Moraga Storm Drain Master Plan
July 2015

APPENDICES

A – V&A Condition Assessment

B – Culvert Assessment Field Sheets and Photos

C – Street Pavement Storm Drain Repairs

D – Capacity Improvement Project Sheets

E – Creek Culvert Improvement Project Sheets

APPENDIX A

V&A Storm Drain Condition Assessment

TECHNICAL MEMORANDUM

TOWN OF MORAGA
STORM DRAINAGE CONDITION ASSESSMENT

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Glenn Willson, PE, V&A Consulting Engineers, Inc.

Date: July 2, 2015

V&A Project No.: 13-0390

ES EXECUTIVE SUMMARY

V&A Consulting Engineers, Inc. (V&A) was retained by Schaaf & Wheeler (S&W) to conduct a condition assessment of storm drain facilities in support of the Storm Drain Master Plan (SDMP) for the Town of Moraga, California (Town). The field work was performed over a total of four days during the months of May, June, October, and November 2014. Based on the findings from the condition assessment activities, V&A presents the following conclusions:

- A total of 80 features (approximately 3 percent of the storm drainage system) were documented.
- 7 of the evaluated features have a prioritization rating of 5. The Rheem Shopping Center Pipeline is one of these features, and was documented having a severe/significant amount of damage. This pipeline along with the other features given this rating, require immediate repair or replacement.
- 2 of the evaluated features have a prioritization rating of 4. This rating requires prioritization for rehabilitation within the next 5 years.
- 71 of the evaluated features have a prioritization rating of 3 or lower. These features have moderate to minor defects and should be reassessed within the next 5 to 15 years.
- 15 of the evaluated features have signs of infiltration.

Before performing any of the suggested recommendations, appropriate analysis of alternatives and detailed design should be conducted for each item. The suggested rehabilitation methods are based on industry standards and may not apply to all situations. Based on the findings from the condition assessment activities, V&A presents the following recommendations for consideration:

- Continue to collect storm drainage feature information to update and develop the Town's GIS for the storm drainage system. This includes features that are not currently on the Town's system wide GIS.
- Conduct further investigations and rehabilitate specific features mentioned in this report based on the timeframes provided. A list of general suggested rehabilitation methods is provided as follows:
    - Pour a new concrete invert in pipes noted with significant surface corrosion and perforations at the invert. Ensure that the pipe bedding is restored below and around the pipe and that the new invert has structural strength for the anticipated loading on the pipe.

- Consider methods such as cast-in-place-pipe liner, slip-lining, pipe bursting in conjunction with replacement materials/liners, and also conventional open-cut construction for pipes noted with significant defects.
- Establish a routine cleaning schedule for pipes noted with significant sediment/debris.
- Install retaining walls or similar erosion control devices in areas that have a high potential for burial/overgrowth.

- Alternatives for rehabilitation and replacement of the Rheem Shopping Center Pipeline should be considered to determine the best viable approach, preferably considering the economic, social, and environmental aspects of the project.

1.0 INTRODUCTION

V&A Consulting Engineers, Inc. (V&A) was retained by Schaaf & Wheeler (S&W) to conduct a condition assessment of storm drain facilities in support of the Storm Drain Master Plan (SDMP) for the Town of Moraga, California (Town). The findings of the assessment will serve as a guide for future improvements, rehabilitation, and expansion of the City's storm water infrastructure. A total of 25 locations were selected for condition assessment. For the purpose of this report, the locations will be referenced as storm drainage facility areas (SDFA). The SDFAs contained, but are not limited to, catch basins, pipes, manholes, and channels. The criteria for picking the SDFAs is as follows:

- Needed field verification/documentation
- Known areas of concern
- Areas marked for proposed pavement repair projects

The field work was performed over a total of four days during the months of May, June, October, and November 2014. Each SDFA consisted of evaluating a point feature (e.g. a catch basin or manhole) and all the connecting pipe features accessible from that point. Figure 1-1 shows the SDFAs where the condition assessment activities were performed.

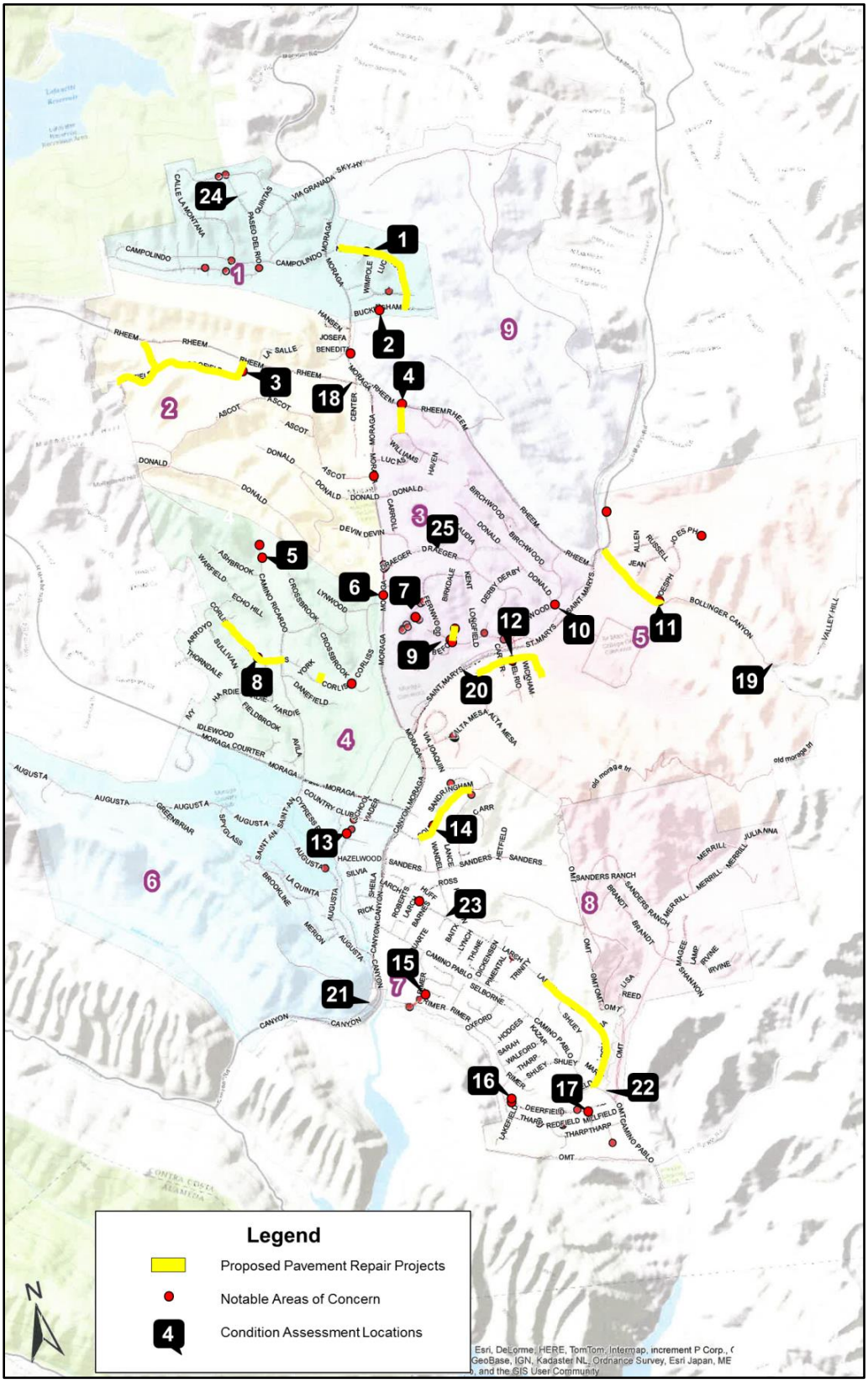


Figure 1-1. Map of Selected SDFAs for Condition Assessment

2.0 CONDITION ASSESSMENT

Qualitative condition assessment observations were based on V&A's extensive experience evaluating potable water, wastewater, and storm water structures and pipelines. Assessment methods included the following:

- Feature IDs for the assets evaluated were taken from the Town's storm drainage geographic information system (GIS). Features that were not within the GIS were assigned a new ID.
- Visual examinations and documentation with photographs. A pole-mounted camera was used to evaluate features through video documentation that were unable to be properly assessed from a topside evaluation. When applicable, a confined space entry was conducted to document some of the features.
- Pipes were evaluated starting with the effluent pipe and moving in a clockwise direction to the subsequent pipes found at each access point. When the effluent, or outlet, pipe was unknown, a sketch was provided depicting the estimated direction of flow.
- Feature locations were recorded using a handheld GPS unit and/or through written documentation. The feature was identified as being on public or private property.
- Relevant dimensions and grade/rim to invert depth were measured or estimated, depending on access and the surrounding environment.
- Sediment/debris was briefly described and its depth was measured or estimated. Also, water depth within the feature was measured or estimated.
- Deflections, cracking, corrosion, displacement, and other defects and concerns were documented.
- VANDA Condition Index ratings were used as appropriate (Table 2-1 and Table 2-2).
- Observations of infiltration were rated according to the National Association of Sewer Service Companies (NASSCO) Pipeline Assessment and Certification Program (PACP) codes (Table 2-3).
- V&A used a prioritization rating scale of 1 to 5 to classify the storm drainage facilities needing attention. The rating is in the order of increasing priority from 1 to 5, with facilities rated 5 needing immediate attention. Table 2-4 summarizes the methods used to prioritize the facilities and some example defects associated with each priority level.

The condition assessment data gathered for this project was limited to what was visible from the available access points. Defects may exist in portions of the pipe segments not visible to the evaluator. In some situations, a view into the pipe was not possible due to access limitations, sediment/debris, or other factors. In some cases, the condition assessment data did not provide enough useful information to apply ratings for an asset.

2.1 VANDA™ Reinforced Concrete Condition Index

The VANDA™ Reinforced Concrete Condition Index was created by V&A to provide consistent reporting of corrosion damage based on qualitative, objective criteria. Condition of corrosion can vary from Level 1 to Level 4 based upon visual observations and field measurements, with Level 1 indicating the best condition and Level 4 indicating severe damage. Table 2-1 describes the concrete condition index system.

Table 2-1. VANDA™ Reinforced Concrete Condition Index Rating System

Condition Rating	Description	Representative Photograph
Level 1	**None/Minimal Damage to Concrete** Hardness: No Loss Surface Profile: No Loss Cracking: Shrinkage Cracks Spalling: None Reinforcing Steel (Rebar): Not Exposed or Damaged	
Level 2	**Damage to Concrete Mortar** Hardness: Damage to Concrete Mortar Surface Profile: Some Loss Cracking: Thumbnail Sized Cracks of Minimal Frequency Spalling: Shallow Spalling of Minimal Frequency, Related Rebar Damage Reinforcing Steel (Rebar): May Be Exposed but Not Damaged	
Level 3	**Loss of Concrete Mortar/Damage to Rebar** Hardness: Complete Loss Surface Profile: Large Diameter Exposed Aggregate Cracking: ¼-inch to ½-inch Cracks, Moderate Frequency Spalling: Deep Spalling of Moderate Frequency, Related Rebar Damage Reinforcing Steel (Rebar): Exposed and Damaged, Can Be Rehabilitated	
Level 4	**Rebar Severely Corroded/Significant Damage to Structure** Hardness: Complete Loss Surface Profile: Large Diameter Exposed Aggregate Cracking: ½-inch Cracks or Greater, High Frequency Spalling: Deep Spalling at High Frequency, Related Rebar Damage Reinforcing Steel (Rebar): Damaged or Consumed, Loss of Structural Integrity	

2.2 VANDA™ Metal Condition Index

The VANDA™ Metal Condition Index was created by V&A to provide consistent reporting of metal corrosion damage based on qualitative, objective criteria. Condition of metal can vary from Level 1 to Level 4 based upon visual observations and field measurements, with Level 1 indicating the best condition and Level 4 indicating severe damage. Table 2-2 displays the metal condition index system.

Table 2-2. VANDA™ Metal Condition Index Rating System

Condition Rating	Description	Representative Photograph
Level 1	**Little or No Corrosion** Loss of Wall Thickness %: None Pitting Depth (as % of Wall Thickness): None to Minimal Extent (Area) of Corrosion: None	
Level 2	**Minor Surface Corrosion** Loss of Wall Thickness %: < 25% Pitting Depth (as % of Wall Thickness): < 25% Extent (Area) of Corrosion: Localized	
Level 3	**Moderate to Significant Corrosion** Loss of Wall Thickness %: 25%-75% Pitting Depth (as % of Wall Thickness): 25%-75% Extent (Area) of Corrosion: 25%-75%	
Level 4	**Severe Corrosion; Immediate Repair/Replacement Needed** Loss of Wall Thickness %: > 75% Pitting Depth (as % of Wall Thickness): 75% or More Extent (Area) of Corrosion: Affects Most or All of Surface	

2.3 Infiltration Ratings

Groundwater infiltration (groundwater leaking into the storm drain system) was observed in some locations. These observations were rated according to the NASSCO PACP codes and broken down into the categories shown in Table 2-3.

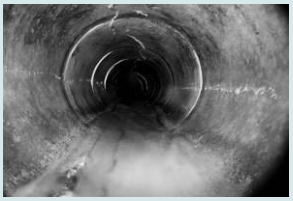
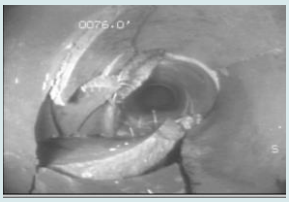
Table 2-3. Infiltration Ratings

Category	NASSCO PACP Code	Code Meaning	Type of Infiltration
None	–	–	No observed infiltration
Evidence	IS	Infiltration, Stains	Stains or dry encrustations
	IW	Infiltration, Weeper	Wet marks or stains (water weeping in)
Active	ID	Infiltration, Dripper	Dripping water
	IR	Infiltration, Runner	Small stream of flowing water
	IG	Infiltration, Gusher	Larger stream of flowing water under apparent external pressure

2.4 Storm Drainage Facility Prioritization Scale

Storm drain features received overall evaluations according to the prioritization ratings shown in Table 2-4. Note that this scale is used for reporting the overall priority ratings of the storm water drainage facilities, while the material conditions, with respect to corrosion, are reported using the VANDA ratings. The prioritization ratings take into account the overall condition of the structure or pipeline, isolated defects that were noted, and factors such as the possible effects on the surrounding area. Some features may need immediate attention for certain problems even if they are in good condition otherwise. The table also provides a recommended timeline for repair or reassessment of the facilities.

Table 2-4. Storm Drainage Facility Prioritization Scale

Color Code	Rating	Reassessment or Repair Priority	Structural Rating Example	
	1 Excellent	Failure unlikely in the foreseeable future. Reassess on a 15-year interval.		Minor or no defects
	2 Good	Reassess on a 10-year interval.	 Longitudinal Cracking	Defects that have not begun to deteriorate
	3 Fair	Reassess on a 5-year interval and consider conducting repairs.	 Multiple Fractures	Moderate defects that will continue to deteriorate
	4 Poor	Prioritize for rehabilitation within 5 years.	 Broken Pipe	Severe defects
	5 Immediate Attention	Repair or replace immediately.	 Collapsed Pipe	Defect requires immediate action

Rationale for each prioritization rating was made based on the categories described in Table 2-5. Please note that more than one category may influence the provided prioritization rating for each feature.

Table 2-5. Prioritization Rating Rationale

Rationale	Description
Condition	The condition of the structure warrants the specified rating level due to likelihood and consequence of asset failure.
Location	The location of the asset warrants the specified rating level due to effects on the surrounding area (e.g. the asset is located under a roadway and would have a higher consequence upon failing).
Sediment/Debris	The level of sediment/debris within the asset warrants the specified rating level due to likelihood of hindering asset performance. High levels of sediment/debris can block a pipe and subsequently flood the surrounding area.
Safety	There is a safety concern which warrants the specified prioritization rating (e.g. public access is permitted to an asset that has potential trip and fall or other hazards).
Obstruction	There is an object that has blocked the asset to a degree which warrants the specified prioritization rating due to limitation in feature performance and operation.
Other	There are other aspects that need to be taken into account and warrant the specified prioritization rating

3.0 FINDINGS AND ANALYSIS

The selected features assessed at each SDFA received ratings per the VANDA Condition Index scales and the storm drainage facility prioritization scale. Note that the VANDA Condition Index only applies to metal and concrete corrosion damage. Features without a VANDA condition rating were assigned a prioritization rating based on other criteria, such as integrity, operational capabilities, and safety concerns. The features that pose the most significant concern have received a prioritization rating of 4 or 5 and are displayed in Table 3-1. Detailed information regarding all of the individual features that were evaluated is presented in Appendix A – Facility Inventory. Prioritization ratings and recurring notable concerns are analyzed in more detail in the following subsections. Please note that for SDFA 19, 20, 21, and 22, the culverts for each of these locations are divided into two nodes and one pipe feature. These features were not divided, but rather considered a single feature for each location for the analysis since the access points, or nodes, are the culvert itself.

Feature IDs for known features were taken from the Town's storm drainage GIS, and new IDs were assigned to features found in the field that were not shown on the GIS. Assigned IDs were based on the Town zone the feature was located in, the type of feature, the SDFA the feature was associated with, and order of evaluation. Based on these criteria, a feature (e.g., a catch basin or manhole) evaluated in Zone 1 at SDFA 1 would have the ID of Z1_NODE_S1, and a pipe at the same location would have the ID of Z1_LINK_S1_P1. The pipes were evaluated starting with the effluent pipe and moving in a clockwise direction to the subsequent pipes found at each access point.

Table 3-1. Features with a Prioritization Rating of 4 or 5

SDFA	Feature ID	Type	Location	Dia. (in)	Matl.	VANDA Rating	Priority Rating	Priority Rationale
20	Z5_LINK_S20	Culvert	1528 St Marys Rd	50	CMP	Level 2	Level 5	Sediment Safety
6	Z3_LINK_S6_P1	Pipe	Moraga Rd	24	CMP	Level 4	Level 5	Condition Location
11	Z5_LINK_S11_P3	Pipe	Joseph Dr/Bollinger Canyon Rd	18	RCP	Level 4	Level 5	Condition Location
21	Z6_LINK_S21	Culvert	423 Canyon Rd	10H x 15W	CMP	Level 4	Level 5	Condition Location
10	Z3_LINK_S10_P1	Pipe	Donald Dr/Fernwood Dr	Unknown	RCP	Unknown	Level 5	Condition Obstruction
18	Z3_LINK_S18_P1	Catch Basin	Rheem Blvd/Center St	96	CMP	Level 4	Level 5	Condition Location
18	Z3_LINK_S18_P2	Catch Basin	Rheem Blvd/Center St	96	CMP	Level 4	Level 5	Condition Location
6	Z3_LINK_S6_P3	Pipe	Moraga Rd	24	CMP	Level 3	Level 4	Condition Location
11	Z5_LINK_S11_P1	Pipe	Joseph Dr/Bollinger Canyon Rd	18	CMP	Level 3	Level 4	Condition Location

3.1 Prioritization Ratings

The condition assessment analysis shows that 9 of the evaluated features have a prioritization rating of Level 4 or 5. These features require immediate replacement/rehabilitation, or prioritization for rehabilitation within the next 5 years. The majority of the features evaluated are in good to adequate condition with 71 features having a prioritization rating of 3 or lower. The results of this analysis are displayed in Table 3-2 and Figure 3-1.

Table 3-2. Prioritization of Evaluated Features

Prioritization Rating	Number of Features	Percentage of Evaluated Features
5	7	9%
4	2	3%
3	13	16%
2	41	51%
1	17	21%

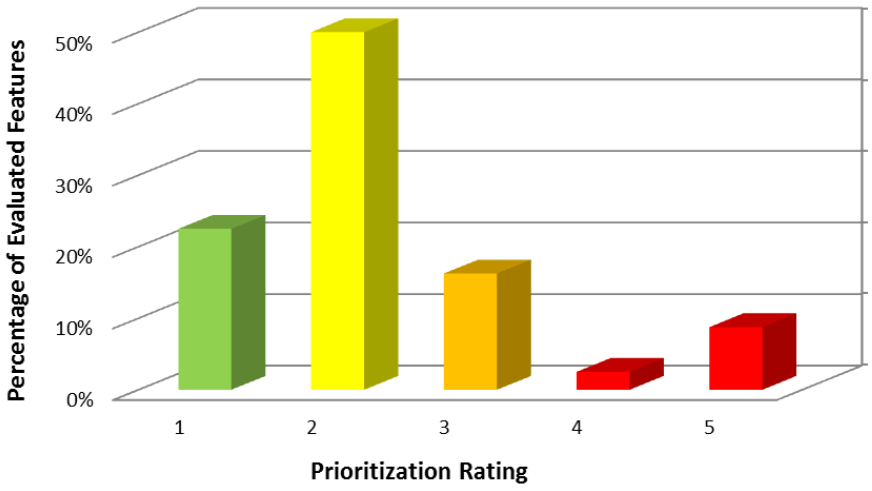


Figure 3-1. Prioritization Percentages of Evaluated Features

3.2 Condition Ratings

There are 7 features that were observed to have severe/significant to moderate amount of damage due to corrosion. 65 features were observed to have minor to no corrosion damage. The remaining 8 features evaluated were not assigned a VANDA condition rating due to materials of construction (plastic pipes, for example) or limited amount of information available for evaluation. These features are listed under the "Not Rated" category. The results of this analysis are displayed in Table 3-3 and Figure 3-2.

Table 3-3. Condition of Evaluated Features

VANDA Level	Number of Features	Percentage of Evaluated Features
4	5	6%
3	2	2%
2	15	19%
1	50	63%
Not Rated	8	10%

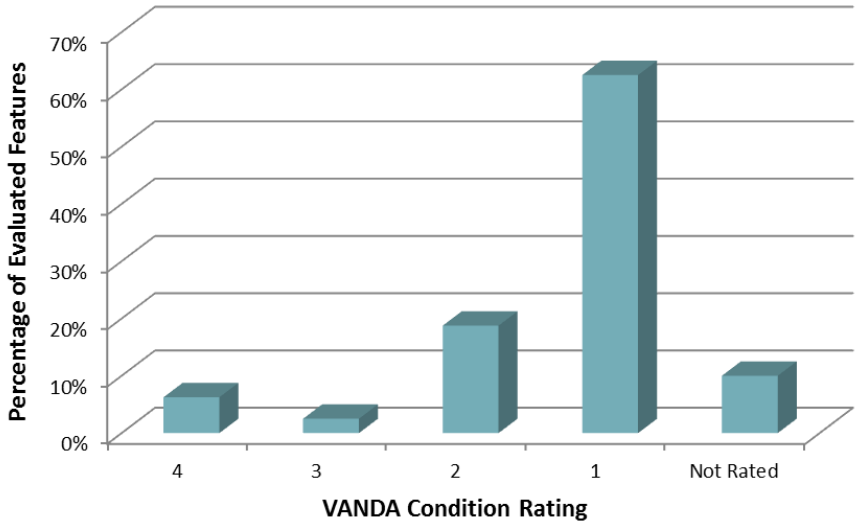


Figure 3-2. Condition Percentages of Evaluated Features

3.3 Infiltration

Out of the 80 features evaluated, 15 features were noted with signs of groundwater infiltration. The majority of the features evaluated do not appear to have infiltration. Features with a lack of information available to determine if infiltration is present are listed under "Not Rated". The results of this analysis are displayed in Table 3-4 and Figure 3-3.

Table 3-4. Infiltration Ratings for Evaluated Features

Infiltration Rating	Number of Features	Percentage of Evaluated Features
None	62	77%
Evidence	15	19%
Active	0	0%
Not Rated	3	4%

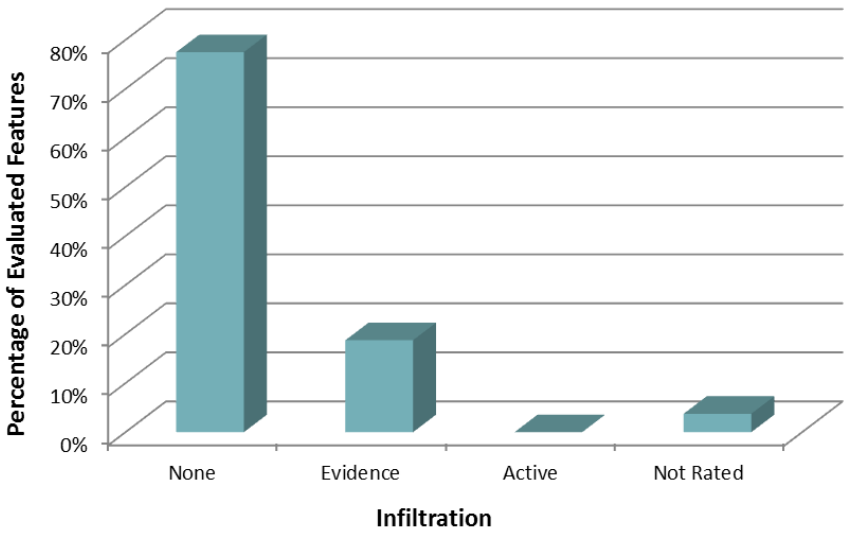


Figure 3-3. Percentage of Evaluated Features with Infiltration

3.4 Rheem Shopping Center Pipeline

A confined space entry was performed to evaluate the 96-inch corrugated metal pipe (CMP)/reinforced-concrete pipe (RCP) that is located under the Rheem Shopping Center. Entry to the pipeline was through a catch basin located at the intersection of Rheem Blvd and Center St. The approximate location of the pipeline is shown in Figure 3-4. To allow access, the Town scheduled to remove a filter from the catch basin prior to the assessment. The assessment consisted of an Attendant/Supervisor who remained topside, an Entrant who accessed the pipe and conducted the evaluation, and a Standby-Rescue who was positioned within the pipeline near the entry point. A ventilation blower was utilized to provide additional airflow during the assessment. Approximately 81 feet of pipe was evaluated upstream (heading north) from the entry point. This stretch of pipe consisted of about 46 feet of CMP, followed by 35 feet of RCP. There were numerous defects documented including surface corrosion, holes with voids visible, and infiltration staining. Approximately 440 feet of CMP was evaluated downstream from the entry point. Similar defects were noted as seen upstream, along with additional defects such as deformations. The end point of the downstream assessment was at a storm drainage grate near the drive-through exit for the building in the northeast corner of the shopping center parking lot. At this point, the pipe bends from heading southeast to south. Figure 3-5 through Figure 3-7 present the condition assessment findings and approximate observation locations on the features evaluated. More detailed findings from the assessment are presented under SDFA 18 in Appendix A – Facility Inventory.

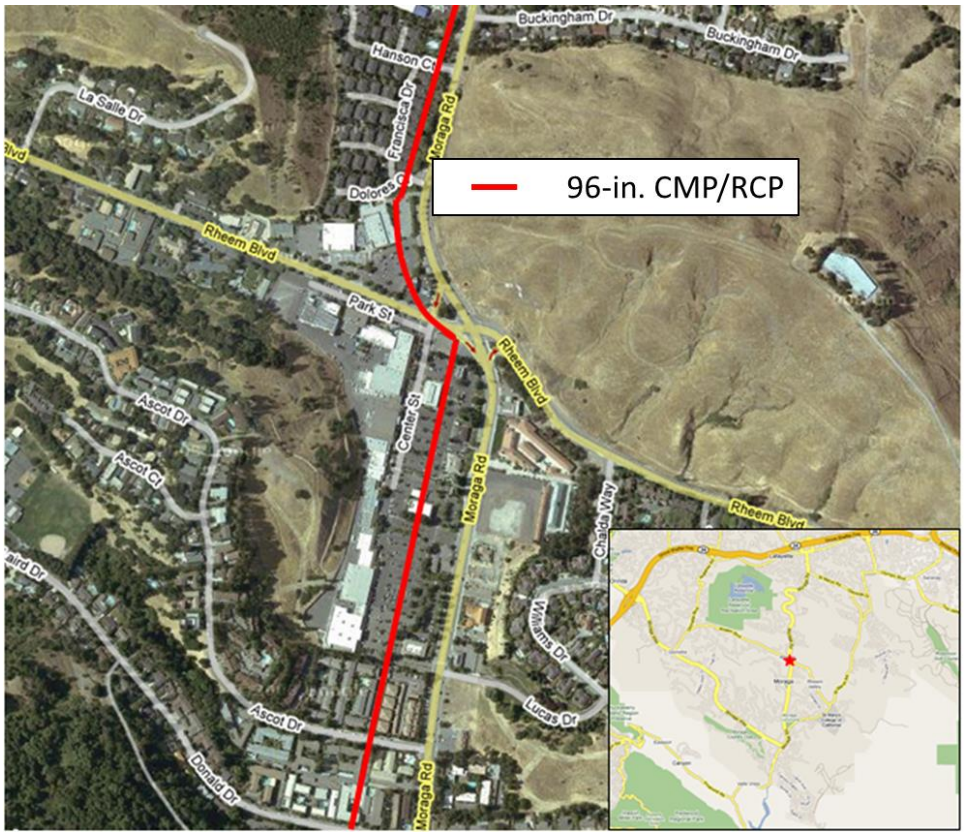


Figure 3-4. Location of Rheem Shopping Center Pipeline

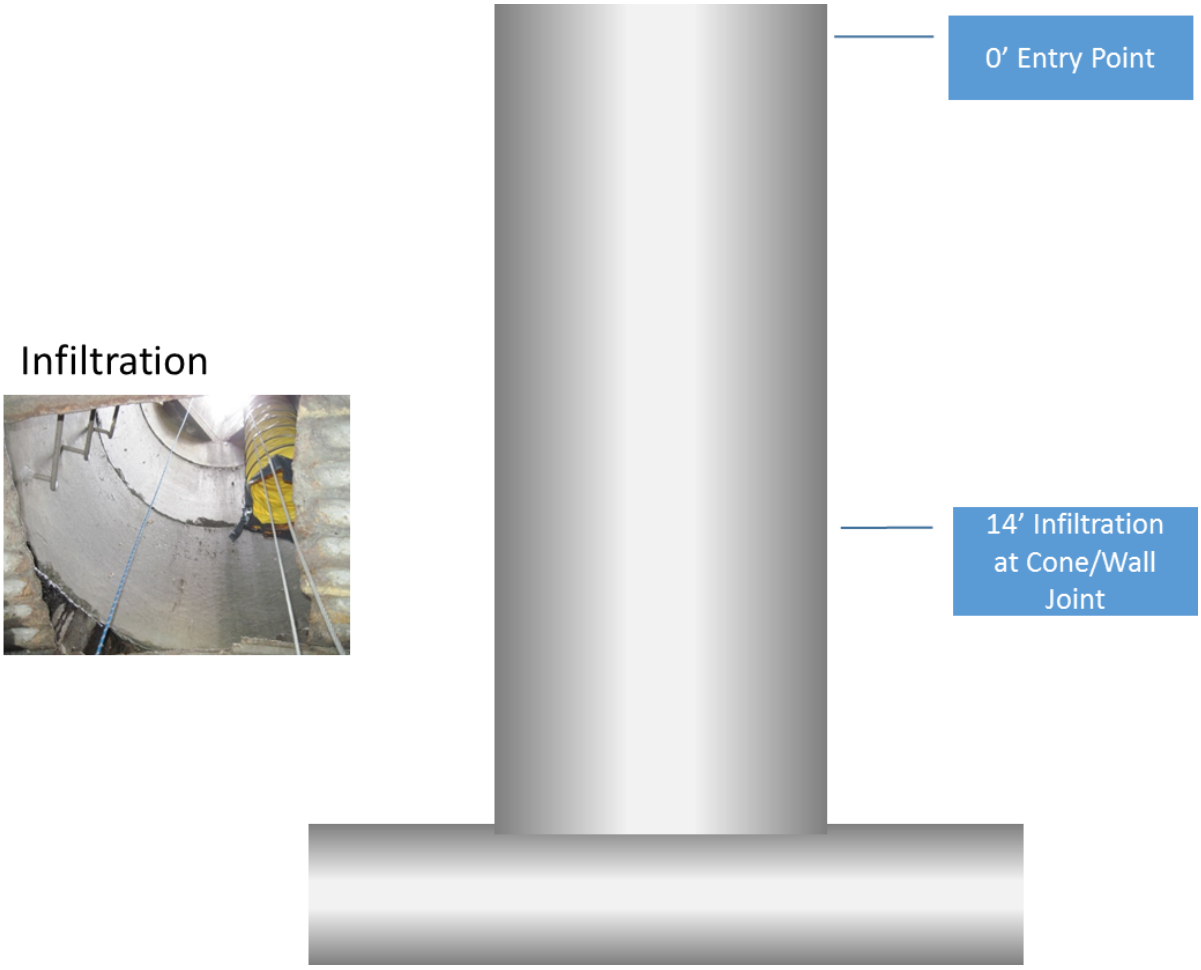


Figure 3-5. Assessment of Entry Point (Section View)

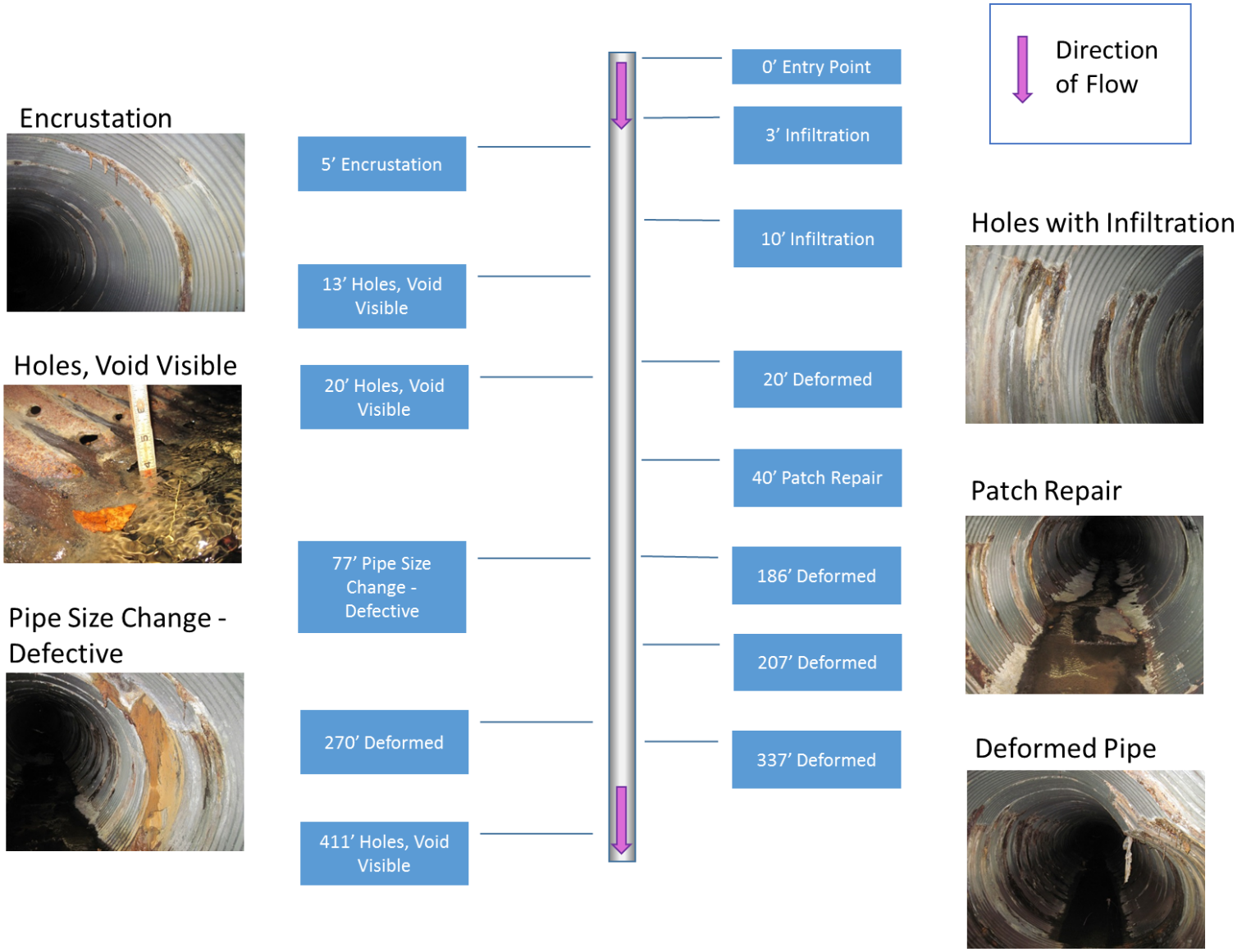


Figure 3-6. Assessment Downstream from Entry Point (Plan View)

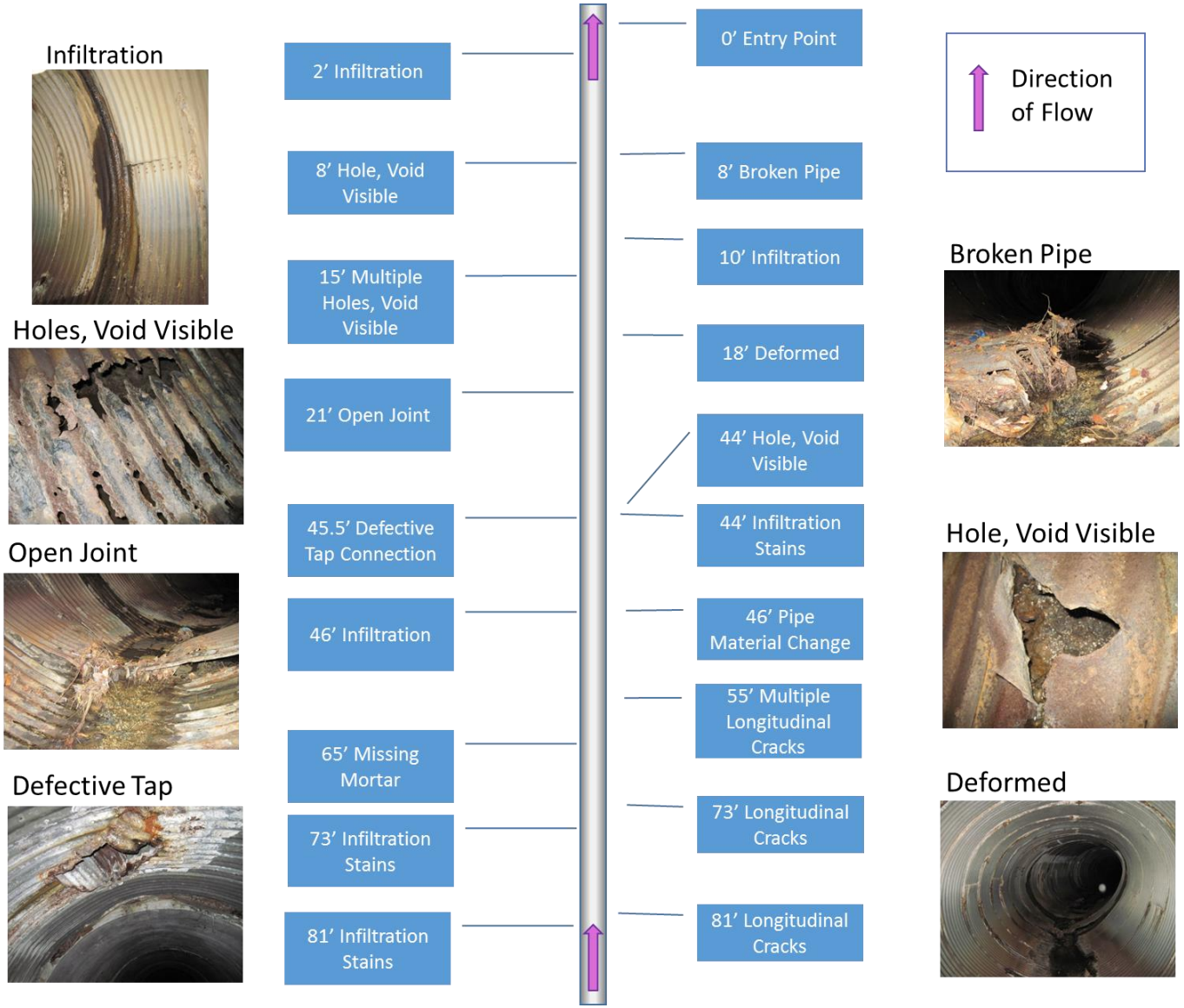


Figure 3-7. Assessment Upstream from Entry Point (Plan View)

4.0 CONCLUSIONS

Based on the findings from the condition assessment activities, V&A presents the following conclusions:

- A total of 80 features (approximately 3 percent of the storm drainage system) were documented.
- 7 of the evaluated features have a prioritization rating of 5. The Rheem Shopping Center Pipeline is one of these features, and was documented having a severe/significant amount of damage. This pipeline along with the other features given this rating, require immediate repair or replacement.
- 2 of the evaluated features have a prioritization rating of 4. This rating requires prioritization for rehabilitation within the next 5 years.
- 71 of the evaluated features have a prioritization rating of 3 or lower. These features have moderate to minor defects and should be reassessed within the next 5 to 15 years.
- 15 of the evaluated features have signs of infiltration.

5.0 RECOMMENDATIONS

Before performing any of the suggested recommendations, proper planning and evaluation procedures for specified areas must be conducted. The suggested rehabilitation methods are based on industry standards and may not apply to all situations. Based on the findings from the condition assessment activities, V&A presents the following recommendations for consideration:

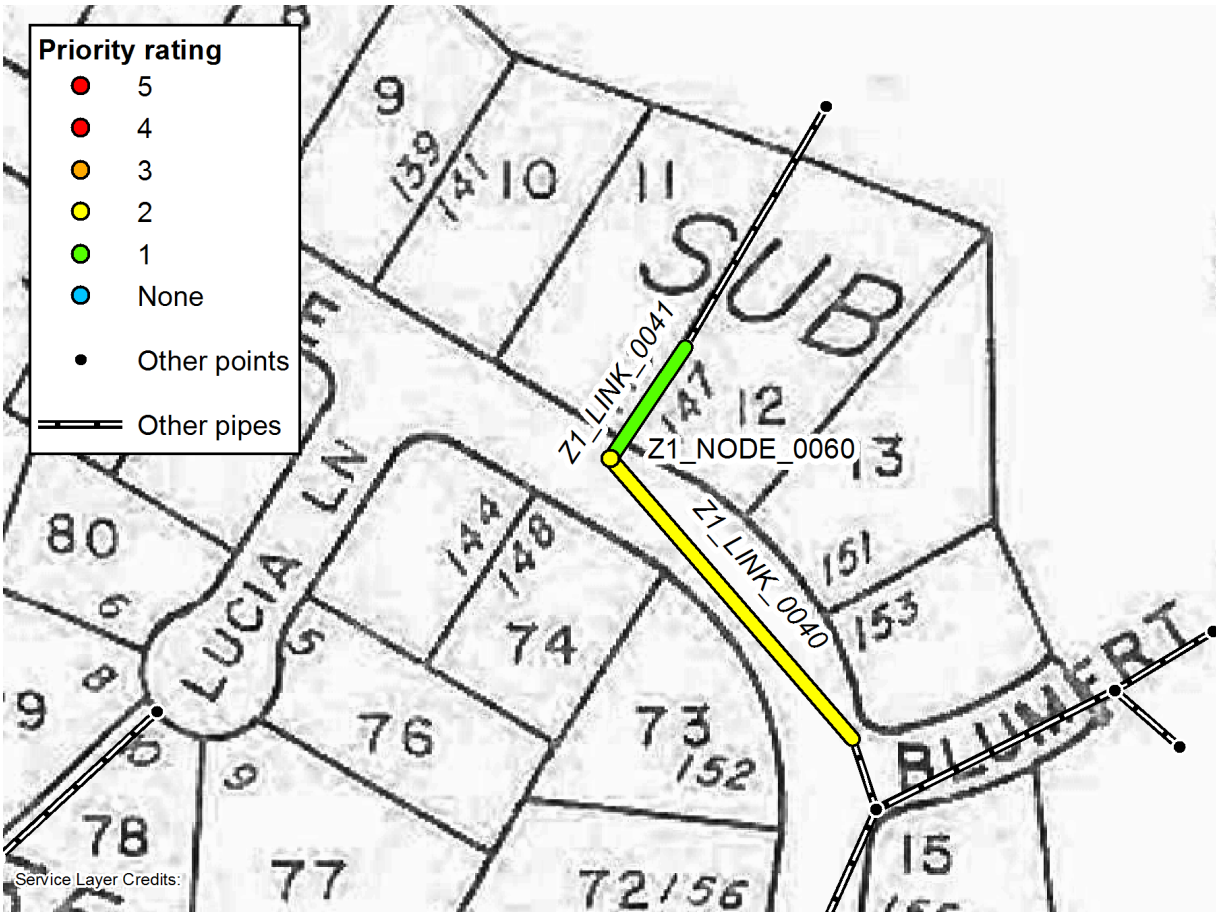
- Continue to collect storm drainage feature information to update and develop the Town's GIS for the storm drainage system. This includes features that are not currently on the Town's system wide GIS.
- Conduct further investigations and rehabilitate specific features mentioned in previous sections and in Appendix A – Facility Inventory based on the timeframe provided in the storm drainage facility prioritization scale. A list of general suggested rehabilitation methods is provided as follows:
  - Pour a new concrete invert in pipes noted with significant surface corrosion and perforations at the invert. Ensure that the pipe bedding is restored below and around the pipe and that the new invert has structural strength for the anticipated loading on the pipe.
  - Consider methods such as cast-in-place-pipe liner, slip-lining, pipe bursting in conjunction with replacement materials/liners, and also conventional open-cut construction for pipes noted with significant defects.
  - Establish a routine cleaning schedule for pipes noted with significant sediment/debris.
  - Install retaining walls or similar erosion control devices in areas that have a high potential for burial/overgrowth.
- Alternatives for rehabilitation and replacement of the Rheem Shopping Center Pipeline should be considered to determine the best viable approach, preferably considering economic, social, and environmental aspects of the project.

APPENDIX A - FACILITY INVENTORY

Table of Contents

SDFA 1 - 143 Natalie Dr

Area Map



SDFA 1 - 143 Natalie Dr

Catch Basin Z1_NODE_0060

Evaluation date/time:	6/27/2014 12:17 PM
Address/location:	143 Natalie Dr
Weather:	Dry

General Information		Condition Information and Ratings	
Latitude:	37.8671	Susceptible to burial/overgrowth:	No
Longitude:	-122.12022	Susceptible to ponding/flooding:	No
Property type:	Public	Sediment/debris depth (%):	5
Access:	Good	Type of sediment/debris	Rock
Traffic:	None	Infiltration:	None
Ground surface type:	Asphalt, Concrete	VANDA Condition Rating:	Level 2 - Minor Damage
Dia./Ht. (in.):	36	Prioritization Rating:	Level 2 - Good
Width (in.):	24	Prioritization Rationale:	Condition
Material:	Concrete	Illegal dumping evidence:	No
Grade/rim-invert (ft.):	4.25		
Water level (%):	0		
Devices:	None		

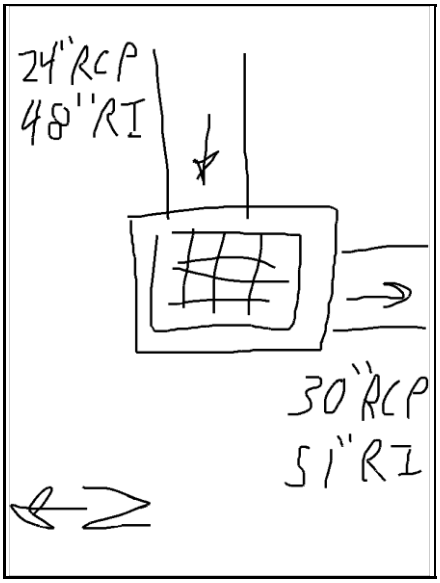
Notes

Fractures in catch basin walls. RI in sketch signifies rim-to-invert.

Photos

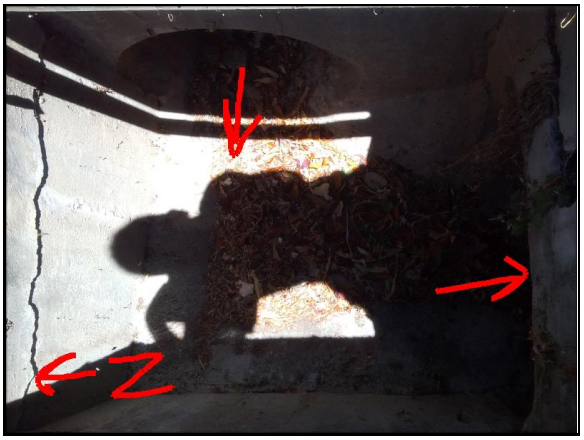
SDFA 1 - 143 Natalie Dr

Catch Basin Z1_NODE_0060



Sketch

Location view.



Down view of structure.

View of outlet.

SDFA 1 - 143 Natalie Dr

Catch Basin Z1_NODE_0060

View of inlet.

SDFA 1 - 143 Natalie Dr

Pipe Z1_LINK_0041

Evaluation date/time:	6/27/2014 12:17 PM
Address/location:	143 Natalie Dr
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Private	Sediment depth (%):	0
Diameter (in):	24	Type of sediment:	None
Upstream feature ID:	Z1_NODE_0061	Infiltration:	Stain
Downstream feature ID:	Z1_NODE_0060	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):		VANDA Condition Rating:	Level 1 - No Damage
Downstream rim-inv. (ft.):	4	Prioritization Rating:	Level 2 - Good
Material:	RCP	Prioritization Rationale:	Condition, Location

Notes

Inlet pipe. Pipe runs under residence. Please refer to included videos for visuals.

Photos

SDFA 1 - 143 Natalie Dr

Pipe Z1_LINK_0040

Evaluation date/time:	6/27/2014 12:17 PM
Address/location:	143 Natalie Dr
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	10
Diameter (in):	30	Type of sediment:	Rock, Gravel
Upstream feature ID:	Z1_NODE_0060	Infiltration:	None
Downstream feature ID:	Z1_NODE_0059	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):	4.25	VANDA Condition Rating:	Level 1 - No Damage
Downstream rim-inv. (ft.):		Prioritization Rating:	Level 1 - Excellent
Material:	RCP	Prioritization Rationale:	Condition

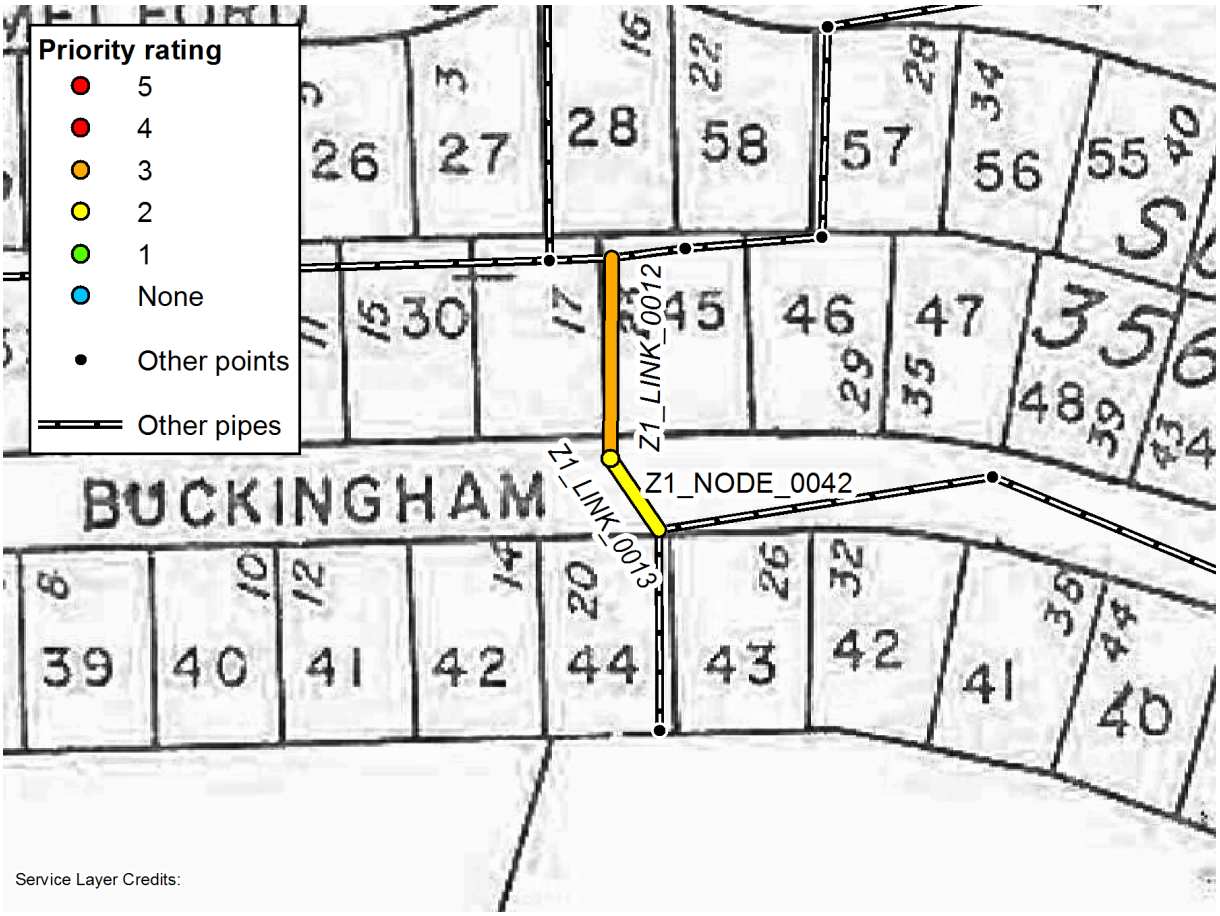
Notes

Outlet pipe. Pipe runs under road shoulder. Please refer to included videos for visuals.

Photos

SDFA 2 - Buckingham Dr

Area Map



SDFA 2 - Buckingham Dr

Catch Basin Z1_NODE_0042

Evaluation date/time:	6/27/2014 9:40 AM
Address/location:	Buckingham Dr
Weather:	Dry

General Information

Latitude:	37.864522
Longitude:	-122.122176
Property type:	Public
Access:	Good
Traffic:	None
Ground surface type:	Asphalt, Concrete
Dia./Ht. (in.):	36
Width (in.):	24
Material:	Concrete
Grade/rim-invert (ft.):	12.5
Water level (%):	5
Devices:	None

Condition Information and Ratings

Susceptible to burial/overgrowth:	No
Susceptible to ponding/flooding:	No
Sediment/debris depth (%):	5
Type of sediment/debris	Rock
Infiltration:	Weeper
VANDA Condition Rating:	Level 1 - No Damage
Prioritization Rating:	Level 2 - Good
Prioritization Rationale:	Condition
Illegal dumping evidence:	No

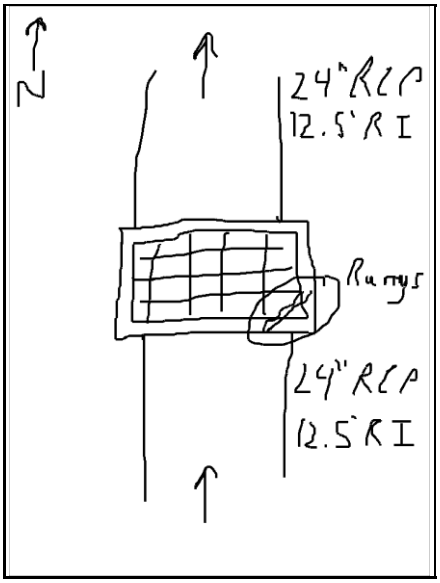
Notes

Rungs in sound condition. Projecting reinforcing steel at bottom of structure appears to be a construction defect. Infiltration between segments.

