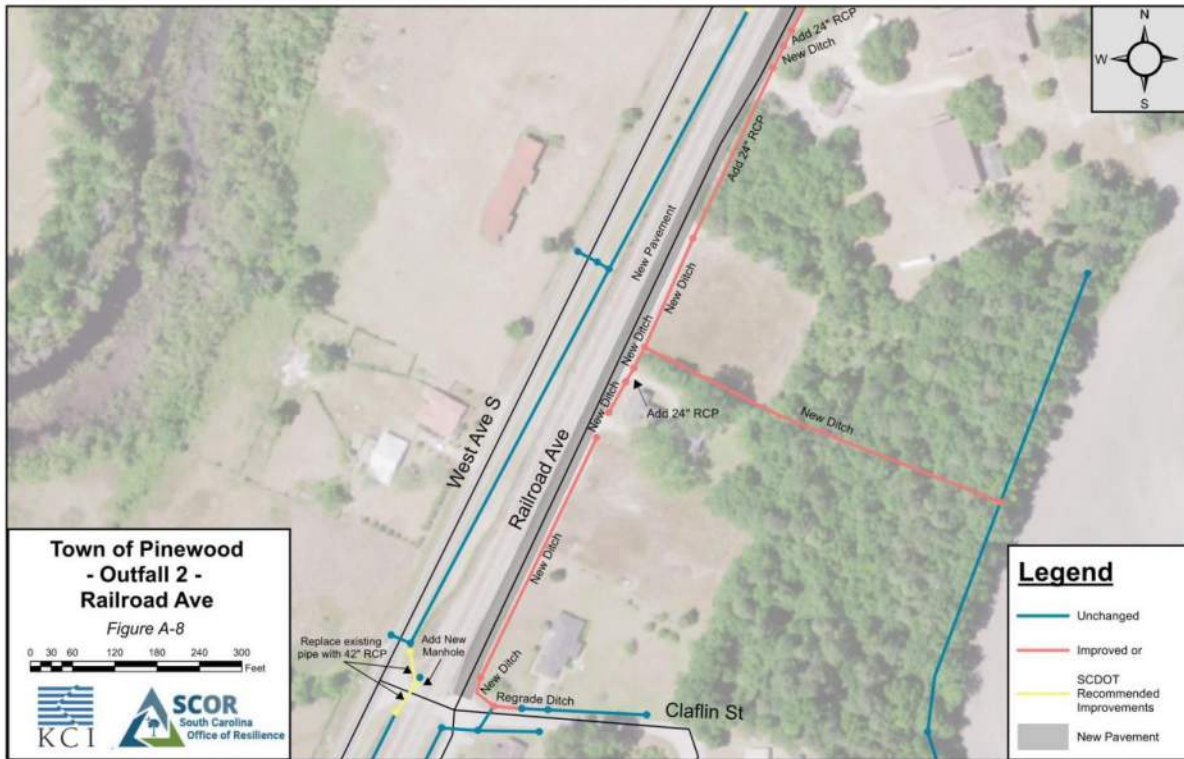


Figure 7. Railroad Avenue Project Location



Appendix G - Detailed Scopes of Work

Scope of Work

The following summarizes the requested professional services:

Task 1 – Data Gathering and Survey

- Review all available information pertaining to the project, including, but not limited to: previous drainage studies, associated master drainage plans, flood event documentation, existing maps, proposed development, proposed infrastructure improvements, etc.
- Conduct a detailed topographic survey of the project area to support the drainage design.
- Additional services may include:
 - Stream and wetland determinations
 - Subsurface investigations
 - Storm drain inspections via CCTV

Task 2 – 30% Design

- Develop design criteria in accordance with Town and SCOR guidelines
- Developing design plans for preliminary (30%) design. Plan may include, but not limited to:
 - Hydrology and Hydraulic Modeling
 - Detailed design plans and relevant details
 - Roadway typical and cross sections
- Develop a design basis memorandum that communicates the engineering key elements of the design, including modeling results
- Develop a utility conflict matrix that highlights utilities within the project area and potential conflicts
- Develop preliminary engineer's Opinion of Probable Cost (OPCs)
- Prepare a Categorical Exclusion (CE) or Environmental Assessment (EA) document following guidelines set forth in SCOR's *NEPA Environmental Review Guidance for SCOR ASIP Projects*.



Appendix H – Model Parameters & Results

Refer to Separate Document