Photos

SDFA 2 - Buckingham Dr

Catch Basin Z1_NODE_0042



Sketch

Location View

Location View

Down view of structure.

SDFA 2 - Buckingham Dr

Catch Basin Z1_NODE_0042

Water infiltration staining.

SDFA 2 - Buckingham Dr

Pipe Z1_LINK_0012

Evaluation date/time:	6/27/2014 9:40 AM
Address/location:	Buckingham Dr
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Private	Sediment depth (%):	0
Diameter (in):	24	Type of sediment:	None
Upstream feature ID:	Z1_NODE_0037	Infiltration:	None
Downstream feature ID:	Z1_NODE_0042	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):		VANDA Condition Rating:	Level 2 - Minor Damage
Downstream rim-inv. (ft.):	12.5	Prioritization Rating:	Level 3 - Fair
Material:	RCP	Prioritization Rationale:	Condition, Location

Notes

Outlet pipe. Scouring on invert. Pipe runs under roadway. Please refer to included videos for visuals.

Photos

SDFA 2 - Buckingham Dr

Pipe Z1_LINK_0013

Evaluation date/time:	6/27/2014 9:40 AM
Address/location:	Buckingham Dr
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	0
Diameter (in):	24	Type of sediment:	None
Upstream feature ID:	Z1_NODE_0042	Infiltration:	None
Downstream feature ID:	Z1_NODE_0043	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):	12.5	VANDA Condition Rating:	Level 1 - No Damage
Downstream rim-inv. (ft.):		Prioritization Rating:	Level 2 - Good
Material:	RCP	Prioritization Rationale:	Condition, Location

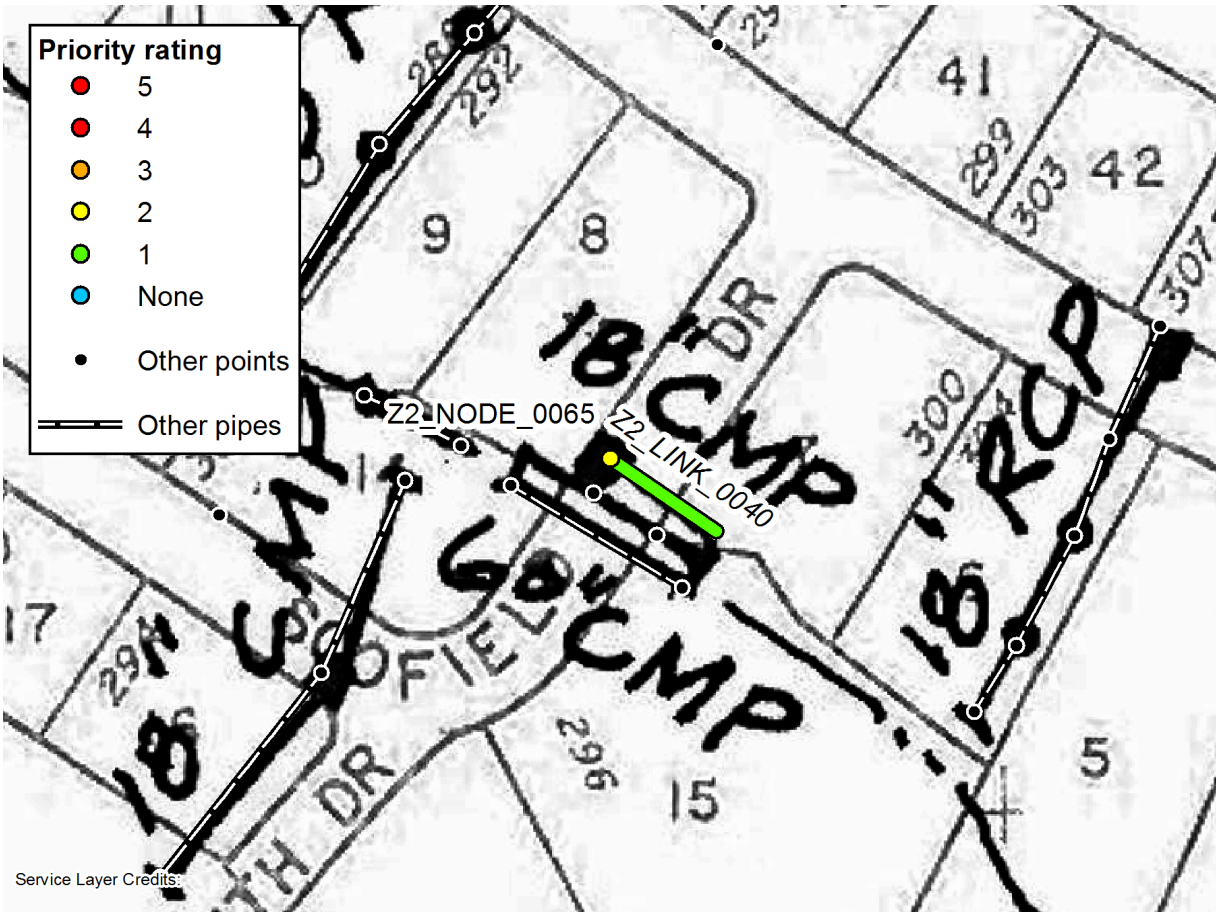
Notes

Inlet pipe appears to be offset. Pipe runs under residence. Please refer to included videos for visuals.

Photos

SDFA 3 - Scofield Dr

Area Map



SDFA 3 - Scofield Dr

Manhole Z2_NODE_0065

Evaluation date/time:	6/27/2014 2:35 PM
Address/location:	Scofield Dr
Weather:	Dry

General Information		Condition Information and Ratings	
Latitude:	37.863235	Susceptible to burial/overgrowth:	No
Longitude:	-122.133545	Susceptible to ponding/flooding:	No
Property type:	Public	Sediment/debris depth (%):	5
Access:	Good	Type of sediment/debris	Silt, Gravel, Rock
Traffic:	Light	Infiltration:	None
Ground surface type:	Asphalt	VANDA Condition Rating:	Level 2 - Minor Damage
Dia./Ht. (in.):	24	Prioritization Rating:	Level 2 - Good
Width (in.):		Prioritization Rationale:	Condition
Material:	Concrete	Illegal dumping evidence:	No
Grade/rim-invert (ft.):	4		
Water level (%):	0		
Devices:	None		

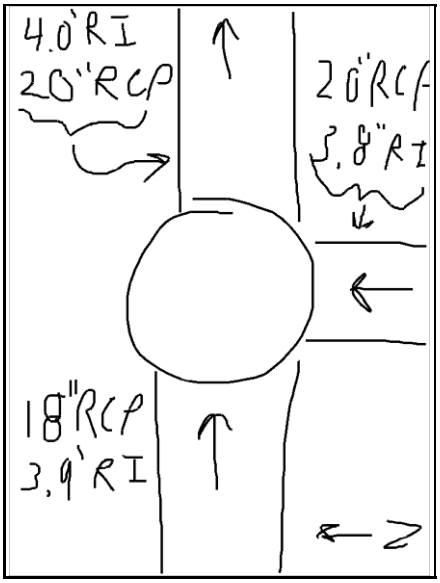
Notes

Exposed reinforcing steel on structure appears to be a construction defect.

Photos

SDFA 3 - Scofield Dr

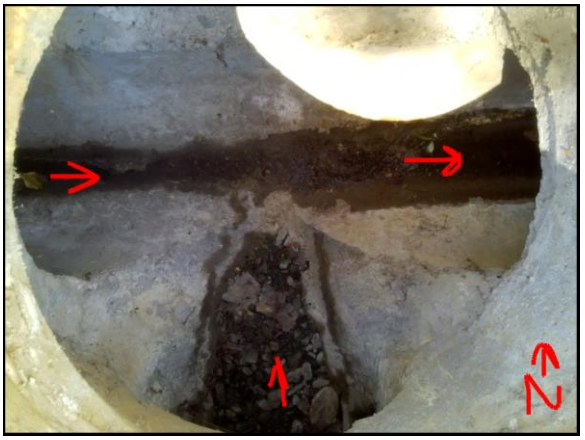
Manhole Z2_NODE_0065



Sketch

Location view.

View of manhole.



Down view of structure.

SDFA 3 - Scofield Dr

Manhole Z2_NODE_0065

View of outlet.

View of inlets.

SDFA 3 - Scofield Dr

Pipe Z2_LINK_0040

Evaluation date/time:	6/27/2014 2:35 PM
Address/location:	Scofield Dr
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	0
Diameter (in):	20	Type of sediment:	None
Upstream feature ID:	Z2_NODE_0065	Infiltration:	None
Downstream feature ID:	Z2_NODE_0064	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):	3.9	VANDA Condition Rating:	Level 1 - No Damage
Downstream rim-inv. (ft.):		Prioritization Rating:	Level 1 - Excellent
Material:	RCP	Prioritization Rationale:	Condition

Notes

Outlet pipe. Please refer to included videos for visuals.

Photos

SDFA 3 - Scofield Dr

Pipe Z2_LINK_S3_P1

Evaluation date/time:	6/27/2014 2:35 PM
Address/location:	Scofield Dr
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	10
Diameter (in):	20	Type of sediment:	Silt, Vegetation
Upstream feature ID:		Infiltration:	None
Downstream feature ID:	Z2_NODE_0065	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):		VANDA Condition Rating:	N/A
Downstream rim-inv. (ft.):	4	Prioritization Rating:	Level 2 - Good
Material:	RCP	Prioritization Rationale:	Condition

Notes

South inlet. Please refer to included videos for visuals.

Photos

SDFA 3 - Scofield Dr

Pipe Z2_LINK_S3_P2

Evaluation date/time:	6/27/2014 2:35 PM
Address/location:	Scofield Dr
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	5
Diameter (in):	18	Type of sediment:	Vegetation
Upstream feature ID:		Infiltration:	None
Downstream feature ID:	Z2_NODE_0065	Obstruction/Deflection (%)	5
Upstream rim-inv. (ft.):		VANDA Condition Rating:	Level 1 - No Damage
Downstream rim-inv. (ft.):	3.8	Prioritization Rating:	Level 1 - Excellent
Material:	RCP	Prioritization Rationale:	Condition

Notes

West inlet pipe. 5% joint offset. Please refer to included videos for visuals.

Photos

SDFA 4 - Chalda Way

Area Map

SDFA 4 - Chalda Way

Catch Basin Z3_NODE_S4

Evaluation date/time:	6/26/2014 2:36 PM
Address/location:	Chalda Way
Weather:	Dry

General Information		Condition Information and Ratings	
Latitude:	37.858458	Susceptible to burial/overgrowth:	No
Longitude:	-122.122006	Susceptible to ponding/flooding:	Yes
Property type:	Public	Sediment/debris depth (%):	5
Access:	Good	Type of sediment/debris	Silt, Vegetation
Traffic:	Light	Infiltration:	None
Ground surface type:	Asphalt, Concrete	VANDA Condition Rating:	Level 2 - Minor Damage
Dia./Ht. (in.):	36	Prioritization Rating:	Level 2 - Good
Width (in.):	24	Prioritization Rationale:	Condition
Material:	Concrete	Illegal dumping evidence:	No
Grade/rim-invert (ft.):	8.3		
Water level (%):	5		
Devices:	None		

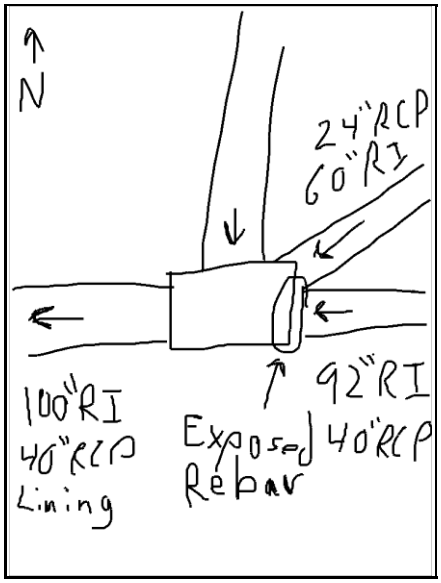
Notes

Projecting reinforcing steel and exposed aggregate at upper east inlet, probably due to break-in connection. Cracking in catch basin walls. No evidence of infiltration.

Photos

SDFA 4 - Chalda Way

Catch Basin Z3_NODE_S4



Sketch

Location view.

Location view.

View inside catch basin.

SDFA 4 - Chalda Way

Catch Basin Z3_NODE_S4

Down view of structure.

Down view of structure.

View of inlets.

Projecting reinforcing steel and exposed aggregate.

SDFA 4 - Chalda Way

Pipe Z3_LINK_S4_P1

Evaluation date/time:	6/26/2014 2:36 PM
Address/location:	Chalda Way
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	0
Diameter (in):	40	Type of sediment:	None
Upstream feature ID:	Z3_NODE_S4	Infiltration:	None
Downstream feature ID:		Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):	8.3	VANDA Condition Rating:	N/A
Downstream rim-inv. (ft.):		Prioritization Rating:	Level 1 - Excellent
Material:	PEP	Prioritization Rationale:	Condition

Notes

Lining delaminated at opening to outlet. Please refer to included videos for visuals.

Photos

SDFA 4 - Chalda Way

Pipe Z3_LINK_S4_P2

Evaluation date/time:	6/26/2014 2:36 PM
Address/location:	Chalda Way
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	5
Diameter (in):		Type of sediment:	Silt, Rock
Upstream feature ID:		Infiltration:	None
Downstream feature ID:	Z3_NODE_S4	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):		VANDA Condition Rating:	Level 1 - No Damage
Downstream rim-inv. (ft.):	8.3	Prioritization Rating:	Level 2 - Good
Material:	RCP	Prioritization Rationale:	Condition, Location

Notes

North inlet pipe. Pipe runs under roadway. Unable to determine diameter due to position within catch basin. Please refer to included videos for visuals.

Photos

SDFA 4 - Chalda Way

Pipe Z3_LINK_S4_P3

Evaluation date/time:	6/26/2014 2:36 PM
Address/location:	Chalda Way
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	0
Diameter (in):	40	Type of sediment:	None
Upstream feature ID:		Infiltration:	None
Downstream feature ID:	Z3_NODE_S4	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):		VANDA Condition Rating:	Level 1 - No Damage
Downstream rim-inv. (ft.):	7.7	Prioritization Rating:	Level 2 - Good
Material:	RCP	Prioritization Rationale:	Condition, Location

Notes

Northeast inlet pipe. Pipe runs under roadway. Please refer to included videos for visuals.

Photos

SDFA 4 - Chalda Way

Pipe Z3_LINK_S4_P4

Evaluation date/time:	6/26/2014 2:36 PM
Address/location:	Chalda Way
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	0
Diameter (in):	24	Type of sediment:	None
Upstream feature ID:		Infiltration:	None
Downstream feature ID:	Z3_NODE_S4	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):		VANDA Condition Rating:	N/A
Downstream rim-inv. (ft.):	5	Prioritization Rating:	Level 2 - Good
Material:	PVC	Prioritization Rationale:	Condition, Location

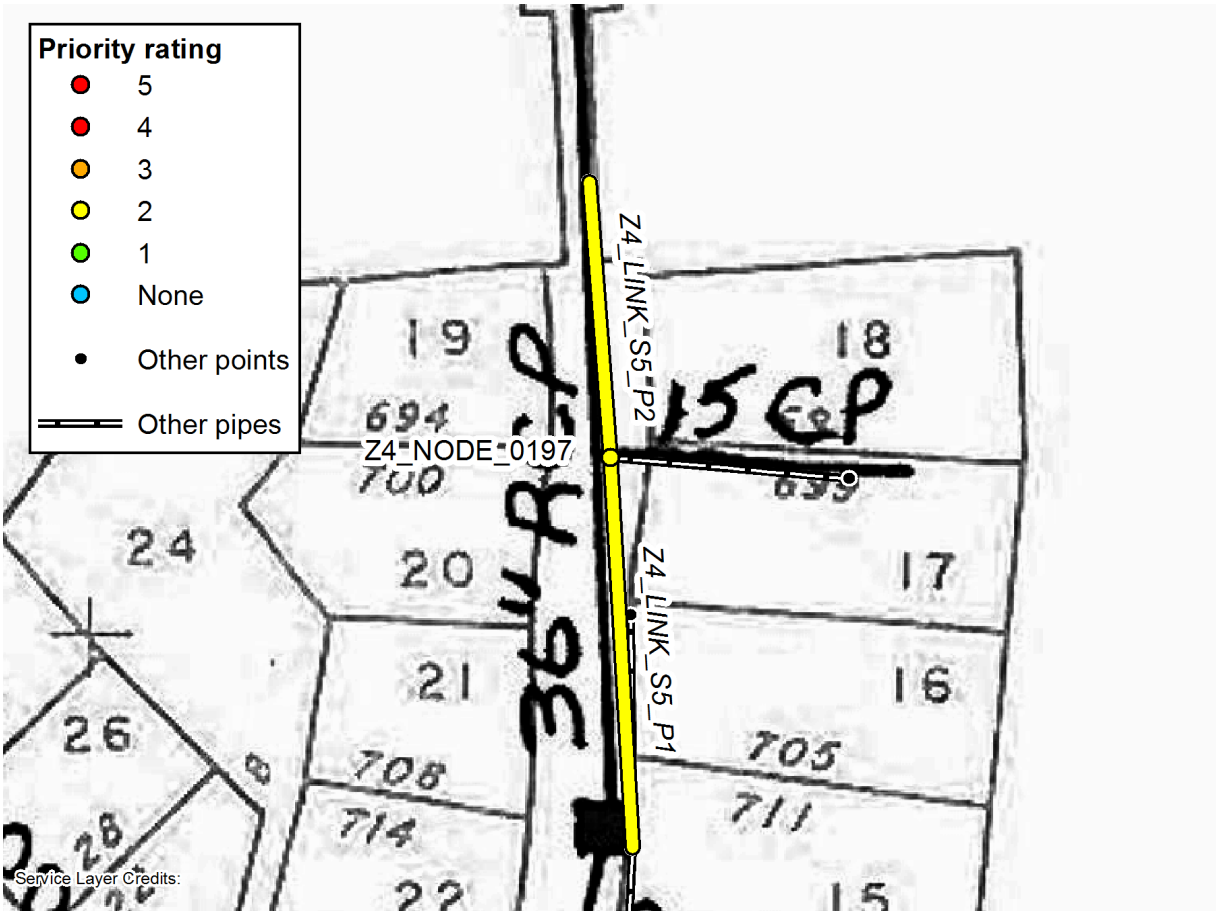
Notes

East inlet pipe. Appears to have an offset joint. Pipe runs under roadway. Please refer to included videos for visuals.

Photos

SDFA 5 - Camino Ricardo

Area Map



SDFA 5 - Camino Ricardo

Catch Basin Z4_NODE_0197

Evaluation date/time:	6/26/2014 1:15 PM
Address/location:	Camino Ricardo
Weather:	Dry

General Information		Condition Information and Ratings	
Latitude:	37.850529	Susceptible to burial/overgrowth:	No
Longitude:	-122.134817	Susceptible to ponding/flooding:	No
Property type:	Public	Sediment/debris depth (%):	5
Access:	Good	Type of sediment/debris	Silt
Traffic:	None	Infiltration:	None
Ground surface type:	Asphalt, Concrete	VANDA Condition Rating:	Level 1 - No Damage
Dia./Ht. (in.):	36	Prioritization Rating:	Level 1 - Excellent
Width (in.):	24	Prioritization Rationale:	Condition
Material:	Concrete	Illegal dumping evidence:	No
Grade/rim-invert (ft.):	16		
Water level (%):	5		
Devices:	None		

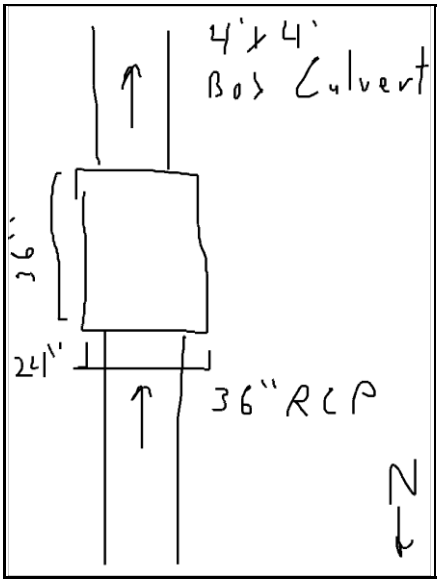
Notes

Down stream of Missouri riser. Fracturing in catch basin walls.

Photos

SDFA 5 - Camino Ricardo

Catch Basin Z4_NODE_0197



Sketch

Location view.

Down view of structure.

Down view of structure.

SDFA 5 - Camino Ricardo

Pipe Z4_LINK_S5_P1

Evaluation date/time:	6/26/2014 1:15 PM
Address/location:	Camino Ricardo
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	0
Diameter (in):	36	Type of sediment:	None
Upstream feature ID:	Z4_NODE_0198	Infiltration:	Stain/Encrustation
Downstream feature ID:	Z4_NODE_0197	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):	16	VANDA Condition Rating:	Level 1 - No Damage
Downstream rim-inv. (ft.):		Prioritization Rating:	Level 2 - Good
Material:	RCP	Prioritization Rationale:	Condition, Location

Notes

Outlet pipe. Pipe runs under roadway. Please refer to included videos for visuals.

Photos

SDFA 5 - Camino Ricardo

Pipe Z4_LINK_S5_P2

Evaluation date/time:	6/26/2014 1:15 PM
Address/location:	Camino Ricardo
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	10
Diameter (in):	48	Type of sediment:	Silt
Upstream feature ID:	Z4_NODE_0197	Infiltration:	Stain/Encrustation
Downstream feature ID:	Z4_NODE_0195	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):		VANDA Condition Rating:	Level 1 - No Damage
Downstream rim-inv. (ft.):	16	Prioritization Rating:	Level 2 - Good
Material:	RCP	Prioritization Rationale:	Condition, Location

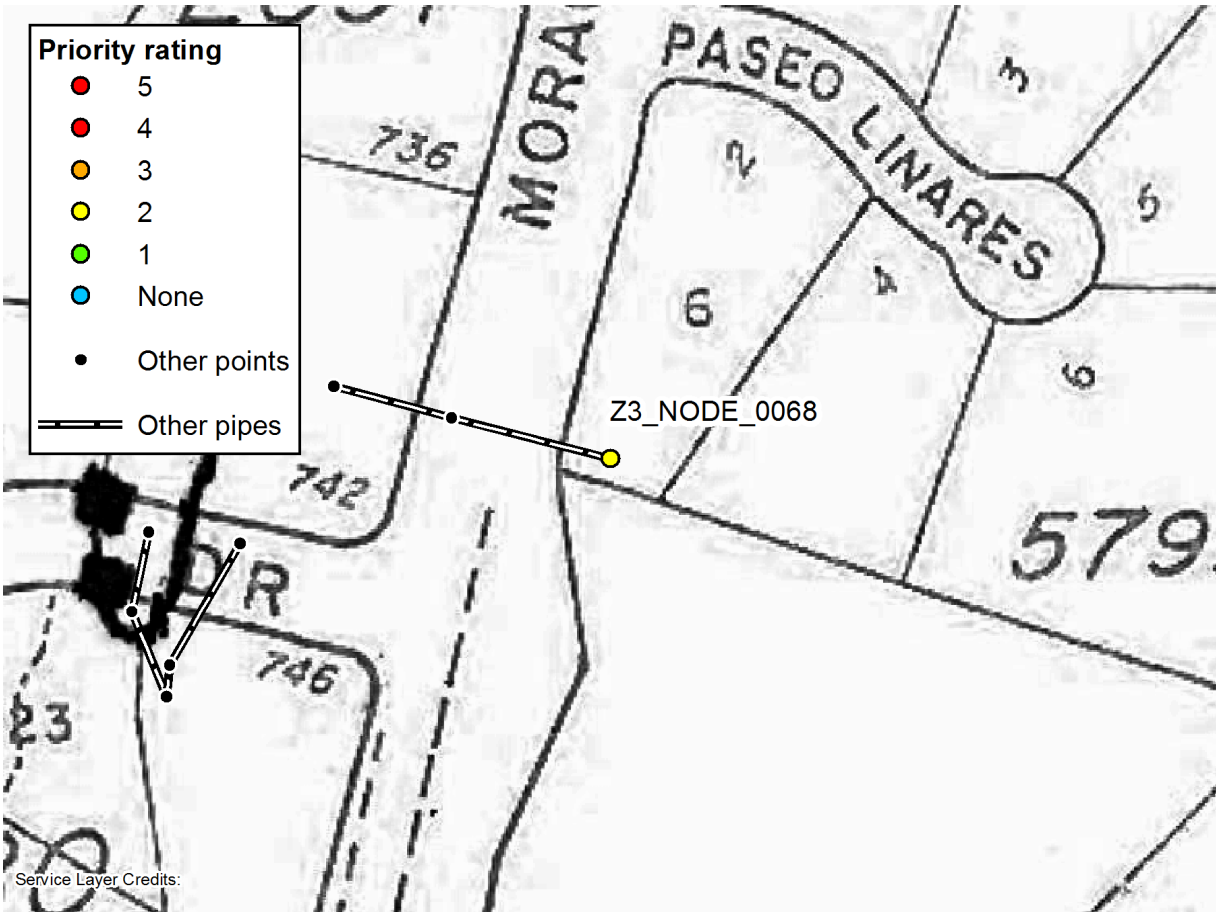
Notes

Inlet pipe. Pipe runs under roadway. Please refer to included videos for visuals.

Photos

SDFA 6 - Moraga Rd

Area Map



SDFA 6 - Moraga Rd

Catch Basin Z3_NODE_0068

Evaluation date/time:	6/26/2014 2:01 PM
Address/location:	Moraga Rd
Weather:	Dry

General Information

Latitude:	37.84731
Longitude:	-122.125826
Property type:	Public
Access:	Good
Traffic:	Heavy
Ground surface type:	Asphalt, Concrete
Dia./Ht. (in.):	36
Width (in.):	24
Material:	Concrete
Grade/rim-invert (ft.):	6.7
Water level (%):	5
Devices:	None

Condition Information and Ratings

Susceptible to burial/overgrowth:	No
Susceptible to ponding/flooding:	No
Sediment/debris depth (%):	0
Type of sediment/debris	None
Infiltration:	None
VANDA Condition Rating:	Level 1 - No Damage
Prioritization Rating:	Level 2 - Good
Prioritization Rationale:	Condition
Illegal dumping evidence:	No

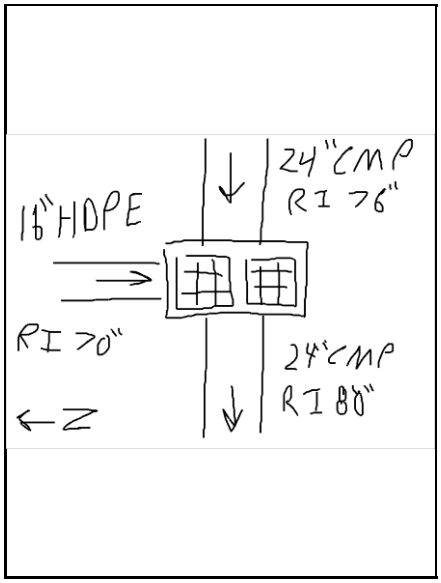
Notes

Good condition.

Photos

SDFA 6 - Moraga Rd

Catch Basin Z3_NODE_0068



Sketch

View inside catch basin.

View of east inlet.

View of outlet.

SDFA 6 - Moraga Rd

Catch Basin Z3_NODE_0068

View of north inlet.

View of catch basin.

SDFA 6 - Moraga Rd

Pipe Z3_LINK_S6_P1

Evaluation date/time:	6/26/2014 2:01 PM
Address/location:	Moraga Rd
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	0
Diameter (in):	24	Type of sediment:	None
Upstream feature ID:	Z3_NODE_0068	Infiltration:	None
Downstream feature ID:		Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):	6.7	VANDA Condition Rating:	Level 4 - Severe/Significant Damage
Downstream rim-inv. (ft.):		Prioritization Rating:	Level 5 - Immediate Attention
Material:	CMP	Prioritization Rationale:	Condition, Location

Notes

Outlet pipe. Significant surface corrosion. Pipe runs under roadway. Please refer to included videos for visuals.

Photos

SDFA 6 - Moraga Rd

Pipe Z3_LINK_S6_P2

Evaluation date/time:	6/26/2014 2:01 PM
Address/location:	Moraga Rd
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	0
Diameter (in):	16	Type of sediment:	None
Upstream feature ID:		Infiltration:	None
Downstream feature ID:	Z3_NODE_0068	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):		VANDA Condition Rating:	N/A
Downstream rim-inv. (ft.):	5.8	Prioritization Rating:	Level 1 - Excellent
Material:	PEP	Prioritization Rationale:	Condition

Notes

North inlet pipe. Pipe runs under sidewalk. Please refer to included videos for visuals.

Photos

SDFA 6 - Moraga Rd

Pipe Z3_LINK_S6_P3

Evaluation date/time:	6/26/2014 2:01 PM
Address/location:	Moraga Rd
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Private	Sediment depth (%):	0
Diameter (in):	24	Type of sediment:	None
Upstream feature ID:		Infiltration:	None
Downstream feature ID:	Z3_NODE_0068	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):		VANDA Condition Rating:	Level 3 - Moderate Damage
Downstream rim-inv. (ft.):	6.3	Prioritization Rating:	Level 4 - Poor
Material:	CMP	Prioritization Rationale:	Condition, Location

Notes

East inlet pipe. Changes diameter and material. Upstream portion is a RCP in good condition. Significant to moderate surface corrosion. Pipe runs under residence. Please refer to included videos for visuals.

Photos

SDFA 7 - Willow Springs Ct

Area Map

SDFA 7 - Willow Springs Ct

Catch Basin Z3_NODE_S7

Evaluation date/time:	6/26/2014 11:24 AM
Address/location:	Willow Springs Ct
Weather:	Dry

General Information

Latitude:	37.845358
Longitude:	-122.123637
Property type:	Public
Access:	Good
Traffic:	None
Ground surface type:	Asphalt
Dia./Ht. (in.):	36
Width (in.):	24
Material:	Concrete
Grade/rim-invert (ft.):	2.9
Water level (%):	0
Devices:	None

Condition Information and Ratings

Susceptible to burial/overgrowth:	No
Susceptible to ponding/flooding:	No
Sediment/debris depth (%):	0
Type of sediment/debris	None
Infiltration:	None
VANDA Condition Rating:	Level 1 - No Damage
Prioritization Rating:	Level 2 - Good
Prioritization Rationale:	Condition
Illegal dumping evidence:	No

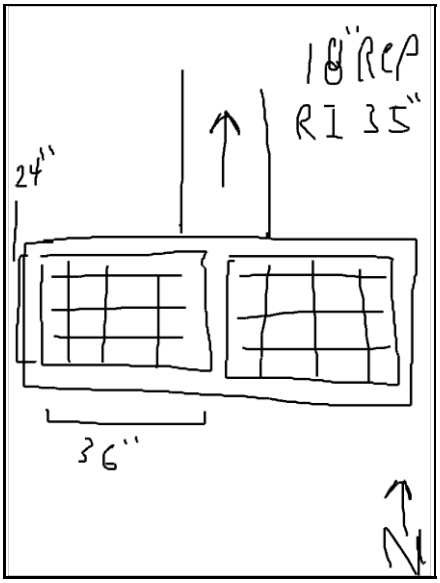
Notes

Good condition.

Photos

SDFA 7 - Willow Springs Ct

Catch Basin Z3_NODE_S7



Sketch

Location view.

View inside catch basin.

View of outlet. Concrete slab obstructing pipe.

SDFA 7 - Willow Springs Ct

Pipe Z3_LINK_S7_P1

Evaluation date/time:	6/26/2014 11:24 AM
Address/location:	Willow Springs Ct
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	10
Diameter (in):		Type of sediment:	Silt Vegetation
Upstream feature ID:	Z3_NODE_S7	Infiltration:	None
Downstream feature ID:		Obstruction/Deflection (%)	25
Upstream rim-inv. (ft.):	2.9	VANDA Condition Rating:	Level 1 - No Damage
Downstream rim-inv. (ft.):		Prioritization Rating:	Level 3 - Fair
Material:	RCP	Prioritization Rationale:	Obstruction

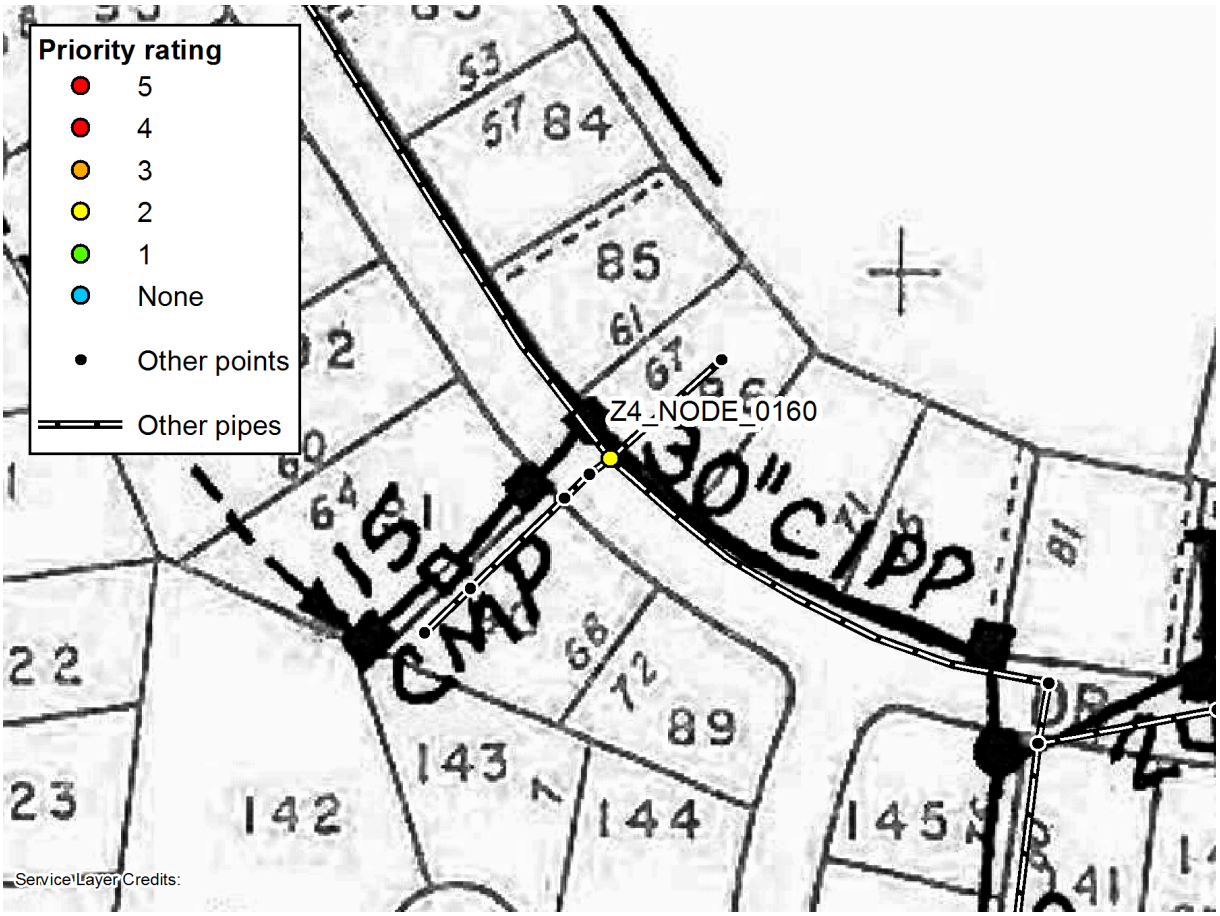
Notes

Concrete slab obstructing outlet pipe. Appears to have an offset joint. Pipe runs under roadway. Please refer to included videos for visuals.

Photos

SDFA 8 - Corliss Dr

Area Map



SDFA 8 - Corliss Dr

Catch Basin Z4_NODE_0160

Evaluation date/time:	6/27/2014 1:56 PM
Address/location:	67 Corliss Dr
Weather:	Dry

General Information

Latitude:	37.844943
Longitude:	-122.136266
Property type:	Public
Access:	Good
Traffic:	Light
Ground surface type:	Asphalt, Concrete
Dia./Ht. (in.):	36
Width (in.):	24
Material:	Concrete
Grade/rim-invert (ft.):	4.8
Water level (%):	0
Devices:	None

Condition Information and Ratings

Susceptible to burial/overgrowth:	No
Susceptible to ponding/flooding:	No
Sediment/debris depth (%):	0
Type of sediment/debris	None
Infiltration:	None
VANDA Condition Rating:	Level 1 - No Damage
Prioritization Rating:	Level 1 - Excellent
Prioritization Rationale:	Condition
Illegal dumping evidence:	No

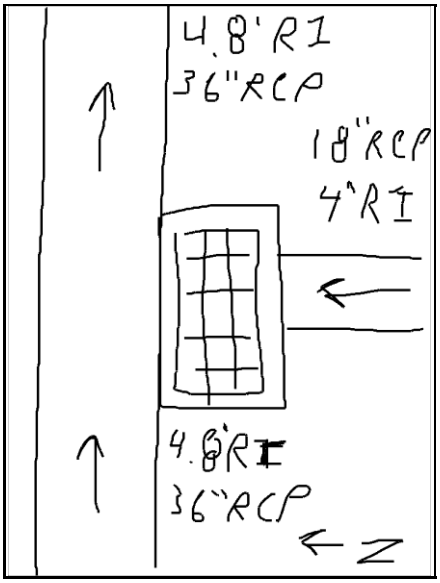
Notes

Good condition.

Photos

SDFA 8 - Corliss Dr

Catch Basin Z4_NODE_0160



Sketch

Location view.

View inside catch basin.

Down view of structure.

SDFA 8 - Corliss Dr

Catch Basin Z4_NODE_0160

View of inlet.

SDFA 8 - Corliss Dr

Pipe Z4_LINK_0052

Evaluation date/time:	6/27/2014 1:56 PM
Address/location:	67 Corliss Dr
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	0
Diameter (in):	36	Type of sediment:	None
Upstream feature ID:	Z4_NODE_0160	Infiltration:	Stain
Downstream feature ID:	Z4_NODE_0159	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):	4.8	VANDA Condition Rating:	Level 1 - No Damage
Downstream rim-inv. (ft.):		Prioritization Rating:	Level 1 - Excellent
Material:	RCP	Prioritization Rationale:	Condition

Notes

West inlet pipe. Pipe runs under sidewalk. Please refer to included videos for visuals.

Photos

SDFA 8 - Corliss Dr

Pipe Z4_LINK_0053

Evaluation date/time:	6/27/2014 1:56 PM
Address/location:	67 Corliss Dr
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	0
Diameter (in):	36	Type of sediment:	None
Upstream feature ID:	Z4_NODE_0161	Infiltration:	None
Downstream feature ID:	Z4_NODE_0160	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):		VANDA Condition Rating:	Level 1 - No Damage
Downstream rim-inv. (ft.):	4.8	Prioritization Rating:	Level 2 - Good
Material:	RCP	Prioritization Rationale:	Condition

Notes

Outlet pipe. Sediment/debris buildup at next catch basin structure. Uncertain of pipe condition at this point, but appears it may be offset. Pipe runs under sidewalk. Please refer to included videos for visuals.

Photos

SDFA 8 - Corliss Dr

Pipe Z4_LINK_0067

Evaluation date/time:	6/27/2014 1:56 PM
Address/location:	67 Corliss Dr
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	0
Diameter (in):	18	Type of sediment:	None
Upstream feature ID:	Z4_NODE_0165	Infiltration:	Stain
Downstream feature ID:	Z4_NODE_0160	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):		VANDA Condition Rating:	Level 1 - No Damage
Downstream rim-inv. (ft.):	4	Prioritization Rating:	Level 2 - Good
Material:	RCP	Prioritization Rationale:	Condition, Location

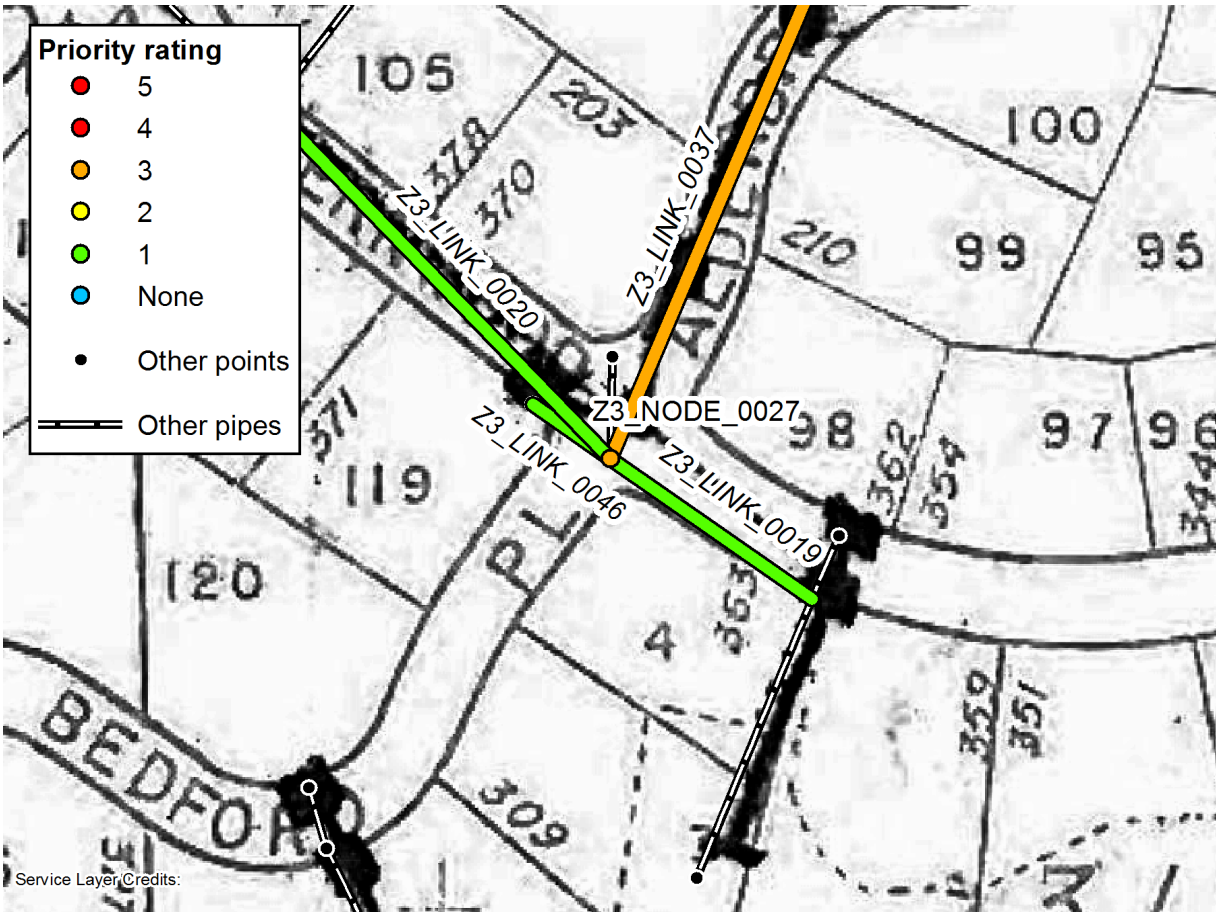
Notes

South inlet pipe. Pipe runs under roadway. Please refer to included videos for visuals.

Photos

SDFA 9 - Bedford Pl and Fernwood Dr

Area Map



SDFA 9 - Bedford Pl and Fernwood Dr

Manhole Z3_NODE_0027

Evaluation date/time:	6/26/2014 10:48 AM
Address/location:	Bedford Pl and Fernwood Dr
Weather:	Dry

General Information		Condition Information and Ratings	
Latitude:	37.84363	Susceptible to burial/overgrowth:	No
Longitude:	-122.121556	Susceptible to ponding/flooding:	No
Property type:	Public	Sediment/debris depth (%):	0
Access:	Good	Type of sediment/debris	None
Traffic:	Light	Infiltration:	None
Ground surface type:	Asphalt	VANDA Condition Rating:	Level 2 - Minor Damage
Dia./Ht. (in.):	24	Prioritization Rating:	Level 2 - Good
Width (in.):	24	Prioritization Rationale:	Condition
Material:	Concrete	Illegal dumping evidence:	No
Grade/rim-invert (ft.):	7.5		
Water level (%):	5		
Devices:	None		

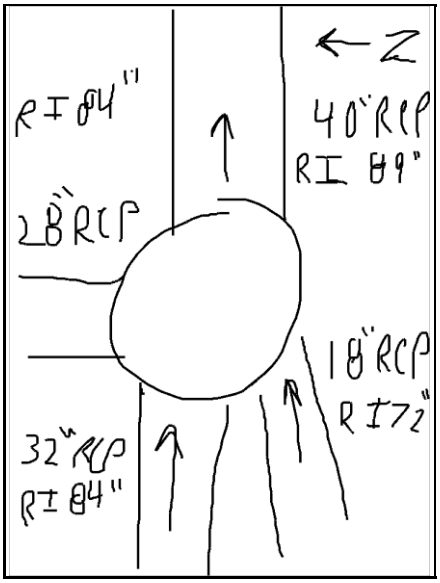
Notes

Poorly consolidated concrete.

Photos

SDFA 9 - Bedford Pl and Fernwood Dr

Manhole Z3_NODE_0027



Sketch

Location view.

Down view of structure.

View of outlet.

SDFA 9 - Bedford Pl and Fernwood Dr

Manhole Z3_NODE_0027

View of inlets.

View of inlets.

SDFA 9 - Bedford Pl and Fernwood Dr

Pipe Z3_LINK_0019

Evaluation date/time:	6/26/2014 10:48 AM
Address/location:	Bedford Pl and Fernwood Dr
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	0
Diameter (in):	40	Type of sediment:	None
Upstream feature ID:	Z3_NODE_0027	Infiltration:	None
Downstream feature ID:	Z3_NODE_0025	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):	7.42	VANDA Condition Rating:	Level 1 - No Damage
Downstream rim-inv. (ft.):		Prioritization Rating:	Level 2 - Good
Material:	RCP	Prioritization Rationale:	Condition, Location

Notes

Outlet pipe. Pipe runs under roadway. Please refer to included videos for visuals.

Photos

SDFA 9 - Bedford Pl and Fernwood Dr

Pipe Z3_LINK_0020

Evaluation date/time:	6/26/2014 10:48 AM
Address/location:	Bedford Pl and Fernwood Dr
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	0
Diameter (in):	32	Type of sediment:	None
Upstream feature ID:	Z3_NODE_0038	Infiltration:	None
Downstream feature ID:	Z3_NODE_0027	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):		VANDA Condition Rating:	Level 1 - No Damage
Downstream rim-inv. (ft.):	7	Prioritization Rating:	Level 2 - Good
Material:	RCP	Prioritization Rationale:	Condition, Location

Notes

West inlet pipe. Pipe runs under roadway. Please refer to included videos for visuals.

Photos

SDFA 9 - Bedford Pl and Fernwood Dr

Pipe Z3_LINK_0037

Evaluation date/time:	6/26/2014 10:48 AM
Address/location:	Bedford Pl and Fernwood Dr
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	0
Diameter (in):	28	Type of sediment:	None
Upstream feature ID:	Z3_NODE_0030	Infiltration:	Stain/Encrustation
Downstream feature ID:	Z3_NODE_0027	Obstruction/Deflection (%)	25
Upstream rim-inv. (ft.):		VANDA Condition Rating:	Level 1 - No Damage
Downstream rim-inv. (ft.):	7	Prioritization Rating:	Level 2 - Good
Material:	RCP	Prioritization Rationale:	Condition, Location

Notes

North inlet pipe. Concrete slab obstructing inlet pipe at upstream catch basin. Pipe runs under roadway. Please refer to included videos for visuals.

Photos

SDFA 9 - Bedford Pl and Fernwood Dr

Pipe Z3_LINK_0046

Evaluation date/time:	6/26/2014 10:48 AM
Address/location:	Bedford Pl and Fernwood Dr
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	0
Diameter (in):	18	Type of sediment:	None
Upstream feature ID:	Z3_NODE_0028	Infiltration:	None
Downstream feature ID:	Z3_NODE_0027	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):		VANDA Condition Rating:	Level 1 - No Damage
Downstream rim-inv. (ft.):	6	Prioritization Rating:	Level 2 - Good
Material:	RCP	Prioritization Rationale:	Condition, Location

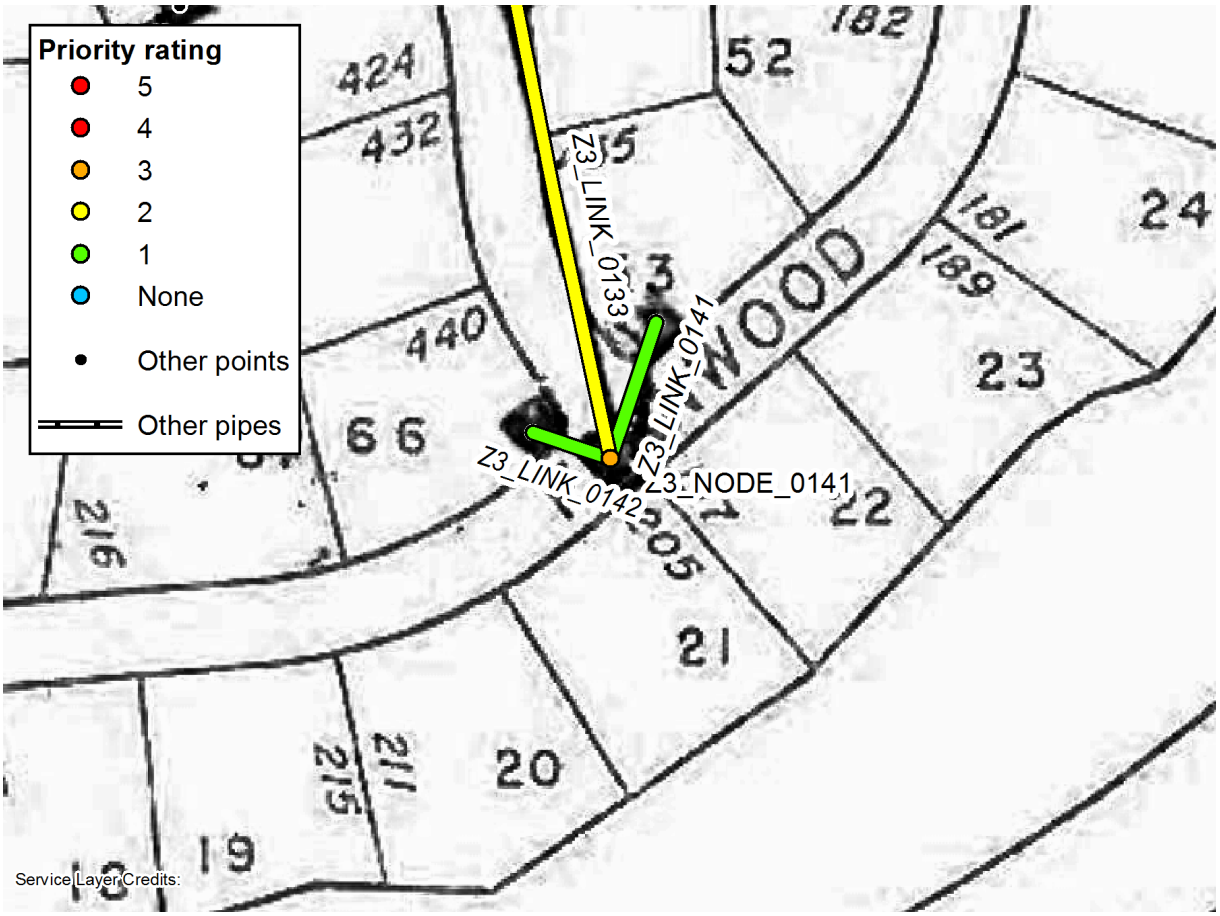
Notes

Southwest inlet pipe. Pipe runs under roadway. Please refer to included videos for visuals.

Photos

SDFA 10 - Donald Dr and Fernwood Dr

Area Map



SDFA 10 - Donald Dr and Fernwood Dr

Catch Basin Z3_NODE_0141

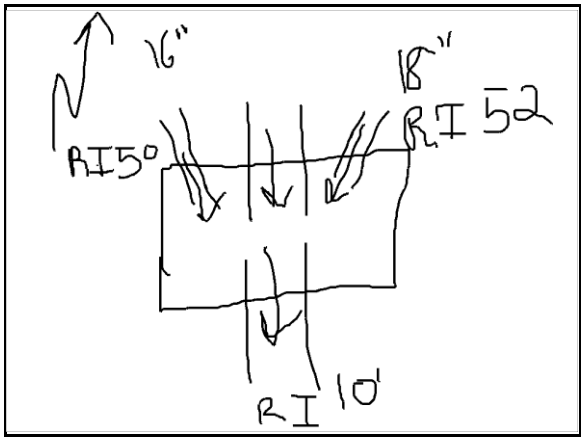
Evaluation date/time:	6/26/2014 10:04 AM
Address/location:	Donald Dr and Fernwood Dr
Weather:	Dry

General Information		Condition Information and Ratings	
Latitude:	37.844617	Susceptible to burial/overgrowth:	No
Longitude:	-122.113059	Susceptible to ponding/flooding:	Yes
Property type:	Public	Sediment/debris depth (%):	10
Access:	Good	Type of sediment/debris	Sand
Traffic:	Light	Infiltration:	None
Ground surface type:	Concrete	VANDA Condition Rating:	Level 1 - No Damage
Dia./Ht. (in.):	36	Prioritization Rating:	Level 1 - Excellent
Width (in.):	24	Prioritization Rationale:	Condition
Material:	Concrete	Illegal dumping evidence:	Yes
Grade/rim-invert (ft.):	10		
Water level (%):	15		
Devices:	None		

Notes

Nearby resident mentioned that a truck was seen two weeks ago dumping water into an inlet. Verify if this was town cleaning.

Photos

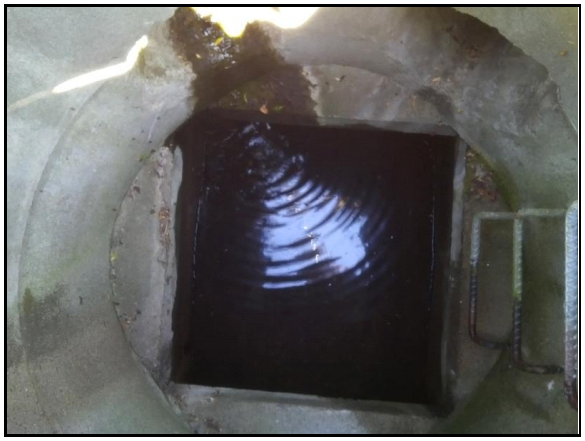


Sketch

SDFA 10 - Donald Dr and Fernwood Dr

Catch Basin Z3_NODE_0141

Location view.



Down view of structure.

View of inlet.

SDFA 10 - Donald Dr and Fernwood Dr

Pipe Z3_LINK_0133

Evaluation date/time:	6/26/2014 10:04 AM
Address/location:	Donald Dr and Fernwood Dr
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	0
Diameter (in):		Type of sediment:	None
Upstream feature ID:	Z3_NODE_0144	Infiltration:	Stain/Encrustation
Downstream feature ID:	Z3_NODE_0141	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):		VANDA Condition Rating:	Level 2 - Minor Damage
Downstream rim-inv. (ft.):	10	Prioritization Rating:	Level 3 - Fair
Material:	RCP	Prioritization Rationale:	Condition, Location

Notes

North inlet pipe. Pipe runs under roadway. Please refer to included videos for visuals.

Photos

SDFA 10 - Donald Dr and Fernwood Dr

Pipe Z3_LINK_0141

Evaluation date/time:	6/26/2014 10:04 AM
Address/location:	Donald Dr and Fernwood Dr
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	0
Diameter (in):	18	Type of sediment:	None
Upstream feature ID:	Z3_NODE_0143	Infiltration:	None
Downstream feature ID:	Z3_NODE_0141	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):		VANDA Condition Rating:	Level 1 - No Damage
Downstream rim-inv. (ft.):	3	Prioritization Rating:	Level 2 - Good
Material:	RCP	Prioritization Rationale:	Condition, Location

Notes

Northeast inlet pipe. Pipe runs under roadway. Please refer to included videos for visuals.

Photos

SDFA 10 - Donald Dr and Fernwood Dr

Pipe Z3_LINK_S10_P1

Evaluation date/time:	6/26/2014 10:04 AM
Address/location:	Donald Dr and Fernwood Dr
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Private	Sediment depth (%):	100
Diameter (in):		Type of sediment:	Silt, Vegetation
Upstream feature ID:	Z3_NODE_0141	Infiltration:	Stain
Downstream feature ID:		Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):	10	VANDA Condition Rating:	Unknown
Downstream rim-inv. (ft.):		Prioritization Rating:	Level 5 - Immediate Attention
Material:	RCP	Prioritization Rationale:	Condition, Obstruction

Notes

Outlet pipe. The pipe is either completely blocked with sediment, or the pipe may have collapsed. Pipe runs under residence. The pipe outlet is potentially in an area where a large pool of stagnant water is located. Nearby residence said this area is prone to odor issues. Please refer to included videos for visuals.

Photos

SDFA 10 - Donald Dr and Fernwood Dr

Pipe Z3_LINK_0142

Evaluation date/time:	6/26/2014 10:04 AM
Address/location:	Donald Dr and Fernwood Dr
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	0
Diameter (in):	16	Type of sediment:	None
Upstream feature ID:	Z3_NODE_0142	Infiltration:	None
Downstream feature ID:	Z3_NODE_0141	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):		VANDA Condition Rating:	Level 1 - No Damage
Downstream rim-inv. (ft.):	3	Prioritization Rating:	Level 2 - Good
Material:	RCP	Prioritization Rationale:	Condition, Location

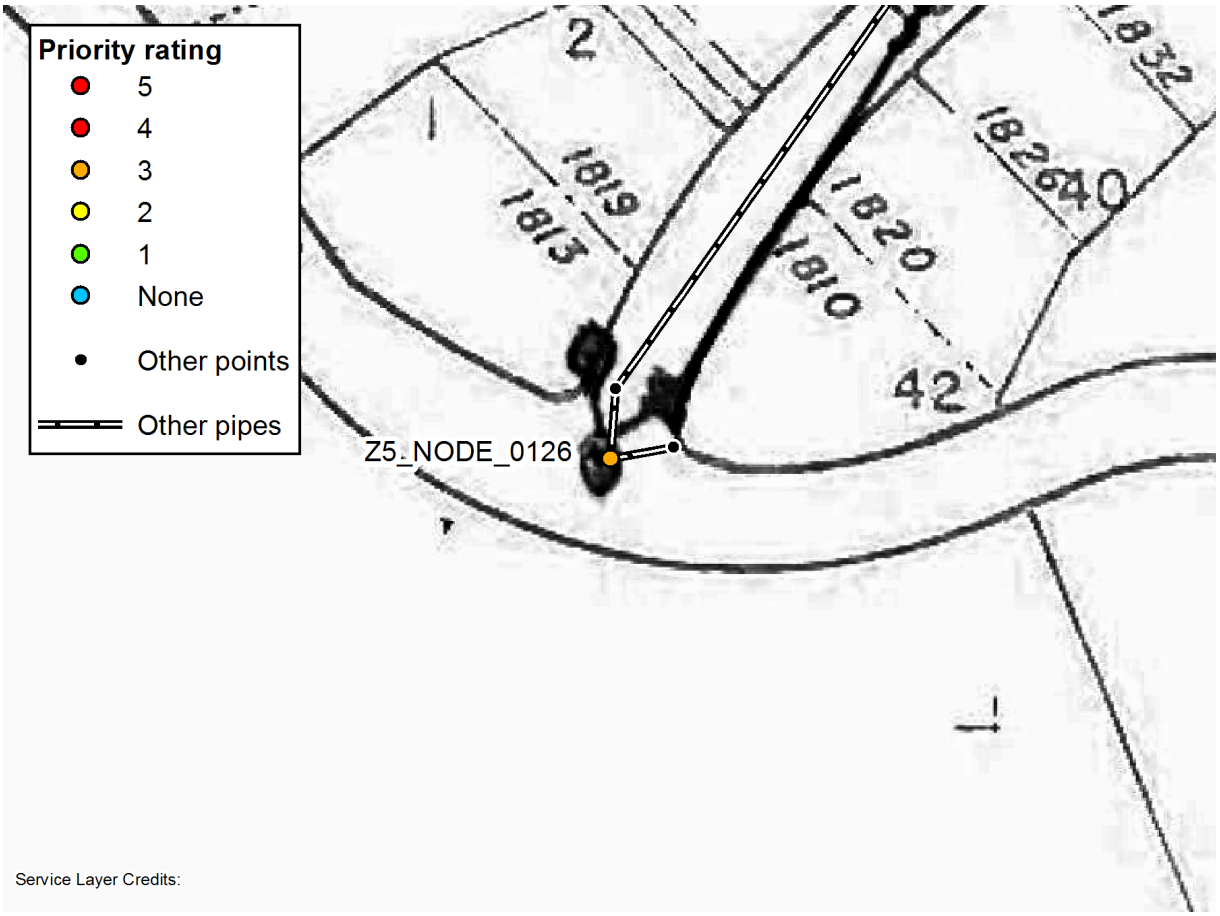
Notes

Inlet pipe. Pipe runs under roadway. Please refer to included videos for visuals.

Photos

SDFA 11 - Joseph Dr and Bollinger Canyon Rd

Area Map



SDFA 11 - Joseph Dr and Bollinger Canyon Rd

Manhole Z5_NODE_0126

Evaluation date/time:	6/27/2014 1:17 PM
Address/location:	Joseph Dr and Bollinger Canyon Rd
Weather:	Dry

General Information		Condition Information and Ratings	
Latitude:	37.843858	Susceptible to burial/overgrowth:	No
Longitude:	-122.105694	Susceptible to ponding/flooding:	Yes
Property type:	Public	Sediment/debris depth (%):	0
Access:	Good	Type of sediment/debris	None
Traffic:	Light	Infiltration:	None
Ground surface type:	Asphalt	VANDA Condition Rating:	Level 2 - Minor Damage
Dia./Ht. (in.):	24	Prioritization Rating:	Level 2 - Good
Width (in.):	24	Prioritization Rationale:	Condition
Material:	Concrete	Illegal dumping evidence:	No
Grade/rim-invert (ft.):	6.1		
Water level (%):	0		
Devices:	None		

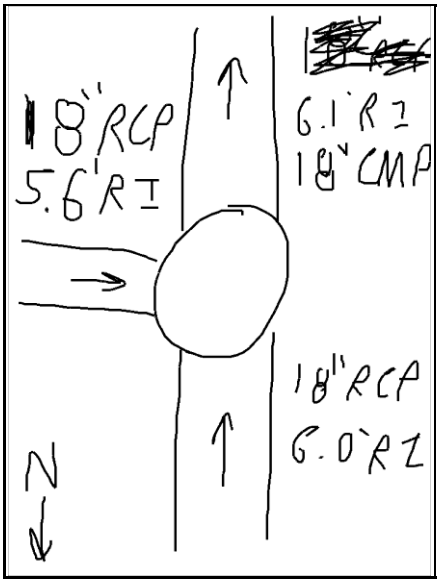
Notes

Scouring on structure bottom. Minor spalling at chimney.

Photos

SDFA 11 - Joseph Dr and Bollinger Canyon Rd

Manhole Z5_NODE_0126



Sketch

Location view.

Down view of structure.

View inside manhole. Spalled concrete on manhole chimney.

SDFA 11 - Joseph Dr and Bollinger Canyon Rd

Manhole Z5_NODE_0126

View of inlet and outlet.

View of inlet.

SDFA 11 - Joseph Dr and Bollinger Canyon Rd

Pipe Z5_LINK_S11_P1

Evaluation date/time:	6/27/2014 1:17 PM
Address/location:	Joseph Dr and Bollinger Canyon Rd
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	5
Diameter (in):	18	Type of sediment:	Silt, Gravel
Upstream feature ID:	Z5_NODE_0126	Infiltration:	None
Downstream feature ID:		Obstruction/Deflection (%)	15
Upstream rim-inv. (ft.):	6.1	VANDA Condition Rating:	Level 3 - Moderate Damage
Downstream rim-inv. (ft.):		Prioritization Rating:	Level 4 - Poor
Material:	CMP	Prioritization Rationale:	Condition, Location

Notes

Outlet pipe. Surface corrosion on invert of outlet pipe. Concrete slab obstructing inlet of pipe. Pipe runs under roadway. Please refer to included videos for visuals.

Photos

SDFA 11 - Joseph Dr and Bollinger Canyon Rd

Pipe Z5_LINK_S11_P2

Evaluation date/time:	6/27/2014 1:17 PM
Address/location:	Joseph Dr and Bollinger Canyon Rd
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	5
Diameter (in):	18	Type of sediment:	Vegetation
Upstream feature ID:	Z5_NODE_0127	Infiltration:	None
Downstream feature ID:	Z5_NODE_0126	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):		VANDA Condition Rating:	Level 2 - Minor Damage
Downstream rim-inv. (ft.):	6	Prioritization Rating:	Level 3 - Fair
Material:	RCP	Prioritization Rationale:	Condition

Notes

Inlet pipe. Concrete degredation at inlet of pipe. Please refer to included videos for visuals.

Photos

SDFA 11 - Joseph Dr and Bollinger Canyon Rd

Pipe Z5_LINK_S11_P3

Evaluation date/time:	6/27/2014 1:17 PM
Address/location:	Joseph Dr and Bollinger Canyon Rd
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	0
Diameter (in):	18	Type of sediment:	None
Upstream feature ID:	Z5_NODE_0130	Infiltration:	None
Downstream feature ID:	Z5_NODE_0126	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):		VANDA Condition Rating:	Level 4 - Severe/Significant Damage
Downstream rim-inv. (ft.):	5.6	Prioritization Rating:	Level 5 - Immediate Attention
Material:	RCP	Prioritization Rationale:	Condition, Location

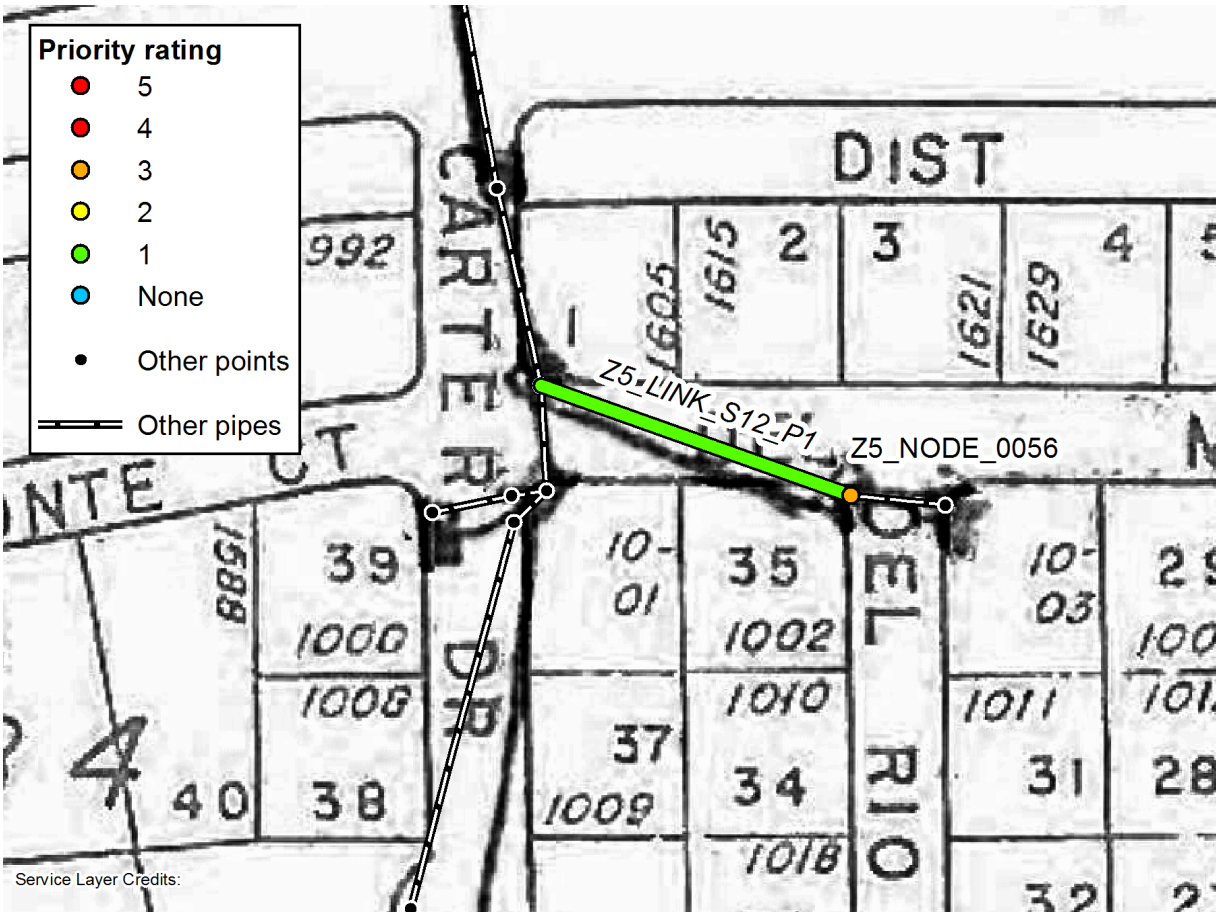
Notes

Invert missing on inlet pipe. Void visible. Pipe runs under roadway. Please refer to included videos for visuals.

Photos

SDFA 12 - Del Rio Way

Area Map



SDFA 12 - Del Rio Way

Catch Basin Z5_NODE_0056

Evaluation date/time:	6/27/2014 12:41 PM
Address/location:	Del Rio Way
Weather:	Dry

General Information

Latitude:	37.842036
Longitude:	-122.117454
Property type:	Public
Access:	Good
Traffic:	None
Ground surface type:	Asphalt
Dia./Ht. (in.):	36
Width (in.):	24
Material:	Concrete
Grade/rim-invert (ft.):	3.75
Water level (%):	0
Devices:	None

Condition Information and Ratings

Susceptible to burial/overgrowth:	No
Susceptible to ponding/flooding:	No
Sediment/debris depth (%):	5
Type of sediment/debris	Silt, Gravel
Infiltration:	None
VANDA Condition Rating:	Level 2 - Minor Damage
Prioritization Rating:	Level 2 - Good
Prioritization Rationale:	Condition
Illegal dumping evidence:	No

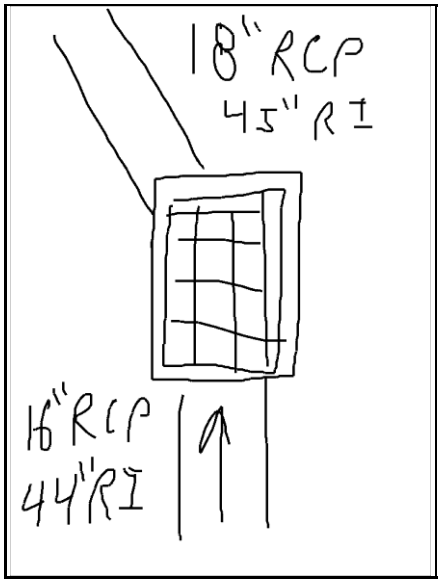
Notes

Scouring at inlet. Exposed aggregate.

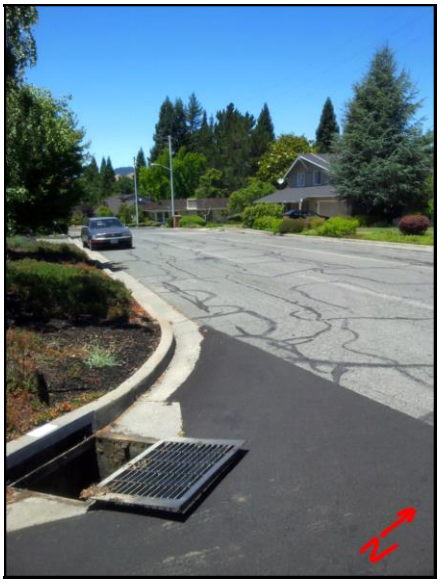
Photos

SDFA 12 - Del Rio Way

Catch Basin Z5_NODE_0056



Sketch



Location view.

Down view of structure.

View of outlet.

SDFA 12 - Del Rio Way

Catch Basin Z5_NODE_0056

View of inlet. Scouring on structure floor.

SDFA 12 - Del Rio Way

Pipe Z5_LINK_S12_P1

Evaluation date/time:	6/27/2014 12:41 PM
Address/location:	Del Rio Way
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	0
Diameter (in):	18	Type of sediment:	None
Upstream feature ID:	Z5_NODE_0056	Infiltration:	None
Downstream feature ID:	Z5_NODE_0050	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):	3.75	VANDA Condition Rating:	Level 1 - No Damage
Downstream rim-inv. (ft.):		Prioritization Rating:	Level 2 - Good
Material:	RCP	Prioritization Rationale:	Condition, Location

Notes

Outlet pipe. Please refer to included videos for visuals.

Photos

SDFA 12 - Del Rio Way

Pipe Z5_LINK_S12_P2

Evaluation date/time:	6/27/2014 12:41 PM
Address/location:	Del Rio Way
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	30
Diameter (in):	16	Type of sediment:	Silt, Rock
Upstream feature ID:		Infiltration:	None
Downstream feature ID:	Z5_NODE_0056	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):		VANDA Condition Rating:	Level 1 - No Damage
Downstream rim-inv. (ft.):	3.66	Prioritization Rating:	Level 3 - Fair
Material:	RCP	Prioritization Rationale:	Sediment

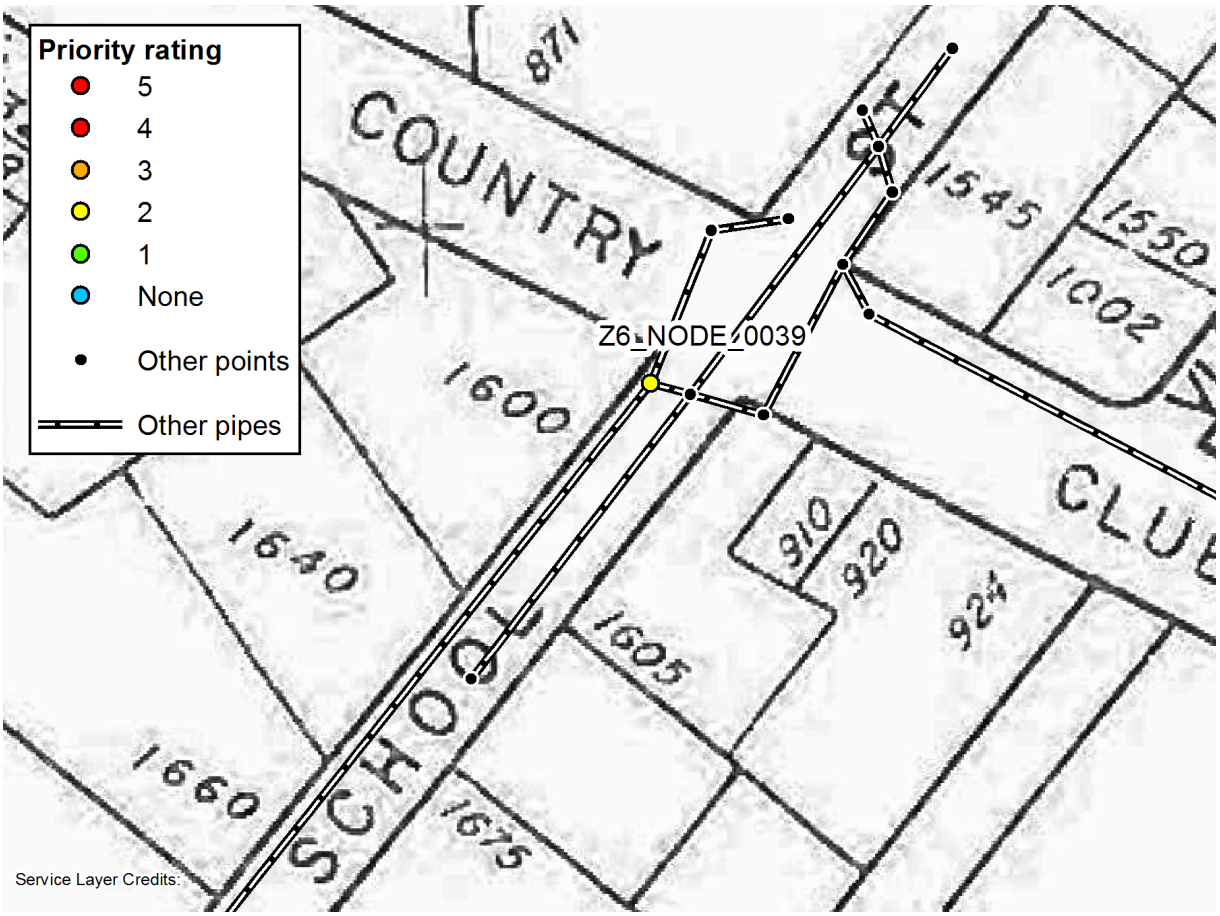
Notes

Inlet pipe. Scouring at pipe inlet. Please refer to included videos for visuals.

Photos

SDFA 13 - Country Club Dr and School St

Area Map



SDFA 13 - Country Club Dr and School St

Manhole Z6_NODE_0039

Evaluation date/time:	6/26/2014 9:18 AM
Address/location:	Country Club Dr and School St
Weather:	Dry

General Information		Condition Information and Ratings	
Latitude:	37.834221	Susceptible to burial/overgrowth:	No
Longitude:	-122.131705	Susceptible to ponding/flooding:	No
Property type:	Public	Sediment/debris depth (%):	0
Access:	Good	Type of sediment/debris	None
Traffic:	Light	Infiltration:	None
Ground surface type:	Concrete	VANDA Condition Rating:	Level 2 - Minor Damage
Dia./Ht. (in.):	24	Prioritization Rating:	Level 2 - Good
Width (in.):		Prioritization Rationale:	Condition
Material:	Concrete	Illegal dumping evidence:	No
Grade/rim-invert (ft.):	4.7		
Water level (%):	0		
Devices:	None		

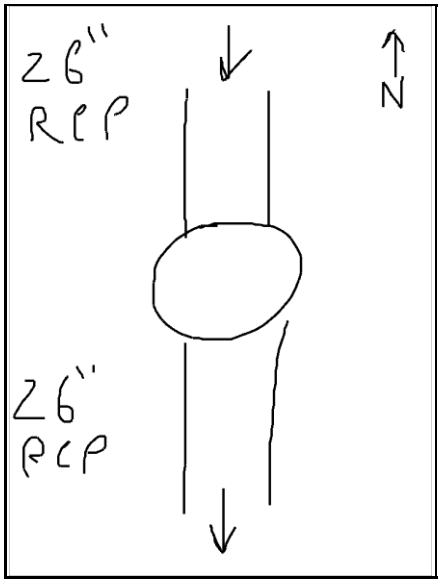
Notes

Thin metal lining over chimney, possibly served as a construction form. Concrete degradation at pipe connections.

Photos

SDFA 13 - Country Club Dr and School St

Manhole Z6_NODE_0039



Sketch

Location view.

Location view.

View of outlet.

SDFA 13 - Country Club Dr and School St

Manhole Z6_NODE_0039

View of inlet.

Delaminating metal lining on manhole chimney.

SDFA 13 - Country Club Dr and School St

Pipe Z6_LINK_S13_P1

Evaluation date/time:	6/26/2014 9:18 AM
Address/location:	Country Club Dr and School St
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	5
Diameter (in):	26	Type of sediment:	Silt, Vegetation
Upstream feature ID:	Z6_NODE_0040	Infiltration:	None
Downstream feature ID:	Z6_NODE_0039	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):		VANDA Condition Rating:	Level 1 - No Damage
Downstream rim-inv. (ft.):	4.7	Prioritization Rating:	Level 1 - Excellent
Material:	RCP	Prioritization Rationale:	Condition

Notes

Outlet pipe. Pipe runs under sidewalk. Please refer to included videos for visuals.

Photos

SDFA 13 - Country Club Dr and School St

Pipe Z6_LINK_S13_P2

Evaluation date/time:	6/26/2014 9:18 AM
Address/location:	Country Club Dr and School St
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	0
Diameter (in):	26	Type of sediment:	None
Upstream feature ID:	Z6_NODE_0039	Infiltration:	None
Downstream feature ID:	Z6_NODE_0038	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):	4.7	VANDA Condition Rating:	Level 1 - No Damage
Downstream rim-inv. (ft.):		Prioritization Rating:	Level 2 - Good
Material:	RCP	Prioritization Rationale:	Condition, Location

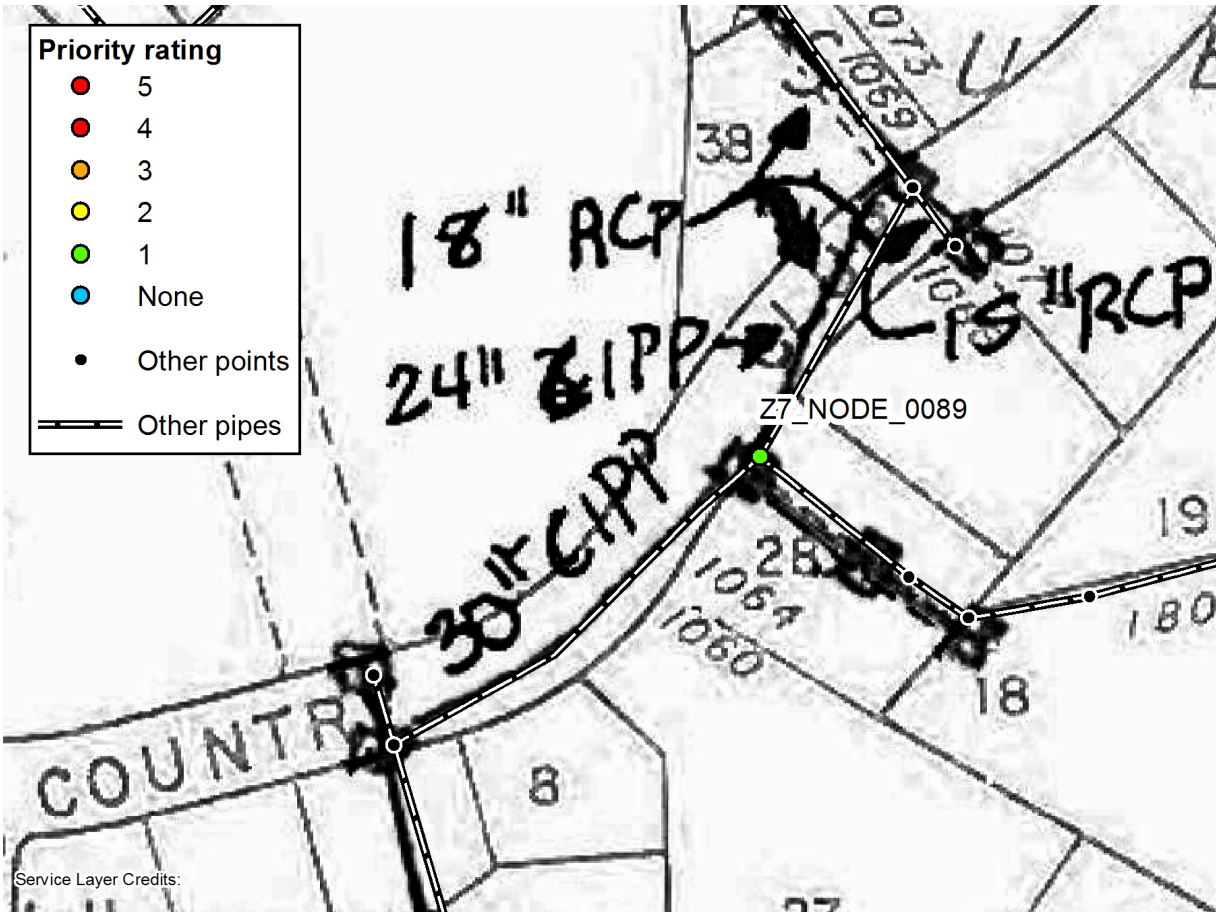
Notes

Inlet pipe. Pipe runs under sidewalk and roadway. Please refer to included videos for visuals.

Photos

SDFA 14 - Country Club Dr

Area Map



SDFA 14 - Country Club Dr

Catch Basin Z7_NODE_0089

Evaluation date/time:	6/27/2014 3:09 PM
Address/location:	Country Club Dr
Weather:	Dry

General Information

Latitude:	37.832698
Longitude:	-122.1257
Property type:	Public
Access:	Good
Traffic:	Light
Ground surface type:	Asphalt, Concrete
Dia./Ht. (in.):	36
Width (in.):	24
Material:	Concrete
Grade/rim-invert (ft.):	6
Water level (%):	5
Devices:	None

Condition Information and Ratings

Susceptible to burial/overgrowth:	No
Susceptible to ponding/flooding:	No
Sediment/debris depth (%):	0
Type of sediment/debris	None
Infiltration:	None
VANDA Condition Rating:	Level 1 - No Damage
Prioritization Rating:	Level 1 - Excellent
Prioritization Rationale:	Condition
Illegal dumping evidence:	No

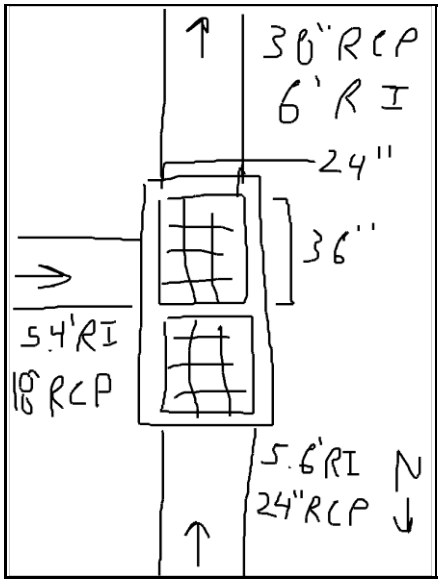
Notes

Good condition.

Photos

SDFA 14 - Country Club Dr

Catch Basin Z7_NODE_0089



Sketch

Down view of structure.

View of inlet and outlet.

View of inlet.

SDFA 14 - Country Club Dr

Pipe Z7_LINK_S14_P1

Evaluation date/time:	6/27/2014 3:09 PM
Address/location:	Country Club Dr
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	0
Diameter (in):	30	Type of sediment:	None
Upstream feature ID:	Z7_NODE_0089	Infiltration:	None
Downstream feature ID:	Z7_NODE_0087	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):	6	VANDA Condition Rating:	Level 1 - No Damage
Downstream rim-inv. (ft.):		Prioritization Rating:	Level 2 - Good
Material:	RCP	Prioritization Rationale:	Condition, Location

Notes

Outlet pipe. Please refer to included videos for visuals.

Photos

SDFA 14 - Country Club Dr

Pipe Z7_LINK_S14_P2

Evaluation date/time:	6/27/2014 3:09 PM
Address/location:	Country Club Dr
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	0
Diameter (in):	24	Type of sediment:	None
Upstream feature ID:	Z7_NODE_0099	Infiltration:	None
Downstream feature ID:	Z7_NODE_0089	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):		VANDA Condition Rating:	Level 1 - No Damage
Downstream rim-inv. (ft.):	5.6	Prioritization Rating:	Level 2 - Good
Material:	RCP	Prioritization Rationale:	Condition, Location

Notes

Inlet pipe. Please refer to included videos for visuals.

Photos

SDFA 14 - Country Club Dr

Pipe Z7_LINK_S14_P3

Evaluation date/time:	6/27/2014 3:09 PM
Address/location:	Country Club Dr
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Private	Sediment depth (%):	0
Diameter (in):	18	Type of sediment:	None
Upstream feature ID:	Z7_NODE_0090	Infiltration:	None
Downstream feature ID:	Z7_NODE_0089	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):		VANDA Condition Rating:	Level 1 - No Damage
Downstream rim-inv. (ft.):	5.4	Prioritization Rating:	Level 2 - Good
Material:	RCP	Prioritization Rationale:	Condition, Location

Notes

Inlet pipe. Please refer to included videos for visuals.

Photos

SDFA 15 - Rimer Dr

Area Map

SDFA 15 - Rimer Dr

Catch Basin Z7_NODE_S15

Evaluation date/time:	6/26/2014 8:17 AM
Address/location:	Rimer Dr
Weather:	Dry

General Information

Latitude:	37.82257
Longitude:	-122.129302
Property type:	Public
Access:	Good
Traffic:	Light
Ground surface type:	Concrete
Dia./Ht. (in.):	36
Width (in.):	24
Material:	Concrete
Grade/rim-invert (ft.):	8
Water level (%):	0
Devices:	None

Condition Information and Ratings

Susceptible to burial/overgrowth:	No
Susceptible to ponding/flooding:	No
Sediment/debris depth (%):	5
Type of sediment/debris	Silt, Vegetation
Infiltration:	None
VANDA Condition Rating:	Level 1 - No Damage
Prioritization Rating:	Level 1 - Excellent
Prioritization Rationale:	Condition
Illegal dumping evidence:	No

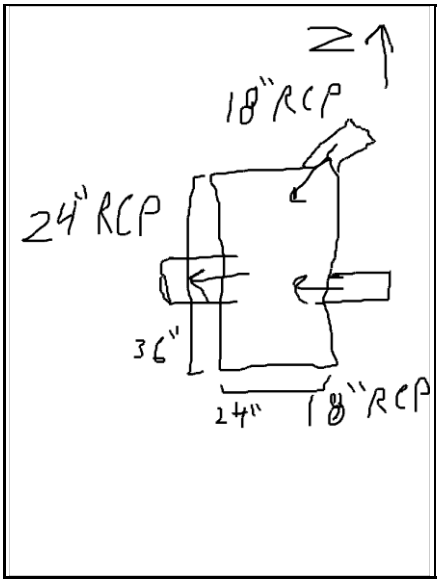
Notes

Good condition.

Photos

SDFA 15 - Rimer Dr

Catch Basin Z7_NODE_S15



Sketch

Location view.

Down view of structure.

SDFA 15 - Rimer Dr

Pipe Z7_LINK_S15_P1

Evaluation date/time:	6/26/2014 8:17 AM
Address/location:	Rimer Dr
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Private	Sediment depth (%):	20
Diameter (in):	24	Type of sediment:	Silt, Rock, Vegetation
Upstream feature ID:	Z7_NODE_S15	Infiltration:	Stain
Downstream feature ID:		Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):	8	VANDA Condition Rating:	Level 1 - No Damage
Downstream rim-inv. (ft.):		Prioritization Rating:	Level 2 - Good
Material:	RCP	Prioritization Rationale:	Condition, Sediment, Location

Notes

Outlet pipe. Pipe runs under residence. Please refer to included videos for visuals.

Photos

SDFA 15 - Rimer Dr

Pipe Z7_LINK_S15_P2

Evaluation date/time:	6/26/2014 8:17 AM
Address/location:	Rimer Dr
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	0
Diameter (in):	18	Type of sediment:	None
Upstream feature ID:		Infiltration:	None
Downstream feature ID:	Z7_NODE_S15	Obstruction/Deflection (%)	25
Upstream rim-inv. (ft.):		VANDA Condition Rating:	Level 1 - No Damage
Downstream rim-inv. (ft.):	8	Prioritization Rating:	Level 3 - Fair
Material:	RCP	Prioritization Rationale:	Obstruction

Notes

Northeast inlet pipe. Pipe appears to be obstructed by a board of unknown material. Pipe runs under roadway. Please refer to included videos for visuals.

Photos

SDFA 15 - Rimer Dr

Pipe Z7_LINK_S15_P3

Evaluation date/time:	6/26/2014 8:17 AM
Address/location:	Rimer Dr
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	0
Diameter (in):	18	Type of sediment:	None
Upstream feature ID:		Infiltration:	None
Downstream feature ID:	Z7_NODE_S15	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):		VANDA Condition Rating:	Level 1 - No Damage
Downstream rim-inv. (ft.):	8	Prioritization Rating:	Level 2 - Good
Material:	RCP	Prioritization Rationale:	Condition, Location

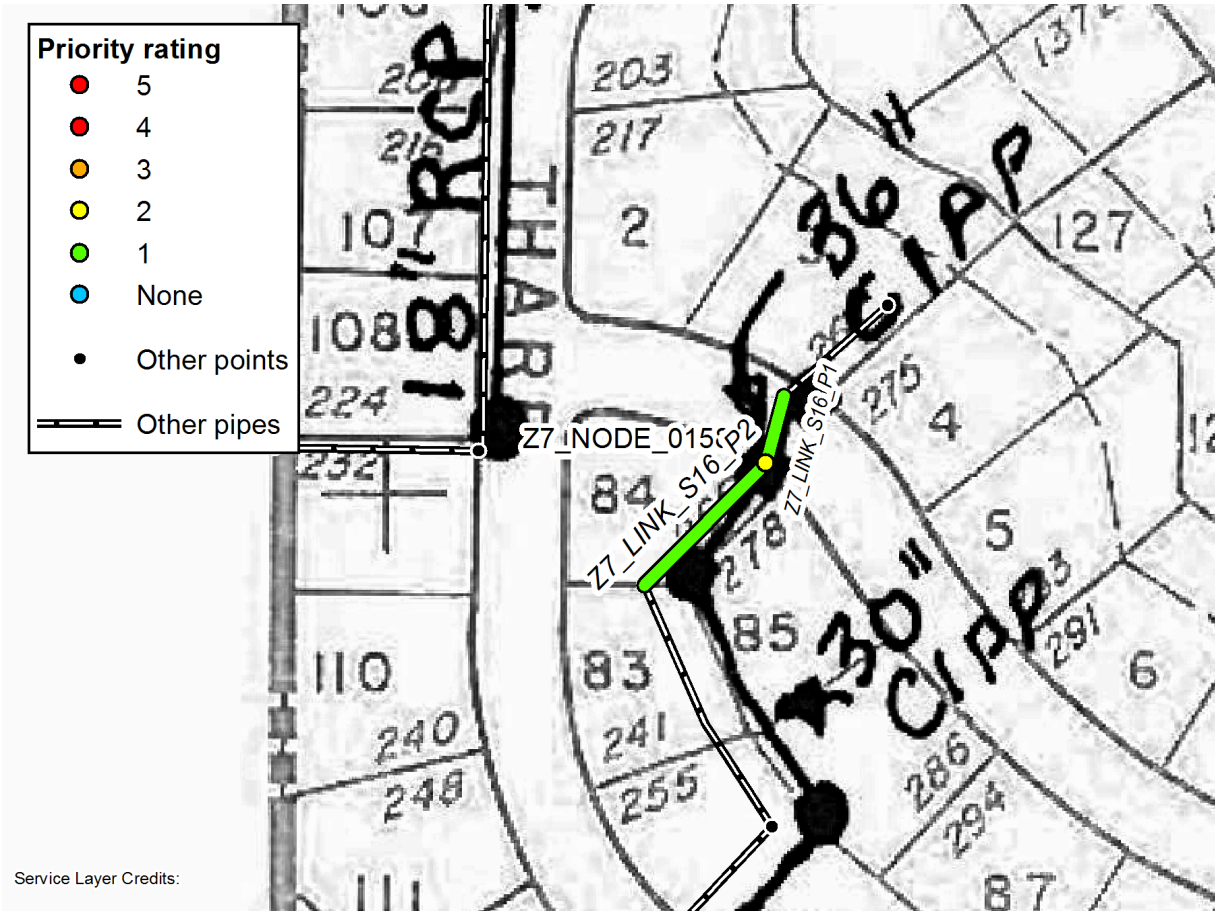
Notes

East inlet pipe. Pipe runs under roadway. Please refer to included videos for visuals.

Photos

SDFA 16 - Deerfield Dr

Area Map



SDFA 16 - Deerfield Dr

Catch Basin Z7_NODE_0158

Evaluation date/time:	6/27/2014 8:57 AM
Address/location:	Deerfield Dr
Weather:	Dry

General Information

Latitude:	37.815815
Longitude:	-122.124003
Property type:	Public
Access:	Good
Traffic:	None
Ground surface type:	Asphalt, Concrete
Dia./Ht. (in.):	36
Width (in.):	24
Material:	Concrete
Grade/rim-invert (ft.):	6.8
Water level (%):	5
Devices:	None

Condition Information and Ratings

Susceptible to burial/overgrowth:	No
Susceptible to ponding/flooding:	No
Sediment/debris depth (%):	0
Type of sediment/debris	None
Infiltration:	Weeper
VANDA Condition Rating:	Level 1 - No Damage
Prioritization Rating:	Level 2 - Good
Prioritization Rationale:	Condition
Illegal dumping evidence:	No

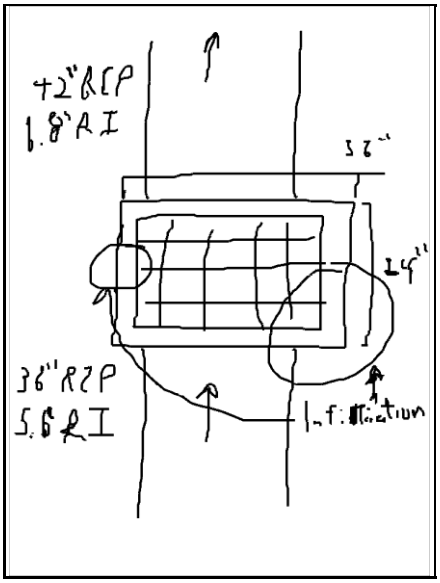
Notes

Infiltration stains on catch basin structure walls.

Photos

SDFA 16 - Deerfield Dr

Catch Basin Z7_NODE_0158



Sketch

Location view.

View of outlet.

Down view of structure. Water infiltration staining.

SDFA 16 - Deerfield Dr

Catch Basin Z7_NODE_0158

Down view of structure. Water infiltration staining.

SDFA 16 - Deerfield Dr

Pipe Z7_LINK_S16_P1

Evaluation date/time:	6/27/2014 8:57 AM
Address/location:	Deerfield Dr
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	0
Diameter (in):	42	Type of sediment:	None
Upstream feature ID:	Z7_NODE_0158	Infiltration:	None
Downstream feature ID:	Z7_NODE_0157	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):	6.8	VANDA Condition Rating:	Level 2 - Minor Damage
Downstream rim-inv. (ft.):		Prioritization Rating:	Level 3 - Fair
Material:	RCP	Prioritization Rationale:	Condition, Location

Notes

Outlet pipe. Pipe runs under roadway. Concrete degradation at invert. Please refer to included videos for visuals.

Photos

SDFA 16 - Deerfield Dr

Pipe Z7_LINK_S16_P2

Evaluation date/time:	6/27/2014 8:57 AM
Address/location:	Deerfield Dr
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Private	Sediment depth (%):	0
Diameter (in):	36	Type of sediment:	None
Upstream feature ID:	Z7_NODE_0159	Infiltration:	None
Downstream feature ID:	Z7_NODE_0158	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):		VANDA Condition Rating:	Level 2 - Minor Damage
Downstream rim-inv. (ft.):	5.6	Prioritization Rating:	Level 3 - Fair
Material:	RCP	Prioritization Rationale:	Condition, Location

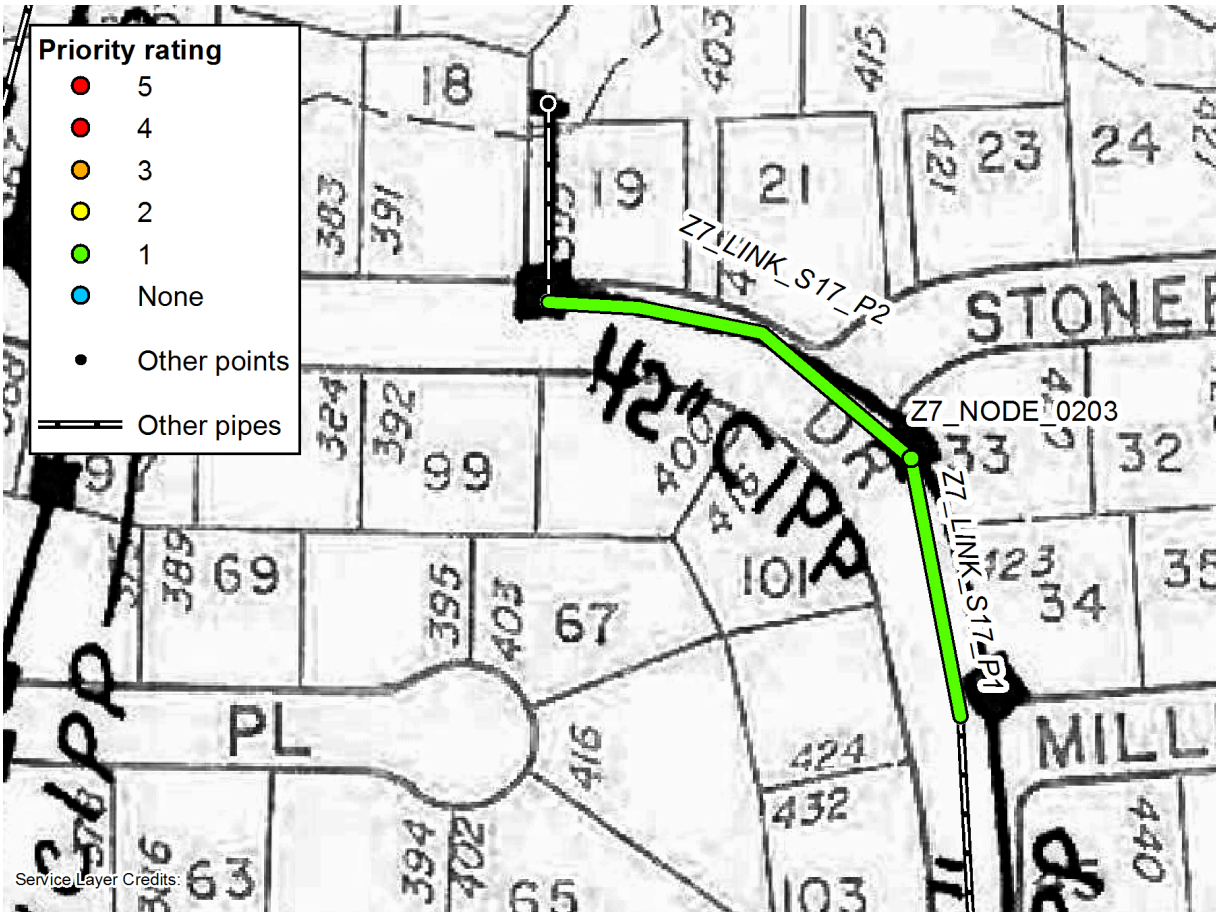
Notes

Inlet pipe. Pipe runs under residence. Concrete degradation at invert. Please refer to included videos for visuals.

Photos

SDFA 17 - Deerfield Dr and Stoneridge Pl

Area Map



SDFA 17 - Deerfield Dr and Stoneridge Pl

Catch Basin Z7_NODE_0203

Evaluation date/time:	6/27/2014 8:22 AM
Address/location:	Deerfield Dr and Stonefield Pl
Weather:	Dry

General Information		Condition Information and Ratings	
Latitude:	37.813634	Susceptible to burial/overgrowth:	No
Longitude:	-122.118609	Susceptible to ponding/flooding:	No
Property type:	Public	Sediment/debris depth (%):	5
Access:	Good	Type of sediment/debris	Vegetation
Traffic:	Light	Infiltration:	None
Ground surface type:	Asphalt, Concrete	VANDA Condition Rating:	Level 1 - No Damage
Dia./Ht. (in.):	36	Prioritization Rating:	Level 1 - Excellent
Width (in.):	24	Prioritization Rationale:	Condition
Material:	Concrete	Illegal dumping evidence:	No
Grade/rim-invert (ft.):	11		
Water level (%):	0		
Devices:	None		

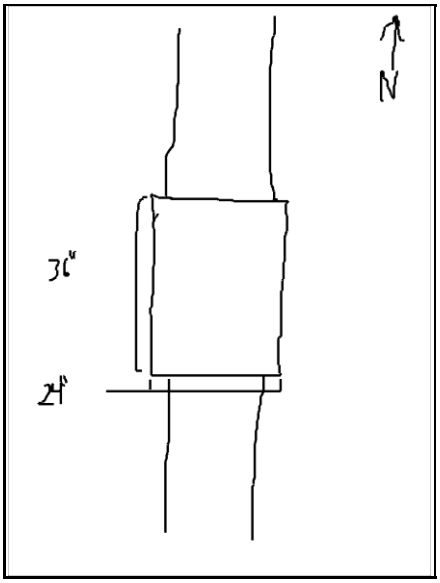
Notes

Minor build up of leaves.

Photos

SDFA 17 - Deerfield Dr and Stoneridge Pl

Catch Basin Z7_NODE_0203



Sketch

Location view.

Location view.

Down view of structure.

SDFA 17 - Deerfield Dr and Stoneridge Pl

Catch Basin Z7_NODE_0203

Down view of structure.

SDFA 17 - Deerfield Dr and Stoneridge Pl

Pipe Z7_LINK_S17_P1

Evaluation date/time:	6/27/2014 8:22 AM
Address/location:	Deerfield Dr and Stonefield Pl
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	0
Diameter (in):		Type of sediment:	None
Upstream feature ID:	Z7_NODE_0203	Infiltration:	None
Downstream feature ID:	Z7_NODE_0204	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):	11	VANDA Condition Rating:	Level 1 - No Damage
Downstream rim-inv. (ft.):		Prioritization Rating:	Level 2 - Good
Material:	RCP	Prioritization Rationale:	Condition, Location

Notes

Outlet pipe. Pipe runs under roadway. Please refer to included videos for visuals.

Photos

SDFA 17 - Deerfield Dr and Stoneridge Pl

Pipe Z7_LINK_S17_P2

Evaluation date/time:	6/27/2014 8:22 AM
Address/location:	Deerfield Dr and Stonefield Pl
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	0
Diameter (in):		Type of sediment:	None
Upstream feature ID:	Z7_NODE_0202	Infiltration:	None
Downstream feature ID:	Z7_NODE_0203	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):		VANDA Condition Rating:	Level 1 - No Damage
Downstream rim-inv. (ft.):	11	Prioritization Rating:	Level 2 - Good
Material:	RCP	Prioritization Rationale:	Condition, Location

Notes

Inlet pipe. Pipe runs under roadway. Please refer to included videos for visuals.

Photos

SDFA 18 - Rheem Blvd and Center St

Area Map

SDFA 18 - Rheem Blvd and Center St

Catch Basin Z3_NODE_S18

Evaluation date/time:	10/14/14 9:00 AM
Address/location:	Rheem Blvd and Center St
Weather:	Dry

General Information		Condition Information and Ratings	
Latitude:		Susceptible to burial/overgrowth:	No
Longitude:		Susceptible to ponding/flooding:	No
Property type:	Public	Sediment/debris depth (%):	0
Access:	Good	Type of sediment/debris	None
Traffic:	Heavy	Infiltration:	Weeper
Ground surface type:	Asphalt, Concrete	VANDA Condition Rating:	Level 1 - No Damage
Dia./Ht. (in.):	36	Prioritization Rating:	Level 2 - Good
Width (in.):	36	Prioritization Rationale:	Condition
Material:	Concrete	Illegal dumping evidence:	No
Grade/rim-invert (ft.):	22.6		
Water level (%):	5		
Devices:	Filter		

Notes

Filter removed in order to access for assessment. Opening cut in crown of CMP (2 ft. x 2 ft.). Weeper infiltration at 14 ft. from grade.

Photos

Catch Basin Topside (1)

SDFA 18 - Rheem Blvd and Center St

Catch Basin Z3_NODE_S18

Catch Basin Topside (2)

Catch Basin Topside (3)

Catch Basin Topside (4)

Catch Basin Topside (5)

Catch Basin Down Catch Basin (1)

SDFA 18 - Rheem Blvd and Center St

Catch Basin Z3_NODE_S18

Catch Basin Down Catch Basin (2)

Catch Basin Down Catch Basin (3)

Catch Basin Pointing Downstream

Catch Basin 14' Infiltration

SDFA 18 - Rheem Blvd and Center St

Catch Basin Z3_LINK_S18_P1

Evaluation date/time:	10/14/14 9:00 AM
Address/location:	Rheem Blvd and Center St
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	5
Diameter (in):	96	Type of sediment:	Silt, Vegetation
Upstream feature ID:	Z3_NODE_S18	Infiltration:	Stain/Encrustation
Downstream feature ID:		Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):	22.6	VANDA Condition Rating:	Level 4 - Severe/Significant Damage
Downstream rim-inv. (ft.):		Prioritization Rating:	Level 5 - Immediate Attention
Material:	CMP	Prioritization Rationale:	Condition, Location

Notes

Outlet pipe. Pipe runs under roadway, parking lot, and commercial buildings. Multiple points of infiltration/encrustation. Significant/severe corrosion at invert. Perforations in invert with voids visible. Voids are about 3 in. deep. Pipe buckled/deformed in various places by approx. 10 percent. Portion of pipe invert has been rehabilitated with a concrete overlay.

Photos

Downstream 3' Infiltration (1)

Downstream 5' Encrustation

SDFA 18 - Rheem Blvd and Center St

Catch Basin Z3_LINK_S18_P1

Downstream 10' Infiltration

Downstream 13' Holes Void Visible

Downstream 20' Deformed (IMG_2580)

Downstream 20' Deformed (IMG_2583)

Downstream 20' Holes Void Visible

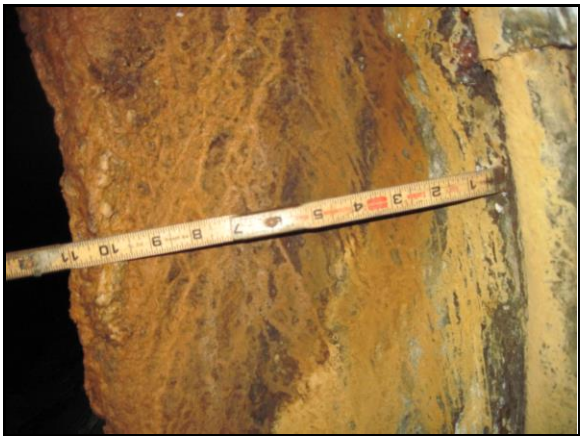
Downstream 40' Patch Repair

SDFA 18 - Rheem Blvd and Center St

Catch Basin Z3_LINK_S18_P1

Downstream 77' Defective Pipe Size Change (1)

Downstream 77' Defective Pipe Size Change (2)



Downstream 77' Defective Pipe Size Change (3)

Downstream 186' Deformed (IMG_2636)

Downstream 207' Deformed (1)

Downstream 207' Deformed (2)

SDFA 18 - Rheem Blvd and Center St

Catch Basin Z3_LINK_S18_P1

Downstream 270' Deformed (IMG_2644)

Downstream 337' Deformed

Downstream 411' Hole Void Visible (IMG_2654)

SDFA 18 - Rheem Blvd and Center St

Catch Basin Z3_LINK_S18_P2

Evaluation date/time:	10/14/14 9:00 AM
Address/location:	Rheem Blvd and Center St
Weather:	Dry

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	5
Diameter (in):	96	Type of sediment:	Silt, Vegetation
Upstream feature ID:		Infiltration:	Stain/Encrustation
Downstream feature ID:	Z3_NODE_S18	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):		VANDA Condition Rating:	Level 4 - Severe/Significant Damage
Downstream rim-inv. (ft.):	22.6	Prioritization Rating:	Level 5 - Immediate Attention
Material:	CMP	Prioritization Rationale:	Condition, Location

Notes

Inlet pipe. Pipe runs under roadway, parking lot, and commercial buildings. Multiple points of infiltration/encrustation. Significant/severe corrosion at invert. Perforations in invert with voids visible. Voids are between 4 in. to 10 in. deep. Hole with void visible on east pipe wall near assessment entry point. Pipe changes from CMP to RCP of same diameter. Connection appears to be of sheet metal and wood boards. RCP is in good condition with some infiltration staining/encrustation. Mortar missing at RCP joints (1 in. gap between pipe segments). Evidence of vandalism/unauthorized access warrants additional safety concerns.

Photos

Upstream 2' Infiltration

Upstream 2' Infiltration (2)

SDFA 18 - Rheem Blvd and Center St

Catch Basin Z3_LINK_S18_P2

Upstream Infiltration (4)

Upstream 8' Broken Pipe (1)

Upstream 8' Broken Pipe (2)

Upstream 8' Broken Pipe (3)

Upstream 8' Hole Void Visible (1)

Upstream 8' Hole Void Visible (2)

SDFA 18 - Rheem Blvd and Center St

Catch Basin Z3_LINK_S18_P2

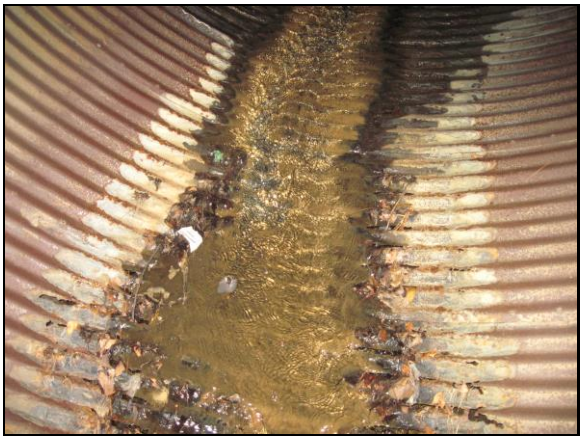
Upstream 10' Infiltration

Upstream 15' Hole Void Visible

Upstream 15' Holes

Upstream 18' Deformation

Upstream 21' Open Joint



Upstream 44' Hole Void Visible

SDFA 18 - Rheem Blvd and Center St

Catch Basin Z3_LINK_S18_P2

Upstream 44' Staining

Upstream 45.5' Defective Tap Connection (1)

Upstream 45.5' Defective Tap Connection (4)

Upstream 46' Defective Pipe Material Change (1)

Upstream 46' Defective Pipe Material Change (2)

Upstream 46' Defective Pipe Material Change (3)

SDFA 18 - Rheem Blvd and Center St

Catch Basin Z3_LINK_S18_P2

Upstream 46' Defective Pipe Material Change (4)

Upstream 55' Longitudinal Cracks at Joint (1)

Upstream 55' Longitudinal Cracks at Joint (2)

Upstream 65' Missing Mortar (1)

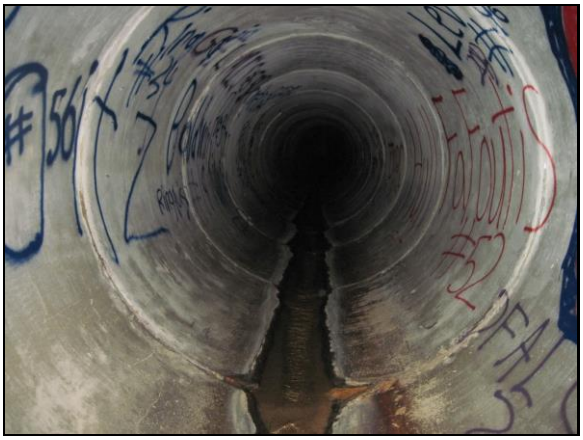
Upstream 65' Missing Mortar (2)

Upstream 73' Infiltration Stains

SDFA 18 - Rheem Blvd and Center St

Catch Basin Z3_LINK_S18_P2

Upstream 73' Longitudinal Cracks, Staining (1)



Upstream 81' Longitudinal Cracks, Staining (3)

SDFA 19 - Bollinger Canyon Rd and Valley Hill Dr

Area Map

SDFA 19 - Bollinger Canyon Rd and Valley Hill Dr

Culvert Z5_NODE_S19_N1

Evaluation date/time:	11/20/2014 9:21 AM
Address/location:	Bollinger Canyon Rd and Valley Hill Dr
Weather:	Damp

General Information		Condition Information and Ratings	
Latitude:	37.838116	Susceptible to burial/overgrowth:	No
Longitude:	-122.097931	Susceptible to ponding/flooding:	No
Property type:	Public	Sediment/debris depth (%):	10
Access:	Fair	Type of sediment/debris	Silt, Sand, Gravel
Traffic:	Light	Infiltration:	None
Ground surface type:	Asphalt, Grass/Dirt	VANDA Condition Rating:	Level 2 - Minor Damage
Dia./Ht. (in.):	6	Prioritization Rating:	Level 3 - Fair
Width (in.):	13	Prioritization Rationale:	Condition, Location
Material:	CMP	Illegal dumping evidence:	No
Grade/rim-invert (ft.):	10		
Water level (%):	0		
Devices:	Headwall		

Notes

Outlet to culvert. Minor to moderate surface corrosion at base of pipe wall. Nearby CMP outlet.

Photos

SDFA 19 - Bollinger Canyon Rd and Valley Hill Dr

Culvert Z5_NODE_S19_N1

Location view.

View of outlet area.

View of outlet.

View of outlet.

View of nearby outlet.

View downstream

SDFA 19 - Bollinger Canyon Rd and Valley Hill Dr

Culvert Z5_NODE_S19_N1

View of nearby outlet.

View inside nearby outlet.

View inside nearby outlet.

SDFA 19 - Bollinger Canyon Rd and Valley Hill Dr

Culvert Z5_LINK_S19

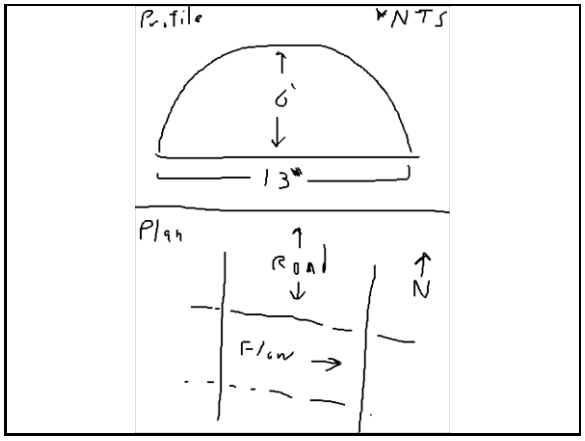
Evaluation date/time:	11/20/2014 9:21 AM
Address/location:	Bollinger Canyon Rd and Valley Hill Dr
Weather:	Damp

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	10
Diameter (in):	6	Type of sediment:	Silt, Sand, Gravel
Upstream feature ID:	Z5_NODE_S19	Infiltration:	None
Downstream feature ID:	Z5_NODE_S19	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):	10	VANDA Condition Rating:	Level 2 - Minor Damage
Downstream rim-inv. (ft.):	10	Prioritization Rating:	Level 3 - Fair
Material:	CMP	Prioritization Rationale:	Condition, Location

Notes

Pipe runs under roadway. Accessed from outlet and proceeded towards inlet. Minor to moderate surface corrosion at base of pipe wall.

Photos



Sketch

Corrosion on pipe wall.

SDFA 19 - Bollinger Canyon Rd and Valley Hill Dr

Culvert Z5_LINK_S19

View inside pipe from outlet.

View of pipe wall from outlet.

Corrosion on pipe wall.

View inside pipe from outlet.

Corrosion on pipe wall

View of pipe wall from outlet.

SDFA 19 - Bollinger Canyon Rd and Valley Hill Dr

Culvert Z5_NODE_S19_N2

Evaluation date/time:	11/20/2014 9:21 AM
Address/location:	Bollinger Canyon Rd and Valley Hill Dr
Weather:	Damp

General Information		Condition Information and Ratings	
Latitude:		Susceptible to burial/overgrowth:	No
Longitude:		Susceptible to ponding/flooding:	No
Property type:	Public	Sediment/debris depth (%):	10
Access:	Fair	Type of sediment/debris	Silt, Sand, Gravel
Traffic:	Light	Infiltration:	None
Ground surface type:	Asphalt, Grass/Dirt	VANDA Condition Rating:	Level 2 - Minor Damage
Dia./Ht. (in.):	6	Prioritization Rating:	Level 3 - Fair
Width (in.):	13	Prioritization Rationale:	Condition, Location
Material:	CMP	Illegal dumping evidence:	No
Grade/rim-invert (ft.):	10		
Water level (%):	0		
Devices:	Headwall		

Notes

Inlet to culvert. Minor to moderate surface corrosion at base of pipe wall.

Photos

SDFA 19 - Bollinger Canyon Rd and Valley Hill Dr

Culvert Z5_NODE_S19_N2

Location view.

View of inlet area.

View of inlet.

View upstream.

SDFA 20 - 1528 St Marys Rd

Area Map

SDFA 20 - 1528 St Marys Rd

Culvert Z5_NODE_S20_N1

Evaluation date/time:	11/20/2014 10:02 AM
Address/location:	1528 St Marys Rd
Weather:	Damp

General Information

Latitude:	37.841497
Longitude:	-122.121683
Property type:	Public
Access:	Fair
Traffic:	Heavy
Ground surface type:	Asphalt, Grass/Dirt
Dia./Ht. (in.):	50
Width (in.):	
Material:	CMP
Grade/rim-invert (ft.):	10
Water level (%):	0
Devices:	Debris/Trash Rack

Condition Information and Ratings

Susceptible to burial/overgrowth:	Yes
Susceptible to ponding/flooding:	No
Sediment/debris depth (%):	0
Type of sediment/debris	None
Infiltration:	None
VANDA Condition Rating:	Level 2 - Minor Damage
Prioritization Rating:	Level 5 - Immediate Attention
Prioritization Rationale:	Safety
Illegal dumping evidence:	No

Notes

Heavy vegetation surrounding outlet. Buildup of sediment at outlet. Outlet is 48 in. while inlet is 50 in. indicating possible pipe deformation.

Photos

SDFA 20 - 1528 St Marys Rd

Culvert Z5_NODE_S20_N1

View of downstream area.

View of outlet.

View of outlet.

View of outlet.

View downstream.

View of downstream area.

SDFA 20 - 1528 St Marys Rd

Culvert Z5_LINK_S20

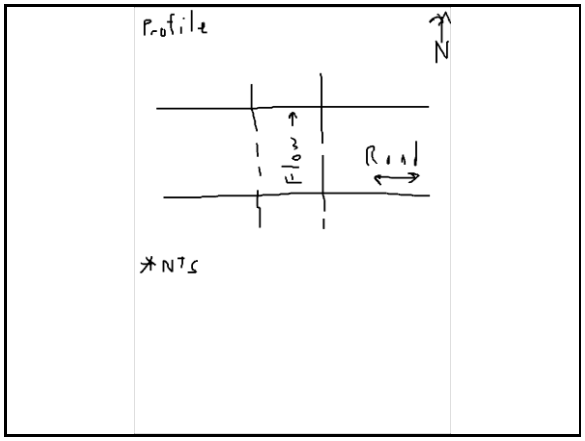
Evaluation date/time:	11/20/2014 10:02 AM
Address/location:	1528 St Marys Rd
Weather:	Damp

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	55
Diameter (in):	50	Type of sediment:	Silt, Sand, Gravel
Upstream feature ID:	Z5_NODE_S20	Infiltration:	None
Downstream feature ID:	Z5_NODE_S20	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):	5	VANDA Condition Rating:	Level 2 - Minor Damage
Downstream rim-inv. (ft.):	10	Prioritization Rating:	Level 5 - Immediate Attention
Material:	CMP	Prioritization Rationale:	Sediment

Notes

Pipe appears to slope down, then bend into a flat horizontal section. This slope change could be the reason for the buildup of sediment at the outlet. Outlet is 48 in. while inlet is 50 in. indicating possible pipe deformation.

Photos



Sketch

View inside pipe from inlet.

SDFA 20 - 1528 St Marys Rd

Culvert Z5_LINK_S20

View inside pipe from outlet.

View of pipe wall from outlet.

View inside pipe from outlet.

View inside pipe from outlet.

SDFA 20 - 1528 St Marys Rd

Culvert Z5_NODE_S20_N2

Evaluation date/time:	11/20/2014 10:02 AM
Address/location:	1528 St Marys Rd
Weather:	Damp

General Information		Condition Information and Ratings	
Latitude:		Susceptible to burial/overgrowth:	Yes
Longitude:		Susceptible to ponding/flooding:	No
Property type:	Public	Sediment/debris depth (%):	55
Access:	Fair	Type of sediment/debris	Silt, Sand, Gravel
Traffic:	Heavy	Infiltration:	None
Ground surface type:	Asphalt, Grass/Dirt	VANDA Condition Rating:	Level 2 - Minor Damage
Dia./Ht. (in.):	50	Prioritization Rating:	Level 5 - Immediate Attention
Width (in.):		Prioritization Rationale:	Sediment
Material:	CMP	Illegal dumping evidence:	No
Grade/rim-invert (ft.):	10		
Water level (%):	0		
Devices:	Debris/Trash Rack		

Notes

Area surrounding inlet appears unstable. Near a mailbox and could pose a safety concern if someone fell. Possibly a debris/trash rack at inlet. Outlet is 48 in. while inlet is 50 in. indicating possible pipe deformation.

Photos

SDFA 20 - 1528 St Marys Rd

Culvert Z5_NODE_S20_N2

Location view.

View of inlet area.

View of inlet.

View of inlet.

View of inlet. Mailbox to right.

View of inlet.

SDFA 20 - 1528 St Marys Rd

Culvert Z5_NODE_S20_N2

View of inlet area.

SDFA 21 - 423 Canyon Rd

Area Map

SDFA 21 - 423 Canyon Rd

Culvert Z6_NODE_S21_N1

Evaluation date/time:	11/20/2014 11:26 AM
Address/location:	423 Canyon Rd
Weather:	Light Rain

General Information		Condition Information and Ratings	
Latitude:	37.822537	Susceptible to burial/overgrowth:	Yes
Longitude:	-122.133379	Susceptible to ponding/flooding:	No
Property type:	Public	Sediment/debris depth (%):	20
Access:	Good	Type of sediment/debris	Silt, Vegetation
Traffic:	Light	Infiltration:	None
Ground surface type:	Asphalt, Grass/Dirt	VANDA Condition Rating:	Level 4 - Severe/Significant Damage
Dia./Ht. (in.):	10	Prioritization Rating:	Level 5 - Immediate Attention
Width (in.):	15	Prioritization Rationale:	Condition, Location
Material:	CMP	Illegal dumping evidence:	No
Grade/rim-invert (ft.):	5		
Water level (%):	10		
Devices:	None		

Notes

Outlet to culvert. Significant/severe corrosion with lower half of pipe missing. Significant scouring of pipe bedding.

Photos

SDFA 21 - 423 Canyon Rd

Culvert Z6_NODE_S21_N1

Location view.

View of outlet area.

View downstream.

SDFA 21 - 423 Canyon Rd

Culvert Z6_LINK_S21

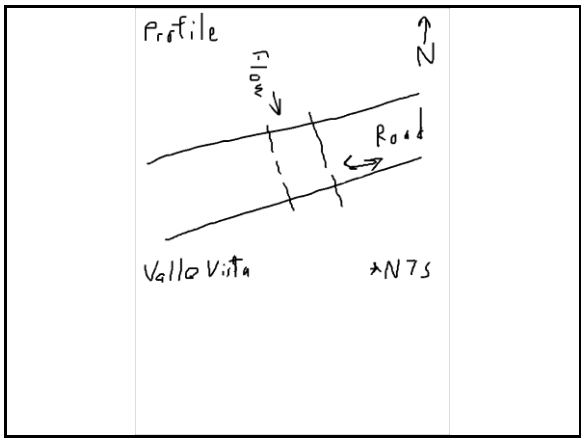
Evaluation date/time:	11/20/2014 11:26 AM
Address/location:	423 Canyon Rd
Weather:	Light Rain

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	20
Diameter (in):	10	Type of sediment:	Silt, Vegetation
Upstream feature ID:	Z6_NODE_S21	Infiltration:	None
Downstream feature ID:	Z6_NODE_S21	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):	4	VANDA Condition Rating:	Level 4 - Severe/Significant Damage
Downstream rim-inv. (ft.):	5	Prioritization Rating:	Level 5 - Immediate Attention
Material:	CMP	Prioritization Rationale:	Condition, Location

Notes

Pipe runs under roadway. Significant/severe corrosion with lower half of pipe missing. Significant scouring of pipe bedding.

Photos



Sketch

View inside pipe from inlet.

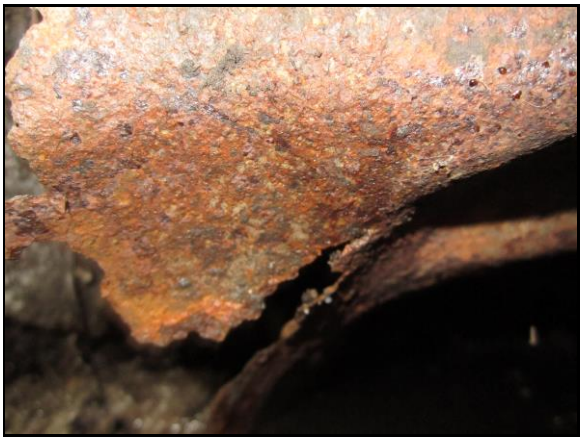
SDFA 21 - 423 Canyon Rd

Culvert Z6_LINK_S21

View inside pipe from inlet.

View inside pipe from outlet.

View inside pipe from outlet.



View of pipe wall at outlet.

SDFA 21 - 423 Canyon Rd

Culvert Z6_NODE_S21_N2

Evaluation date/time:	11/20/2014 11:26 AM
Address/location:	423 Canyon Rd
Weather:	Light Rain

General Information		Condition Information and Ratings	
Latitude:		Susceptible to burial/overgrowth:	Yes
Longitude:		Susceptible to ponding/flooding:	No
Property type:	Public	Sediment/debris depth (%):	20
Access:	Good	Type of sediment/debris	Silt, Vegetation
Traffic:	Light	Infiltration:	None
Ground surface type:	Asphalt, Grass/Dirt	VANDA Condition Rating:	Level 4 - Severe/Significant Damage
Dia./Ht. (in.):	10	Prioritization Rating:	Level 5 - Immediate Attention
Width (in.):	15	Prioritization Rationale:	Condition, Location
Material:	CMP	Illegal dumping evidence:	No
Grade/rim-invert (ft.):	5		
Water level (%):	10		
Devices:	None		

Notes

Inlet to culvert. Significant/severe corrosion with lower half of pipe missing. Significant scouring of pipe bedding.

Photos

SDFA 21 - 423 Canyon Rd

Culvert Z6_NODE_S21_N2

Location view.

View of inlet area.

View of inlet.

View of exterior pipe crown at inlet.

Minor perforations in pipe crown at inlet.

SDFA 22 - Moraga Creek crossing near Camino Pablo and Sanders Ranch Rd

Area Map

SDFA 22 - Moraga Creek crossing near Camino Pablo and Sanders Ranch Rd

Culvert Z7_NODE_S22_N1

Evaluation date/time:	11/20/2014 12:03 PM
Address/location:	Moraga Creek crossing near Camino Pablo and Sanders Ranch Rd
Weather:	Light Rain

General Information		Condition Information and Ratings	
Latitude:	37.815178	Susceptible to burial/overgrowth:	No
Longitude:	-122.116237	Susceptible to ponding/flooding:	No
Property type:	Public	Sediment/debris depth (%):	0
Access:	Fair	Type of sediment/debris	None
Traffic:	Light	Infiltration:	Stain
Ground surface type:	Grass/Dirt	VANDA Condition Rating:	Level 2 - Minor Damage
Dia./Ht. (in.):	80	Prioritization Rating:	Level 2 - Good
Width (in.):		Prioritization Rationale:	Condition
Material:	CMP	Illegal dumping evidence:	No
Grade/rim-invert (ft.):	15		
Water level (%):	5		
Devices:	Headwall, Wingwall(s)		

Notes

Outlet to culvert. There is a 16-in. RCP near the outlet. Evidence of vandalism/unauthorized access warrants safety concerns.

Photos

SDFA 22 - Moraga Creek crossing near Camino Pablo and Sanders Ranch Rd

Culvert Z7_NODE_S22_N1

Location view.

Location view.

View of outlet area.

View of outlet.

View of outlet.

View of outlet.

SDFA 22 - Moraga Creek crossing near Camino Pablo and Sanders Ranch Rd

Culvert Z7_NODE_S22_N1

View downstream.

View of nearby 16-in. RCP outlet.

View inside nearby 16-in. RCP outlet.

Offset joint inside nearby 16-in. RCP outlet.

View of outlet.

SDFA 22 - Moraga Creek crossing near Camino Pablo and Sanders Ranch Rd

Culvert Z7_LINK_S22

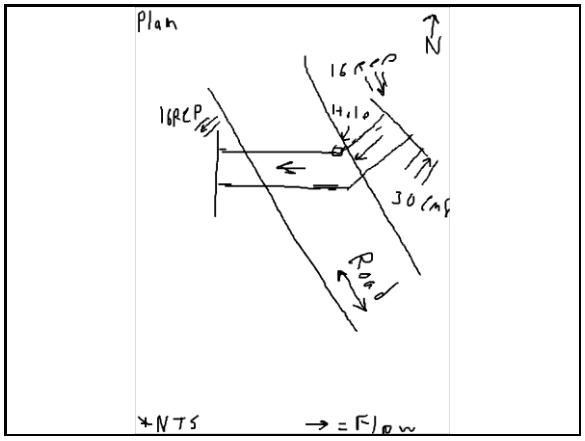
Evaluation date/time:	11/20/2014 12:03 PM
Address/location:	Moraga Creek crossing near Camino Pablo and Sanders Ranch Rd
Weather:	Light Rain

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	0
Diameter (in):	80	Type of sediment:	None
Upstream feature ID:	Z7_NODE_S22	Infiltration:	Stain
Downstream feature ID:	Z7_NODE_S22	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):	15	VANDA Condition Rating:	Level 2 - Minor Damage
Downstream rim-inv. (ft.):	15	Prioritization Rating:	Level 3 - Fair
Material:	CMP	Prioritization Rationale:	Condition, Location

Notes

Pipe runs under roadway. The pipe is in overall good condition. There is some infiltration staining/encrustation. There is one hole in the pipe wall near the bend, but there is another later of metal material behind the hole. The invert has a concrete formed channel. There is a coating on the upstream portion of the pipe. There is some minor surface corrosion near the concrete invert.

Photos



Sketch


View inside pipe from outlet.

SDFA 22 - Moraga Creek crossing near Camino Pablo and Sanders Ranch Rd

Culvert Z7_LINK_S22

View of invert at outlet.

View inside pipe from outlet.

View outside pipe from outlet.

Joint seal.

Infiltration staining.

View inside pipe heading from outlet to inlet.

SDFA 22 - Moraga Creek crossing near Camino Pablo and Sanders Ranch Rd

Culvert Z7_LINK_S22

View of encrustation on pipe wall.

Hole in pipe wall.

View inside hole in pipe wall. Appears to be another layer of metal material within the hole.

View inside hole in pipe wall. Appears to be another layer of metal material within the hole.

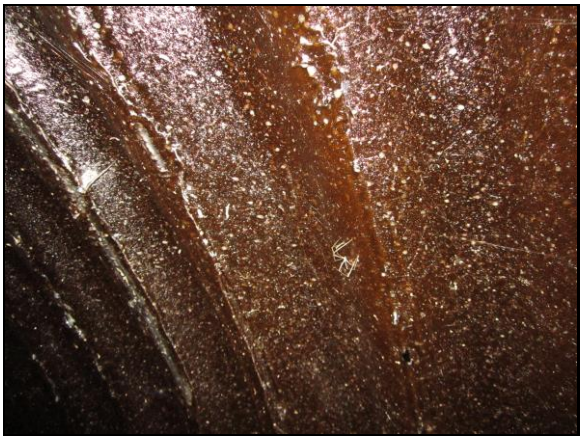
View of pipe bend before inlet.

View inside pipe towards inlet.

SDFA 22 - Moraga Creek crossing near Camino Pablo and Sanders Ranch Rd

Culvert Z7_LINK_S22

View inside pipe towards outlet.



View of pipe wall at bend.

View of pipe wall at inlet.

SDFA 22 - Moraga Creek crossing near Camino Pablo and Sanders Ranch Rd

Culvert Z7_NODE_S22_N2

Evaluation date/time:	11/20/2014 12:03 PM
Address/location:	Moraga Creek crossing near Camino Pablo and Sanders Ranch Rd
Weather:	Light Rain

General Information		Condition Information and Ratings	
Latitude:		Susceptible to burial/overgrowth:	No
Longitude:		Susceptible to ponding/flooding:	No
Property type:	Public	Sediment/debris depth (%):	0
Access:	Fair	Type of sediment/debris	None
Traffic:	Light	Infiltration:	Stain
Ground surface type:	Grass/Dirt	VANDA Condition Rating:	Level 1 - No Damage
Dia./Ht. (in.):	80	Prioritization Rating:	Level 2 - Good
Width (in.):		Prioritization Rationale:	Condition, Safety
Material:	CMP	Illegal dumping evidence:	No
Grade/rim-invert (ft.):	15		
Water level (%):	5		
Devices:	Headwall, Wingwall(s)		

Notes

Inlet to culvert. There is a 16-in. RCP and a 30-in. CMP near the inlet.

Photos

SDFA 22 - Moraga Creek crossing near Camino Pablo and Sanders Ranch Rd

Culvert Z7_NODE_S22_N2

View of inlet.

View of inlet area.

View upstream.

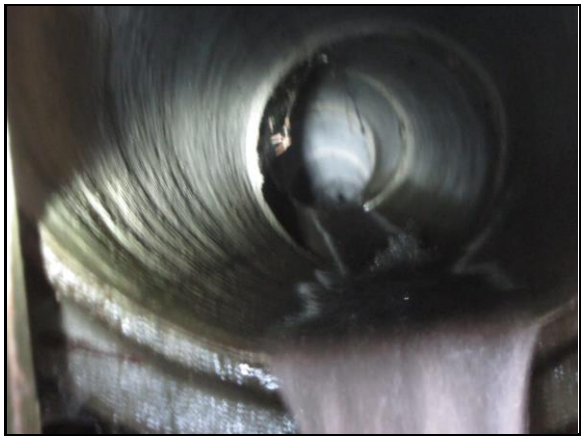
View of inlet area.

View of nearby 16-in. RCP outlet.

View inside nearby 16-in. RCP outlet.

SDFA 22 - Moraga Creek crossing near Camino Pablo and Sanders Ranch Rd

Culvert Z7_NODE_S22_N2



View inside nearby 16-in. RCP outlet.

View of nearby 30-in. CMP outlet.

View inside nearby 30-in. CMP outlet.

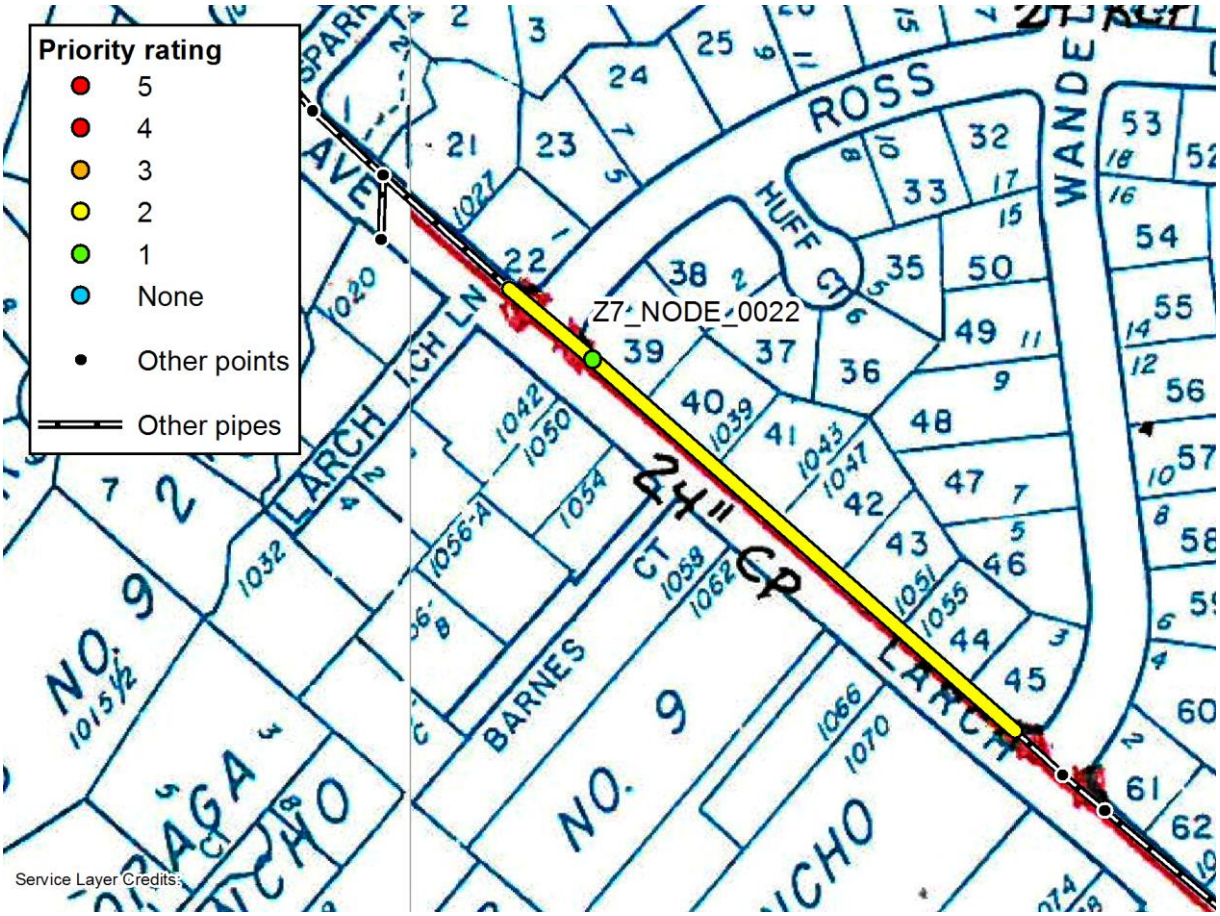
View of invert of nearby 30-in. CMP outlet.

View of inlet.

Location view.

SDFA 23 - Larch Ave and Ross Dr

Area Map



SDFA 23 - Larch Ave and Ross Dr

Culvert Z7_NODE_0022

Evaluation date/time:	11/20/2014 2:03 PM
Address/location:	Larch Ave and Ross Dr
Weather:	Damp

General Information

Latitude:	37.828569
Longitude:	-122.128301
Property type:	Public
Access:	Good
Traffic:	Light
Ground surface type:	Asphalt, Concrete
Dia./Ht. (in.):	24
Width (in.):	
Material:	RCP
Grade/rim-invert (ft.):	4.7
Water level (%):	10
Devices:	Debris/Trash Rack

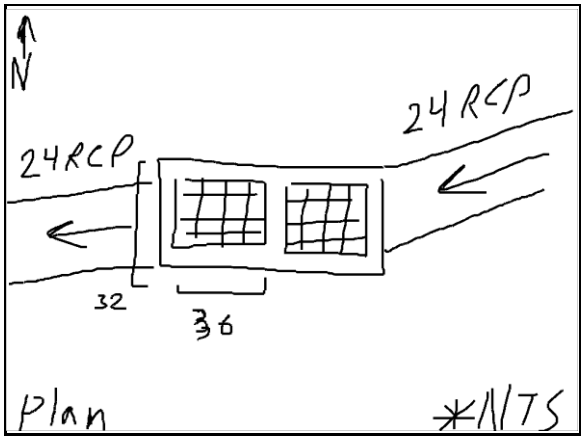
Condition Information and Ratings

Susceptible to burial/overgrowth:	No
Susceptible to ponding/flooding:	Yes
Sediment/debris depth (%):	5
Type of sediment/debris	Silt, Vegetation
Infiltration:	None
VANDA Condition Rating:	Level 1 - No Damage
Prioritization Rating:	Level 2 - Good
Prioritization Rationale:	Condition, Location
Illegal dumping evidence:	No

Notes

Good condition.

Photos



Sketch


Location view.

SDFA 23 - Larch Ave and Ross Dr

Culvert Z7_NODE_0022

Debris buildup and ponding.

View of catch basin.

Location view.

View of inlet pipe.

View of outlet pipe.

View inside catch basin.

SDFA 23 - Larch Ave and Ross Dr

Culvert Z7_NODE_0022

Direction of flow.

SDFA 23 - Larch Ave and Ross Dr

Culvert Z7_LINK_S23_P1

Evaluation date/time:	11/20/2014 2:03 PM
Address/location:	Larch Ave and Ross Dr
Weather:	Damp

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	5
Diameter (in):	24	Type of sediment:	Silt, Vegetation
Upstream feature ID:	Z7_NODE_0022	Infiltration:	None
Downstream feature ID:		Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):	4.7	VANDA Condition Rating:	Level 1 - No Damage
Downstream rim-inv. (ft.):		Prioritization Rating:	Level 2 - Good
Material:	RCP	Prioritization Rationale:	Condition, Location

Notes

Outlet pipe. Pipe runs under roadway. Pipe is noted as CMP per GIS, but is actually RCP. Please refer to included videos for visuals.

Photos

SDFA 23 - Larch Ave and Ross Dr

Culvert Z7_LINK_S23_P2

Evaluation date/time:	11/20/2014 2:03 PM
Address/location:	Larch Ave and Ross Dr
Weather:	Damp

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	5
Diameter (in):	24	Type of sediment:	Silt, Vegetation
Upstream feature ID:		Infiltration:	None
Downstream feature ID:	Z7_NODE_0022	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):		VANDA Condition Rating:	Level 1 - No Damage
Downstream rim-inv. (ft.):	4.7	Prioritization Rating:	Level 2 - Good
Material:	RCP	Prioritization Rationale:	Condition, Location

Notes

Inlet pipe. Pipe runs under roadway. Pipe is noted as CMP per GIS, but is actually RCP. Please refer to included videos for visuals.

Photos

SDFA 24 - Paseo Del Rio

Area Map

SDFA 24 - Paseo Del Rio

Catch Basin Z1_NODE_0204

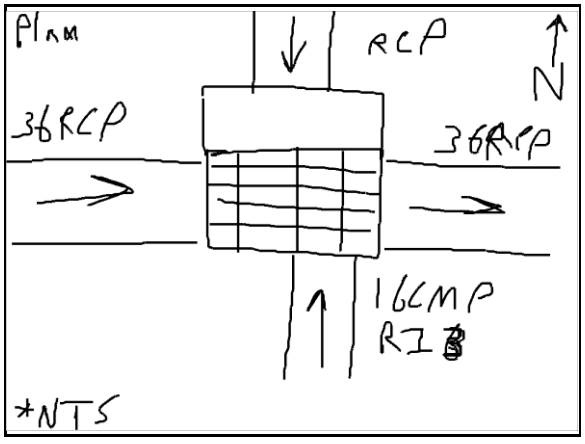
Evaluation date/time:	11/20/2014 4:50 PM
Address/location:	Paseo Del Rio
Weather:	Damp

General Information		Condition Information and Ratings	
Latitude:	37.872624	Susceptible to burial/overgrowth:	No
Longitude:	-122.131201	Susceptible to ponding/flooding:	No
Property type:	Public	Sediment/debris depth (%):	0
Access:	Good	Type of sediment/debris	None
Traffic:	None	Infiltration:	None
Ground surface type:	Asphalt, Concrete	VANDA Condition Rating:	Level 1 - No Damage
Dia./Ht. (in.):	36	Prioritization Rating:	Level 1 - Excellent
Width (in.):	32	Prioritization Rationale:	Condition
Material:	Concrete	Illegal dumping evidence:	No
Grade/rim-invert (ft.):	9		
Water level (%):	5		
Devices:	Debris/Trash Rack		

Notes

Connected to two 36 in. RCP, 16 in. CMP, and unknown diameter RCP. Unable to determine RCP dimensions and grade to invert due to position within catch basin.

Photos



Sketch

SDFA 24 - Paseo Del Rio

Catch Basin Z1_NODE_0204

View of catch basin.

View inside catch basin.

View of 36-in. RCP outlet and 16-in. CMP inlet.

Direction of flow.

View of 36-in. RCP inlet.

SDFA 24 - Paseo Del Rio

Catch Basin Z1_NODE_0204

View of 16-in. CMP inlet.

Location view.

SDFA 24 - Paseo Del Rio

Catch Basin Z1_LINK_0162

Evaluation date/time:	11/20/2014 4:50 PM
Address/location:	Paseo Del Rio
Weather:	Damp

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	0
Diameter (in):	15	Type of sediment:	None
Upstream feature ID:	Z1_NODE_0204	Infiltration:	None
Downstream feature ID:		Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):		VANDA Condition Rating:	Level 1 - No Damage
Downstream rim-inv. (ft.):	0	Prioritization Rating:	Level 1 - Excellent
Material:	RCP	Prioritization Rationale:	Condition

Notes

Outlet 36 in. RCP. Please refer to included videos for visuals.

Photos

SDFA 24 - Paseo Del Rio

Catch Basin Z1_LINK_0175

Evaluation date/time:	11/20/2014 4:50 PM
Address/location:	Paseo Del Rio
Weather:	Damp

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	0
Diameter (in):	15	Type of sediment:	None
Upstream feature ID:		Infiltration:	None
Downstream feature ID:	Z1_NODE_0204	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):		VANDA Condition Rating:	Level 2 - Minor Damage
Downstream rim-inv. (ft.):	0	Prioritization Rating:	Level 2 - Good
Material:	CMP	Prioritization Rationale:	Condition

Notes

West inlet 16 in. CMP. Please refer to included videos for visuals.

Photos

SDFA 24 - Paseo Del Rio

Catch Basin Z1_LINK_0163

Evaluation date/time:	11/20/2014 4:50 PM
Address/location:	Paseo Del Rio
Weather:	Damp

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	0
Diameter (in):	15	Type of sediment:	None
Upstream feature ID:		Infiltration:	None
Downstream feature ID:	Z1_NODE_0204	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):		VANDA Condition Rating:	Level 1 - No Damage
Downstream rim-inv. (ft.):	0	Prioritization Rating:	Level 1 - Excellent
Material:	RCP	Prioritization Rationale:	Condition

Notes

North inlet 36 in. RCP. Please refer to included videos for visuals.

Photos

SDFA 24 - Paseo Del Rio

Catch Basin Z1_LINK_0176

Evaluation date/time:	11/20/2014 4:50 PM
Address/location:	Paseo Del Rio
Weather:	Damp

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	0
Diameter (in):	24	Type of sediment:	None
Upstream feature ID:		Infiltration:	None
Downstream feature ID:	Z1_NODE_0204	Obstruction/Deflection (%)	0
Upstream rim-inv. (ft.):		VANDA Condition Rating:	Level 1 - No Damage
Downstream rim-inv. (ft.):	0	Prioritization Rating:	Level 1 - Excellent
Material:	RCP	Prioritization Rationale:	Condition

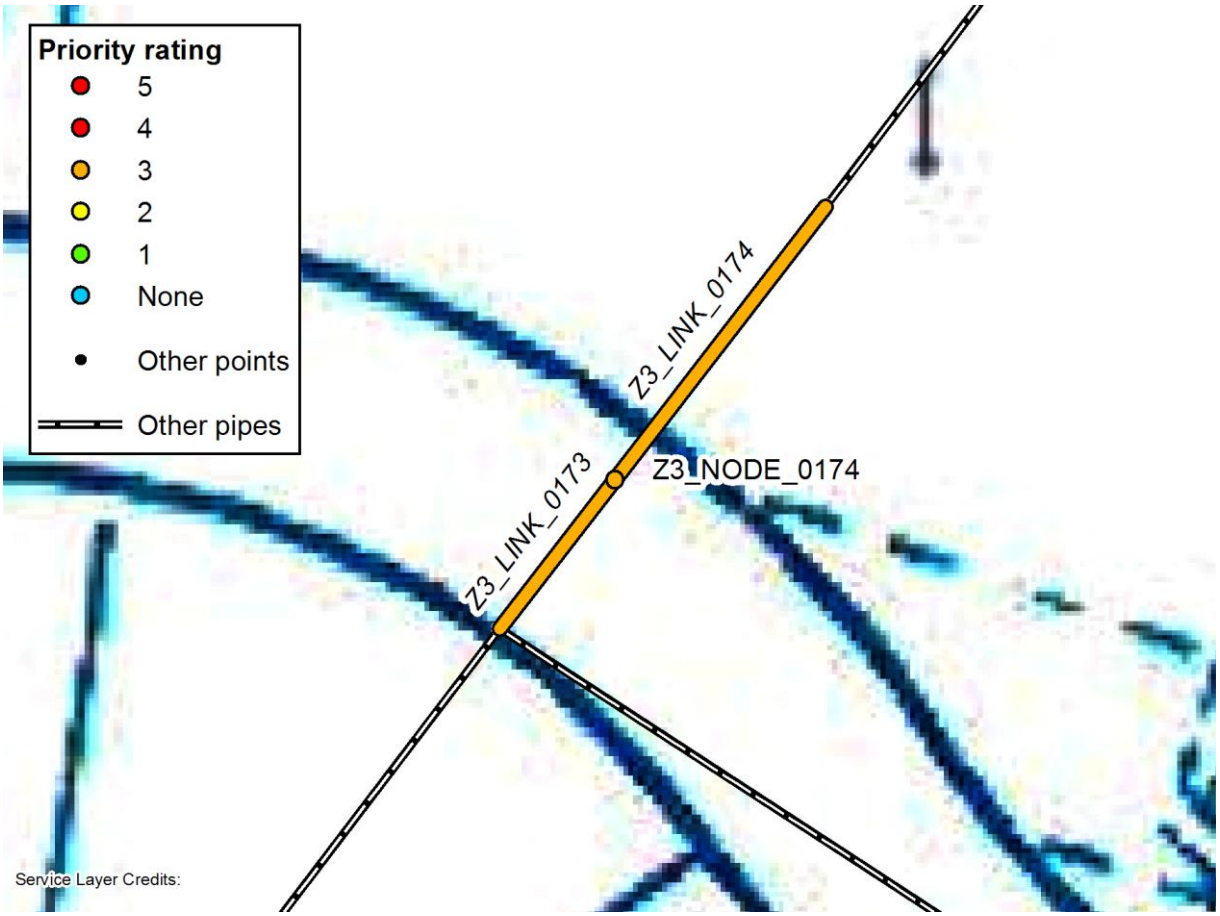
Notes

East inlet unknown diameter RCP. Unable to determine RCP dimensions and grade to invert due to position within catch basin. Please refer to included videos for visuals.

Photos

SDFA 25 - Draeger Dr

Area Map



SDFA 25 - Draeger Dr

Catch Basin Z3_NODE_0174

Evaluation date/time:	11/20/2014 5:17 PM
Address/location:	Draeger Dr
Weather:	Light Rain

General Information

Latitude:	
Longitude:	
Property type:	Public
Access:	Good
Traffic:	Light
Ground surface type:	Asphalt, Concrete
Dia./Ht. (in.):	36
Width (in.):	32
Material:	Concrete
Grade/rim-invert (ft.):	0
Water level (%):	5
Devices:	Debris/Trash Rack

Condition Information and Ratings

Susceptible to burial/overgrowth:	No
Susceptible to ponding/flooding:	No
Sediment/debris depth (%):	
Type of sediment/debris	Unknown
Infiltration:	Unknown
VANDA Condition Rating:	Unknown
Prioritization Rating:	Level 3 - Fair
Prioritization Rationale:	Condition
Illegal dumping evidence:	No

Notes

Unable to evaluate due to bolted catch basin grate.

Photos

Location view.

SDFA 25 - Draeger Dr

Catch Basin Z3_LINK_0173

Evaluation date/time:	11/20/2014 5:17 PM
Address/location:	Draeger Dr
Weather:	Light Rain

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	
Diameter (in):		Type of sediment:	Unknown
Upstream feature ID:	Z3_NODE_0174	Infiltration:	Unknown
Downstream feature ID:		Obstruction/Deflection (%)	
Upstream rim-inv. (ft.):	0	VANDA Condition Rating:	Unknown
Downstream rim-inv. (ft.):	0	Prioritization Rating:	Level 3 - Fair
Material:	Unknown	Prioritization Rationale:	Condition

Notes

Outlet pipe. Unable to evaluate due to bolted catch basin grate. Pipe runs under roadway and residence. Pipe appears to be CMP.

Photos

SDFA 25 - Draeger Dr

Catch Basin Z3_LINK_0174

Evaluation date/time:	11/20/2014 5:17 PM
Address/location:	Draeger Dr
Weather:	Light Rain

General Information		Condition Information and Ratings	
Property type:	Public	Sediment depth (%):	
Diameter (in):		Type of sediment:	Unknown
Upstream feature ID:		Infiltration:	Unknown
Downstream feature ID:	Z3_NODE_0174	Obstruction/Deflection (%)	
Upstream rim-inv. (ft.):	0	VANDA Condition Rating:	Unknown
Downstream rim-inv. (ft.):	0	Prioritization Rating:	Level 3 - Fair
Material:	Unknown	Prioritization Rationale:	Condition

Notes

Inlet pipe. Unable to evaluate due to bolted catch basin grate. Pipe runs under roadway and residence. Pipe appears to be CMP.

Photos

APPENDIX B

Culvert Field Sheets and Photos

Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

JOB # TMOR.01.14
DATE 4-2-15
OBSERVED BY RJL/LNF

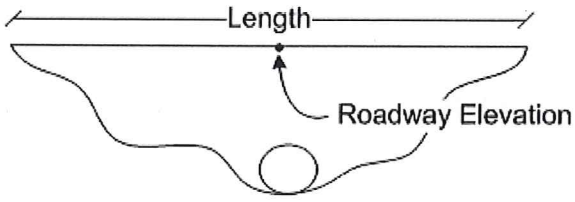
CREEK Larch LOCATION Wandel LacC 1

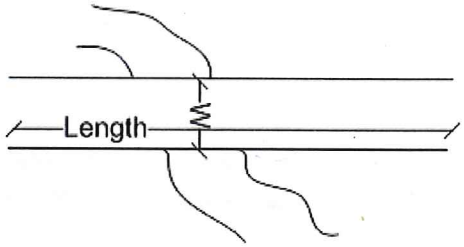
ROADWAY DATA (All data shall be given looking downstream)

TYPE: BRIDGE CULVERT: BOX (PIPE)

LENGTH OF ROADWAY 12 (ft) SKEW _____ (deg) (L up strm)

BOT. WIDTH 58' (ft) SIDE SLOPES L _____ R _____





CULVERT DATA

BOX:

TYPE	# OF BOXES	WIDTH	HEIGHT	DIST bwtn BOX

PIPE:

TYPE	# OF PIPES	DIAMETER	DIST btwn PIPES
CMP	1	~~88"~~ 64" (H) x 88"(W)	∅

N-VALUES

UPSTREAM
LOB .055
Channel .05
ROB .055

DOWNSTREAM
LOB .025
Channel .093
ROB .045

Manning's n for Channels (Chow, 1959).

Type of Channel and Description	Minimum	Normal	Maximum
Natural streams - minor streams (top width at floodstage < 100 ft)			
1. Main Channels			
a. clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
b. same as above, but more stones and weeds	0.030	0.035	0.040
c. clean, winding, some pools and shoals	0.033	0.040	0.045
d. same as above, but some weeds and stones	0.035	0.045	0.050
e. same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
f. same as "d" with more stones	0.045	0.050	0.060
g. sluggish reaches, weedy, deep pools	0.050	0.070	0.080
h. very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150
2. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
a. bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
b. bottom: cobbles with large boulders	0.040	0.050	0.070

Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

BRIDGE DATA

RAILING

TYPE _____ HEIGHT _____

LENGTH _____ % OPEN SPACE _____

HEIGHTS

INVERT TO LOW CHORD _____ INVERT TO TOP OF ROAD _____

LOW CHORD TO TOP OF ROAD _____

PIER DATA

SHAPE: # ■■■■ ——— # SETS OF PIERS_____ WIDTH _____

●●●● ═══

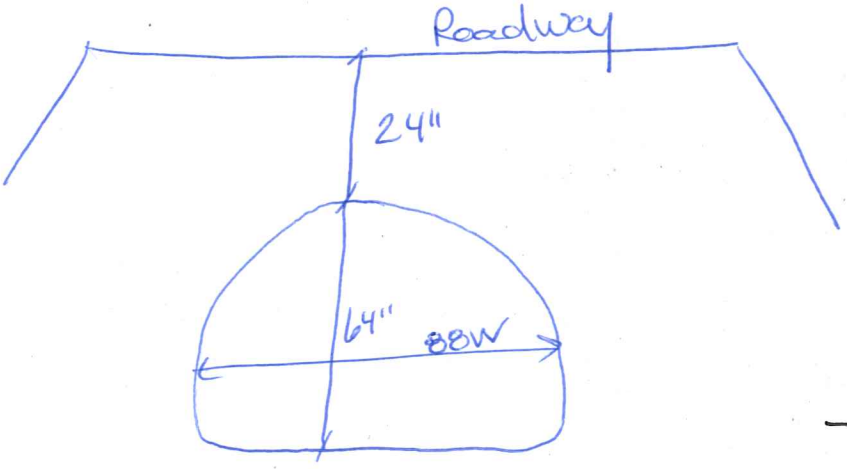
▬▬ ◀▬▬▶ SPACING _____

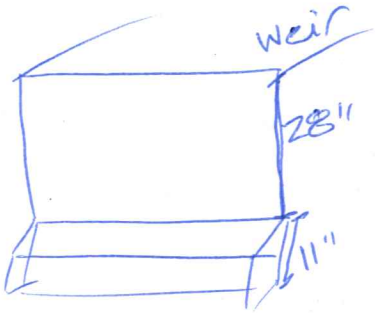
WINGWALL DATA

	TYPE (str8 / warped)	ANGLE (from CL)	LENGTH
UPSTREAM			
DOWNSTREAM			

NOTES: Weir drop u/s invert
D/s Right bank concrete riprap

SKETCH:





	X	Y
u/s	250.45	481.2
d/s	226.47	482.34

Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

JOB # TMOR.01.14
DATE 4-2-05
OBSERVED BY RJL/LNF

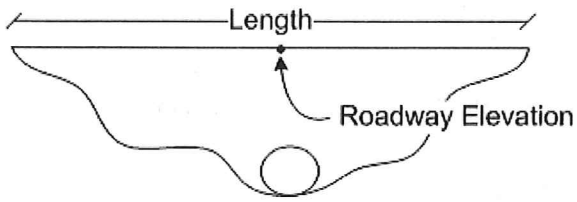
CREEK Larch LOCATION Camino Pablo LacC2

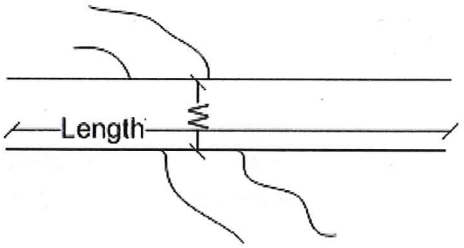
ROADWAY DATA (All data shall be given looking downstream)

TYPE: BRIDGE CULVERT: BOX (PIPE)

LENGTH OF ROADWAY 35' (ft) SKEW _____ (deg) (L up strm)

BOT. WIDTH google est. (ft) SIDE SLOPES L _____ R _____





CULVERT DATA

BOX:

TYPE	# OF BOXES	WIDTH	HEIGHT	DIST bwtn BOX

PIPE:

TYPE	# OF PIPES	DIAMETER	DIST btwn PIPES
RCP CMP	2	72"	2'

N-VALUES

UPSTREAM
LOB .03 (above wall)
Channel .04
ROB .045

DOWNSTREAM
LOB .04
Channel .03
ROB .04

Manning's n for Channels (Chow, 1959).

Type of Channel and Description	Minimum	Normal	Maximum
Natural streams - minor streams (top width at floodstage < 100 ft)			
1. Main Channels			
a. clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
b. same as above, but more stones and weeds	0.030	0.035	0.040
c. clean, winding, some pools and shoals	0.033	0.040	0.045
d. same as above, but some weeds and stones	0.035	0.045	0.050
e. same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
f. same as "d" with more stones	0.045	0.050	0.060
g. sluggish reaches, weedy, deep pools	0.050	0.070	0.080
h. very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150
2. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
a. bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
b. bottom: cobbles with large boulders	0.040	0.050	0.070

Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

BRIDGE DATA

RAILING

TYPE ______________ HEIGHT ______________

LENGTH ______________ % OPEN SPACE ______________

HEIGHTS

INVERT TO LOW CHORD __________ INVERT TO TOP OF ROAD 8'5"

LOW CHORD TO TOP OF ROAD ______

PIER DATA

SHAPE: # ■■■■ ●—● # SETS OF PIERS ________ WIDTH ________

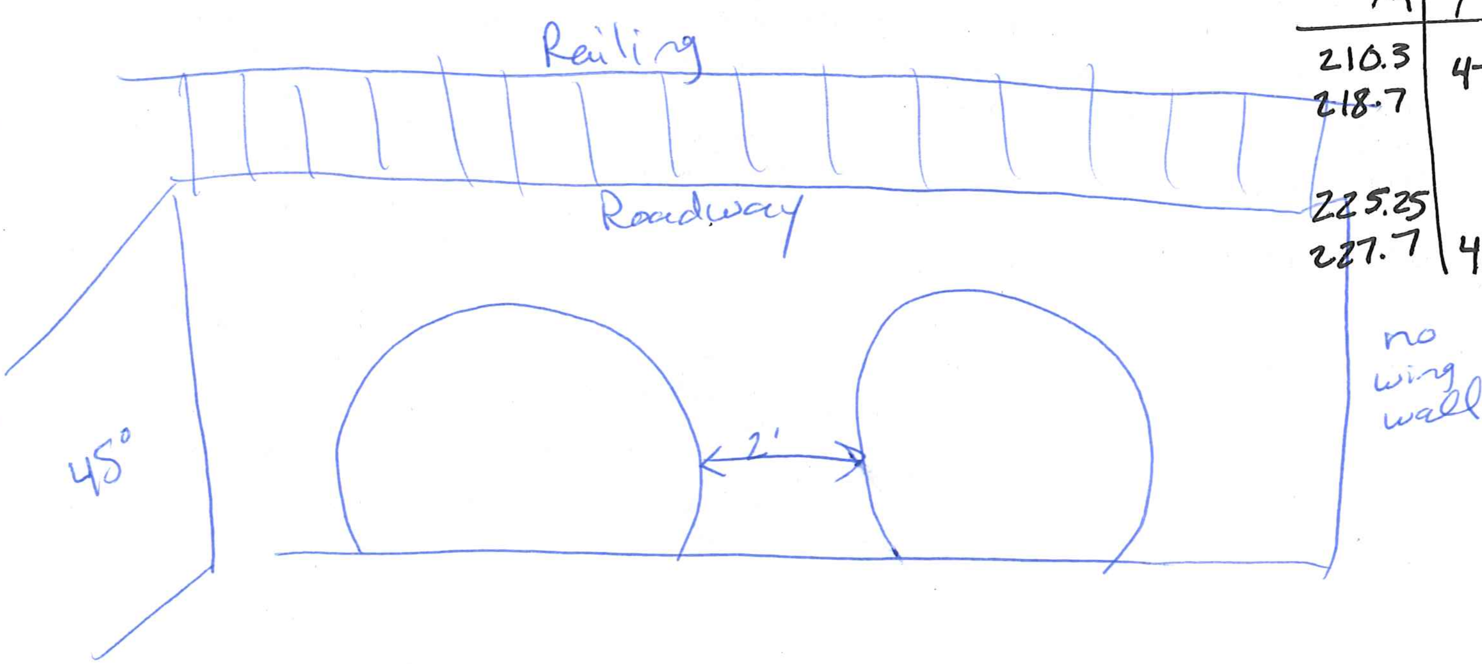
\# ●●●● ▬ ▬ SPACING ________

WINGWALL DATA

	TYPE (str8 / warped)	ANGLE (from CL)	LENGTH
UPSTREAM			
DOWNSTREAM			

NOTES: U/S left bank is concrete wall 3½'
Culverts have concrete lining then CMP pipe.
on Left U/S culvert CMP is tearing away.
Recomend future monitoring of condition.

SKETCH:



X	Y
210.3	470.5
218.7	
225.25	
227.7	470

Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

JOB # THOR.01.14
DATE 4-9-15
OBSERVED BY RJL/LNF

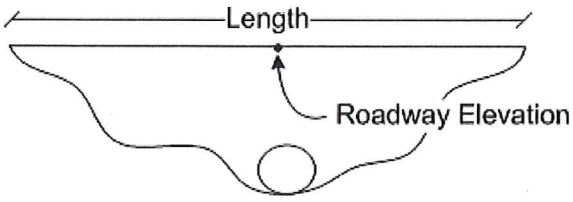
CREEK Larch LOCATION Corte Maria Lad C2.5

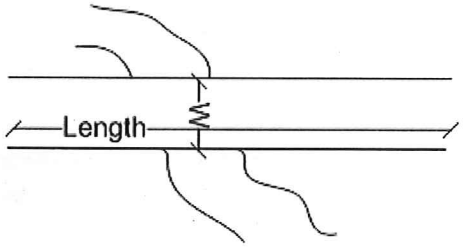
ROADWAY DATA (All data shall be given looking downstream)

TYPE: BRIDGE CULVERT: BOX (PIPE)

LENGTH OF ROADWAY _____ (ft) SKEW _____ (deg) (L up strm)

BOT. WIDTH _____ (ft) SIDE SLOPES L _____ R _____





CULVERT DATA

BOX:

TYPE	# OF BOXES	WIDTH	HEIGHT	DIST bwtn BOX

PIPE:

TYPE	# OF PIPES	DIAMETER	DIST btwn PIPES
RCP Arch		16'10"W x 54"(H)	

N-VALUES

UPSTREAM
LOB _____
Channel _____
ROB _____

DOWNSTREAM
LOB _____
Channel _____
ROB _____

Manning's n for Channels (Chow, 1959).

Type of Channel and Description	Minimum	Normal	Maximum
Natural streams - minor streams (top width at floodstage < 100 ft)			
1. Main Channels			
a. clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
b. same as above, but more stones and weeds	0.030	0.035	0.040
c. clean, winding, some pools and shoals	0.033	0.040	0.045
d. same as above, but some weeds and stones	0.035	0.045	0.050
e. same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
f. same as "d" with more stones	0.045	0.050	0.060
g. sluggish reaches, weedy, deep pools	0.050	0.070	0.080
h. very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150
2. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
a. bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
b. bottom: cobbles with large boulders	0.040	0.050	0.070

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BRIDGE DATA

RAILING

TYPE Metal HEIGHT 4'

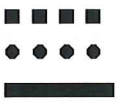
LENGTH _____ % OPEN SPACE 90

HEIGHTS

INVERT TO LOW CHORD _____ INVERT TO TOP OF ROAD _____

LOW CHORD TO TOP OF ROAD _____

PIER DATA

SHAPE: #   # SETS OF PIERS_____ WIDTH _____

#

SPACING _____

WINGWALL DATA

	TYPE (str8 / warped)	ANGLE (from CL)	LENGTH
UPSTREAM		45°	
DOWNSTREAM		~~45°~~ none	

NOTES: Not previously studied, perhaps new development. Looks new. u/s has some sediment. Private? 13yr. old. Property owners own land that is creek. & paid for cleaning on culvert.

SKETCH:

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CONSULTING CIVIL ENGINEERS

JOB # TMOR.01.14
DATE 4-2-15
OBSERVED BY RJL/LNF

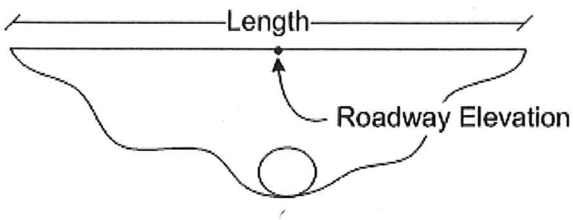
CREEK Larch Creek LOCATION LacC3

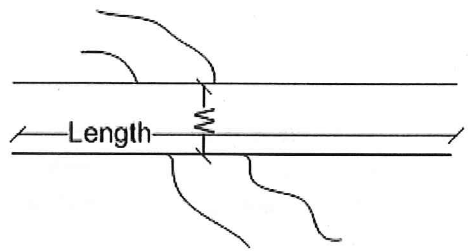
ROADWAY DATA (All data shall be given looking downstream)

TYPE: BRIDGE CULVERT: (BOX) PIPE

LENGTH OF ROADWAY 50' (ft) SKEW ______ (deg) (L up strm)

BOT. WIDTH 12' (ft) SIDE SLOPES L ______ R ______





CULVERT DATA

BOX:

TYPE	# OF BOXES	WIDTH	HEIGHT	DIST bwtn BOX
CBC	1	10'	4.4 ft	

PIPE:

TYPE	# OF PIPES	DIAMETER	DIST btwn PIPES

N-VALUES

UPSTREAM
LOB ~~[illegible]~~ .05
Channel .035
ROB ~~[illegible]~~ .05

DOWNSTREAM
LOB .05
Channel .035
ROB .05

Manning's n for Channels (Chow, 1959).

Type of Channel and Description	Minimum	Normal	Maximum
Natural streams - minor streams (top width at floodstage < 100 ft)			
1. Main Channels			
a. clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
b. same as above, but more stones and weeds	0.030	0.035	0.040
c. clean, winding, some pools and shoals	0.033	0.040	0.045
d. same as above, but some weeds and stones	0.035	0.045	0.050
e. same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
f. same as "d" with more stones	0.045	0.050	0.060
g. sluggish reaches, weedy, deep pools	0.050	0.070	0.080
h. very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150
2. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
a. bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
b. bottom: cobbles with large boulders	0.040	0.050	0.070

Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

BRIDGE DATA

RAILING

TYPE _____ HEIGHT _____

LENGTH _____ % OPEN SPACE _____

HEIGHTS

INVERT TO LOW CHORD _____ INVERT TO TOP OF ROAD 6'

LOW CHORD TO TOP OF ROAD _____

PIER DATA

SHAPE: # ■■■■ ——— # SETS OF PIERS_____ WIDTH _____

●●●● ═══

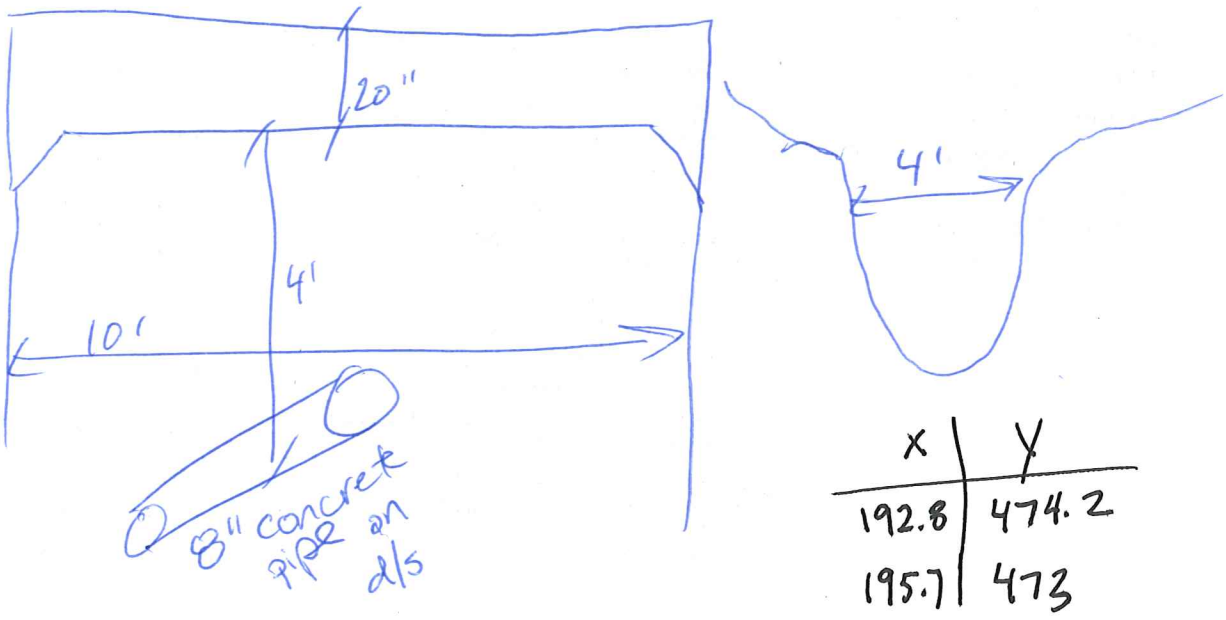
▬▬ ◀═══ SPACING _____

WINGWALL DATA

	TYPE (str8 / warped)	ANGLE (from CL)	LENGTH
UPSTREAM			
DOWNSTREAM			

NOTES: Problem area noted by Town staff
Bad smell

SKETCH:



X	Y
192.8	474.2
195.7	473

Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

JOB # TMDR.01.14
DATE 4-2-15
OBSERVED BY RJL/LNF

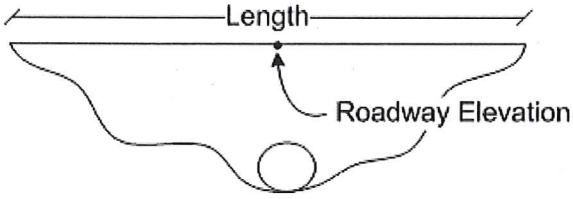
CREEK Las Trampas LOCATION St. Marys Rd. LTC1

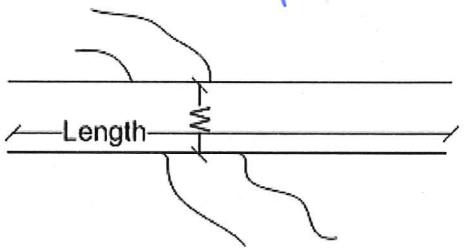
ROADWAY DATA (All data shall be given looking downstream)

TYPE: BRIDGE CULVERT: (BOX) PIPE

LENGTH OF ROADWAY 51' (ft) SKEW _____ (deg) (L up strm)

BOT. WIDTH google est. (ft) SIDE SLOPES L _____ R _____
steep!





CULVERT DATA

BOX:

TYPE	# OF BOXES	WIDTH	HEIGHT	DIST bwtn BOX
RCP	1	8'	8'	

PIPE:

TYPE	# OF PIPES	DIAMETER	DIST btwn PIPES

N-VALUES

UPSTREAM
LOB .05
Channel .04
ROB .05

DOWNSTREAM
LOB .04
Channel .035
ROB .035

Manning's n for Channels (Chow, 1959).

Type of Channel and Description	Minimum	Normal	Maximum
Natural streams - minor streams (top width at floodstage < 100 ft)			
1. Main Channels			
a. clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
b. same as above, but more stones and weeds	0.030	0.035	0.040
c. clean, winding, some pools and shoals	0.033	0.040	0.045
d. same as above, but some weeds and stones	0.035	0.045	0.050
e. same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
f. same as "d" with more stones	0.045	0.050	0.060
g. sluggish reaches, weedy, deep pools	0.050	0.070	0.080
h. very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150
2. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
a. bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
b. bottom: cobbles with large boulders	0.040	0.050	0.070

Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

BRIDGE DATA

RAILING

TYPE ____________________ HEIGHT ____________________

LENGTH ____________________ % OPEN SPACE ____________________

HEIGHTS

INVERT TO LOW CHORD __________ INVERT TO TOP OF ROAD ~28'

LOW CHORD TO TOP OF ROAD ______

PIER DATA

SHAPE: # ________ # SETS OF PIERS ________ WIDTH ________

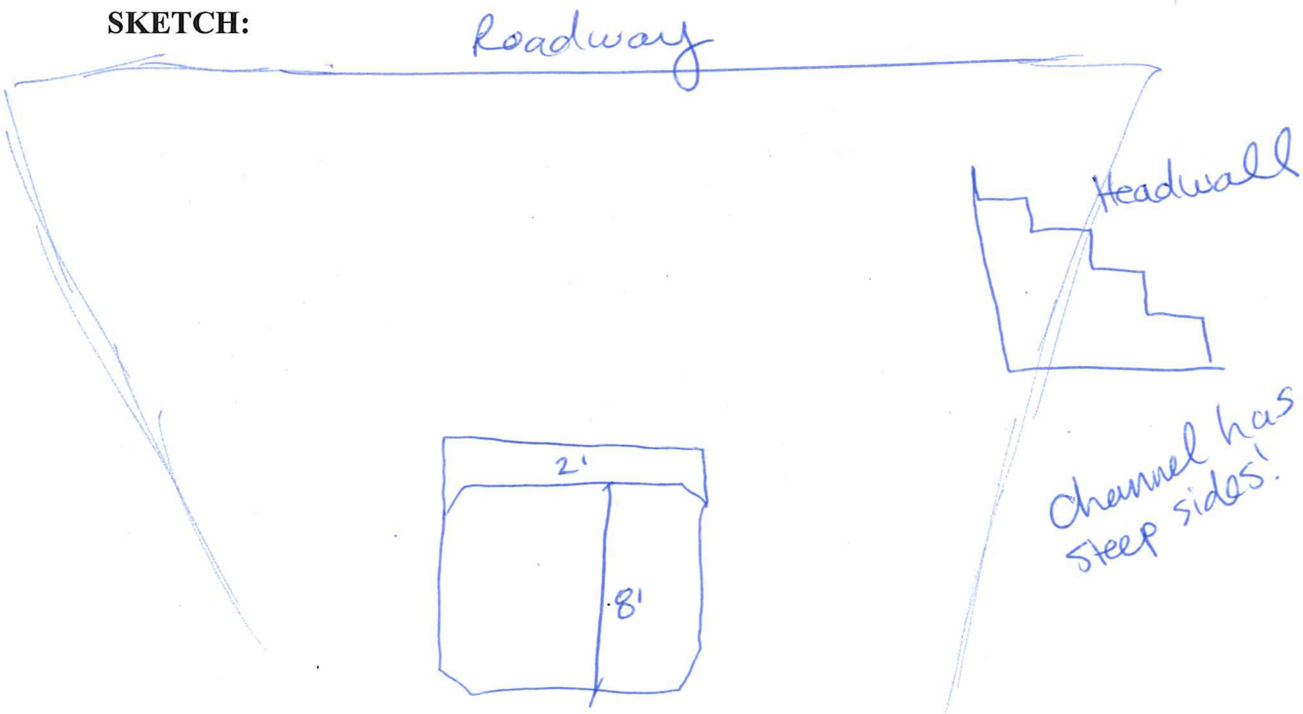
\# ________ SPACING ________

WINGWALL DATA

	TYPE (str8 / warped)	ANGLE (from CL)	LENGTH
UPSTREAM		0°	
DOWNSTREAM		0°	

NOTES: Very deep & steep channel. Not too much vegetation but woody and rocky. Nice artwork!

SKETCH:



Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

JOB # TMOR.01.14
DATE 4-9-15
OBSERVED BY RJC/LNF

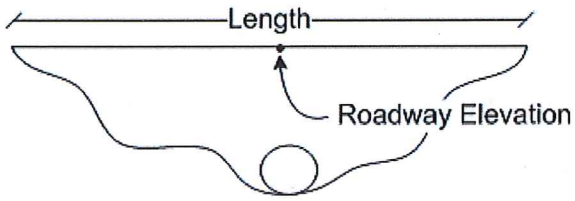
CREEK Las Trampas LOCATION LTC2, trib.

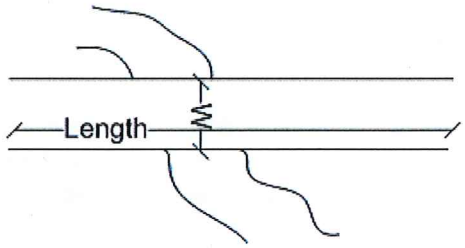
ROADWAY DATA (All data shall be given looking downstream)

TYPE: BRIDGE CULVERT: BOX (PIPE)

LENGTH OF ROADWAY _____ (ft) SKEW _____ (deg) (L up strm)

BOT. WIDTH google (ft) SIDE SLOPES L _____ R _____





CULVERT DATA

BOX:

TYPE	# OF BOXES	WIDTH	HEIGHT	DIST bwtn BOX

PIPE:

TYPE	# OF PIPES	DIAMETER	DIST btwn PIPES
CMP	1	Arch 55 54" W x 32"	

N-VALUES

UPSTREAM
LOB _____
Channel _____
ROB _____

DOWNSTREAM
LOB _____
Channel _____
ROB _____

Manning's n for Channels (Chow, 1959).

Type of Channel and Description	Minimum	Normal	Maximum
Natural streams - minor streams (top width at floodstage < 100 ft)			
1. Main Channels			
a. clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
b. same as above, but more stones and weeds	0.030	0.035	0.040
c. clean, winding, some pools and shoals	0.033	0.040	0.045
d. same as above, but some weeds and stones	0.035	0.045	0.050
e. same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
f. same as "d" with more stones	0.045	0.050	0.060
g. sluggish reaches, weedy, deep pools	0.050	0.070	0.080
h. very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150
2. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
a. bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
b. bottom: cobbles with large boulders	0.040	0.050	0.070

Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

BRIDGE DATA

RAILING

TYPE _____ HEIGHT _____

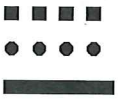
LENGTH _____ % OPEN SPACE _____

HEIGHTS

INVERT TO LOW CHORD _____ INVERT TO TOP OF ROAD _____

LOW CHORD TO TOP OF ROAD _____

PIER DATA

SHAPE: #   # SETS OF PIERS _____ WIDTH _____

#

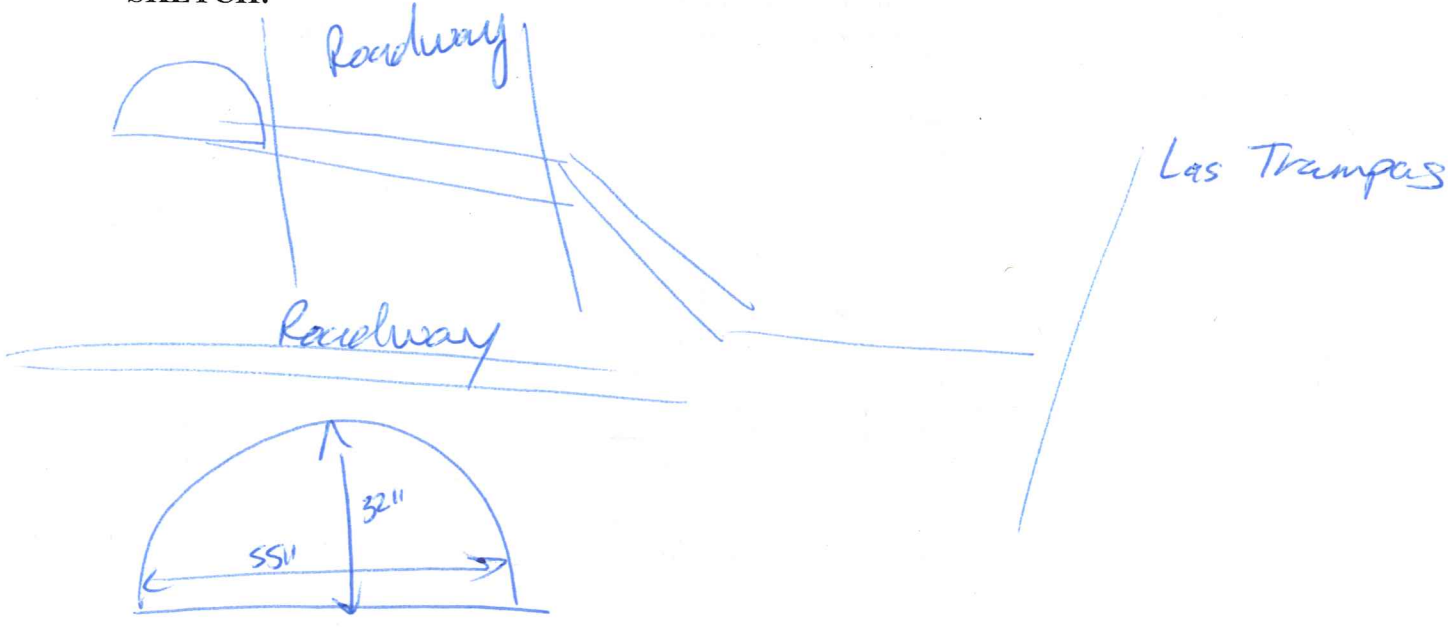
SPACING _____

WINGWALL DATA

	TYPE (str8 / warped)	ANGLE (from CL)	LENGTH
UPSTREAM			
DOWNSTREAM			

NOTES: Pipe suppose to be circular but lots of sediment. Model as arch. Pipe also has significant drop.

SKETCH:



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JOB # TM02.01.14
DATE 4-9-15
OBSERVED BY RJL/LNF

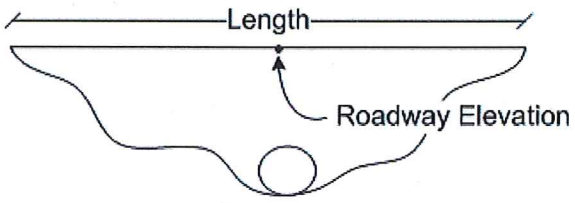
CREEK Las Trampas LOCATION Bollinger Canyon LTC3

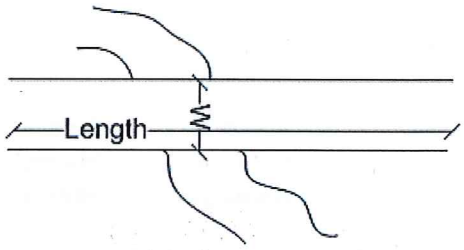
ROADWAY DATA (All data shall be given looking downstream)

TYPE: BRIDGE CULVERT: BOX (PIPE)

LENGTH OF ROADWAY _____ (ft) SKEW _____ (deg) (L up strm)

BOT. WIDTH 80' (ft) SIDE SLOPES L _____ R _____





CULVERT DATA

BOX:

TYPE	# OF BOXES	WIDTH	HEIGHT	DIST bwtn BOX

PIPE: Arch

TYPE	# OF PIPES	DIAMETER	DIST btwn PIPES
CMP	1	158"(W) x 58"(H) 66"(H) o/s.	

N-VALUES

UPSTREAM
LOB _____
Channel _____
ROB _____

DOWNSTREAM
LOB _____
Channel _____
ROB _____

Manning's n for Channels (Chow, 1959).

Type of Channel and Description	Minimum	Normal	Maximum
Natural streams - minor streams (top width at floodstage < 100 ft)			
1. Main Channels			
a. clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
b. same as above, but more stones and weeds	0.030	0.035	0.040
c. clean, winding, some pools and shoals	0.033	0.040	0.045
d. same as above, but some weeds and stones	0.035	0.045	0.050
e. same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
f. same as "d" with more stones	0.045	0.050	0.060
g. sluggish reaches, weedy, deep pools	0.050	0.070	0.080
h. very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150
2. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
a. bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
b. bottom: cobbles with large boulders	0.040	0.050	0.070

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BRIDGE DATA

RAILING

TYPE _____ HEIGHT _____

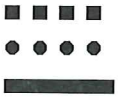
LENGTH _____ % OPEN SPACE _____

HEIGHTS

INVERT TO LOW CHORD _____ INVERT TO TOP OF ROAD _____

LOW CHORD TO TOP OF ROAD _____

PIER DATA

SHAPE: #  # SETS OF PIERS _____ WIDTH _____

SPACING _____

WINGWALL DATA

	TYPE (str8 / warped)	ANGLE (from CL)	LENGTH
UPSTREAM			
DOWNSTREAM			

NOTES: Large arch, V&A inspected? Check report. Lots of sediment inside culvert. Sediment on downstream side makes capacity lower. Model smaller dimension.

SKETCH:

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JOB # TMoR.01.14
DATE 4-2-15
OBSERVED BY RJL/LNF

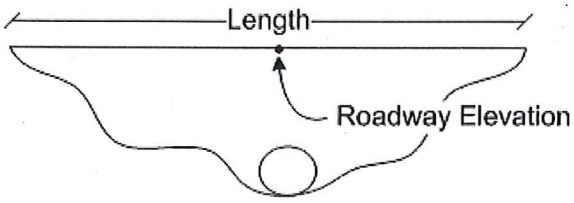
CREEK St Marys Creek LOCATION Moraga Rd. SM1

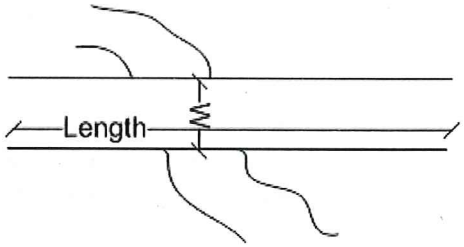
ROADWAY DATA (All data shall be given looking downstream)

TYPE: BRIDGE CULVERT: BOX (PIPE)

LENGTH OF ROADWAY 20' (ft) SKEW _____ (deg) (L up strm)

BOT. WIDTH google (ft) SIDE SLOPES L _____ R _____





CULVERT DATA

BOX:

TYPE	# OF BOXES	WIDTH	HEIGHT	DIST bwtn BOX

PIPE:

TYPE	# OF PIPES	DIAMETER	DIST btwn PIPES
CMP/Asphalt lined	1	60"	∅

N-VALUES

UPSTREAM
LOB .045
Channel .035
ROB .045

DOWNSTREAM
LOB .045
Channel .035
ROB .045
} Assumed based on U/S

Manning's n for Channels (Chow, 1959).

Type of Channel and Description	Minimum	Normal	Maximum
Natural streams - minor streams (top width at floodstage < 100 ft)			
1. Main Channels			
a. clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
b. same as above, but more stones and weeds	0.030	0.035	0.040
c. clean, winding, some pools and shoals	0.033	0.040	0.045
d. same as above, but some weeds and stones	0.035	0.045	0.050
e. same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
f. same as "d" with more stones	0.045	0.050	0.060
g. sluggish reaches, weedy, deep pools	0.050	0.070	0.080
h. very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150
2. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
a. bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
b. bottom: cobbles with large boulders	0.040	0.050	0.070

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BRIDGE DATA

RAILING

TYPE ____________________ HEIGHT ____________________

LENGTH ____________________ % OPEN SPACE ____________________

HEIGHTS

INVERT TO LOW CHORD __________ INVERT TO TOP OF ROAD 15'

LOW CHORD TO TOP OF ROAD ______

PIER DATA

SHAPE: # ▪▪▪▪
••••

SETS OF PIERS ________ WIDTH ________

SPACING __________

WINGWALL DATA Beveled o/s

	TYPE (str8 / warped)	ANGLE (from CL)	LENGTH
UPSTREAM			
DOWNSTREAM			

NOTES: Beveled CMP w/ Asphalt lining. Rip rap channel u/s for ~20' No wing walls. Pipe goes under park. Downstream inaccessible.

SKETCH:

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JOB # TMOR.01.14
DATE 4-2-15
OBSERVED BY RJL/LNF

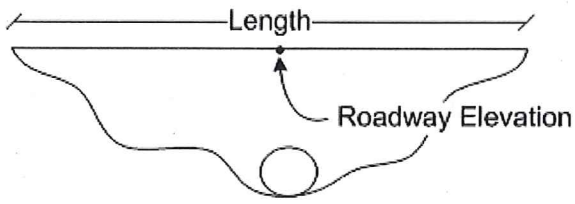
CREEK St. Mary Trib LOCATION St. Mary's Rd. SMT2

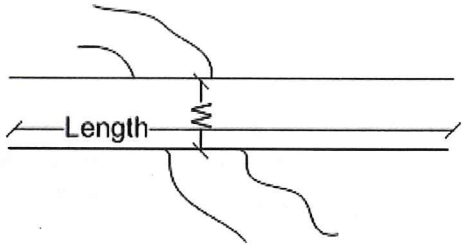
ROADWAY DATA (All data shall be given looking downstream)

TYPE: BRIDGE CULVERT: ✓ BOX (PIPE)

LENGTH OF ROADWAY 20' (ft) SKEW 90° (deg) (L up strm)

BOT. WIDTH google est. (ft) SIDE SLOPES L _____ R _____





CULVERT DATA

BOX:

TYPE	# OF BOXES	WIDTH	HEIGHT	DIST bwtn BOX

PIPE:

TYPE	# OF PIPES	DIAMETER	DIST btwn PIPES
HDPE	2	48"	1"

N-VALUES

UPSTREAM
LOB .05
Channel ~~.035~~ .045
ROB .05

DOWNSTREAM
LOB .04
Channel .03
ROB .04

Manning's n for Channels (Chow, 1959).

Type of Channel and Description	Minimum	Normal	Maximum
Natural streams - minor streams (top width at floodstage < 100 ft)			
1. Main Channels			
a. clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
b. same as above, but more stones and weeds	0.030	0.035	0.040
c. clean, winding, some pools and shoals	0.033	0.040	0.045
d. same as above, but some weeds and stones	0.035	0.045	0.050
e. same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
f. same as "d" with more stones	0.045	0.050	0.060
g. sluggish reaches, weedy, deep pools	0.050	0.070	0.080
h. very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150
2. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
a. bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
b. bottom: cobbles with large boulders	0.040	0.050	0.070

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BRIDGE DATA

RAILING

TYPE ______________________ HEIGHT ______________________

LENGTH ______________________ % OPEN SPACE ______________________

HEIGHTS

INVERT TO LOW CHORD __________ INVERT TO TOP OF ROAD __________

LOW CHORD TO TOP OF ROAD _______

PIER DATA

SHAPE: # # SETS OF PIERS ________ WIDTH ________

#

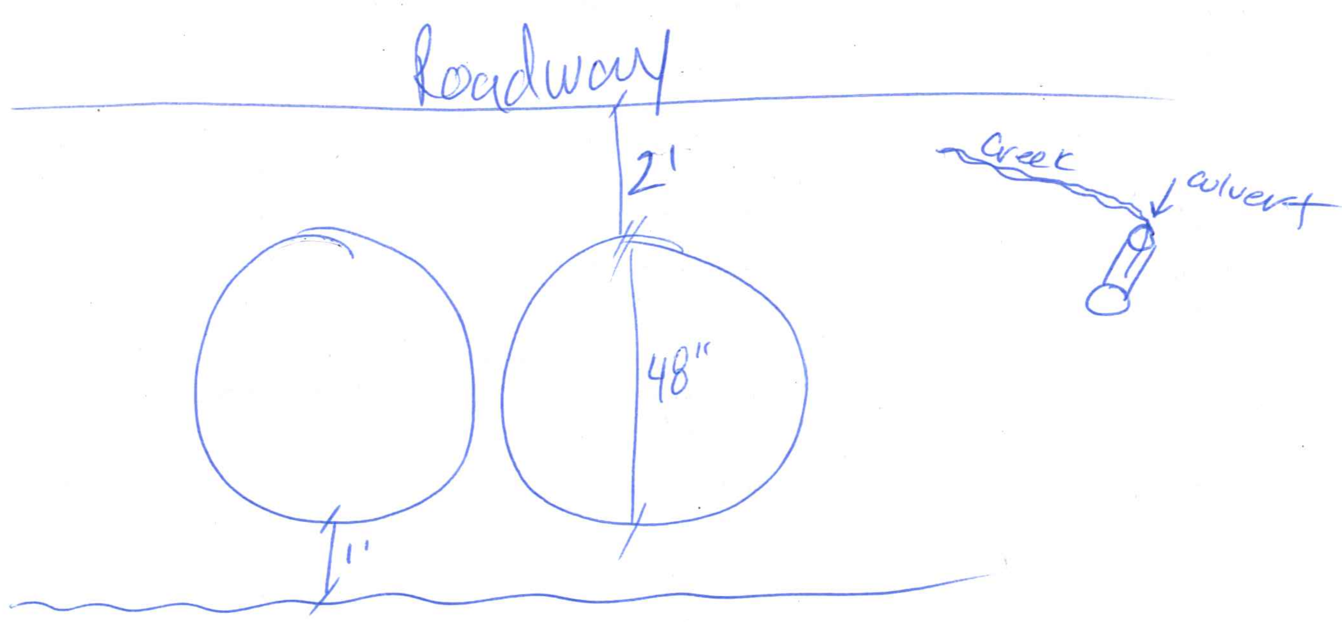
SPACING __________

WINGWALL DATA

	TYPE (str8 / warped)	ANGLE (from CL)	LENGTH
UPSTREAM			
DOWNSTREAM			

NOTES: Concrete chunks in channel. Pipes elevated above channel bottom 12". Pipes protrude out w/ no headwall, 7'. Downstream pipes 15' from roadway.

SKETCH:



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JOB # TMOR.01.14
DATE 4-2-15
OBSERVED BY RJL/LNF

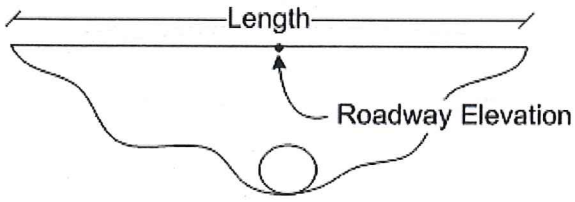
CREEK St Mary's LOCATION Stafford STM3

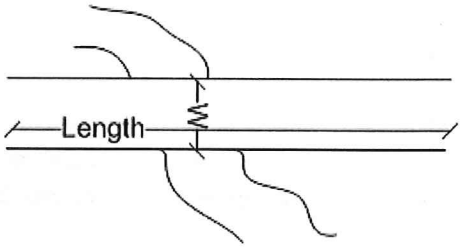
ROADWAY DATA (All data shall be given looking downstream)

TYPE: BRIDGE CULVERT: BOX (PIPE)

LENGTH OF ROADWAY 81 (ft) SKEW _____ (deg) (L up strm)

BOT. WIDTH 40' (ft) SIDE SLOPES L _____ R _____





CULVERT DATA

BOX:

TYPE	# OF BOXES	WIDTH	HEIGHT	DIST bwtn BOX

PIPE:

TYPE	# OF PIPES	DIAMETER	DIST btwn PIPES
HDPE	1	36"	Ø

N-VALUES

UPSTREAM
LOB _____
Channel _____
ROB _____

DOWNSTREAM
LOB .04
Channel .035
ROB .04

Manning's n for Channels (Chow, 1959).

Type of Channel and Description	Minimum	Normal	Maximum
Natural streams - minor streams (top width at floodstage < 100 ft)			
1. Main Channels			
a. clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
b. same as above, but more stones and weeds	0.030	0.035	0.040
c. clean, winding, some pools and shoals	0.033	0.040	0.045
d. same as above, but some weeds and stones	0.035	0.045	0.050
e. same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
f. same as "d" with more stones	0.045	0.050	0.060
g. sluggish reaches, weedy, deep pools	0.050	0.070	0.080
h. very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150
2. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
a. bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
b. bottom: cobbles with large boulders	0.040	0.050	0.070

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BRIDGE DATA

RAILING

TYPE _____ HEIGHT _____

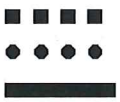
LENGTH _____ % OPEN SPACE _____

HEIGHTS

INVERT TO LOW CHORD _____ INVERT TO TOP OF ROAD 4'

LOW CHORD TO TOP OF ROAD _____

PIER DATA

SHAPE: #   # SETS OF PIERS_____ WIDTH _____

  SPACING _____

WINGWALL DATA

	TYPE (str8 / warped)	ANGLE (from CL)	LENGTH
UPSTREAM			
DOWNSTREAM			

NOTES: D/s pipe 12' from roadway. U/s pipe is 5' from roadway d/s pipe has significant sedimentation.

SKETCH:

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JOB # TMOR.01.14
DATE 4-9-15
OBSERVED BY RJL/LNF

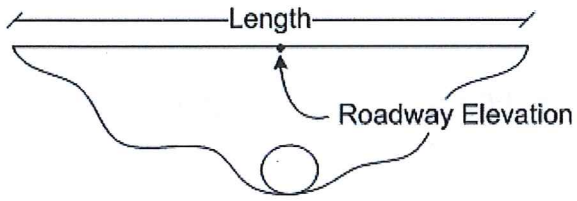
CREEK St. Marys Trib LOCATION STM4 *new* under trail

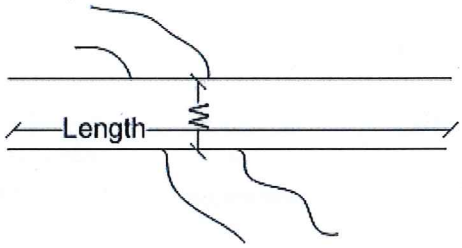
ROADWAY DATA (All data shall be given looking downstream)

TYPE: BRIDGE CULVERT: BOX (PIPE)

LENGTH OF ROADWAY _____ (ft) SKEW _____ (deg) (L up strm)

BOT. WIDTH 37' (ft) SIDE SLOPES L _____ R _____





CULVERT DATA

BOX:

TYPE	# OF BOXES	WIDTH	HEIGHT	DIST bwtn BOX

PIPE:

TYPE	# OF PIPES	DIAMETER	DIST btwn PIPES
CMP	1	72"	

N-VALUES

UPSTREAM
LOB _____
Channel _____
ROB _____

DOWNSTREAM
LOB _____
Channel _____
ROB _____

Manning's n for Channels (Chow, 1959).

Type of Channel and Description	Minimum	Normal	Maximum
Natural streams - minor streams (top width at floodstage < 100 ft)			
1. Main Channels			
a. clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
b. same as above, but more stones and weeds	0.030	0.035	0.040
c. clean, winding, some pools and shoals	0.033	0.040	0.045
d. same as above, but some weeds and stones	0.035	0.045	0.050
e. same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
f. same as "d" with more stones	0.045	0.050	0.060
g. sluggish reaches, weedy, deep pools	0.050	0.070	0.080
h. very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150
2. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
a. bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
b. bottom: cobbles with large boulders	0.040	0.050	0.070

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BRIDGE DATA

RAILING

TYPE _____ HEIGHT _____

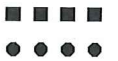
LENGTH _____ % OPEN SPACE _____

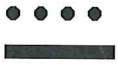
HEIGHTS

INVERT TO LOW CHORD _____ INVERT TO TOP OF ROAD _____

LOW CHORD TO TOP OF ROAD _____

PIER DATA

SHAPE: #   # SETS OF PIERS _____ WIDTH _____

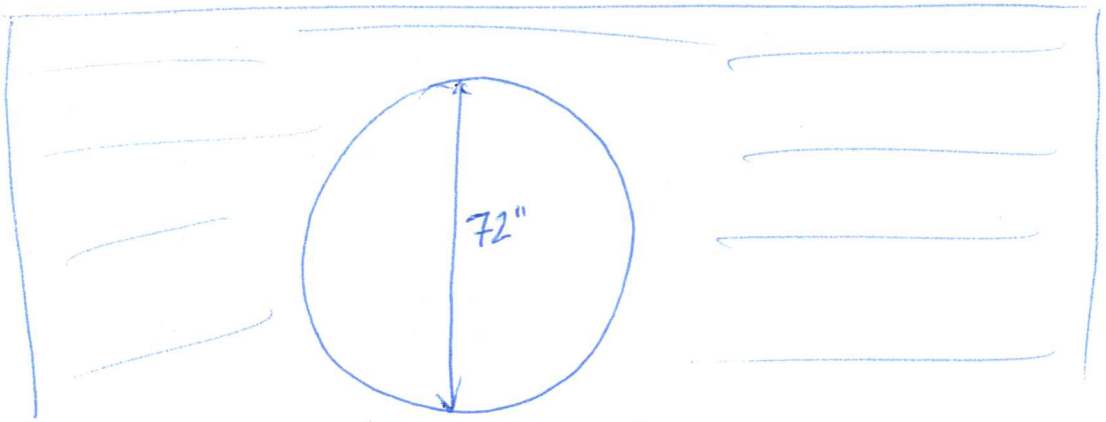
  SPACING _____

WINGWALL DATA

	TYPE (str8 / warped)	ANGLE (from CL)	LENGTH
UPSTREAM			
DOWNSTREAM			

NOTES: Culvert under trail, just downstream of 2x48"

SKETCH:



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JOB # TMDR.0.14
DATE 4-2-15
OBSERVED BY RJL/LNF

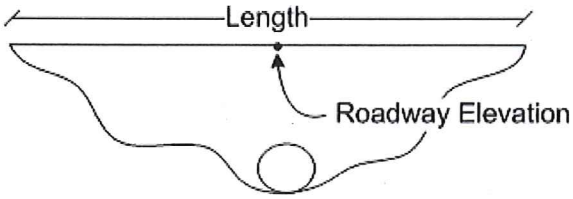
CREEK Moraga LOCATION Ivy Drive MC1

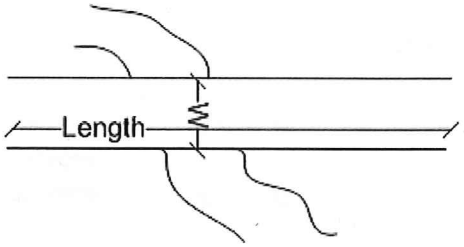
ROADWAY DATA (All data shall be given looking downstream)

TYPE: BRIDGE CULVERT: ✓ BOX PIPE ✓

LENGTH OF ROADWAY 25' (ft) SKEW Ø (deg) (L up strm)

BOT. WIDTH 46' (ft) SIDE SLOPES L _____ R _____





CULVERT DATA

BOX:

TYPE	# OF BOXES	WIDTH	HEIGHT	DIST bwtn BOX

PIPE:

TYPE	# OF PIPES	DIAMETER	DIST btwn PIPES
CMP	1	8' x 13'	

Arch

N-VALUES

UPSTREAM
LOB ~~.035~~ .04
Channel ~~.025~~ .03
ROB ~~.035~~ .04

DOWNSTREAM
LOB .035
Channel .025
ROB .035

Manning's n for Channels (Chow, 1959).

Type of Channel and Description	Minimum	Normal	Maximum
Natural streams - minor streams (top width at floodstage < 100 ft)			
1. Main Channels			
a. clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
b. same as above, but more stones and weeds	0.030	0.035	0.040
c. clean, winding, some pools and shoals	0.033	0.040	0.045
d. same as above, but some weeds and stones	0.035	0.045	0.050
e. same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
f. same as "d" with more stones	0.045	0.050	0.060
g. sluggish reaches, weedy, deep pools	0.050	0.070	0.080
h. very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150
2. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
a. bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
b. bottom: cobbles with large boulders	0.040	0.050	0.070

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BRIDGE DATA

RAILING

TYPE _____ HEIGHT _____

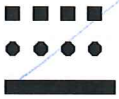
LENGTH _____ % OPEN SPACE _____

HEIGHTS

INVERT TO LOW CHORD _____ INVERT TO TOP OF ROAD 12'

LOW CHORD TO TOP OF ROAD _____

PIER DATA

SHAPE: #   # SETS OF PIERS _____ WIDTH _____

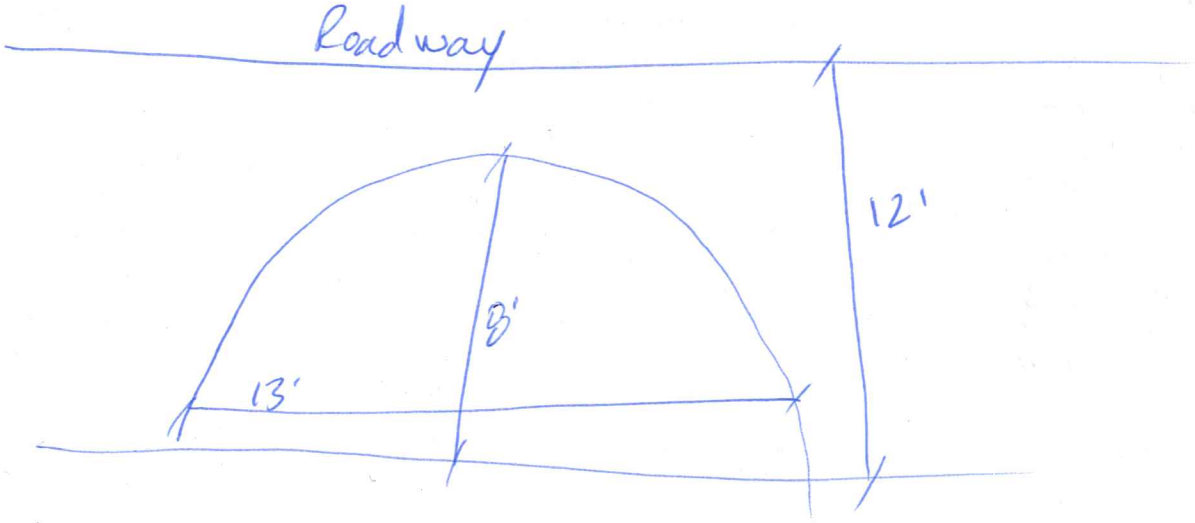
SPACING _____

WINGWALL DATA

	TYPE (str8 / warped)	ANGLE (from CL)	LENGTH
UPSTREAM	NONE		
DOWNSTREAM			

NOTES: Arched CMP. Culvert likely in Orinda. Noted wing wall seperated from pipe coming from school. Minor erosion on R u/s. 8" pipe runs through culvert

SKETCH:



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JOB # TMOR.01.14
DATE 4-2-15
OBSERVED BY RJL/LNF

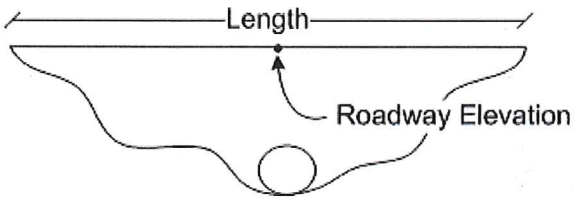
CREEK Moraga LOCATION Miramonte, MC2

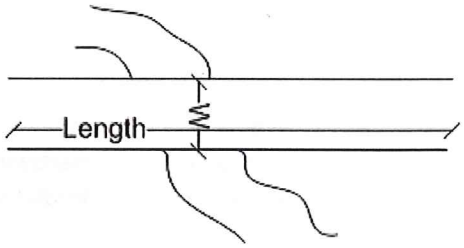
ROADWAY DATA (All data shall be given looking downstream)

TYPE: BRIDGE CULVERT: ✓ BOX PIPE ✓

LENGTH OF ROADWAY 24' (ft) SKEW _____ (deg) (L up strm)

BOT. WIDTH 70' (ft) SIDE SLOPES L _____ R _____





CULVERT DATA

BOX:

TYPE	# OF BOXES	WIDTH	HEIGHT	DIST bwtn BOX

PIPE:

TYPE	# OF PIPES	DIAMETER	DIST btwn PIPES
CMP	1	(W) 15' x 8.5' (H)	∅

Arch

N-VALUES

UPSTREAM
LOB 0.03
Channel 0.025
ROB 0.03

DOWNSTREAM
LOB 0.025
Channel 0.025
ROB 0.025

Manning's n for Channels (Chow, 1959).

Type of Channel and Description	Minimum	Normal	Maximum
Natural streams - minor streams (top width at floodstage < 100 ft)			
1. Main Channels			
a. clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
b. same as above, but more stones and weeds	0.030	0.035	0.040
c. clean, winding, some pools and shoals	0.033	0.040	0.045
d. same as above, but some weeds and stones	0.035	0.045	0.050
e. same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
f. same as "d" with more stones	0.045	0.050	0.060
g. sluggish reaches, weedy, deep pools	0.050	0.070	0.080
h. very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150
2. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
a. bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
b. bottom: cobbles with large boulders	0.040	0.050	0.070

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BRIDGE DATA

RAILING

TYPE _____ HEIGHT _____

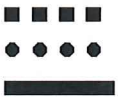
LENGTH _____ % OPEN SPACE _____

HEIGHTS

INVERT TO LOW CHORD _____ INVERT TO TOP OF ROAD 13'

LOW CHORD TO TOP OF ROAD _____

PIER DATA

SHAPE: #   # SETS OF PIERS_____ WIDTH _____

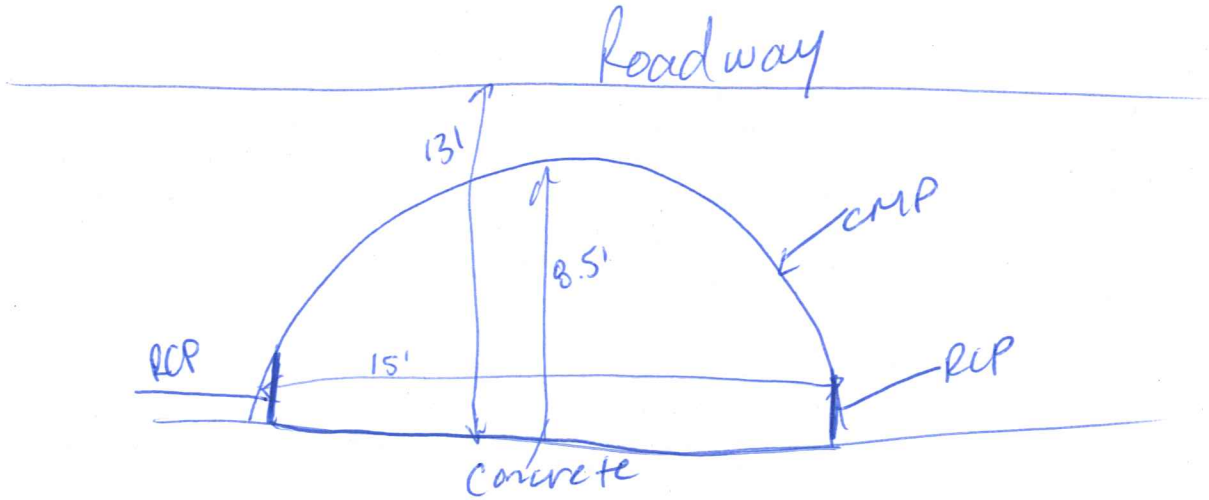
  SPACING _____

WINGWALL DATA

	TYPE (str8 / warped)	ANGLE (from CL)	LENGTH
UPSTREAM		45°	
DOWNSTREAM		45°	

NOTES: Concrete headwall.

SKETCH:



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JOB # TMOR.01.14
DATE 4-2-15
OBSERVED BY RJL/LNF

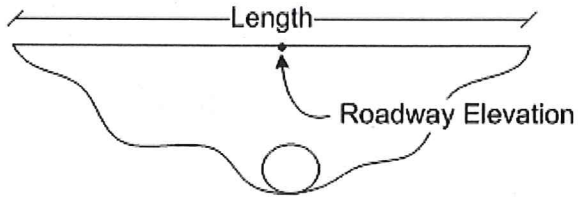
CREEK Moraga LOCATION St. Andrews Camino Ricardo MB3

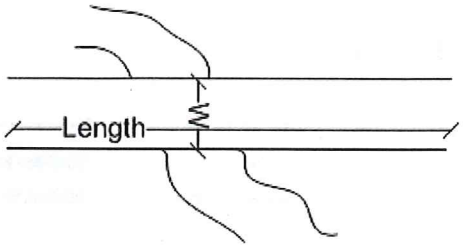
ROADWAY DATA (All data shall be given looking downstream)

TYPE: BRIDGE CULVERT: ✓ BOX (PIPE)

LENGTH OF ROADWAY 23' (ft) SKEW _____ (deg) (L up strm)

BOT. WIDTH google estimate (ft) SIDE SLOPES L _____ R _____





CULVERT DATA

BOX:

TYPE	# OF BOXES	WIDTH	HEIGHT	DIST bwtn BOX

PIPE:

TYPE	# OF PIPES	DIAMETER	DIST btwn PIPES
CMP Arch	1	22' x 8'	

N-VALUES

UPSTREAM
LOB .025
Channel .03
ROB .025

DOWNSTREAM
LOB .045
Channel .035
ROB .045

Manning's n for Channels (Chow, 1959).

Type of Channel and Description	Minimum	Normal	Maximum
Natural streams - minor streams (top width at floodstage < 100 ft)			
1. Main Channels			
a. clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
b. same as above, but more stones and weeds	0.030	0.035	0.040
c. clean, winding, some pools and shoals	0.033	0.040	0.045
d. same as above, but some weeds and stones	0.035	0.045	0.050
e. same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
f. same as "d" with more stones	0.045	0.050	0.060
g. sluggish reaches, weedy, deep pools	0.050	0.070	0.080
h. very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150
2. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
a. bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
b. bottom: cobbles with large boulders	0.040	0.050	0.070

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BRIDGE DATA

RAILING

TYPE Metal HEIGHT 2'

LENGTH _____ % OPEN SPACE 80

HEIGHTS

INVERT TO LOW CHORD _____ INVERT TO TOP OF ROAD 17'

LOW CHORD TO TOP OF ROAD _____

PIER DATA

SHAPE: # ■■■■ ——— # SETS OF PIERS_____ WIDTH _____

●●●● ═══

▬▬ ◀▬▬

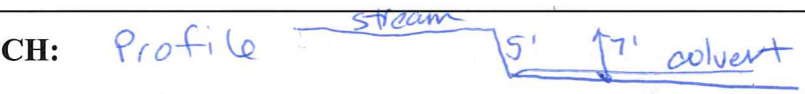
SPACING _____

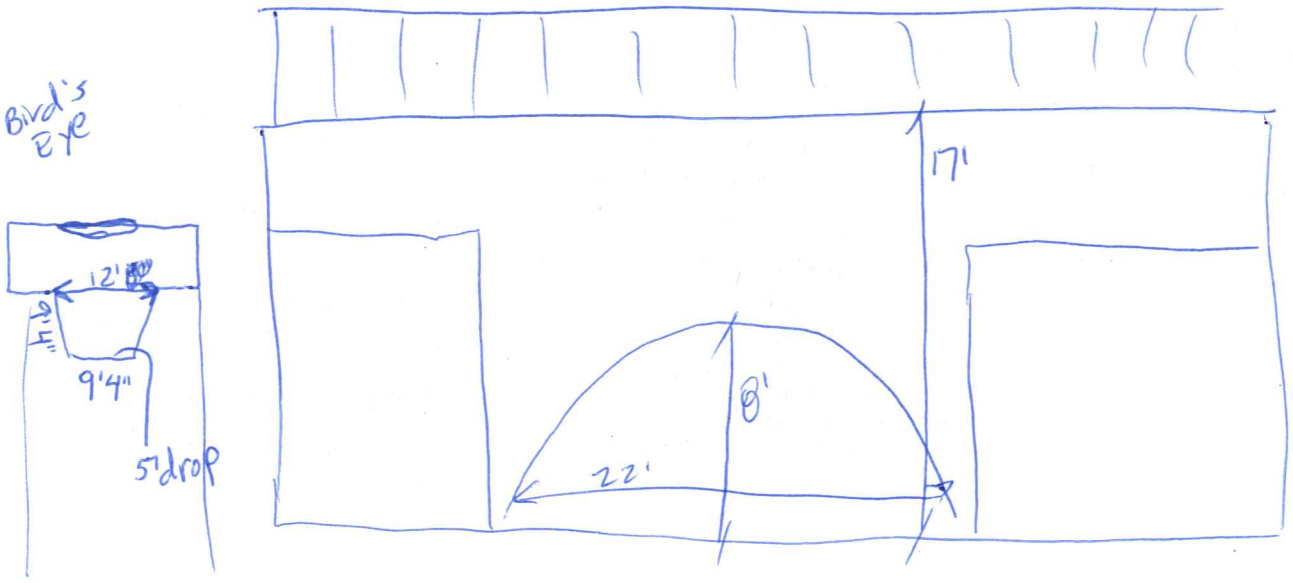
WINGWALL DATA

	TYPE (str8 / warped)	ANGLE (from CL)	LENGTH
UPSTREAM			
DOWNSTREAM			

NOTES: Downstream very overgrown but only for about 100' then clears up. Upstream has unusual headwall, may be too complex to model

SKETCH: Profile





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JOB # TMOR.01.14
DATE 4-2-15
OBSERVED BY RJL/LNA

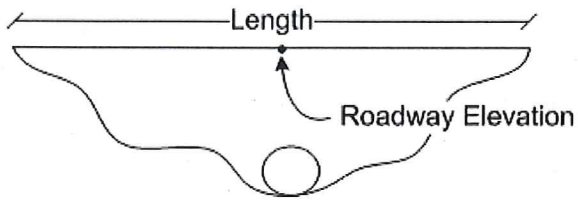
CREEK Moraga Creek LOCATION Canyon Rd MC4 Bridge

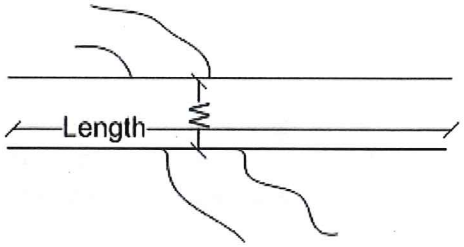
ROADWAY DATA (All data shall be given looking downstream)

TYPE: (BRIDGE) CULVERT: BOX PIPE

LENGTH OF ROADWAY google (ft) SKEW _____ (deg) (L up strm)

BOT. WIDTH google (ft) SIDE SLOPES L _____ R _____





CULVERT DATA

BOX:

TYPE	# OF BOXES	WIDTH	HEIGHT	DIST bwtn BOX

PIPE:

TYPE	# OF PIPES	DIAMETER	DIST btwn PIPES

N-VALUES

UPSTREAM
LOB .03
Channel .025
ROB .03

DOWNSTREAM
LOB .03
Channel .025
ROB .03

Manning's n for Channels (Chow, 1959).

Type of Channel and Description	Minimum	Normal	Maximum
Natural streams - minor streams (top width at floodstage < 100 ft)			
1. Main Channels			
a. clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
b. same as above, but more stones and weeds	0.030	0.035	0.040
c. clean, winding, some pools and shoals	0.033	0.040	0.045
d. same as above, but some weeds and stones	0.035	0.045	0.050
e. same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
f. same as "d" with more stones	0.045	0.050	0.060
g. sluggish reaches, weedy, deep pools	0.050	0.070	0.080
h. very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150
2. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
a. bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
b. bottom: cobbles with large boulders	0.040	0.050	0.070

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BRIDGE DATA

RAILING

TYPE _____ HEIGHT _____

LENGTH _____ % OPEN SPACE _____

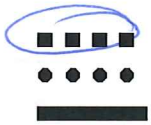
HEIGHTS

INVERT TO LOW CHORD _____ INVERT TO TOP OF ROAD _____

LOW CHORD TO TOP OF ROAD _____

PIER DATA

I-beams

SHAPE: #   # SETS OF PIERS ~2 WIDTH _____

SPACING _____

WINGWALL DATA

	TYPE (str8 / warped)	ANGLE (from CL)	LENGTH
UPSTREAM			
DOWNSTREAM			

NOTES: No access to bridge. Very large channel & small piers. Could model as free spanning bridge. Piers are I-beams

SKETCH:

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JOB # TMDR.01
DATE 4-2-15
OBSERVED BY RJL/LNF

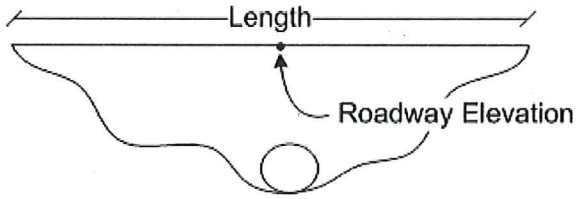
CREEK Ivy LOCATION ID1

ROADWAY DATA (All data shall be given looking downstream)

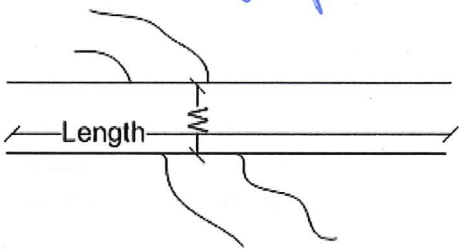
TYPE: BRIDGE CULVERT: ✓ BOX PIPE x2

LENGTH OF ROADWAY 20' (ft) SKEW _____ (deg) (L up strm)

BOT. WIDTH 37' (ft) SIDE SLOPES L _____ R _____



Steep



CULVERT DATA

BOX:

TYPE	# OF BOXES	WIDTH	HEIGHT	DIST bwtn BOX

PIPE:

TYPE	# OF PIPES	DIAMETER	DIST btwn PIPES
CMP	2	(W)70" x45"(H)	2'

N-VALUES

UPSTREAM
LOB 0.1
Channel 0.1
ROB 0.1

DOWNSTREAM
LOB 0.045
Channel 0.04
ROB 0.045

Manning's n for Channels (Chow, 1959).

Type of Channel and Description	Minimum	Normal	Maximum
Natural streams - minor streams (top width at floodstage < 100 ft)			
1. Main Channels			
a. clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
b. same as above, but more stones and weeds	0.030	0.035	0.040
c. clean, winding, some pools and shoals	0.033	0.040	0.045
d. same as above, but some weeds and stones	0.035	0.045	0.050
e. same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
f. same as "d" with more stones	0.045	0.050	0.060
g. sluggish reaches, weedy, deep pools	0.050	0.070	0.080
h. very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150
2. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
a. bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
b. bottom: cobbles with large boulders	0.040	0.050	0.070

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BRIDGE DATA

RAILING

TYPE __________ HEIGHT __________

LENGTH __________ % OPEN SPACE __________

HEIGHTS

INVERT TO LOW CHORD __________ INVERT TO TOP OF ROAD 6'

LOW CHORD TO TOP OF ROAD __________

PIER DATA

SHAPE: # ■■■■ ●●●● # SETS OF PIERS __________ WIDTH __________

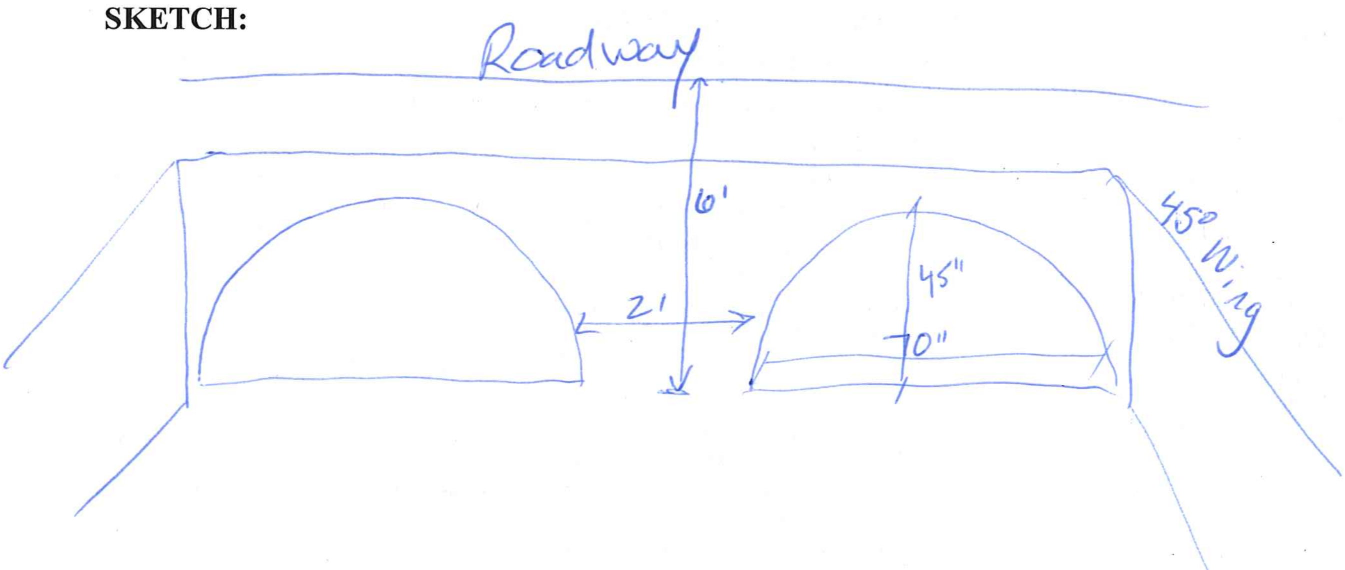
SPACING __________

WINGWALL DATA

	TYPE (str8 / warped)	ANGLE (from CL)	LENGTH
UPSTREAM			
DOWNSTREAM		45°	10'

NOTES: Could not access due to chain fence. Dimensions estimates. D/S has shelf, ~3'

SKETCH:



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JOB # TMOR.01.14
DATE 4-2-15
OBSERVED BY RJL/LNF

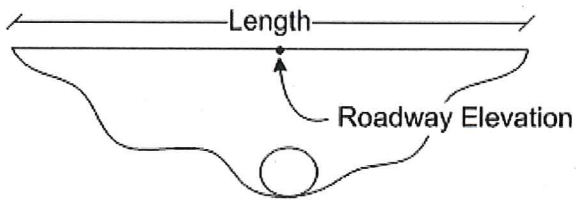
CREEK Ivy LOCATION Moraga Rd. ID2

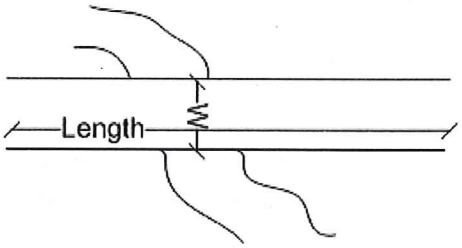
ROADWAY DATA (All data shall be given looking downstream)

TYPE: BRIDGE CULVERT: ✓ BOX PIPE ✓

LENGTH OF ROADWAY 25' (ft) SKEW _____ (deg) (L up strm)

BOT. WIDTH Est in Google (ft) SIDE SLOPES L _____ R _____





CULVERT DATA

BOX:

TYPE	# OF BOXES	WIDTH	HEIGHT	DIST bwtn BOX

PIPE:

TYPE	# OF PIPES	DIAMETER	DIST btwn PIPES
RCP	1	66"	0

N-VALUES

UPSTREAM
LOB 0.04
Channel .035
ROB 0.04

DOWNSTREAM
LOB .025
Channel .025
ROB .025

Manning's n for Channels (Chow, 1959).

Type of Channel and Description	Minimum	Normal	Maximum
Natural streams - minor streams (top width at floodstage < 100 ft)			
1. Main Channels			
a. clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
b. same as above, but more stones and weeds	0.030	0.035	0.040
c. clean, winding, some pools and shoals	0.033	0.040	0.045
d. same as above, but some weeds and stones	0.035	0.045	0.050
e. same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
f. same as "d" with more stones	0.045	0.050	0.060
g. sluggish reaches, weedy, deep pools	0.050	0.070	0.080
h. very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150
2. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
a. bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
b. bottom: cobbles with large boulders	0.040	0.050	0.070

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BRIDGE DATA

RAILING

TYPE _____ HEIGHT _____

LENGTH _____ % OPEN SPACE _____

HEIGHTS

INVERT TO LOW CHORD _____ INVERT TO TOP OF ROAD 8.5'

LOW CHORD TO TOP OF ROAD _____

PIER DATA

SHAPE: # ■■■■ ——— # SETS OF PIERS_____ WIDTH _____

●●●● ═══

▬▬ ◀▬▬ SPACING _____

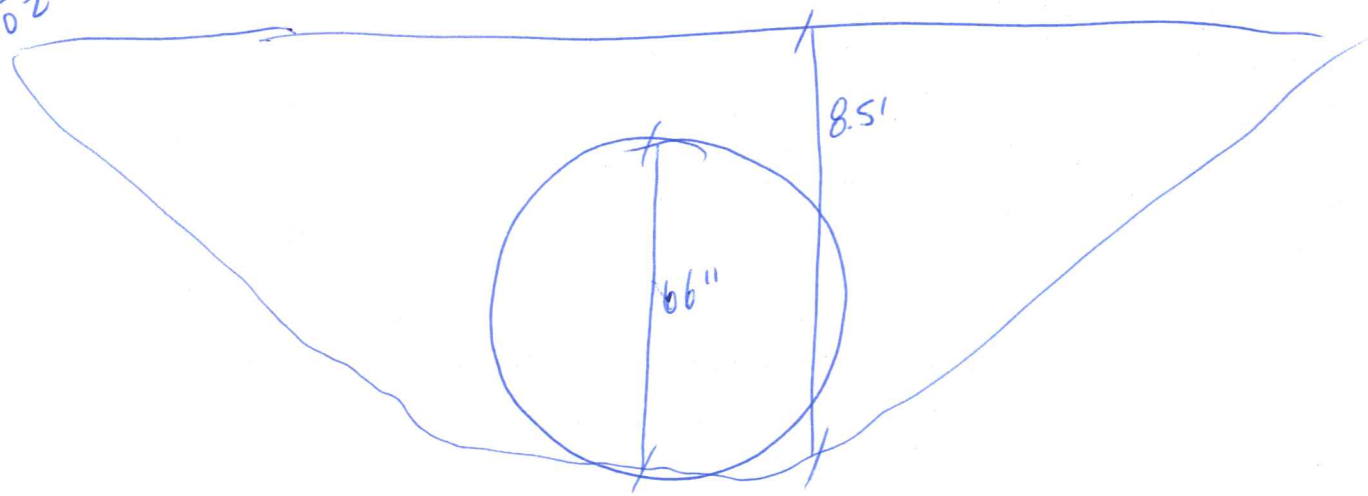
WINGWALL DATA

	TYPE (str8 / warped)	ANGLE (from CL)	LENGTH
UPSTREAM			
DOWNSTREAM			

NOTES: Noted large inflow to RCP pipe from Moraga Rd.

SKETCH:

66
136
102



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JOB # TNOR01.14
DATE 4-9-15
OBSERVED BY RJL/LNF

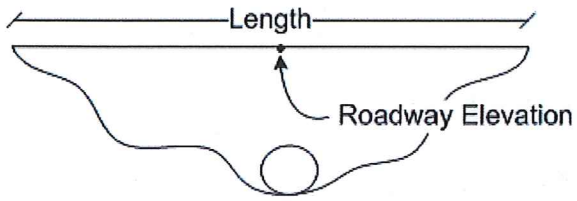
CREEK Corliss Trib LOCATION Corliss Dr. CD1

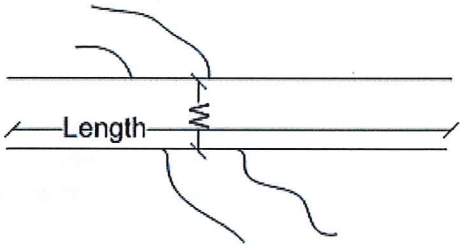
ROADWAY DATA (All data shall be given looking downstream)

TYPE: BRIDGE CULVERT: BOX (PIPE)

LENGTH OF ROADWAY _____ (ft) SKEW _____ (deg) (L up strm)

BOT. WIDTH google maps (ft) SIDE SLOPES L _____ R _____





CULVERT DATA

BOX:

TYPE	# OF BOXES	WIDTH	HEIGHT	DIST bwtn BOX

PIPE:

TYPE	# OF PIPES	DIAMETER	DIST btwn PIPES
CMP Ashpatt lined.	1	68"	

N-VALUES

UPSTREAM
LOB _____
Channel _____
ROB _____

DOWNSTREAM
LOB _____
Channel _____
ROB _____

Manning's n for Channels (Chow, 1959).

Type of Channel and Description	Minimum	Normal	Maximum
Natural streams - minor streams (top width at floodstage < 100 ft)			
1. Main Channels			
a. clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
b. same as above, but more stones and weeds	0.030	0.035	0.040
c. clean, winding, some pools and shoals	0.033	0.040	0.045
d. same as above, but some weeds and stones	0.035	0.045	0.050
e. same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
f. same as "d" with more stones	0.045	0.050	0.060
g. sluggish reaches, weedy, deep pools	0.050	0.070	0.080
h. very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150
2. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
a. bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
b. bottom: cobbles with large boulders	0.040	0.050	0.070

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BRIDGE DATA

RAILING

TYPE _____ HEIGHT _____

LENGTH _____ % OPEN SPACE _____

HEIGHTS

INVERT TO LOW CHORD _____ INVERT TO TOP OF ROAD _____

LOW CHORD TO TOP OF ROAD _____

PIER DATA

SHAPE: #   # SETS OF PIERS _____ WIDTH _____

 

  SPACING _____

WINGWALL DATA

	TYPE (str8 / warped)	ANGLE (from CL)	LENGTH
UPSTREAM		45°	
DOWNSTREAM		45°	

NOTES: u/s good condition. channel cleared. d/s has some sediment, not too bad height on d/s is 43"

SKETCH:

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JOB # TMOR.01.14
DATE 4-9-15
OBSERVED BY RJ/LNF

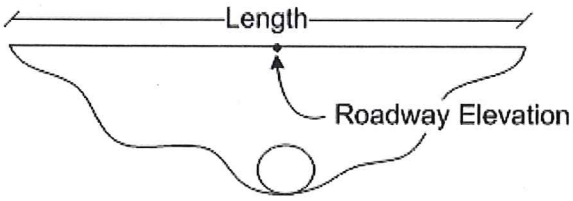
CREEK Rheem Trib LOCATION Scofield RT 1

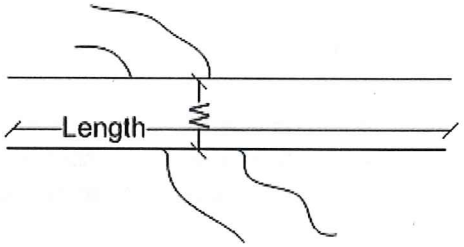
ROADWAY DATA (All data shall be given looking downstream)

TYPE: BRIDGE CULVERT: BOX PIPE

LENGTH OF ROADWAY _____ (ft) SKEW _____ (deg) (L up strm)

BOT. WIDTH google (ft) SIDE SLOPES L _____ R _____





CULVERT DATA

BOX:

TYPE	# OF BOXES	WIDTH	HEIGHT	DIST bwtn BOX

PIPE:

TYPE	# OF PIPES	DIAMETER	DIST btwn PIPES
RC P/CMP	1	CMP - 58" ~~RCP - 15"x21"~~	
D/S U/S		Roadway	

N-VALUES

UPSTREAM
LOB _____
Channel _____
ROB _____

DOWNSTREAM
LOB _____
Channel _____
ROB _____

Manning's n for Channels (Chow, 1959).

Type of Channel and Description	Minimum	Normal	Maximum
Natural streams - minor streams (top width at floodstage < 100 ft)			
1. Main Channels			
a. clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
b. same as above, but more stones and weeds	0.030	0.035	0.040
c. clean, winding, some pools and shoals	0.033	0.040	0.045
d. same as above, but some weeds and stones	0.035	0.045	0.050
e. same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
f. same as "d" with more stones	0.045	0.050	0.060
g. sluggish reaches, weedy, deep pools	0.050	0.070	0.080
h. very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150
2. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
a. bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
b. bottom: cobbles with large boulders	0.040	0.050	0.070

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BRIDGE DATA

RAILING

TYPE _____ HEIGHT _____

LENGTH _____ % OPEN SPACE _____

HEIGHTS

INVERT TO LOW CHORD _____ INVERT TO TOP OF ROAD _____

LOW CHORD TO TOP OF ROAD _____

PIER DATA

SHAPE: # #  # SETS OF PIERS_____ WIDTH _____

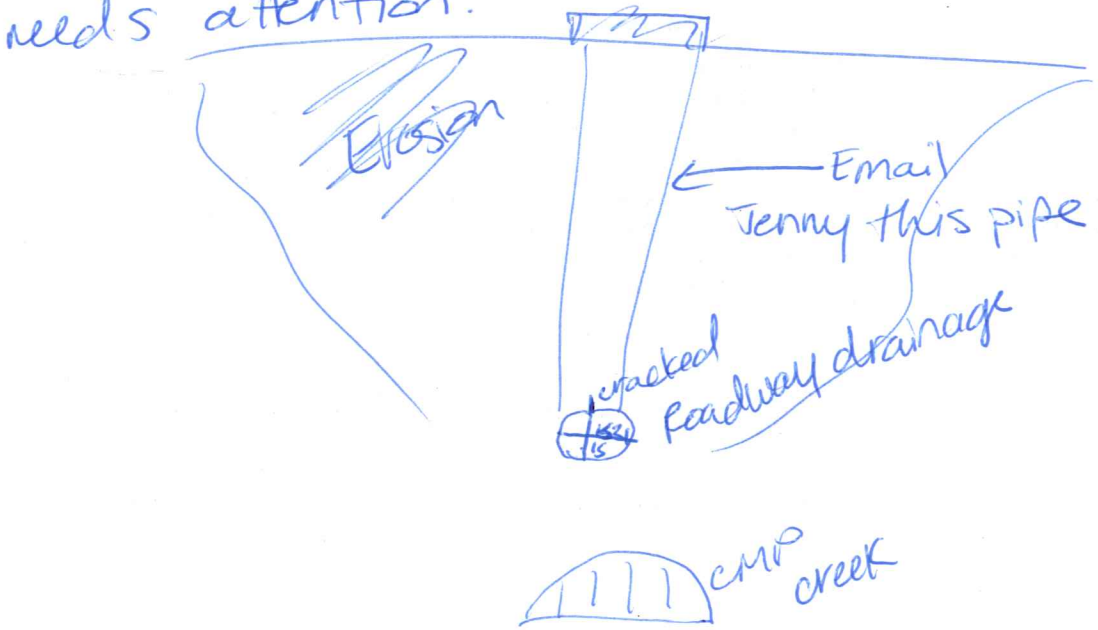
SPACING _____

WINGWALL DATA

	TYPE (str8 / warped)	ANGLE (from CL)	LENGTH
UPSTREAM			
DOWNSTREAM			

NOTES: D/S outlet cracked pipe oval. 15"(H) x 21"(W) cracked all the way. U/S is CMP U/S has heavy debris. Possibly pipe is collapsed. 2 pipes. RCP from roadway & CMP is creek culvert. RCP needs replacing & CMP needs attention.

SKETCH:



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JOB # TMOR.01.14
DATE 4-9-15
OBSERVED BY RJL/LNF

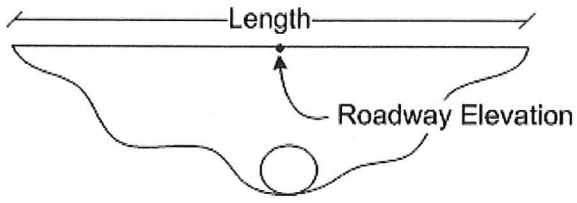
CREEK Rheem Trib. LOCATION Harold R+2

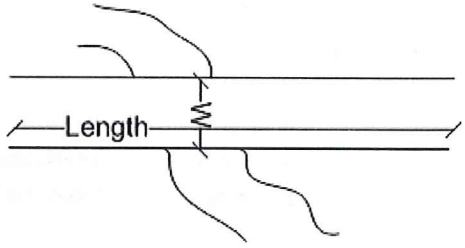
ROADWAY DATA (All data shall be given looking downstream)

TYPE: BRIDGE CULVERT: BOX PIPE

LENGTH OF ROADWAY _____ (ft) SKEW _____ (deg) (L up strm)

BOT. WIDTH google (ft) SIDE SLOPES L _____ R _____





CULVERT DATA

BOX:

TYPE	# OF BOXES	WIDTH	HEIGHT	DIST bwtn BOX

PIPE:

TYPE	# OF PIPES	DIAMETER	DIST btwn PIPES
RCP	1	42"	

N-VALUES

UPSTREAM
LOB _____
Channel _____
ROB _____

DOWNSTREAM
LOB _____
Channel _____
ROB _____

Manning's n for Channels (Chow, 1959).

Type of Channel and Description	Minimum	Normal	Maximum
Natural streams - minor streams (top width at floodstage < 100 ft)			
1. Main Channels			
a. clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
b. same as above, but more stones and weeds	0.030	0.035	0.040
c. clean, winding, some pools and shoals	0.033	0.040	0.045
d. same as above, but some weeds and stones	0.035	0.045	0.050
e. same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
f. same as "d" with more stones	0.045	0.050	0.060
g. sluggish reaches, weedy, deep pools	0.050	0.070	0.080
h. very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150
2. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
a. bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
b. bottom: cobbles with large boulders	0.040	0.050	0.070

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BRIDGE DATA

RAILING

TYPE _____ HEIGHT _____

LENGTH _____ % OPEN SPACE _____

HEIGHTS

INVERT TO LOW CHORD _____ INVERT TO TOP OF ROAD _____

LOW CHORD TO TOP OF ROAD _____

PIER DATA

SHAPE: #   # SETS OF PIERS_____ WIDTH _____

  SPACING _____

WINGWALL DATA

	TYPE (str8 / warped)	ANGLE (from CL)	LENGTH
UPSTREAM			
DOWNSTREAM			

NOTES: D/S sedimented pellrips 25%. Large channel.

SKETCH:

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JOB # TMOR.01.14
DATE 4-2-15
OBSERVED BY RJL/LNF

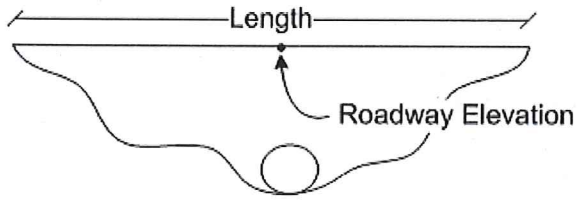
CREEK Rheem Trib. LOCATION RT3

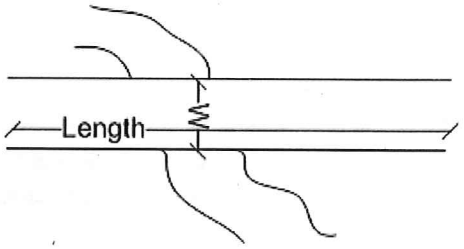
ROADWAY DATA (All data shall be given looking downstream)

TYPE: BRIDGE CULVERT: BOX (PIPE)

LENGTH OF ROADWAY _____ (ft) SKEW _____ (deg) (L up strm)

BOT. WIDTH unknown (ft) SIDE SLOPES L _____ R _____





CULVERT DATA

BOX:

TYPE	# OF BOXES	WIDTH	HEIGHT	DIST bwtn BOX

PIPE:

TYPE	# OF PIPES	DIAMETER	DIST btwn PIPES
RCP	1	54" (4.5')	

N-VALUES

UPSTREAM
LOB _____
Channel _____
ROB _____

DOWNSTREAM
LOB _____
Channel _____
ROB _____

Manning's n for Channels (Chow, 1959).

Type of Channel and Description	Minimum	Normal	Maximum
Natural streams - minor streams (top width at floodstage < 100 ft)			
1. Main Channels			
a. clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
b. same as above, but more stones and weeds	0.030	0.035	0.040
c. clean, winding, some pools and shoals	0.033	0.040	0.045
d. same as above, but some weeds and stones	0.035	0.045	0.050
e. same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
f. same as "d" with more stones	0.045	0.050	0.060
g. sluggish reaches, weedy, deep pools	0.050	0.070	0.080
h. very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150
2. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
a. bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
b. bottom: cobbles with large boulders	0.040	0.050	0.070

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BRIDGE DATA

RAILING

TYPE _____ HEIGHT _____

LENGTH _____ % OPEN SPACE _____

HEIGHTS

INVERT TO LOW CHORD _____ INVERT TO TOP OF ROAD _____

LOW CHORD TO TOP OF ROAD _____

PIER DATA

SHAPE: # #  # SETS OF PIERS_____ WIDTH _____

SPACING _____

WINGWALL DATA

	TYPE (str8 / warped)	ANGLE (from CL)	LENGTH
UPSTREAM			
DOWNSTREAM			

NOTES: u/s has lots of rocks & vegetation. RCP pipe in good condition. Pipe ends @ junction w/ laguna. Model boundary to be laguna creek depth @ 100yr.

SKETCH:

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JOB # TMOR.01.14
DATE 4-9-15
OBSERVED BY RJL/LNF

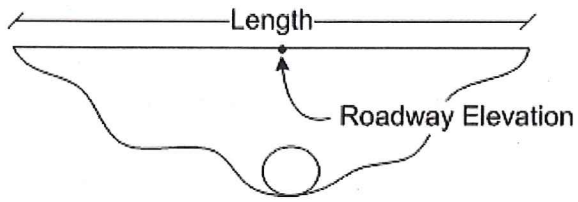
CREEK Laguna Trib LOCATION TL1

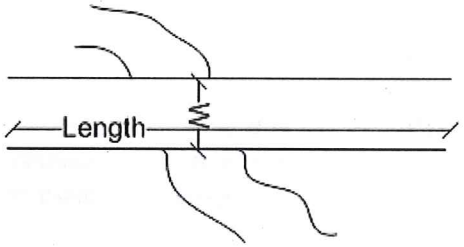
ROADWAY DATA (All data shall be given looking downstream)

TYPE: BRIDGE CULVERT: BOX PIPE

LENGTH OF ROADWAY _____ (ft) SKEW _____ (deg) (L up strm)

BOT. WIDTH _____ (ft) SIDE SLOPES L _____ R _____





CULVERT DATA

BOX:

TYPE	# OF BOXES	WIDTH	HEIGHT	DIST bwtn BOX

PIPE:

TYPE	# OF PIPES	DIAMETER	DIST btwn PIPES
CMP	1	64"	

N-VALUES

UPSTREAM
LOB _____
Channel _____
ROB _____

DOWNSTREAM
LOB _____
Channel _____
ROB _____

Manning's n for Channels (Chow, 1959).

Type of Channel and Description	Minimum	Normal	Maximum
Natural streams - minor streams (top width at floodstage < 100 ft)			
1. Main Channels			
a. clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
b. same as above, but more stones and weeds	0.030	0.035	0.040
c. clean, winding, some pools and shoals	0.033	0.040	0.045
d. same as above, but some weeds and stones	0.035	0.045	0.050
e. same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
f. same as "d" with more stones	0.045	0.050	0.060
g. sluggish reaches, weedy, deep pools	0.050	0.070	0.080
h. very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150
2. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
a. bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
b. bottom: cobbles with large boulders	0.040	0.050	0.070

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BRIDGE DATA

RAILING

TYPE _____ HEIGHT _____

LENGTH _____ % OPEN SPACE _____

HEIGHTS

INVERT TO LOW CHORD _____ INVERT TO TOP OF ROAD _____

LOW CHORD TO TOP OF ROAD _____

PIER DATA

SHAPE: # 




SETS OF PIERS_____ WIDTH _____

SPACING _____

WINGWALL DATA

	TYPE (str8 / warped)	ANGLE (from CL)	LENGTH
UPSTREAM			
DOWNSTREAM			

NOTES: Not in 2008 study, might be in WRECO study. Pipe goes under parking lot

SKETCH:

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JOB # TMDR.01.14
DATE 4-9-15
OBSERVED BY RSL/LNF

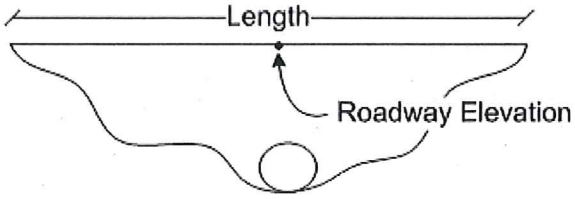
CREEK Laguna Trib LOCATION T12

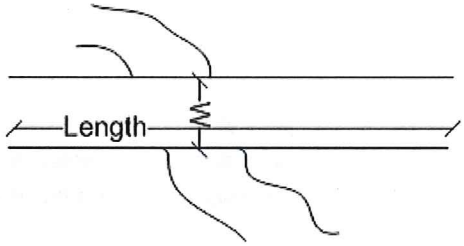
ROADWAY DATA (All data shall be given looking downstream)

TYPE: BRIDGE CULVERT: BOX (PIPE)

LENGTH OF ROADWAY _____ (ft) SKEW _____ (deg) (L up strm)

BOT. WIDTH _____ (ft) SIDE SLOPES L _____ R _____





CULVERT DATA

BOX:

TYPE	# OF BOXES	WIDTH	HEIGHT	DIST bwtn BOX

PIPE:

TYPE	# OF PIPES	DIAMETER	DIST btwn PIPES
CMP	1	72"	

N-VALUES

UPSTREAM
LOB _____
Channel _____
ROB _____

DOWNSTREAM
LOB _____
Channel _____
ROB _____

Manning's n for Channels (Chow, 1959).

Type of Channel and Description	Minimum	Normal	Maximum
Natural streams - minor streams (top width at floodstage < 100 ft)			
1. Main Channels			
a. clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
b. same as above, but more stones and weeds	0.030	0.035	0.040
c. clean, winding, some pools and shoals	0.033	0.040	0.045
d. same as above, but some weeds and stones	0.035	0.045	0.050
e. same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
f. same as "d" with more stones	0.045	0.050	0.060
g. sluggish reaches, weedy, deep pools	0.050	0.070	0.080
h. very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150
2. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
a. bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
b. bottom: cobbles with large boulders	0.040	0.050	0.070

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BRIDGE DATA

RAILING

TYPE _____ HEIGHT _____

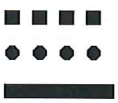
LENGTH _____ % OPEN SPACE _____

HEIGHTS

INVERT TO LOW CHORD _____ INVERT TO TOP OF ROAD _____

LOW CHORD TO TOP OF ROAD _____

PIER DATA

SHAPE: # 

SETS OF PIERS _____ WIDTH _____

SPACING _____

WINGWALL DATA

	TYPE (str8 / warped)	ANGLE (from CL)	LENGTH
UPSTREAM			
DOWNSTREAM			

NOTES: Inside Hacienda, check WRECO study.

SKETCH:

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CONSULTING CIVIL ENGINEERS

JOB # TMOR.01.14
DATE 4-9-15
OBSERVED BY RJL/LNF

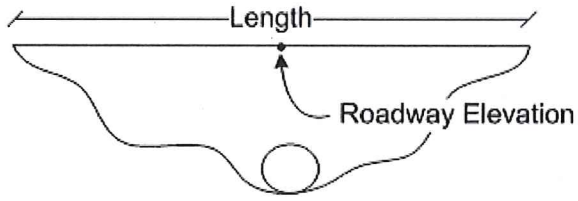
CREEK Trib Laguna LOCATION TL3

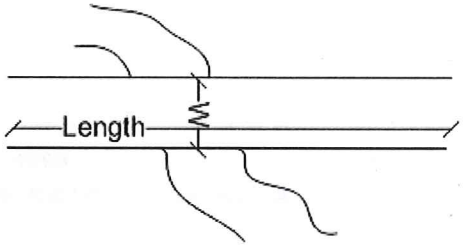
ROADWAY DATA (All data shall be given looking downstream)

TYPE: BRIDGE CULVERT: BOX PIPE

LENGTH OF ROADWAY _____ (ft) SKEW _____ (deg) (L up strm)

BOT. WIDTH _____ (ft) SIDE SLOPES L _____ R _____





CULVERT DATA

BOX:

TYPE	# OF BOXES	WIDTH	HEIGHT	DIST bwtn BOX

PIPE:

TYPE	# OF PIPES	DIAMETER	DIST btwn PIPES
CMP	1	72"	

N-VALUES

UPSTREAM
LOB _____
Channel _____
ROB _____

DOWNSTREAM
LOB _____
Channel _____
ROB _____

Manning's n for Channels (Chow, 1959).

Type of Channel and Description	Minimum	Normal	Maximum
Natural streams - minor streams (top width at floodstage < 100 ft)			
1. Main Channels			
a. clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
b. same as above, but more stones and weeds	0.030	0.035	0.040
c. clean, winding, some pools and shoals	0.033	0.040	0.045
d. same as above, but some weeds and stones	0.035	0.045	0.050
e. same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
f. same as "d" with more stones	0.045	0.050	0.060
g. sluggish reaches, weedy, deep pools	0.050	0.070	0.080
h. very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150
2. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
a. bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
b. bottom: cobbles with large boulders	0.040	0.050	0.070

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BRIDGE DATA

RAILING

TYPE _____ HEIGHT _____

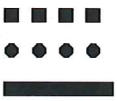
LENGTH _____ % OPEN SPACE _____

HEIGHTS

INVERT TO LOW CHORD _____ INVERT TO TOP OF ROAD _____

LOW CHORD TO TOP OF ROAD _____

PIER DATA

SHAPE: #   # SETS OF PIERS_____ WIDTH _____

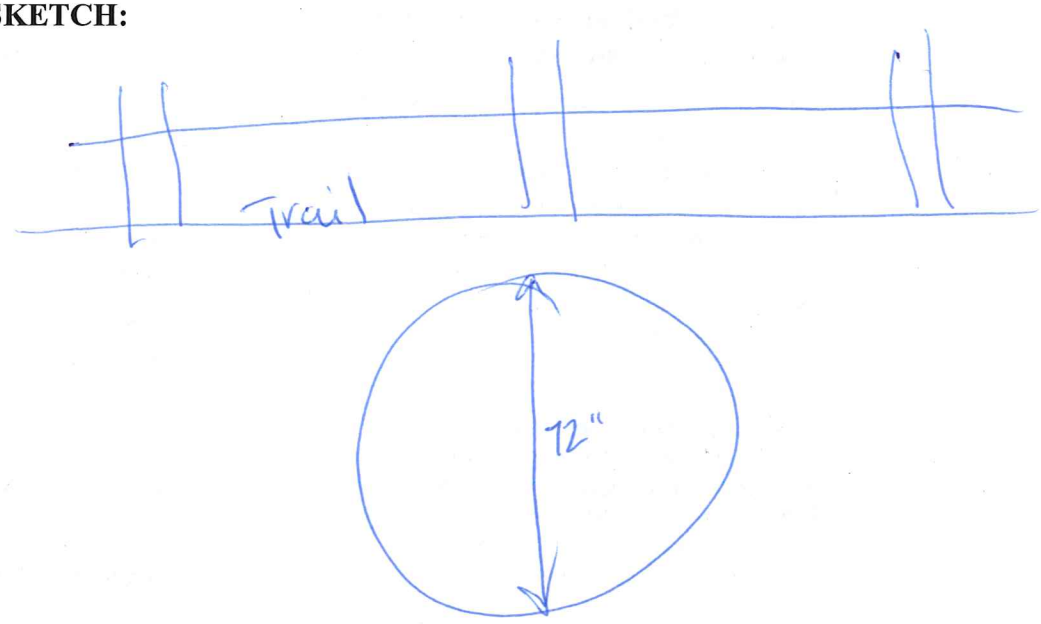
  SPACING _____

WINGWALL DATA

	TYPE (str8 / warped)	ANGLE (from CL)	LENGTH
UPSTREAM			
DOWNSTREAM			

NOTES: Shorter pipe, ~20½ long. under trail

SKETCH:



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CONSULTING CIVIL ENGINEERS

JOB # TMOR.a.15
DATE 4-2-15
OBSERVED BY RJL/LNF

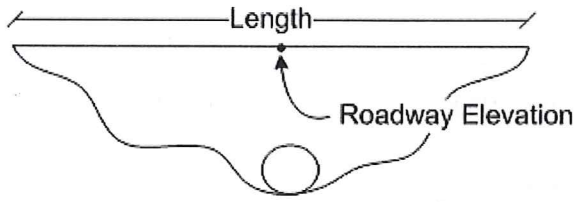
CREEK South Maraga (Riner) LOCATION SMC1

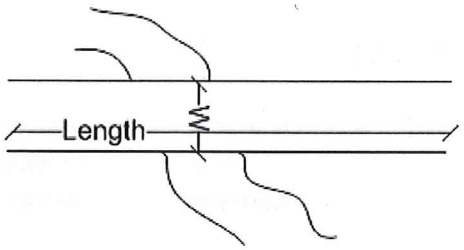
ROADWAY DATA (All data shall be given looking downstream)

TYPE: BRIDGE CULVERT: BOX (PIPE)

LENGTH OF ROADWAY _____ (ft) SKEW _____ (deg) (L up strm)

BOT. WIDTH _____ (ft) SIDE SLOPES L _____ R _____





CULVERT DATA

BOX:

TYPE	# OF BOXES	WIDTH	HEIGHT	DIST bwtn BOX

PIPE:

TYPE	# OF PIPES	DIAMETER	DIST btwn PIPES
CMP	1	102"	

* Assumed no access

N-VALUES

UPSTREAM
LOB .03
Channel .025
ROB .03

DOWNSTREAM
LOB .03
Channel .025
ROB .03

Manning's n for Channels (Chow, 1959).

Type of Channel and Description	Minimum	Normal	Maximum
Natural streams - minor streams (top width at floodstage < 100 ft)			
1. Main Channels			
a. clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
b. same as above, but more stones and weeds	0.030	0.035	0.040
c. clean, winding, some pools and shoals	0.033	0.040	0.045
d. same as above, but some weeds and stones	0.035	0.045	0.050
e. same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
f. same as "d" with more stones	0.045	0.050	0.060
g. sluggish reaches, weedy, deep pools	0.050	0.070	0.080
h. very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150
2. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
a. bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
b. bottom: cobbles with large boulders	0.040	0.050	0.070

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BRIDGE DATA

RAILING

TYPE _____ HEIGHT _____

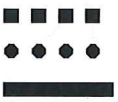
LENGTH _____ % OPEN SPACE _____

HEIGHTS

INVERT TO LOW CHORD _____ INVERT TO TOP OF ROAD ?

LOW CHORD TO TOP OF ROAD _____

PIER DATA

SHAPE: # 

SETS OF PIERS _____ WIDTH _____

SPACING _____

WINGWALL DATA

	TYPE (str8 / warped)	ANGLE (from CL)	LENGTH
UPSTREAM			
DOWNSTREAM			

NOTES: Assumed pipe diameter b/c no access, locked fence. Appears private properties extend to creek. Culvert is abaut 10-15' from roadway

SKETCH:

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CONSULTING CIVIL ENGINEERS

JOB # TMOR 01.14
DATE 4-2-2015
OBSERVED BY RJL/LNF

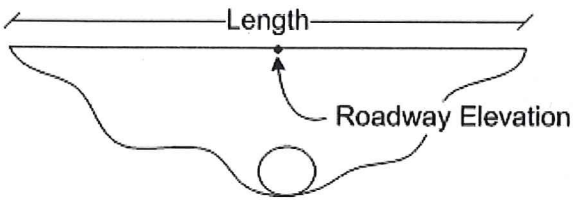
CREEK S. Moraga (Rimer) LOCATION Camino Pablo SMC2

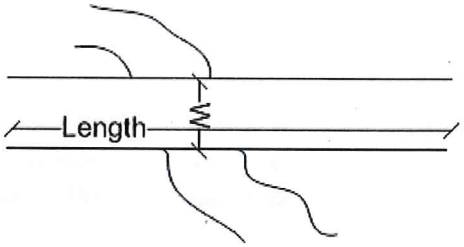
ROADWAY DATA (All data shall be given looking downstream)

TYPE: BRIDGE CULVERT: BOX (PIPE)

LENGTH OF ROADWAY _____ (ft) SKEW _____ (deg) (L up strm)

BOT. WIDTH _____ (ft) SIDE SLOPES L _____ R _____





CULVERT DATA

BOX:

TYPE	# OF BOXES	WIDTH	HEIGHT	DIST bwtn BOX

PIPE:

TYPE	# OF PIPES	DIAMETER	DIST btwn PIPES
CMP	1	78"(H) x 80"(W)	NA

N-VALUES

UPSTREAM
LOB .04
Channel .03
ROB .04

DOWNSTREAM
LOB .045
Channel .035
ROB .045

Manning's n for Channels (Chow, 1959).

Type of Channel and Description	Minimum	Normal	Maximum
Natural streams - minor streams (top width at floodstage < 100 ft)			
1. Main Channels			
a. clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
b. same as above, but more stones and weeds	0.030	0.035	0.040
c. clean, winding, some pools and shoals	0.033	0.040	0.045
d. same as above, but some weeds and stones	0.035	0.045	0.050
e. same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
f. same as "d" with more stones	0.045	0.050	0.060
g. sluggish reaches, weedy, deep pools	0.050	0.070	0.080
h. very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150
2. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
a. bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
b. bottom: cobbles with large boulders	0.040	0.050	0.070

Schaaf & Wheeler
CONSULTING CIVIL ENGINEERS

BRIDGE DATA

RAILING

TYPE _____ HEIGHT _____

LENGTH _____ % OPEN SPACE _____

HEIGHTS

INVERT TO LOW CHORD _____ INVERT TO TOP OF ROAD _____

LOW CHORD TO TOP OF ROAD _____

PIER DATA

SHAPE: # #  # SETS OF PIERS_____ WIDTH _____

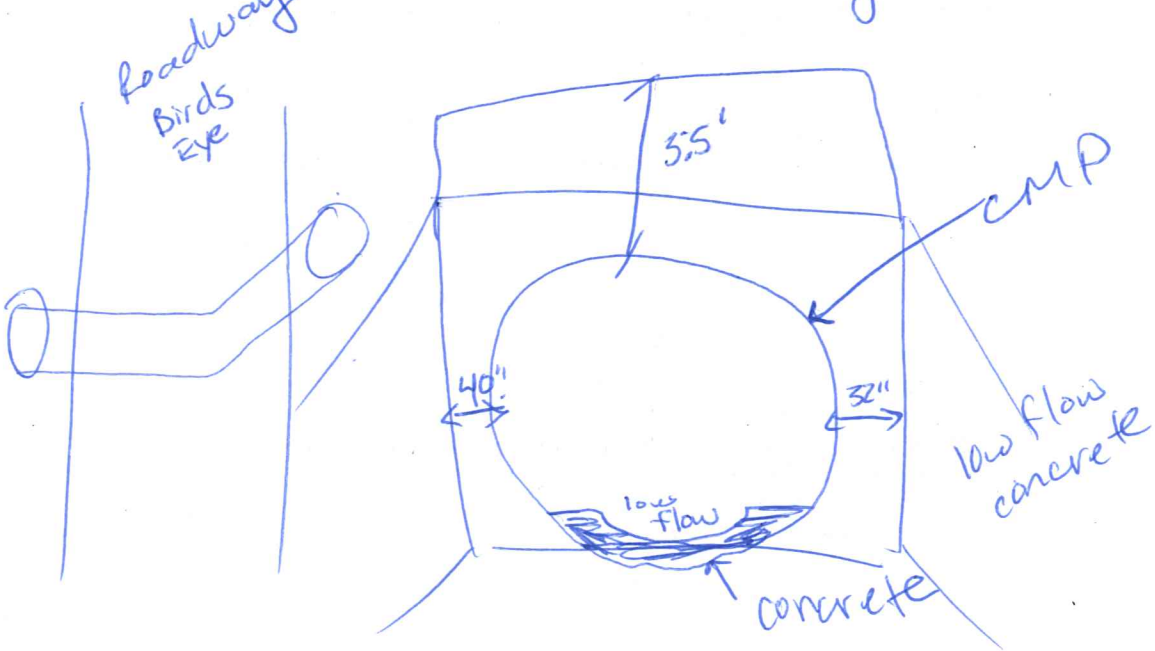
SPACING _____

WINGWALL DATA

	TYPE (str8 / warped)	ANGLE (from CL)	LENGTH
UPSTREAM		45°	
DOWNSTREAM		45°	

NOTES: Culvert makes a bend.
D/s drop 2' out of culvert

SKETCH:



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JOB # TMOR.01.14
DATE 4-9-15
OBSERVED BY RJL/LNF

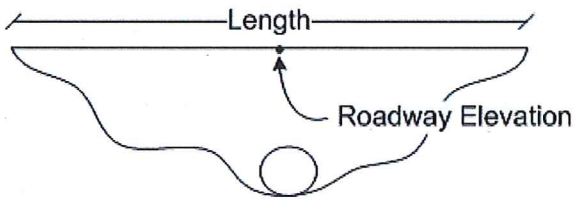
CREEK Laguna Creek LOCATION LC1 - Campolindo

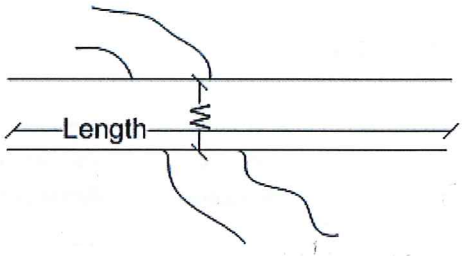
ROADWAY DATA (All data shall be given looking downstream)

TYPE: BRIDGE CULVERT: BOX (PIPE)

LENGTH OF ROADWAY _____ (ft) SKEW _____ (deg) (L up strm)

BOT. WIDTH google (ft) SIDE SLOPES L _____ R _____





CULVERT DATA

BOX:

TYPE	# OF BOXES	WIDTH	HEIGHT	DIST bwtn BOX

PIPE:

TYPE	# OF PIPES	DIAMETER	DIST btwn PIPES
RCP	1	48"	

N-VALUES

UPSTREAM
LOB _____
Channel _____
ROB _____

DOWNSTREAM
LOB _____
Channel _____
ROB _____

Manning's n for Channels (Chow, 1959).

Type of Channel and Description	Minimum	Normal	Maximum
Natural streams - minor streams (top width at floodstage < 100 ft)			
1. Main Channels			
a. clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
b. same as above, but more stones and weeds	0.030	0.035	0.040
c. clean, winding, some pools and shoals	0.033	0.040	0.045
d. same as above, but some weeds and stones	0.035	0.045	0.050
e. same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
f. same as "d" with more stones	0.045	0.050	0.060
g. sluggish reaches, weedy, deep pools	0.050	0.070	0.080
h. very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150
2. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
a. bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
b. bottom: cobbles with large boulders	0.040	0.050	0.070

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BRIDGE DATA

RAILING

TYPE _____ HEIGHT _____

LENGTH _____ % OPEN SPACE _____

HEIGHTS

INVERT TO LOW CHORD _____ INVERT TO TOP OF ROAD _____

LOW CHORD TO TOP OF ROAD _____

PIER DATA

SHAPE: # ■ ■ ■ ■ ——— # SETS OF PIERS _____ WIDTH _____

● ● ● ● ═══

▬ ◀▬▶ SPACING _____

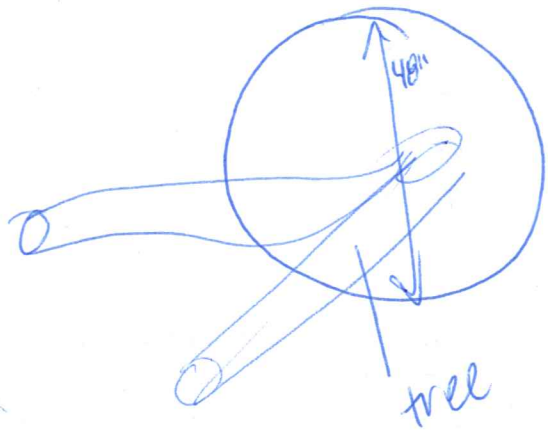
WINGWALL DATA

	TYPE (str8 / warped)	ANGLE (from CL)	LENGTH
UPSTREAM			
DOWNSTREAM			

NOTES: Large tree inside culvert & blocking culvert. Culvert is long, need to get length on google earth. Stagnant water on d/s side. DIs across from bus stop.

SKETCH:

Campolindo



Moraga Rd

Schaaf & Wheeler
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JOB # TMOR0114
DATE 4-9-15
OBSERVED BY RJL/LNF

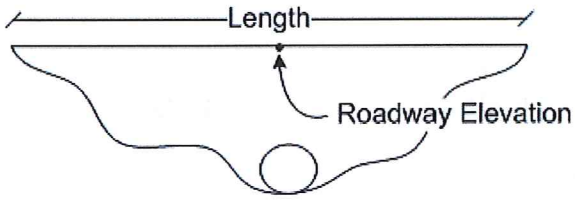
CREEK Laguna Creek LOCATION LC2 - Woodford Dr.

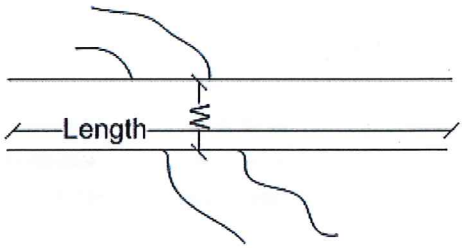
ROADWAY DATA (All data shall be given looking downstream)

TYPE: BRIDGE CULVERT: BOX (PIPE)

LENGTH OF ROADWAY _____ (ft) SKEW _____ (deg) (L up strm)

BOT. WIDTH _____ (ft) SIDE SLOPES L _____ R _____





CULVERT DATA

BOX:

TYPE	# OF BOXES	WIDTH	HEIGHT	DIST bwtn BOX

PIPE:

TYPE	# OF PIPES	DIAMETER	DIST btwn PIPES
RCP	1	42"	

N-VALUES

UPSTREAM
LOB _____
Channel _____
ROB _____

DOWNSTREAM
LOB _____
Channel _____
ROB _____

Manning's n for Channels (Chow, 1959).

Type of Channel and Description	Minimum	Normal	Maximum
Natural streams - minor streams (top width at floodstage < 100 ft)			
1. Main Channels			
a. clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
b. same as above, but more stones and weeds	0.030	0.035	0.040
c. clean, winding, some pools and shoals	0.033	0.040	0.045
d. same as above, but some weeds and stones	0.035	0.045	0.050
e. same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
f. same as "d" with more stones	0.045	0.050	0.060
g. sluggish reaches, weedy, deep pools	0.050	0.070	0.080
h. very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150
2. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
a. bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
b. bottom: cobbles with large boulders	0.040	0.050	0.070

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BRIDGE DATA

RAILING

TYPE _____ HEIGHT _____

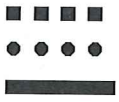
LENGTH _____ % OPEN SPACE _____

HEIGHTS

INVERT TO LOW CHORD _____ INVERT TO TOP OF ROAD _____

LOW CHORD TO TOP OF ROAD _____

PIER DATA

SHAPE: #   # SETS OF PIERS_____ WIDTH _____

#

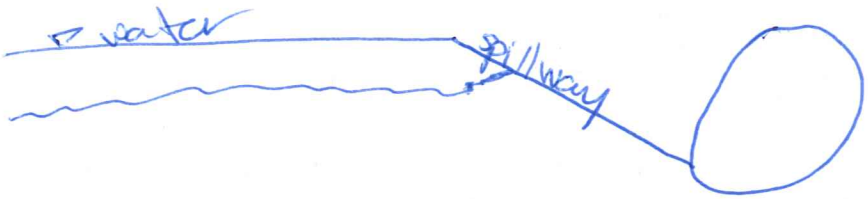
SPACING _____

WINGWALL DATA

	TYPE (str8 / warped)	ANGLE (from CL)	LENGTH
UPSTREAM			
DOWNSTREAM			

NOTES: On u/s there is a spillway that drops about 2-3' this holding back flow in channel w/ standing water

SKETCH: u/s @ house on Moraga Rd.



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JOB # TMOR.01.14
DATE 4-9-15
OBSERVED BY RJL/LNF

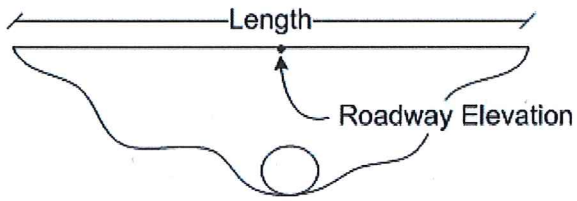
CREEK Laguna Creek LOCATION Hacienda LC4, 5 & 6

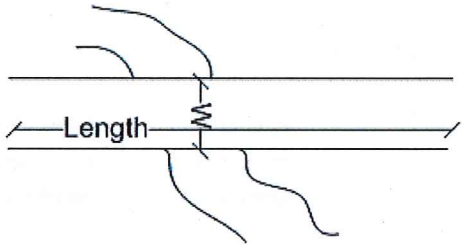
ROADWAY DATA (All data shall be given looking downstream)

TYPE: BRIDGE CULVERT: BOX PIPE

LENGTH OF ROADWAY _____ (ft) SKEW _____ (deg) (L up strm)

BOT. WIDTH _____ (ft) SIDE SLOPES L _____ R _____





CULVERT DATA

BOX:

TYPE	# OF BOXES	WIDTH	HEIGHT	DIST bwtn BOX

PIPE:

TYPE	# OF PIPES	DIAMETER	DIST btwn PIPES
	2	LC5 - 96" CMP LC6 - Box RCP 2'x10'	

N-VALUES

UPSTREAM
LOB _____
Channel _____
ROB _____

DOWNSTREAM
LOB _____
Channel _____
ROB _____

Manning's n for Channels (Chow, 1959).

Type of Channel and Description	Minimum	Normal	Maximum
Natural streams - minor streams (top width at floodstage < 100 ft)			
1. Main Channels			
a. clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
b. same as above, but more stones and weeds	0.030	0.035	0.040
c. clean, winding, some pools and shoals	0.033	0.040	0.045
d. same as above, but some weeds and stones	0.035	0.045	0.050
e. same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
f. same as "d" with more stones	0.045	0.050	0.060
g. sluggish reaches, weedy, deep pools	0.050	0.070	0.080
h. very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150
2. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
a. bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
b. bottom: cobbles with large boulders	0.040	0.050	0.070

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BRIDGE DATA

RAILING

TYPE _____ HEIGHT _____

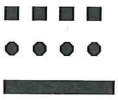
LENGTH _____ % OPEN SPACE _____

HEIGHTS

INVERT TO LOW CHORD _____ INVERT TO TOP OF ROAD _____

LOW CHORD TO TOP OF ROAD _____

PIER DATA

SHAPE: #   # SETS OF PIERS_____ WIDTH _____

#

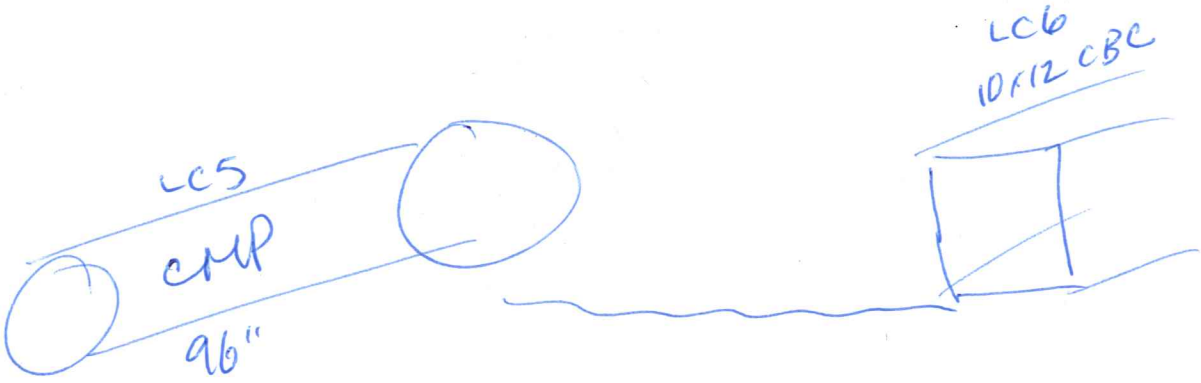
SPACING _____

WINGWALL DATA

	TYPE (str8 / warped)	ANGLE (from CL)	LENGTH
UPSTREAM			
DOWNSTREAM			

NOTES: Get dimensions & data from WRECO study
Drop weir u/s side 20"

SKETCH:



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JOB # TMOR.01.14
DATE RJL/LNF
OBSERVED BY 4-9-15

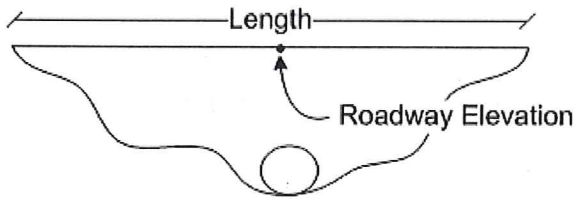
CREEK Laguna Creek LOCATION Lynwood LC7

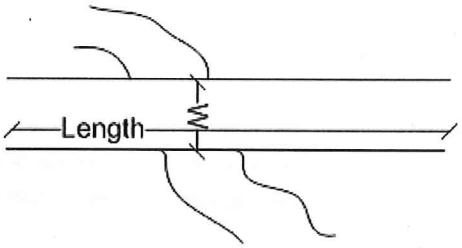
ROADWAY DATA (All data shall be given looking downstream)

TYPE: BRIDGE CULVERT: BOX PIPE

LENGTH OF ROADWAY _____ (ft) SKEW _____ (deg) (L up strm)

BOT. WIDTH _____ (ft) SIDE SLOPES L _____ R _____





CULVERT DATA

BOX:

TYPE	# OF BOXES	WIDTH	HEIGHT	DIST bwtn BOX

PIPE:

TYPE	# OF PIPES	DIAMETER	DIST btwn PIPES
CMP	1	12'	

N-VALUES

UPSTREAM
LOB _____
Channel _____
ROB _____

DOWNSTREAM
LOB _____
Channel _____
ROB _____

Manning's n for Channels (Chow, 1959).

Type of Channel and Description	Minimum	Normal	Maximum
Natural streams - minor streams (top width at floodstage < 100 ft)			
1. Main Channels			
a. clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
b. same as above, but more stones and weeds	0.030	0.035	0.040
c. clean, winding, some pools and shoals	0.033	0.040	0.045
d. same as above, but some weeds and stones	0.035	0.045	0.050
e. same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
f. same as "d" with more stones	0.045	0.050	0.060
g. sluggish reaches, weedy, deep pools	0.050	0.070	0.080
h. very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150
2. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
a. bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
b. bottom: cobbles with large boulders	0.040	0.050	0.070

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BRIDGE DATA

RAILING

TYPE _____ HEIGHT _____

LENGTH _____ % OPEN SPACE _____

HEIGHTS

INVERT TO LOW CHORD _____ INVERT TO TOP OF ROAD _____

LOW CHORD TO TOP OF ROAD _____

PIER DATA

SHAPE: # ■■■■ ——●—— # SETS OF PIERS_____ WIDTH _____

●●●● ▬▬

▬▬ ◀▬▬

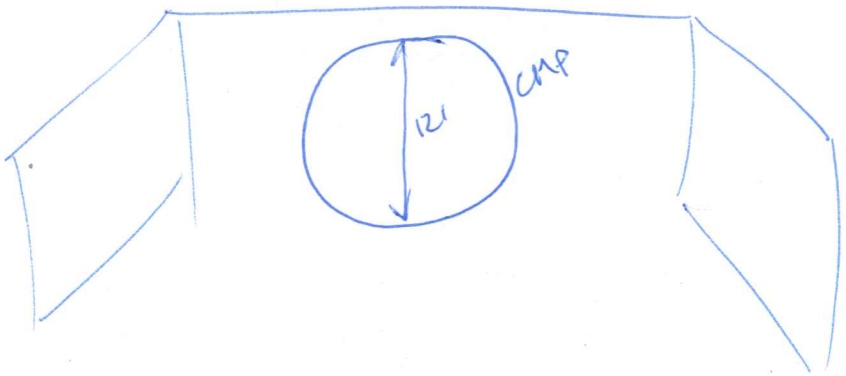
SPACING _____

WINGWALL DATA

	TYPE (str8 / warped)	ANGLE (from CL)	LENGTH
UPSTREAM		45°	
DOWNSTREAM		45°	

NOTES: Large CMP pipe Headwall cracked on top of d/s. Need inlet on street to drain low point of street.

SKETCH:



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JOB # TMOR01.14
DATE 4-2-15
OBSERVED BY RJ4 CNF

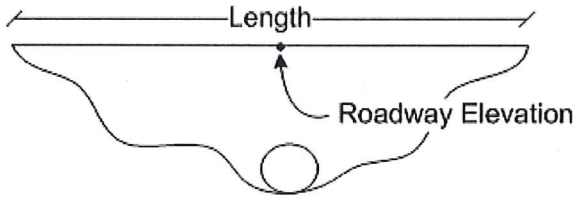
CREEK Laguna Creek LOCATION Moraga Rd LCB

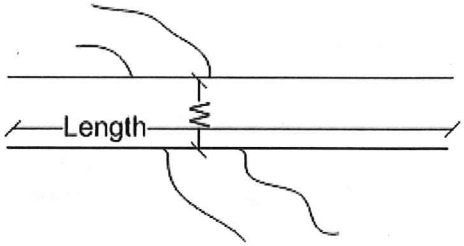
ROADWAY DATA (All data shall be given looking downstream)

TYPE: BRIDGE CULVERT: BOX PIPE

LENGTH OF ROADWAY 29 (ft) SKEW _____ (deg) (L up strm)

BOT. WIDTH google est. (ft) SIDE SLOPES L _____ R _____





CULVERT DATA

BOX:

TYPE	# OF BOXES	WIDTH	HEIGHT	DIST bwtn BOX
CBC	2	13'	10'	11

PIPE:

TYPE	# OF PIPES	DIAMETER	DIST btwn PIPES
CBC	24		

N-VALUES

UPSTREAM
LOB .045, .05
Channel .045
ROB .045, .05

DOWNSTREAM
LOB 0.045
Channel .045
ROB 0.045

Manning's n for Channels (Chow, 1959).

Type of Channel and Description	Minimum	Normal	Maximum
Natural streams - minor streams (top width at floodstage < 100 ft)			
1. Main Channels			
a. clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
b. same as above, but more stones and weeds	0.030	0.035	0.040
c. clean, winding, some pools and shoals	0.033	0.040	0.045
d. same as above, but some weeds and stones	0.035	0.045	0.050
e. same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
f. same as "d" with more stones	0.045	0.050	0.060
g. sluggish reaches, weedy, deep pools	0.050	0.070	0.080
h. very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150
2. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
a. bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
b. bottom: cobbles with large boulders	0.040	0.050	0.070

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BRIDGE DATA

RAILING

TYPE Chain HEIGHT 4'

LENGTH _____ % OPEN SPACE 90

HEIGHTS

INVERT TO LOW CHORD _____ INVERT TO TOP OF ROAD _____

LOW CHORD TO TOP OF ROAD _____

PIER DATA

SHAPE: # ■■■■ ▬▬▬ # SETS OF PIERS 1 WIDTH _____

●●●● ▬▬▬

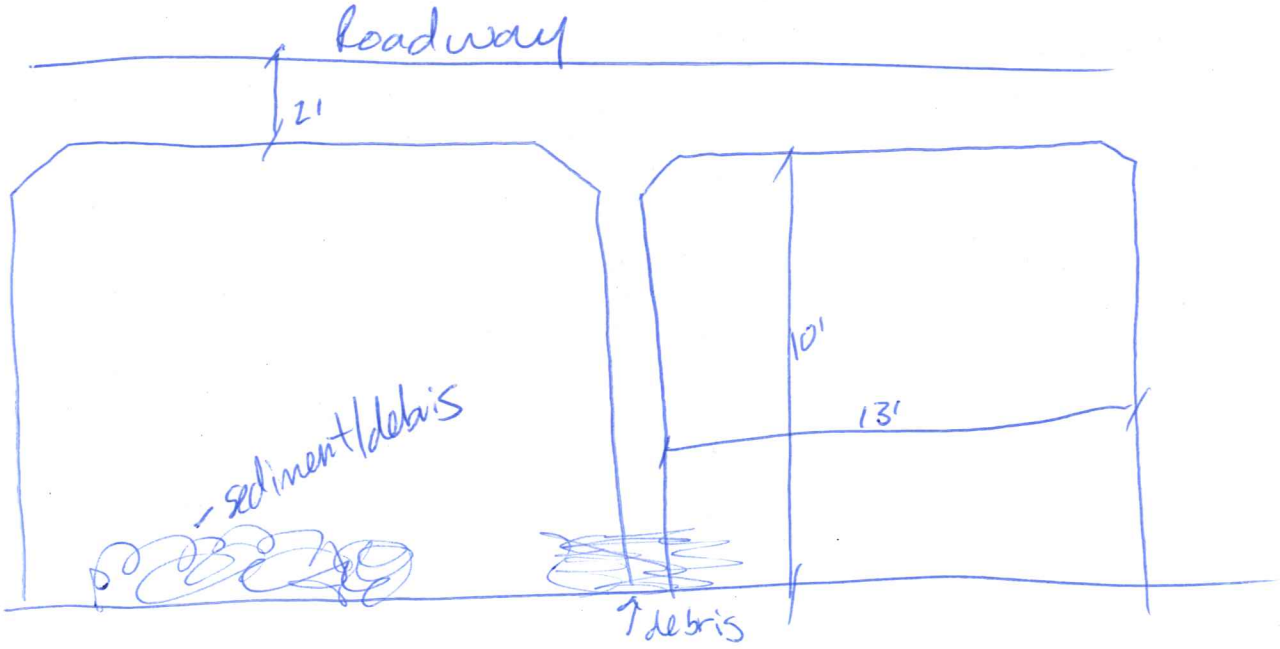
▬▬▬ ◀▬▬ SPACING Middle

WINGWALL DATA

	TYPE (str8 / warped)	ANGLE (from CL)	LENGTH
UPSTREAM		60°	
DOWNSTREAM		45°	

NOTES: Looks more like bridge, could be modeled as 2 boxes or bridge. Major debris buildup at u/s pier and downstream opening

SKETCH:



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JOB # TMOR.01.14
DATE 4-2-15
OBSERVED BY RJL/LNF

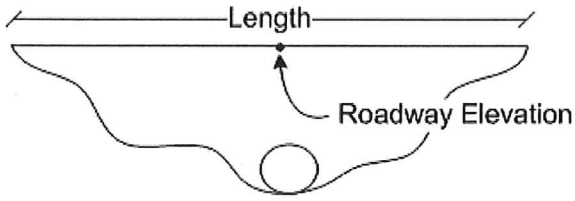
CREEK Laguna LOCATION Country Club LC9

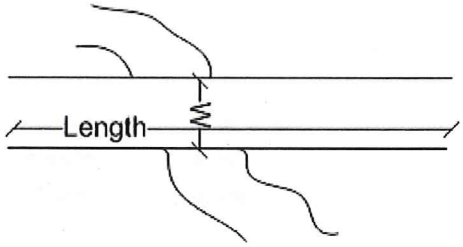
ROADWAY DATA (All data shall be given looking downstream)

TYPE: ✓ BRIDGE CULVERT: BOX PIPE

LENGTH OF ROADWAY 31' (ft) SKEW _____ (deg) (L up strm)

BOT. WIDTH 47' (ft) SIDE SLOPES L _____ R _____





CULVERT DATA

BOX:

TYPE	# OF BOXES	WIDTH	HEIGHT	DIST bwtn BOX

PIPE:

TYPE	# OF PIPES	DIAMETER	DIST btwn PIPES

N-VALUES

UPSTREAM
LOB .045
Channel .04
ROB .045

DOWNSTREAM
LOB .045
Channel .04
ROB .045

Manning's n for Channels (Chow, 1959).

Type of Channel and Description	Minimum	Normal	Maximum
Natural streams - minor streams (top width at floodstage < 100 ft)			
1. Main Channels			
a. clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
b. same as above, but more stones and weeds	0.030	0.035	0.040
c. clean, winding, some pools and shoals	0.033	0.040	0.045
d. same as above, but some weeds and stones	0.035	0.045	0.050
e. same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
f. same as "d" with more stones	0.045	0.050	0.060
g. sluggish reaches, weedy, deep pools	0.050	0.070	0.080
h. very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150
2. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
a. bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
b. bottom: cobbles with large boulders	0.040	0.050	0.070

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BRIDGE DATA

RAILING

TYPE concrete HEIGHT 42" (3.5')

LENGTH 63' % OPEN SPACE 50%

HEIGHTS

INVERT TO LOW CHORD _____ INVERT TO TOP OF ROAD 14'

LOW CHORD TO TOP OF ROAD _____

PIER DATA

SHAPE: # ■■■■ ——— # SETS OF PIERS Ø WIDTH _____

●●●● ═══

▬▬ ◀▬▬

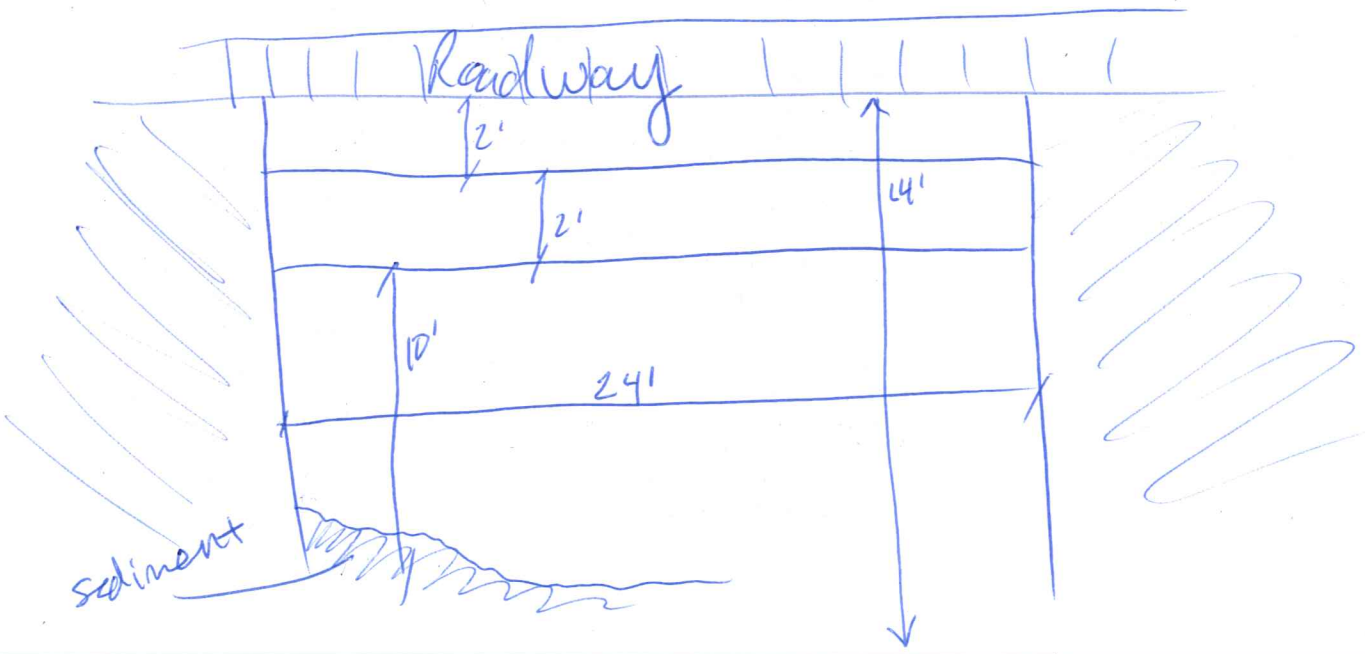
SPACING _____

WINGWALL DATA

	TYPE (str8 / warped)	ANGLE (from CL)	LENGTH
UPSTREAM			
DOWNSTREAM			

NOTES: Bridge is larger than listed in 2008 study.
Heavily vegitated & sediment bank on left side

SKETCH:



Culvert: CD1

Culvert: ID1

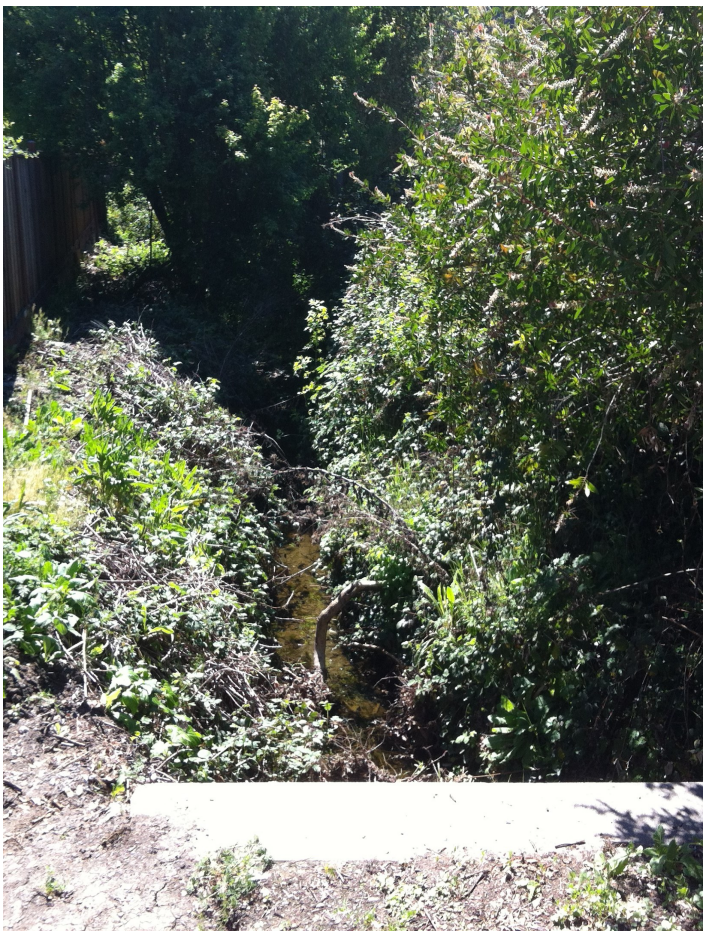
Culvert: ID2

Culvert: LacC1

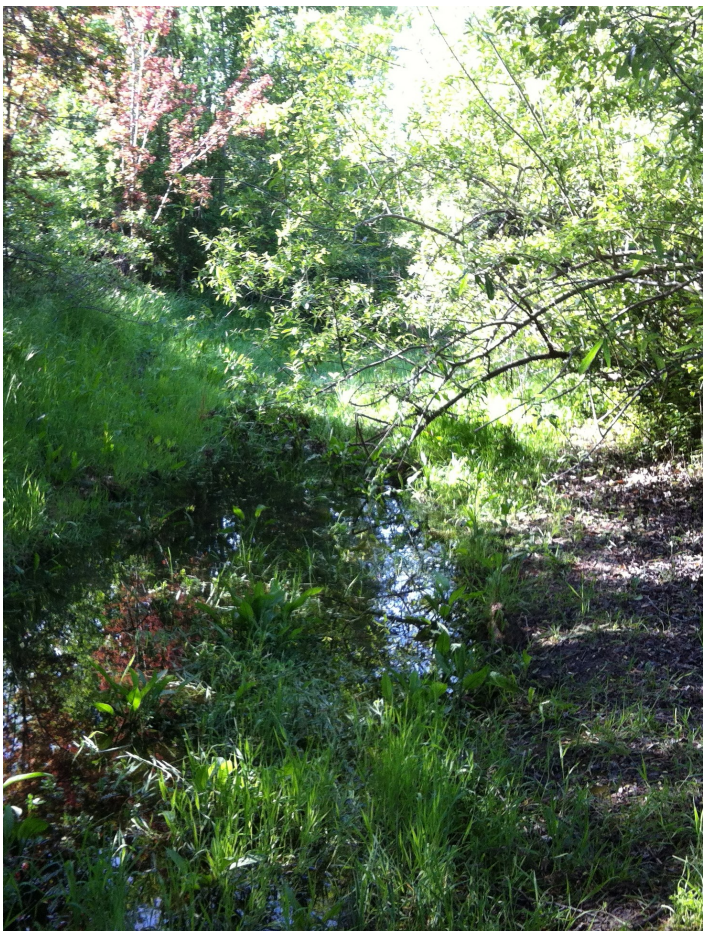
Culvert: LacC2

Culvert: LacC2.5

Culvert: LacC3



Culvert: LC1



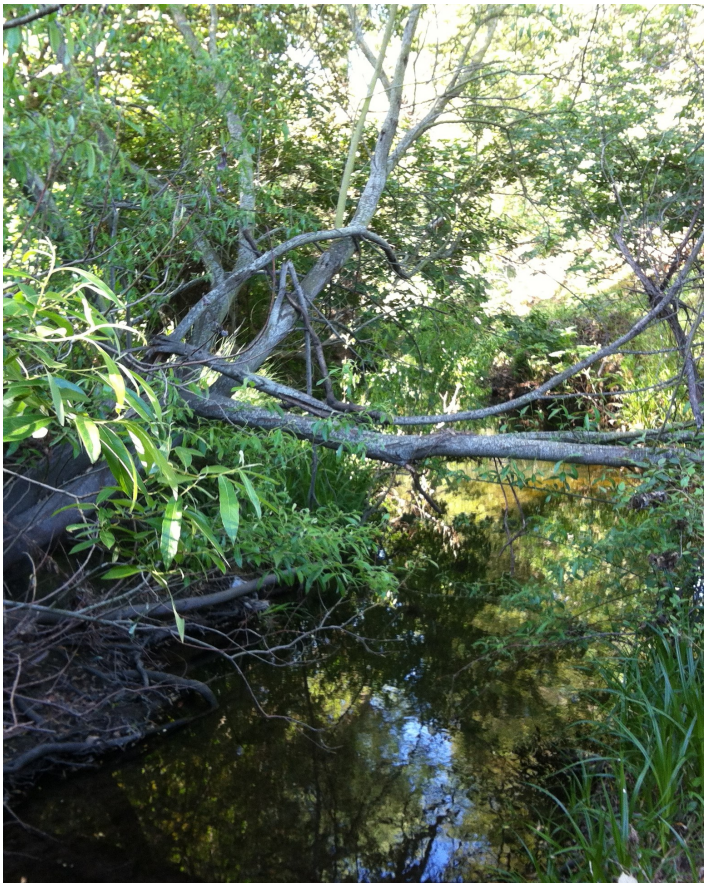
Culvert: LC2

Culvert: LC3

Culvert: LC5/6

Culvert: LC7

Culvert: LC8



Culvert: LC9

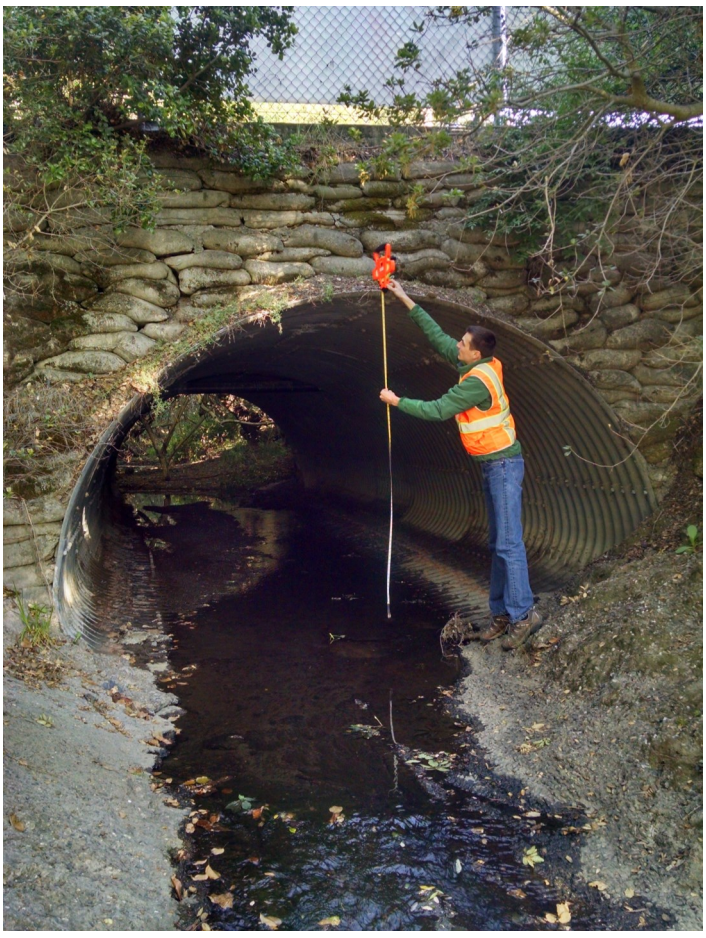
Culvert: LTC1

Culvert: LTC2

Culvert: LTC3

Culvert: MB3

Culvert: MC1



Culvert: MC2

Culvert: RT1

Culvert: RT2

Culvert: RT3

Culvert: SMC1

Culvert: SMC2

Culvert: STM1

Culvert: STM2

Culvert: STM3

Culvert: STM4

Culvert: TL1

Culvert: TL2

Culvert: TL3

APPENDIX C

Street Pavement Storm Drain Repairs

Schaaf & Wheeler
Consulting Civil Engineers

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San Francisco, CA 94102
(415) 433-4848
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TO:	Edric Kwan, PE	DATE:	October 31, 2014
FROM:	Dan Schaaf, PE Robin Lee, PE	JOB #:	TMOR.01.14
SUBJECT:	**2015 Street Pavement Project Storm Drain Improvements**		

Introduction and Purpose

This technical memorandum presents the findings of televising the storm drain network that lies under the streets that are to be repaved in 2015 in the Town of Moraga. Presidio Systems Inc. spent five days in the field televising storm drains. Approximately 9,000 linear feet of pipe was inspected under the streets to be repaved in 2015. The results of these videos showed that the majority of the Town's system is in fair condition, with the exception of a few pipes that need complete replacement and several that need spot repairs. Timing the rehabilitation and replacement of pipes that are impaired with the street pavement projects means that the streets are only torn up once and residents are not disrupted by construction at two separate times. It is anticipated that there will be a cost savings in aligning these storm drain projects to coincide with the pavement projects. Attachment 1 provides a table of the street pavement projects for 2015.

In addition, several pipes were noted with high levels of sediment and in some cases large boulders and/or cement blocks. Six pipes were cleared of sediment and debris by Presidio System Inc. Some of these pipes will require heavy duty cleaning that could take more than a day. To minimize the impacts to residents, it is also recommended that these pipes are maintained at the same time as the street pavement projects.

Severity of Storm Drain Defects

Presidio Systems Inc. (PSI) has a rating scale of 1-5 for the pipe defects that they notice on the televised videos. These are shown in Table 1.

Table 1: Storm Drain Pipe Impairment Rating

Level	Severity
1	Light
2	Moderate
3	Average
4	Heavy
5	Severe

An example of a light severity defect is longitudinal cracking in a reinforced concrete pipe (RCP) that does not show signs of infiltration or weakened structure. An example of a severe defect is a hole in a pipe that is allowing soil, roots, or sediment. Any defect that limits the conveyance capacity of a pipe is considered Heavy to Severe. In some instances, sediment or debris might be considered a Heavy or Severe defect if it is thought that the limit in capacity may results in flooding. The locations of the street repairs and the storm drain impairments are shown in Figure 1. Figure 2 shows examples of debris and broken pipe defects.

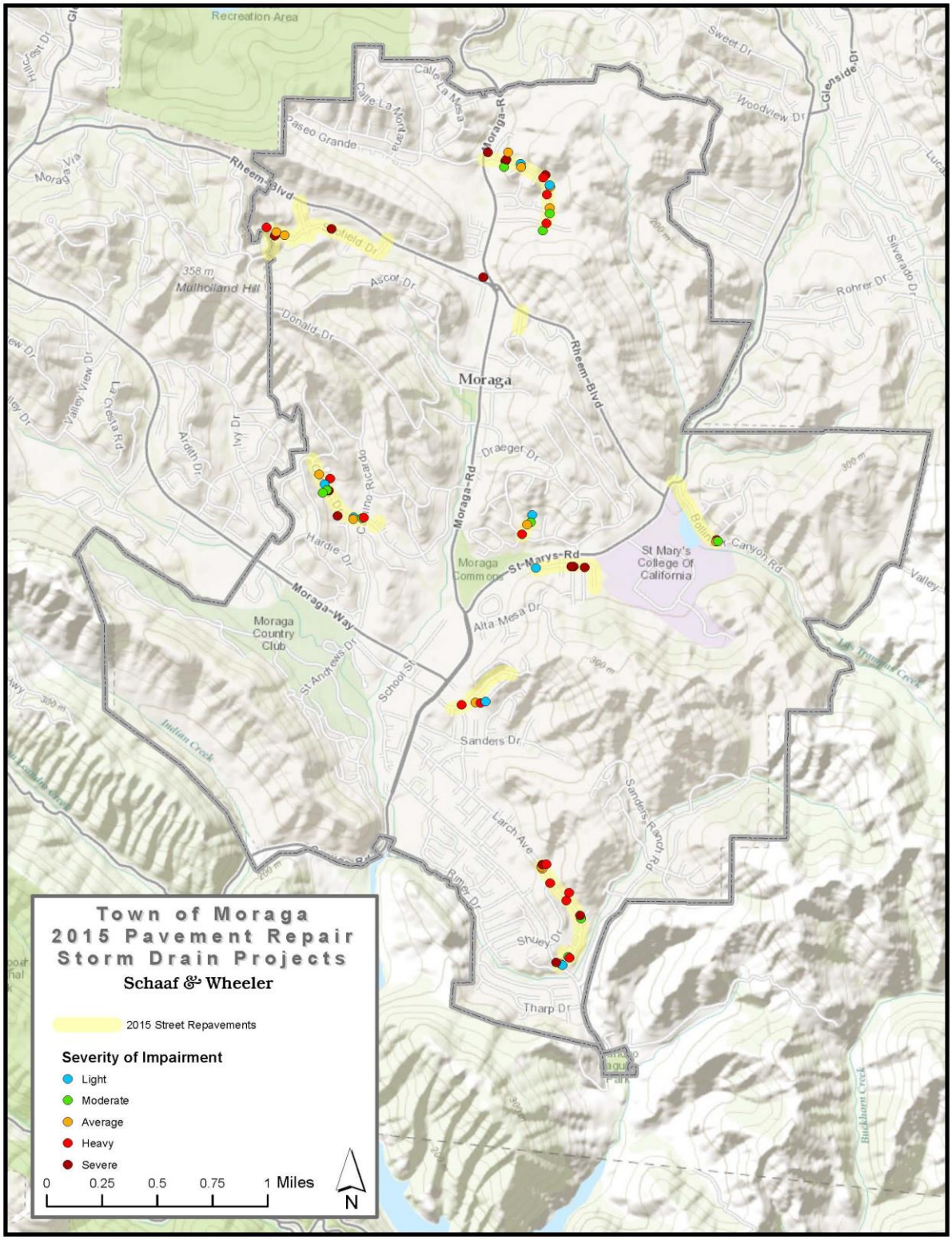


Figure 1: Storm Drain Pipe Impairment Locations

Figure 2: Pipe Impairment Examples: Broken Pipe (left) Pipe Debris (right)

Cost Estimates

All estimates were developed in accordance to current Bay Area practices. The estimates are based on project experience with other jurisdictions and engineering judgment. Project costs are in 2014 dollars. Projects are separated into replacement and rehabilitation by CIPP. The cost for pipe replacement includes a ten foot wide trench with approximately five feet of cover above the pipe. The majority of pipes inspected were RCP and in fair condition, therefore, complete replacement is not recommended, instead, a patch repair on the impaired section of pipe is recommended. Patch repair costs assume two 8-ft sections of pipe are required to make repair. These cost estimates are to be used for planning level decisions, but should not be relied upon for basis of design.

Tables 2 shows the unit costs for replacement and CIPP lining of pipes by diameter.

Table 2: Storm Drain Pipe Unit Costs for Repairs

Diameter (inches)	Cost Replace ($/ft)	Cost CIPP ($/ft)	Patch Repair ($/repair)
8	$200	$80	$3,200
12	$225	$90	$3,600
15	$250	$100	$4,000
18	$270	$110	$4,320
21	$290	$120	$4,640
24	$325	$130	$5,200
27	$350	$145	$5,600
30	$375	$160	$6,000
33	$400	$175	$6,400
36	$425	$190	$6,800
42	$475	$250	$7,600
48	$525	$300	$8,400

Diameter (inches)	Cost Replace ($/ft)	Cost CIPP ($/ft)	Patch Repair ($/repair)
54	$575	$390	$9,200
60	$625	$500	$10,000
66	$675	$510	$10,800
72	$725	$520	$11,600
78	$780	$530	$12,480
84	$830	$540	$13,280

Total project costs include an additional 40% increase for design, administration, and contingency. Some projects require maintenance such as removal of boulder, cement, or sediment. These projects are classified into a cleaning project and the cost is set to $275/hr based on cost estimates from Presidio System Inc.

Prioritization

Condition Related Improvements

Project costs were developed by priority and by project type. Table 3 summarizes the costs by priority level and Table 4 details the projects by project type. Costs in Tables 3, 4, and 5 include the 40% increase.

Table 3: Storm Drain Improvement Costs by Priority

Level	Severity	Cost
1	Light	$3,000
2	Moderate	$21,000
3	Average	$126,000
4	Heavy	$103,000
5	Severe	$260,000
TOTAL		**$513,000**

Of the 97 pipes inspected, roughly half did not require any maintenance or improvement. Of the specified improvement projects, roughly half are spot repairs and cleaning. Table 4 summarize the projects by type.

Table 4: Improvement Projects by Type

Project Type	Number of Projects	Cost
Cleaning	21	$55,000
Spot Repair	20	$204,000
Private Improvement	4	$145,000
Spot Repair & Cleaning	3	$48,000
CIPP	2	$61,000
No Improvement Needed	41	-
Cleaning Completed	6	-

Attachment 2 to this memo contains a detailed table of all the identified impairments located under the street to be repaved in 2015. Table 5 provides a brief summary of the Severe and Heavy rated impairment and the associated projects including the location, pipe size, priority, project type and cost. The projects that are rated Light, Moderate, and Average are recommended to be completed within the next 10 years, and are therefore, not of the highest priority. It is suggested that these projects are lumped into the Storm Drain Master Plan and the Sever and Heavy projects are completed with the road repavement projects.

Attachment 3 of this memo contains maps of each street and the associated projects.

Table 5: Storm Drain Improvement Costs by Street

Street	Pipe Size (in)	Length Surveyed	Severity	Project Type	Cost
Alderbrook Place	24	63	Heavy	Patch Repair	$14,560
Bollinger	24	37	Heavy	Cleaning & 2 Patch Repairs	$15,330
Buckingham	24	148	Heavy	Cleaning & Patch Repairs	$8,820
Camino Pablo	15	15.1	**Severe**	none	-
Campolindo	48	10	**Severe**	Cleaning & 2 Patch Repairs	$24,290
Campolindo	48	140	**Severe**	Cleaning	$770
Corliss	30	612	**Severe**	Patch Repair	$16,800
Corliss	15	0	**Severe**	Private Cleaning	$21,560
Corliss	24	112	Heavy	CIPP	$20,384
Corliss	24	0	Heavy	Cleaning Completed	-
Corliss	18	145	Heavy	Patch Repair	$6,048
Country Club	15	21	Heavy	Cleaning	$1,540
Del Monte	48	4	**Severe**	Cleaning	$21,560
Del Monte Way	15	220	**Severe**	Patch Repair	$5,600

Street	Pipe Size (in)	Length Surveyed	Severity	Project Type	Cost
Del Rio	15	39	**Severe**	Cleaning Completed	-
Larch	18	62	**Severe**	Patch Repair	$12,096
Larch	15	0	**Severe**	none	-
Larch	30	180	Heavy	Patch Repair	$8,400
Larch	18	34	Heavy	Cleaning	$1,540
Larch	24	120	Heavy	Cleaning	$3,080
Larch	18	33	Heavy	Cleaning	$1,540
Larch	15	12	Heavy	Cleaning Completed	-
Larch	42	77	Heavy	Cleaning Completed	-
Natalie	24	290	**Severe**	Patch Repair	$7,280
Natalie	18	34	**Severe**	Patch Repair	$6,048
Natalie	24	134	**Severe**	Patch Repair	$14,560
Natalie	30	36	Heavy	Cleaning Completed	-
Natalie	30	245	Heavy	Patch Repair	$8,400
Sandringham	24	123	Heavy	Patch Repair	$7,280
Scofield	18	110	**Severe**	Private Replacement	$41,580
Scofield	24	83	**Severe**	Private Replacement	$37,765
Scofield	24	97	**Severe**	Private Replacement	$44,135
Scofield	18	263	Heavy	Patch Repair	$6,048

Capacity Related Improvement

The Town's mapped storm drain infrastructure was modeled using DHI's MIKE URBAN software to identify any undersized pipes that require upsizing. None of the pipes under the streets to be repaved showed signs of flooding or limited capacity during a 10-year storm event with 100-year depth in the receiving creeks. At this time, there are no recommend projects to increase pipe capacity under the streets to be repaved in 2015.

Future Storm Drain Master Planning

Additional condition and capacity related projects will be identified and detailed in the Town's Storm Drain Management Plan. Because it is anticipated that other Heavy and Severe impairments will be identified in upcoming modeling and condition assessment work, it is suggested that only the Severe and Heavy projects are completed at the same time as the street repavement projects. The rest of the projects will be added to the Storm Drain Master Plan and should be addressed within the next ten years.

APPENDIX 1

2015 Pavement Repair Project List

Town of Moraga
2015 Pavement Repair Project
Preliminary Street List

Name	Begin Location	End Location	2011 PCI	FC	Lanes	Length (ft)	Area (sf)	Preliminary Treatment	Preliminary Unit cost ($/sy)	Preliminary Treatment Cost
Base Street List										
Bollinger Canyon Rd	St Marys Rd	Joseph Dr	16	C	2	1,725	46,575	Reconstruct Structure	$72.00	$372,600
Corliss Dr	Wakefield Dr	Camino Ricardo	27, 31	C	2	1,660	59,760	Reconstruct Structure	$72.00	$478,080
Del Monte Ct	Carter Dr	W End	14	R	2	670	19,430	Reconstruct Structure	$52.00	$112,262
Del Monte Wy	Carter Dr	S End	15	R	2	1,285	41,120	Reconstruct Structure	$52.00	$237,582
Larch Ave	#1160 Larch Ave	Camino Pablo	26 - 29	C	2	2,860	97,240	Reconstruct Structure	$72.00	$777,920
Natalie Dr	Campolindo Dr	Buckingham Dr	21 - 39	C	2	2,460	88,560	Reconstruct Structure	$52.00	$511,680
Scofield Dr	Harold Dr	Rheem Blvd	31, 32	R	2	2,255	72,160	Reconstruct Structure	$52.00	$416,924
Base Street List Subtotals						**12,915**				**$2,907,049**
Additional Street List										
Alderbrook Pl	Fernwood Dr	N End	24	R	2	415	12,035	Reconstruct Structure	$52.00	$69,536
Chalda Wy	225ft N/O Williams Dr	Rheem Blvd	23	R	2	570	18,240	Thick Overlay	$30.00	$60,800
Country Club Dr	Southard Ct	Sandringham South	25	C	2	1,770	70,800	Reconstruct Structure	$52.00	$409,067
Harold Dr	Rheem Blvd	S End	25, 36	R	2	760	27,360	Reconstruct Structure	$52.00	$158,080
Marie Pl	W End	Larch Ave	23	R	2	235	6,580	Thick Overlay	$30.00	$21,933
Scofield Dr	Goodfellow Dr	Harold Dr	27	R	2	1,040	26,000	Reconstruct Structure	$52.00	$150,222
Winslow Pl	Corliss Dr	N End	25	R	2	170	6,120	Thick Overlay	$30.00	$20,400
Additional Street List Subtotals						**4,960**				**$890,038**
Grand Total						**17,875**				**$3,797,087**

APPENDIX 2

Storm Drain Improvements for 2015 Street Pavement

Town of Moraga 2015 Street Pavement
Storm Drain Repair, Rehabilitation, and Maintenance Projects DRAFT

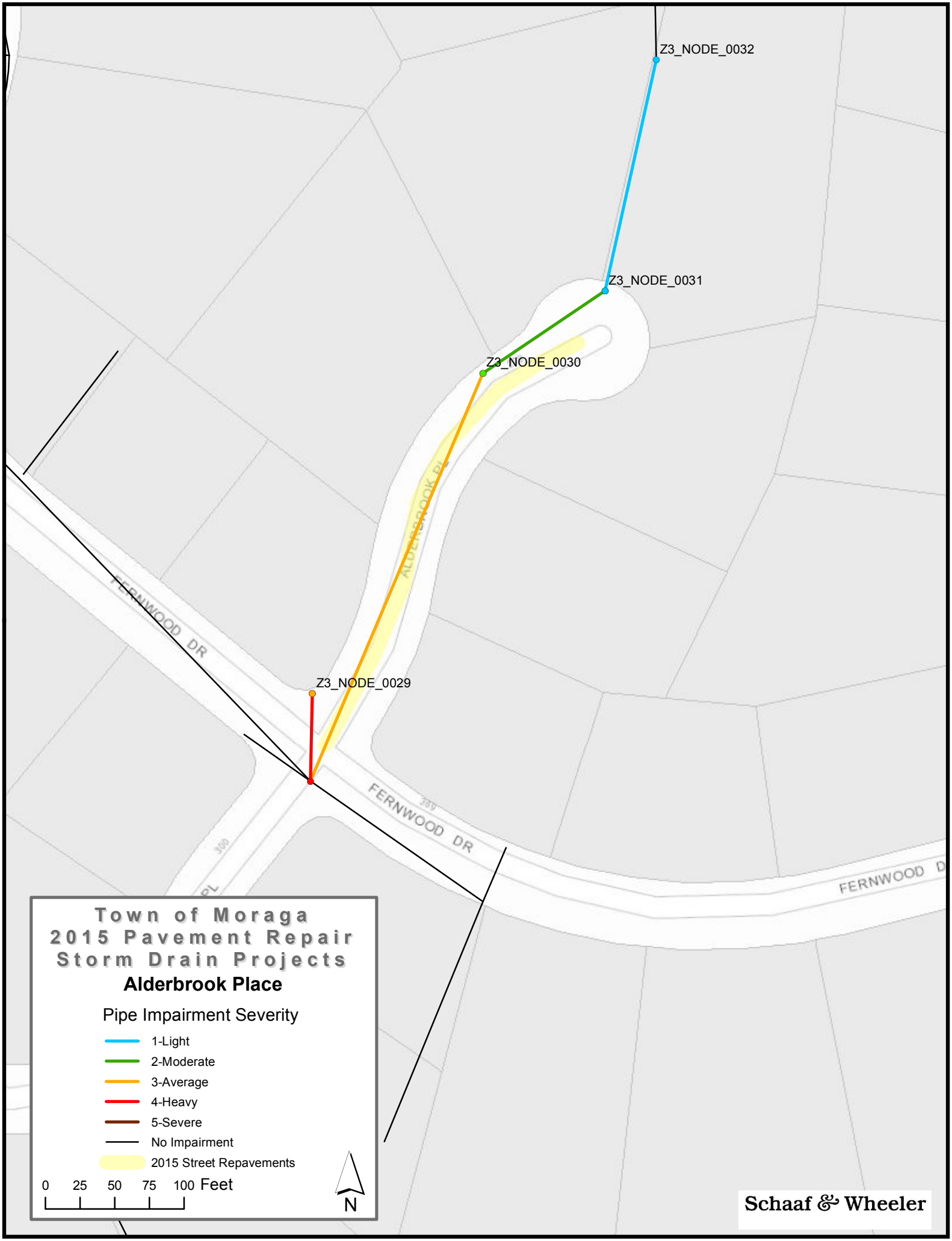
Street	From	To	Link_MUID	Size	Length	Observations	Severity	Project Type	Unit Cost	Qnty	Cost	Cost + 40%
Alderbrook Place	Z3_Node_0029	Z3_Node_0027	Z3_Link_0045	24	63	Egg shape deformation and concrete obstacle	Heavy	Patch Repair	$5,200	2	$ 10,400	$ 14,560
Alderbrook Place	Z3_Node_0030	Z3_Node_0027	Z3_Link_0037	24	221	Infiltration runner and concrete deposit	Average	CIPP	$130	221	$ 28,730	$ 40,222
Alderbrook Place	Z3_Node_0031	Z3_Node_0030	Z3_Link_0038	24	135	Longitudinal Crack	Moderate	none	$0	0	$ -	$ -
Alderbrook Place	Z3_Node_0032	Z3_Node_0031	Z3_Link_0039	24	113	Concrete in pipe and roots at joint	Light	Cleaning	$275	4	$ 1,100	$ 1,540
Bollinger	Z5_Node_0127	Z5_Node_0126	Z5_Link_0099	24	37	Long hinge, cut outs, sediment	Heavy	Cleaning & 2 Patch Repairs	$10,950	1	$ 10,950	$ 15,330
Bollinger	Z5_Node_0126	outfall	unnamed link	24	62	Rocks	Average	Cleaning	$275	2	$ 550	$ 770
Bollinger	Z5_Node_0130	Z5_Node_0126	Z5_Link_0098	24	39	sediment, clay soil buildup,	Moderate	none	$0	1	$ -	$ -
Buckingham	Z1_Node_0046	Z1_Node_0045	Z1_Link_0199	24	148	Long hinge fracture, long cracks	Heavy	Cleaning & Patch Repairs	$6,300	1	$ 6,300	$ 8,820
Buckingham	Z1_Node_0063	Z1_Node_0045	Z1_Link_0047	30	55	Rocks	Moderate	Cleaning	$275	4	$ 1,100	$ 1,540
Camino Pablo	Z7_Node_0228	Z7_Node_0226	Z7_Link_0202	15	15.1	collapsed, rerouted	Severe	none	$0		$ -	$ -
Camino Pablo	Z7_Node_0226	Z7_Node_0223	Z7_Link_0200	18	49	cracks	Average	none	$0		$ -	$ -
Camino Pablo	Z7_Node_0227	Z7_Node_0226	Z7_Link_0206	15	6	heavy debris, camera can't get through	Light	Cleaning Completed	$0	0	$ -	$ -
Campolindo	Z1_Node_0013A	Z1_Node_0013		48	10	heavy sediment and water in pipe	Severe	Cleaning & 2 Patch Repairs	$17,350	1	$ 17,350	$ 24,290
Campolindo	Z1_Node_0014	Z1_Node_0013A		48	140	long hinge, tree trunk in pipe	Severe	Cleaning	$275	2	$ 550	$ 770
Campolindo	Z1_Node_0014A	Z1_Node_0013A		18	26	pipe broken in small section, storm filter	Severe	Patch Repair	$4,320	1	$ 4,320	$ 6,048
Carter	Z5_Node_0054	Z5_Node_0053		15	45	Good condition	Good	none	$0		$ -	$ -
Corliss	Z4_Node_0161	Z4_Node_0160	Z4_Link_0053	30	612	Square cuts, infil stain, broken soil visible, fracture	Severe	Patch Repair	$6,000	2	$ 12,000	$ 16,800
Corliss	Z4_Node_0168	Z4_Node_0167	Z4_Link_0070	15	0	Outlet is 50% covered with concrete, NEEDS repair	Severe	Private Cleaning	$275	56	$ 15,400	$ 21,560
Corliss	Z4_Node_0091	Z4_Node_0071	Z4_Link_0088	24	112	Crack, rocks, clay soil	Heavy	CIPP	$130	112	$ 14,560	$ 20,384
Corliss	Z4_Node_0093	Z4_Node_0092	Z4_Link_0090	24	0	1/2 pipe full sediment, needs cleaning	Heavy	Cleaning Completed	$0	0	$ -	$ -
Corliss	Z4_Node_0177	Z4_Node_0162	Z4_Link_0058	18	145	Fracture, roots at joint	Heavy	Patch Repair	$4,320	1	$ 4,320	$ 6,048
Corliss	Z4_Node_0071	Z4_Node_0070	Z4_Link_0050	30	575	Infil stains, roots intruding,	Average	Patch Repair	$6,000	2	$ 12,000	$ 16,800
Corliss	Z4_Node_0163	Z4_Node_0162	Z4_Link_0055	24	295	Infil, deposits	Average	none	$0	0	$ -	$ -
Corliss	Z4_Node_0171	Z4_Node_0161	Z4_Link_0061	18	43	Construction debris	Moderate	Cleaning	$275	2	$ 550	$ 770
Corliss	Z4_Node_0172	Z4_Node_0171	Z4_Link_0062	18	92	Long cracks	Moderate	Patch Repair	$4,320	2	$ 8,640	$ 12,096
Corliss	Z4_Node_0092	Z4_Node_0091	Z4_Link_0089	24	102	1/4 full sediment, needs cleaning, crack	Light	Cleaning Completed	$0	0	$ -	$ -
Corliss	Z4_Node_0159	Z4_Node_0160	Z4_Link_0052	30	39	Infil stains	Light	none	$0	0	$ -	$ -
Corliss	Z4_Node_0162	Z4_Node_0161	Z4_Link_0054	24	185	Infil stains	Light	none	$0	0	$ -	$ -
Corliss	Z4_Node_0164	Z4_Node_0163	Z4_Link_0057	18	367	Good condition	Good	none	$0	0	$ -	$ -
Corliss	Z4_Node_0167	Z4_Node_0166	Z4_Link_0069	15	32	Good condition	Good	none	$0	0	$ -	$ -
Corliss	Z4_Node_0176	Z4_Node_0161	Z4_Link_0059	18	140	Good condition	Good	none	$0	0	$ -	$ -
Corliss	Z4_Node_0178	Z4_Node_0163	Z4_Link_0056	18	59	Good condition	Good	none	$0	0	$ -	$ -
Country Club	Z7_Node_0088	Z7_Node_0087	Z7_Link_0078	15	21	Same as one above, reverse direction	Heavy	Cleaning	$275	4	$ 1,100	$ 1,540
Country Club	Z7_Node_0089	Z7_Node_0087	Z7_Link_0079	24	294	Tap breaking, pipe in good condition	Good	none	$0	0	$ -	$ -
Country Club	Z7_Node_0099	Z7_Node_0089	Z7_Link_0080	24	208	Good condition	Good	none	$0	0	$ -	$ -
Country Club	Z7_Node_0100	Z7_Node_0099	Z7_Link_0081	18	34	Clay soil, good condition	Good	none	$0	0	$ -	$ -
Del Monte	Z5_Node_0086	Z5_Node_0064	unnamed link	48	4	1/2 full of debris, NEEDS CLENAING	Severe	Cleaning	$275	56	$ 15,400	$ 21,560
Del Monte Ct	Z5_Node_0046	Z5_Node_0045	Z5_Link_0060	24	169	Offset joint	Light	none	$0	0	$ -	$ -
Del Monte Ct	Z5_Node_0047	Z5_Node_0046	Z5_Link_0061	24	83	Good condition	Good	none	$0	0	$ -	$ -
Del Monte Ct	Z5_Node_0048	Z5_Node_0047	Z5_Link_0062	21	133	Good condition	Good	none	$0	0	$ -	$ -
Del Monte Way	Z5_Node_0056	Z5_Node_0050	Z5_Link_0065	15	220	Broken pipe, deposits, and chip	Severe	Patch Repair	$4,000	1	$ 4,000	$ 5,600
Del Monte Way	Z5_Node_0053	Z5_Node_0050	Z5_Link_0067	24	45	Good condition	Good	none	$0	0	$ -	$ -
Del Rio	Z5_Node_0057	Z5_Node_0056	Z5_Link_0066	15	39	Large amount of clay, NEEDS CLEANING	Severe	Cleaning Completed	$0	0	$ -	$ -
Goodfellow	Z2_Node_0164	Z2_Node_0163		18	26	Good condition	Good	none	$0	0	$ -	$ -
Larch	Z7_Node_0242	Z7_Node_0243	Z7_Link_0224	18	62	broken, rebar exposed,	Severe	Patch Repair	$4,320	2	$ 8,640	$ 12,096
Larch	Z7_Node_0256	Z7_Node_0255	Z7_Link_0213	15	0	Concrete blocking pipe	Severe	none	$0	0	$ -	$ -
Larch	Z7_Node_0233	Z7_Node_0232	Z7_Link_0214	30	180	long hinge, cut outs,	Heavy	Patch Repair	$6,000	1	$ 6,000	$ 8,400
Larch	Z7_Node_0245	Z7_Node_0244	Z7_Link_0226	18	34	Settled gravel,	Heavy	Cleaning	$275	4	$ 1,100	$ 1,540
Larch	Z7_Node_0246	Z7_Node_0244	Z7_Link_0225	24	120	Concrete debris, cut outs, sediment	Heavy	Cleaning	$275	8	$ 2,200	$ 3,080
Larch	Z7_Node_0247	Z7_Node_0248	Z7_Link_0223	18	33	Deposits, gravel,	Heavy	Cleaning	$275	4	$ 1,100	$ 1,540
Larch	Z7_Node_0256	Z7_Node_0255	Z7_Link_0213	15	12	rocks in the way	Heavy	Cleaning Completed	$0	0	$ -	$ -
Larch	Z7_Node_0257	Z7_Node_0254	Z7_Link_0211	42	77	clay soil, large rocks	Heavy	Cleaning Completed	$0	0	$ -	$ -

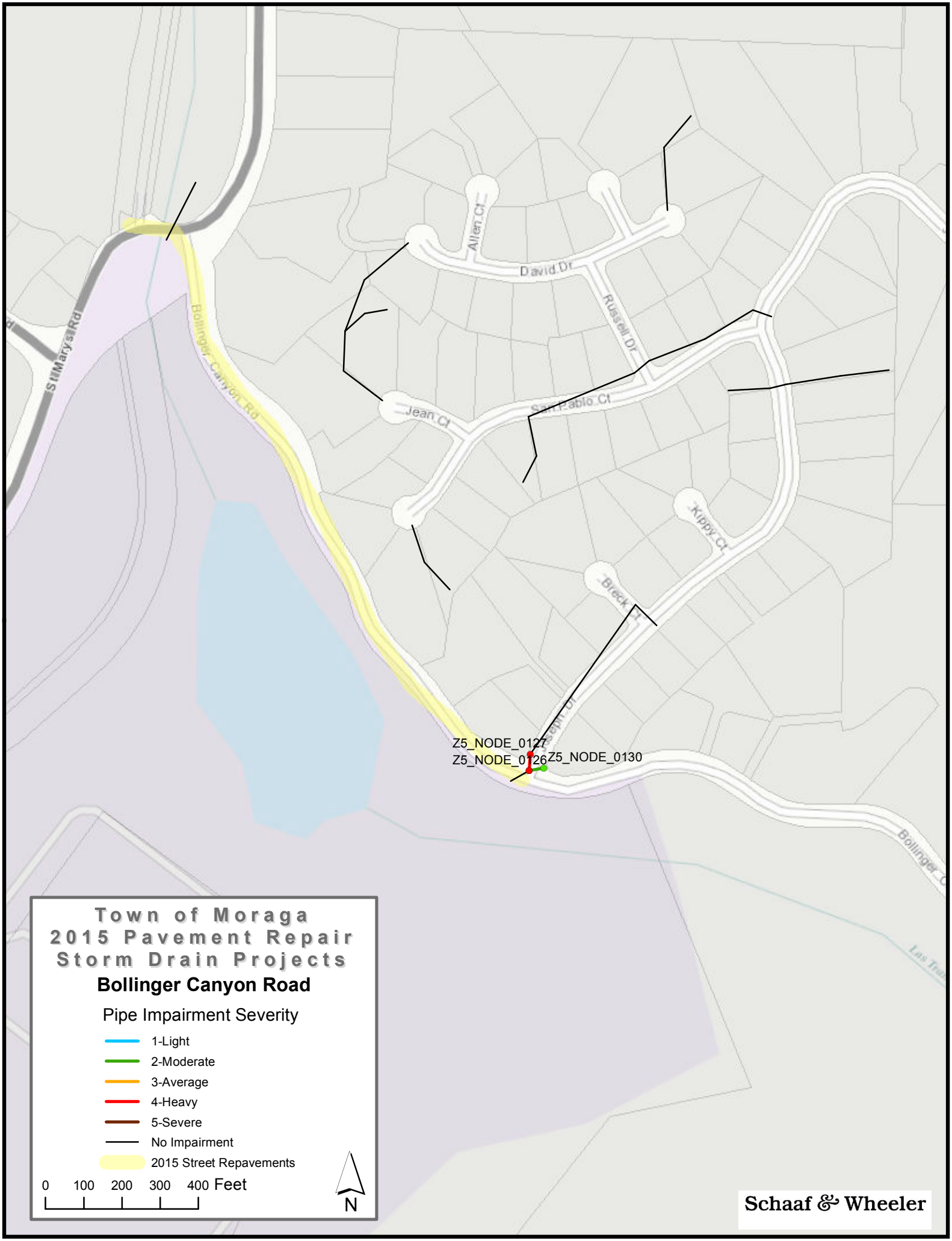
Town of Moraga 2015 Street Pavement
Storm Drain Repair, Rehabilitation, and Maintenance Projects DRAFT

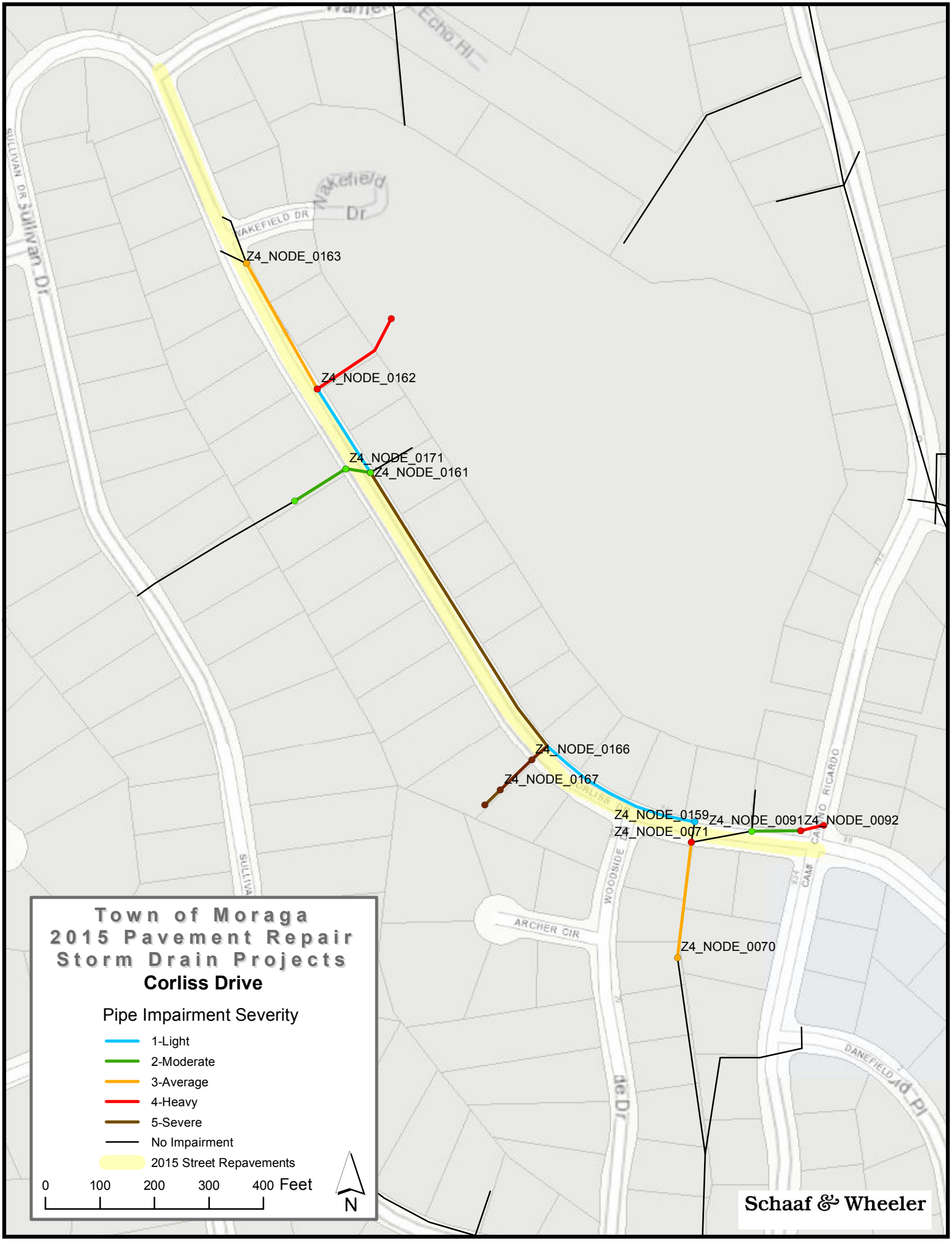
Street	From	To	Link_MUID	Size	Length	Observations	Severity	Project Type	Unit Cost	Qnty	Cost	Cost + 40%
Larch	Z7_Node_0254	Z7_Node_0253	Z7_Link_0210	42	207	fracture long, roots in joint	Average	Patch Repair	$7,600	2	$ 15,200	$ 21,280
Larch	Z7_Node_0255	Z7_Node_0254	Z7_Link_0212	15	68	heavy rock and concrete	Average	Cleaning	$275	16	$ 4,400	$ 6,160
Larch	Z7_Node_0234	Z7_Node_0233	Z7_Link_0215	18	37	construction debris,	Moderate	Cleaning	$275	4	$ 1,100	$ 1,540
Larch	Z7_Node_0241	Z7_Node_0236	Z7_Link_0218	24	386	heavy debris, water, sag in pipe	Moderate	Cleaning	$275	6	$ 1,650	$ 2,310
Larch	Z7_Node_0236	Z7_Node_0235	Z7_Link_0228	30	141	cut outs,	Good	none	$0		$ -	$ -
Larch	Z7_Node_0237	Z7_Node_0236	Z7_Link_0217	18	40	Good condition	Good	none	$0		$ -	$ -
Larch	Z7_Node_0242	Z7_Node_0241	Z7_Link_0220	24	43	cut outs, infil stain,	Good	none	$0		$ -	$ -
Larch	Z7_Node_0244	Z7_Node_0243	Z7_Link_0221	24	200	cut outs, infil stain,	Good	none	$0		$ -	$ -
Larch	Z7_Node_0248	Z7_Node_0244	Z7_Link_0222	24	541	Infil stain, cut outs, clay soil	Good	none	$0	0	$ -	$ -
Natalie	Z1_Node_0019	Z1_Node_0015	Z1_Link_0052	24	290	Cut outs, soil visible, infil stains, clay soil, HOLE	Severe	Patch Repair	$5,200	1	$ 5,200	$ 7,280
Natalie	Z1_Node_0020	Z1_Node_0019	Z1_Link_0183	18	34	Soil and rebar visible, offset joint	Severe	Patch Repair	$4,320	1	$ 4,320	$ 6,048
Natalie	Z1_Node_0061	Z1_Node_0060	Z1_Link_0041	24	134	Rocks, long cracks, rocks	Severe	Patch Repair	$5,200	2	$ 10,400	$ 14,560
Natalie	Z1_Node_0053	Z1_Node_0052	Z1_Link_0034	30	36	Rocks	Heavy	Cleaning Completed	$0	0	$ -	$ -
Natalie	Z1_Node_0060	Z1_Node_0059	Z1_Link_0040	30	245	Broken, cut outs, clay soil	Heavy	Patch Repair	$6,000	1	$ 6,000	$ 8,400
Natalie	Z1_Node_0021	Z1_Node_0020	Z1_Link_0184	18	130	Pipe broken	Average	Patch Repair	$4,320	1	$ 4,320	$ 6,048
Natalie	Z1_Node_0025	Z1_Node_0024	Z1_Link_0055	24	56	Dead animal, 20% sediment	Average	Cleaning	$275	2	$ 550	$ 770
Natalie	Z1_Node_0052	Z1_Node_0048	Z1_Link_0033	30	49	Rocks and debris	Average	Cleaning	$275	4	$ 1,100	$ 1,540
Natalie	Z1_Node_0053	Z1_Node_0052	Z1_Link_0034	30	302	Cut outs, long cracks, infil stain, large rocks	Average	Cleaning	$275	4	$ 1,100	$ 1,540
Natalie	Z1_Node_0058	Z1_Node_0053	Z1_Link_0035	30	206	Infil stains, cutouts, chipped,	Average	Patch Repair	$6,000	1	$ 6,000	$ 8,400
Natalie	Z1_Node_0022	Z1_Node_0019	Z1_Link_0056	18	154	Tap breaking, gravel deposit	Moderate	none	$0	0	$ -	$ -
Natalie	Z1_Node_0050	Z1_Node_0049	Z1_Link_0043	18	43	Sediment and rocks	Moderate	Cleaning	$275	4	$ 1,100	$ 1,540
Natalie	Z1_Node_0023	Z1_Node_0019	Z1_Link_0053	24	392	Cut outs	Light	none	$0	0	$ -	$ -
Natalie	Z1_Node_0059	Z1_Node_0058	Z1_Link_0039	30	37	Fracture, RCP to metal pipe	Light	none	$0	0	$ -	$ -
Natalie	Z1_Node_0015	Z1_Node_0067		24	173	Good condition	Good	none	$0	0	$ -	$ -
Natalie	Z1_Node_0016	Z1_Node_0015	Z1_Link_0182	18	33	Good condition	Good	none	$0	0	$ -	$ -
Natalie	Z1_Node_0049	Z1_Node_0048	Z1_Link_0029	30	45	Cut outs, clay soil,	Good	none	$0	4	$ -	$ -
Natalie	Z1_Node_0064	Z1_Node_0058	Z1_Link_0036	30	149	Cut outs, clay soil,	Good	none	$0		$ -	$ -
Sandringham	Z7_Node_0092	Z7_Node_0091	Z7_Link_0092	24	123	Broken, rebar visible,	Heavy	Patch Repair	$5,200	1	$ 5,200	$ 7,280
Sandringham	Z7_Node_0090	Z7_Node_0089	Z7_Link_0090	24	118	Broken, rebar exposed	Average	Patch Repair	$5,200	2	$ 10,400	$ 14,560
Sandringham	Z7_Node_0093	Z7_Node_0092	Z7_Link_0093	24	104	1/4 pipe full sediment,	Light	Cleaning	$275	4	$ 1,100	$ 1,540
Sandringham	Z7_Node_0091	Z7_Node_0090	Z7_Link_0091	24	56	Good condition	Good	none	$0	0	$ -	$ -
Scofield	Z2_Node_0125	Z2_Node_0124	Z2_Link_0087	18	110	Long. Cracks, rocks, broken, broken with void	Severe	Private Replacement	$270	110	$ 29,700	$ 41,580
Scofield	Z2_Node_0162	Z2_Node_0160	Z2_Link_0110	24	83	Long. Cracks	Severe	Private Replacement	$325	83	$ 26,975	$ 37,765
Scofield	Z2_Node_0163	Z2_Node_0162		24	97	Long. Cracks, broken, severely damaged, private	Severe	Private Replacement	$325	97	$ 31,525	$ 44,135
Scofield	Z2_Node_0161	Z2_Node_0160	Z2_Link_0109	18	263	Broken, rebar exposed, diameter change 21-18	Heavy	Patch Repair	$4,320	1	$ 4,320	$ 6,048
Scofield	Z2_Node_0159	Z2_Node_0157	Z2_Link_0107	18	136	Manhole 159 buried, rebar exposed,	Average	Patch Repair	$4,320	1	$ 4,320	$ 6,048
Scofield	Z2_Node_0160	Z2_Node_0159	Z2_Link_0108	21	199	Concrete deposits, long. Cracks	Average	Cleaning	$275	4	$ 1,100	$ 1,540
Scofield	Z2_Node_0065A	Z2_Node_0066A		18	215	Debris	Moderate	Cleaning	$275	4	$ 1,100	$ 1,540
Scofield	Z2_Node_0066A	Z2_Node_0066		18	29	Separated medium, soil visible	Moderate	none	$0	0	$ -	$ -
Scofield	Z2_Node_0065	Z2_Node_0066A		18	4	Good condition, add manhole 66A to GIS	Good	none	$0	0	$ -	$ -
Scofield	Z2_Node_0103	Z2_Node_0102		18	37	Good condition	Good	none	$0	0	$ -	$ -
Scofield	Z2_Node_0114	Z2_Node_0113		30	31	Good condition	Good	none	$0	0	$ -	$ -
Scofield	Z2_Node_0126	Z2_Node_0125	Z2_Link_0088	18	34	Good condition	Good	none	$0	0	$ -	$ -
Scofield	Z2_Node_0156	Z2_Node_0158		21	23	Good condition	Good	none	$0	0	$ -	$ -

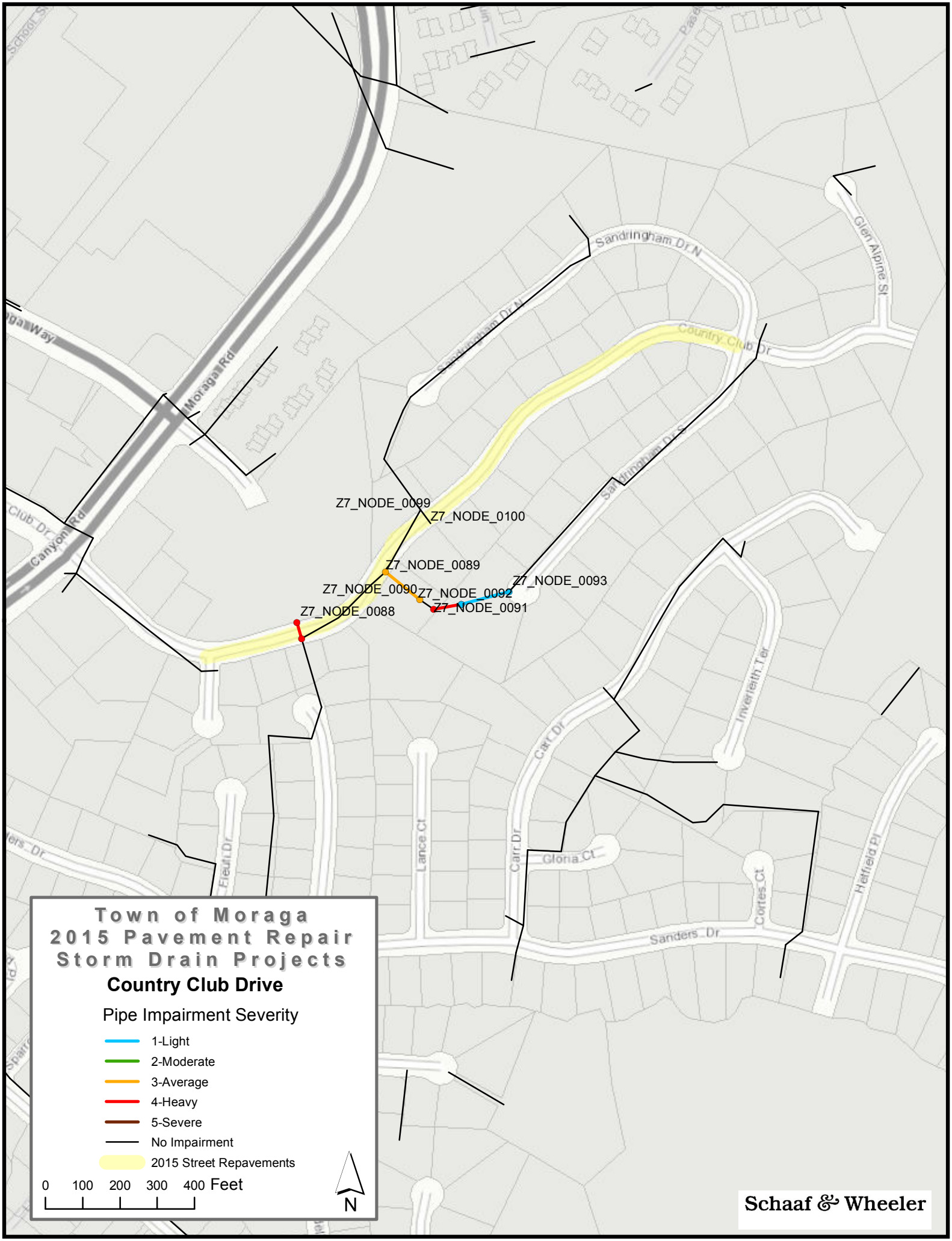
APPENDIX 3

Street Improvement Maps


Z3_NODE_0032
Z3_NODE_0031
Z3_NODE_0030
Z3_NODE_0029
ALDERBROOK PL
FERNWOOD DR
FERNWOOD DR
FERNWOOD D
Town of Moraga
2015 Pavement Repair
Storm Drain Projects
Alderbrook Place
Pipe Impairment Severity
1-Light
2-Moderate
3-Average
4-Heavy
5-Severe
No Impairment
2015 Street Repavements
0 25 50 75 100 Feet
N
Schaaf & Wheeler


Town of Moraga
2015 Pavement Repair
Storm Drain Projects
Bollinger Canyon Road
Pipe Impairment Severity
1-Light
2-Moderate
3-Average
4-Heavy
5-Severe
No Impairment
2015 Street Repavements
0 100 200 300 400 Feet
N
St Marys Rd
Bollinger Canyon Rd
Allen Ct
David Dr
Russell Dr
Jean Ct
San Pablo Ct
Kippy Ct
Breck Ct
Joseph Ct
Bollinger Cr
Z5_NODE_0127
Z5_NODE_0126
Z5_NODE_0130
Schaaf & Wheeler


Z4_NODE_0163
Z4_NODE_0162
Z4_NODE_0171
Z4_NODE_0161
Z4_NODE_0166
Z4_NODE_0167
Z4_NODE_0159
Z4_NODE_0091
Z4_NODE_0092
Z4_NODE_0071
Z4_NODE_0070
WAKEFIELD DR
Wakefield Dr
SULLIVAN DR
Sullivan Dr
CAMINO RICARDO
WOODSIDE
ARCHER CIR
DANEFIELD
Town of Moraga
2015 Pavement Repair
Storm Drain Projects
Corliss Drive
Pipe Impairment Severity
1-Light
2-Moderate
3-Average
4-Heavy
5-Severe
No Impairment
2015 Street Repavements
0
100
200
300
400 Feet
N
Schaaf & Wheeler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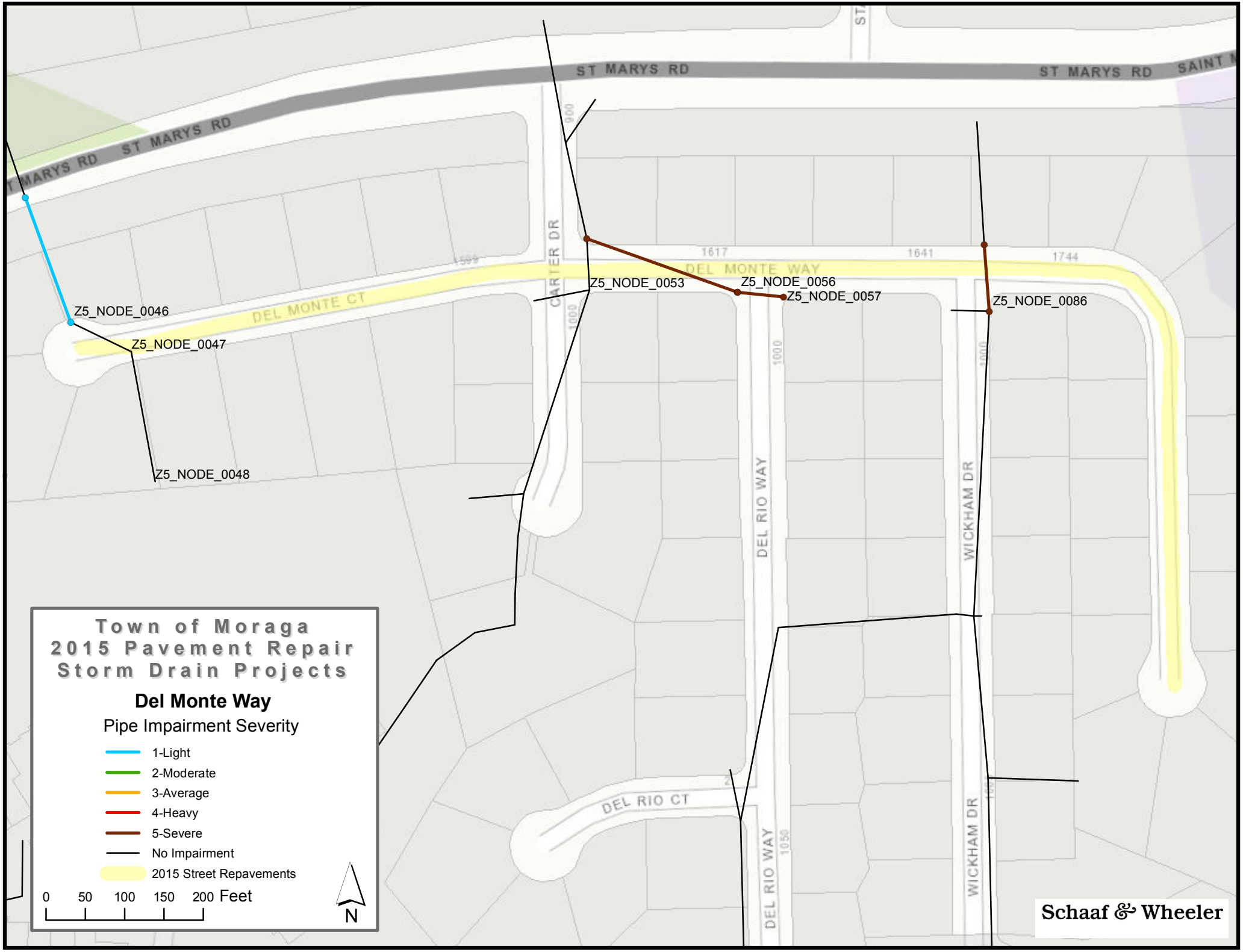
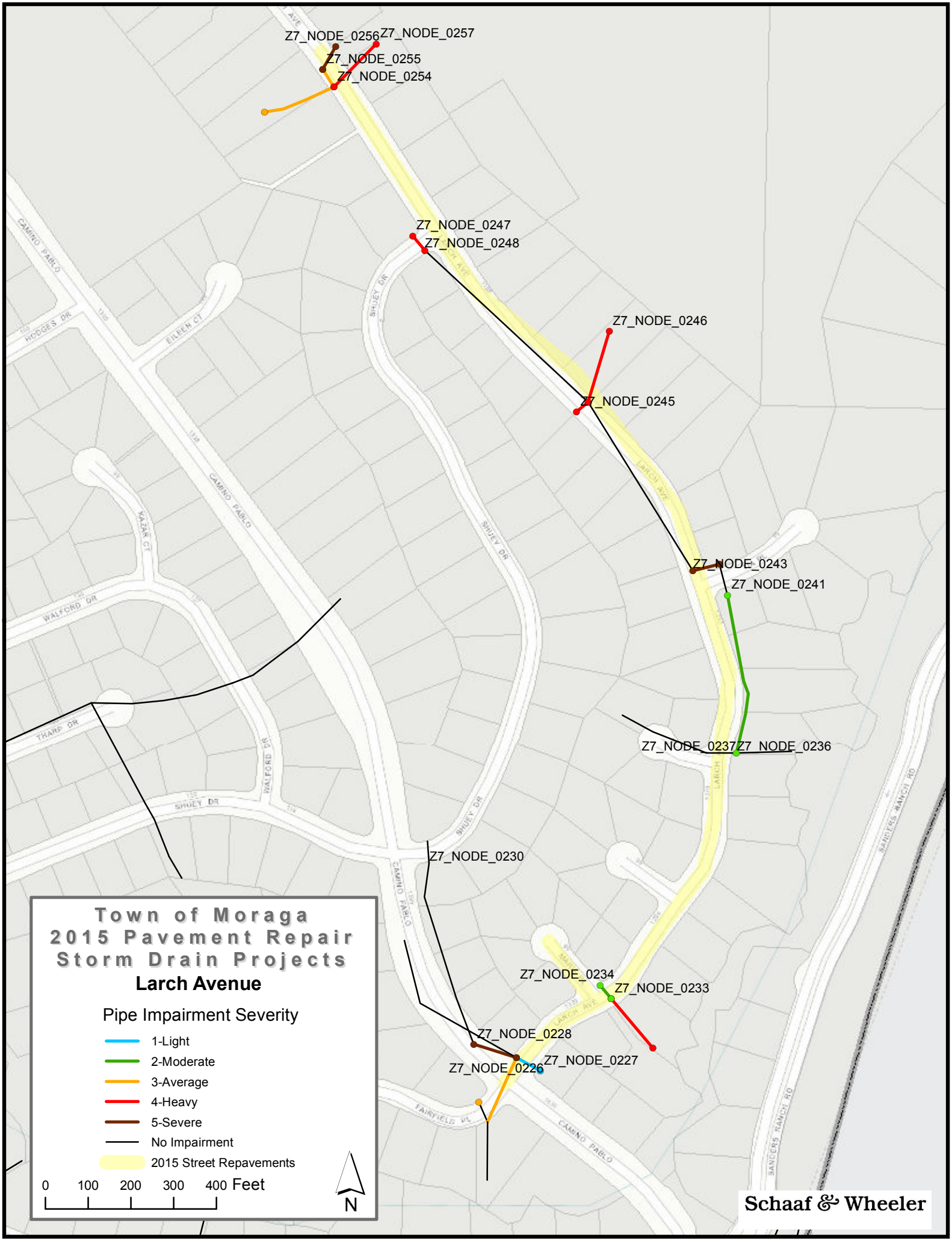
Z7_NODE_0100
Z7_NODE_0089
Z7_NODE_0090
Z7_NODE_0092
Z7_NODE_0093
Z7_NODE_0091
Z7_NODE_0088
Moraga Rd
Canyon Rd
Country Club Dr
Sandringham Dr N
Sandringham Dr S
Glen Alpine St
Inverleith Ter
Carr Dr
Lance Ct
Fleuti Dr
Gloria Ct
Cortes Ct
Hatfield Pl
Sanders Dr
Town of Moraga
2015 Pavement Repair
Storm Drain Projects
Country Club Drive
Pipe Impairment Severity
1-Light
2-Moderate
3-Average
4-Heavy
5-Severe
No Impairment
2015 Street Repavements
0 100 200 300 400 Feet
N
Schaaf & Wheeler


ST MARYS RD
ST MARYS RD
ST MARYS RD
DEL MONTE CT
DEL MONTE WAY
CARTER DR
DEL RIO WAY
DEL RIO CT
WICKHAM DR
Z5_NODE_0046
Z5_NODE_0047
Z5_NODE_0048
Z5_NODE_0053
Z5_NODE_0056
Z5_NODE_0057
Z5_NODE_0086
1617
1641
1744
Town of Moraga
2015 Pavement Repair
Storm Drain Projects
Del Monte Way
Pipe Impairment Severity
1-Light
2-Moderate
3-Average
4-Heavy
5-Severe
No Impairment
2015 Street Repavements
0 50 100 150 200 Feet
N
Schaaf & Wheeler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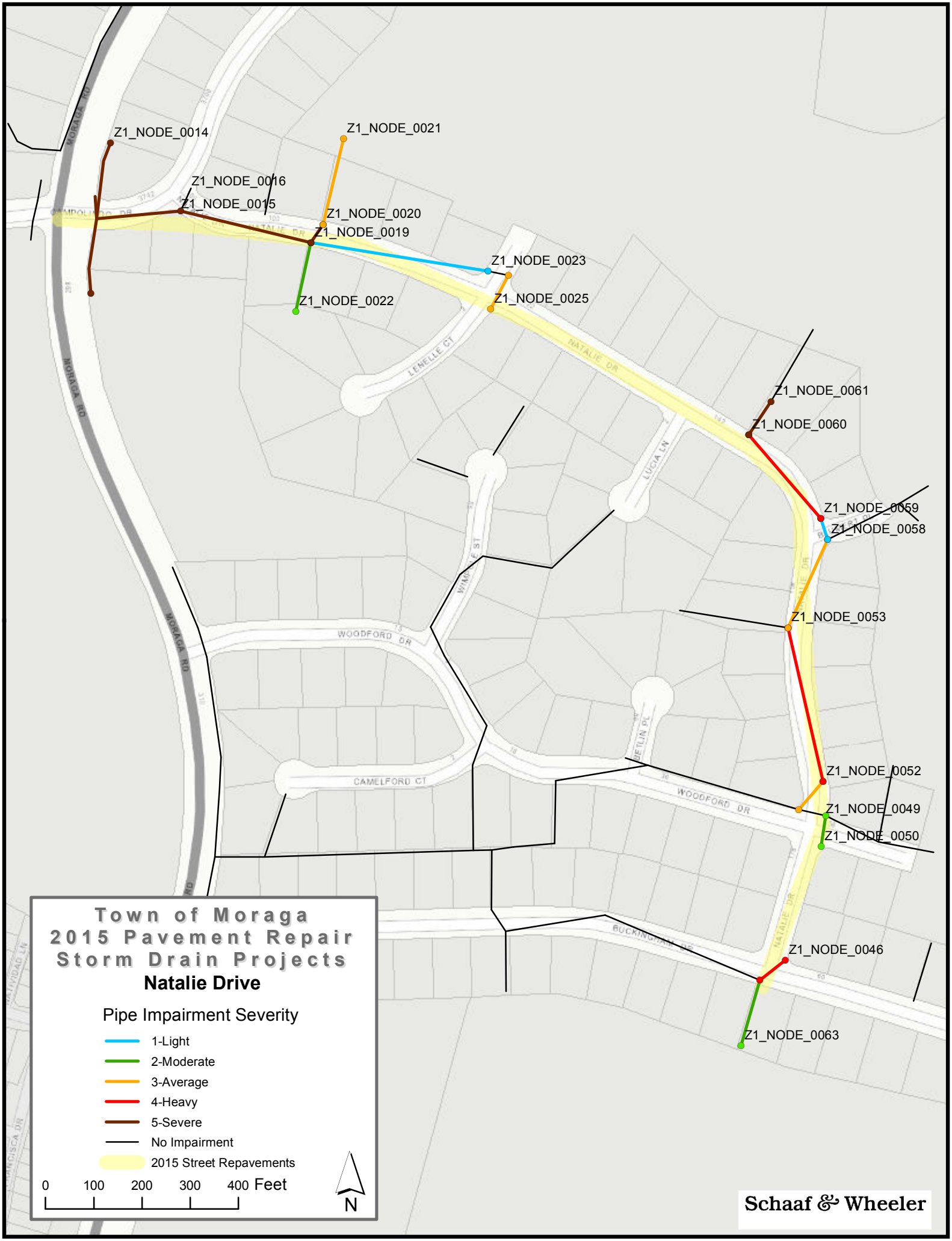
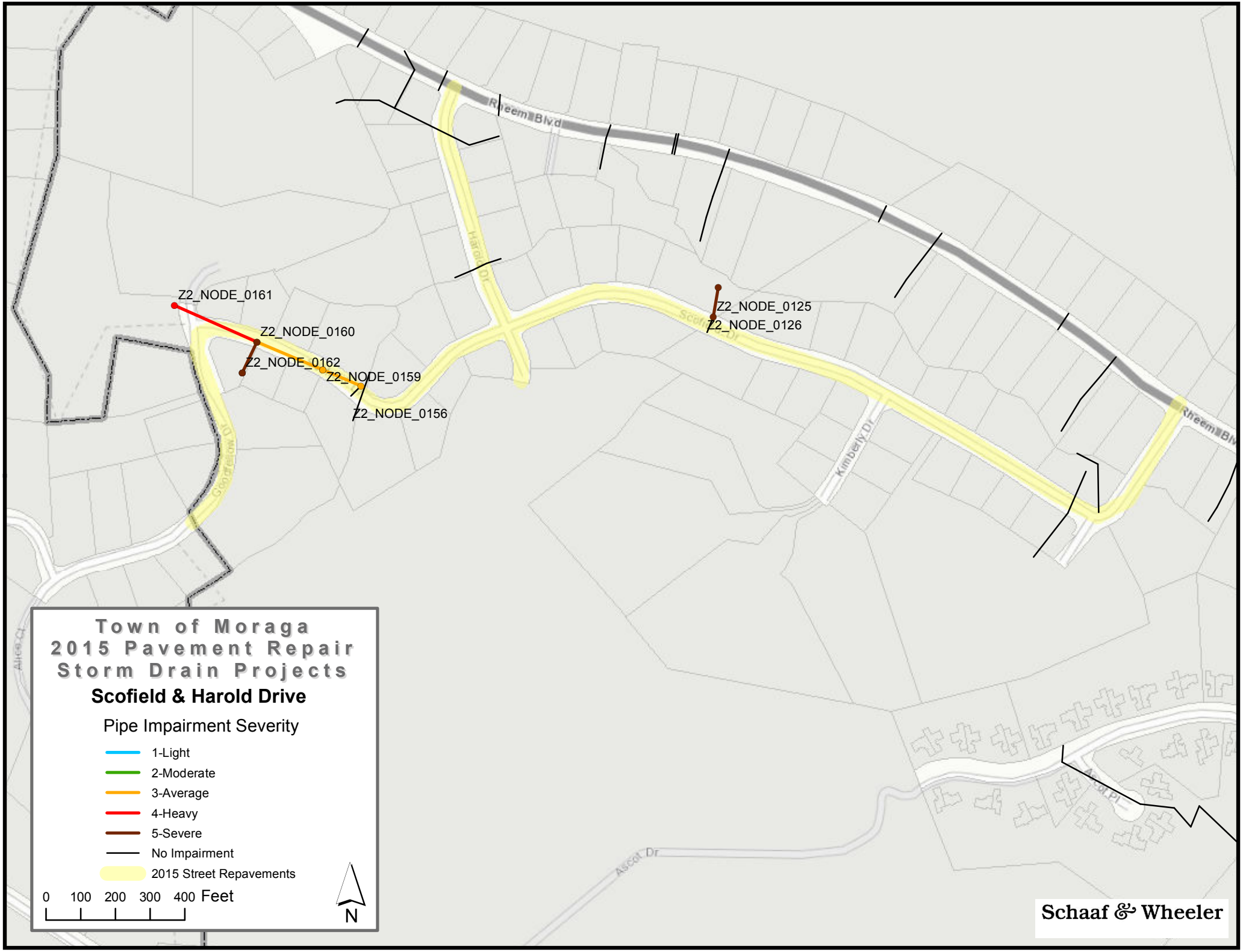
Z7_NODE_0257
Z7_NODE_0255
Z7_NODE_0254
Z7_NODE_0247
Z7_NODE_0248
Z7_NODE_0246
Z7_NODE_0245
Z7_NODE_0243
Z7_NODE_0241
Z7_NODE_0237
Z7_NODE_0236
Z7_NODE_0230
Z7_NODE_0234
Z7_NODE_0233
Z7_NODE_0228
Z7_NODE_0227
Z7_NODE_0226
CAMINO PABLO
SHUEY DR
LARCH AVE
WALFORD DR
KAZAR CT
THARP DR
EILEEN CT
HODGES DR
FAIRFIELD PL
SANDERS RANCH RD
Town of Moraga
2015 Pavement Repair
Storm Drain Projects
Larch Avenue
Pipe Impairment Severity
1-Light
2-Moderate
3-Average
4-Heavy
5-Severe
No Impairment
2015 Street Repavements
0 100 200 300 400 Feet
N
Schaaf & Wheeler


Z1_NODE_0014
Z1_NODE_0021
Z1_NODE_0016
Z1_NODE_0015
Z1_NODE_0020
Z1_NODE_0019
Z1_NODE_0023
Z1_NODE_0022
Z1_NODE_0025
Z1_NODE_0061
Z1_NODE_0060
Z1_NODE_0059
Z1_NODE_0058
Z1_NODE_0053
Z1_NODE_0052
Z1_NODE_0049
Z1_NODE_0050
Z1_NODE_0046
Z1_NODE_0063
MORAGA RD
NATALIE DR
LENELLE CT
LUCIA LN
WOODFORD DR
CAMELFORD CT
BUCKINGHAM RD
Town of Moraga
2015 Pavement Repair
Storm Drain Projects
Natalie Drive
Pipe Impairment Severity
1-Light
2-Moderate
3-Average
4-Heavy
5-Severe
No Impairment
2015 Street Repavements
0 100 200 300 400 Feet
N
Schaaf & Wheeler


Rheem Blvd
Harold Dr
Scofield Dr
Kimberly Dr
Ascot Dr
Z2_NODE_0161
Z2_NODE_0160
Z2_NODE_0162
Z2_NODE_0159
Z2_NODE_0156
Z2_NODE_0125
Z2_NODE_0126
Town of Moraga
2015 Pavement Repair
Storm Drain Projects
Scofield & Harold Drive
Pipe Impairment Severity
1-Light
2-Moderate
3-Average
4-Heavy
5-Severe
No Impairment
2015 Street Repavements
0 100 200 300 400 Feet
N
Schaaf & Wheeler

APPENDIX D

Capacity Improvement Project Sheets

A. Project ID: C01 | **B. Project Name: Paseo Grande**

C. Project Location: Intersection of Paseo Grande and Paseo Del Rio

D. Priority: High (Capacity)

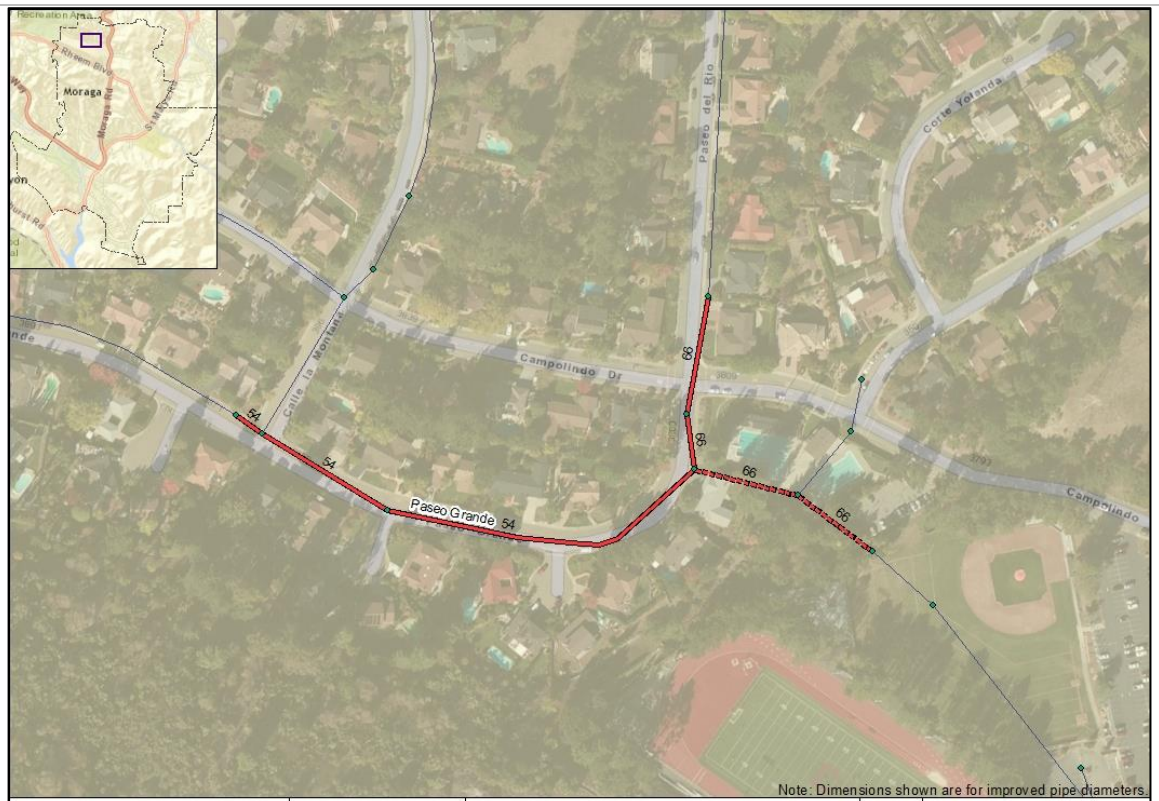
E. Project Description: Overflows occur on both Paseo Grande and Paseo Del Rio. This is a location where two large systems combine into an undersized 60-inch pipe that travels under Campolindo High School. Project includes replacing two pipes on Paseo Del Rio, three pipes on Paseo Grande, and two pipes on private property.

Ex. Diameter (in)	Imp. Diameter (in)	Equivalent Parallel (in)	Length (ft)
42	54	36	51
48	54	30	237
48	54	30	542
54	66	36	192
54	66	36	89
60	66	30	172
60	66	30	149

F. Project Cost..... $1,256,500

G. Contingency..... $377,000

H. Total Preliminary CIP Cost..... $1,633,500



A. Project ID: C02 | **B. Project Name: School St.**

C. Project Location: School St. to intersection with Hazelwood Pl.

D. Priority: High (Capacity)

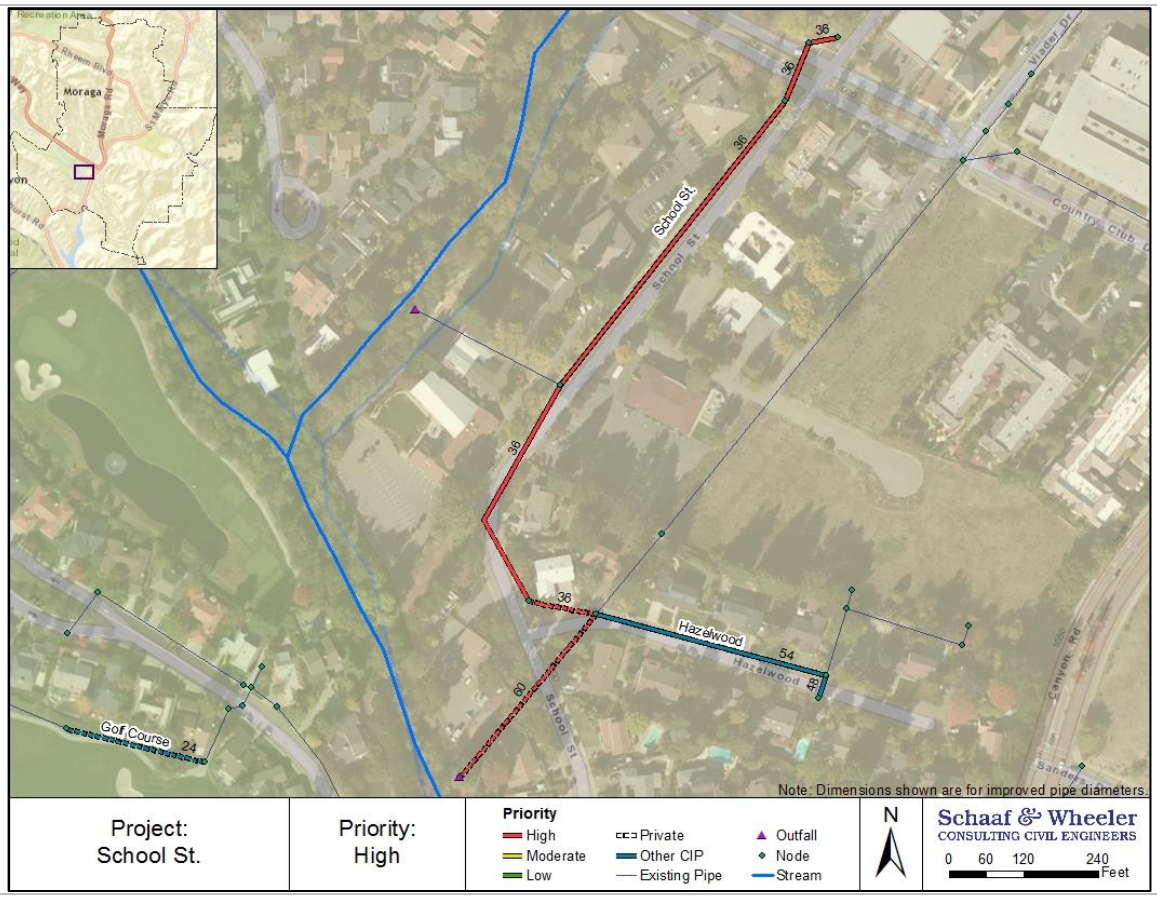
E. Project Description: Overflows occur on School St. This is a location where an undersized outlet and pipes are causing severe storm drain overflows. Project includes rerouting existing outlet pipe to a higher capacity system, replacing three pipes on school St, replacing one pipe on Hazelwood Pl, and replacing the outlet pipe under private property.

Ex. Diameter (in)	Imp. Diameter (in)	Equivalent Parallel (in)	Length (ft)
N/A	36	N/A	351
18	36	33	102
18	36	33	48
24	36	30	583
30	36	24	110
48	60	36	341

F. Project Cost..... **$939,200**

G. Contingency..... **$281,800**

H. Total Preliminary CIP Cost..... **$1,221,000**



A. Project ID: C03

B. Project Name: Campolindo

C. Project Location: Campolindo Dr. between Corte Mateo and Campolindo Ct.

D. Priority: Moderate (Capacity)

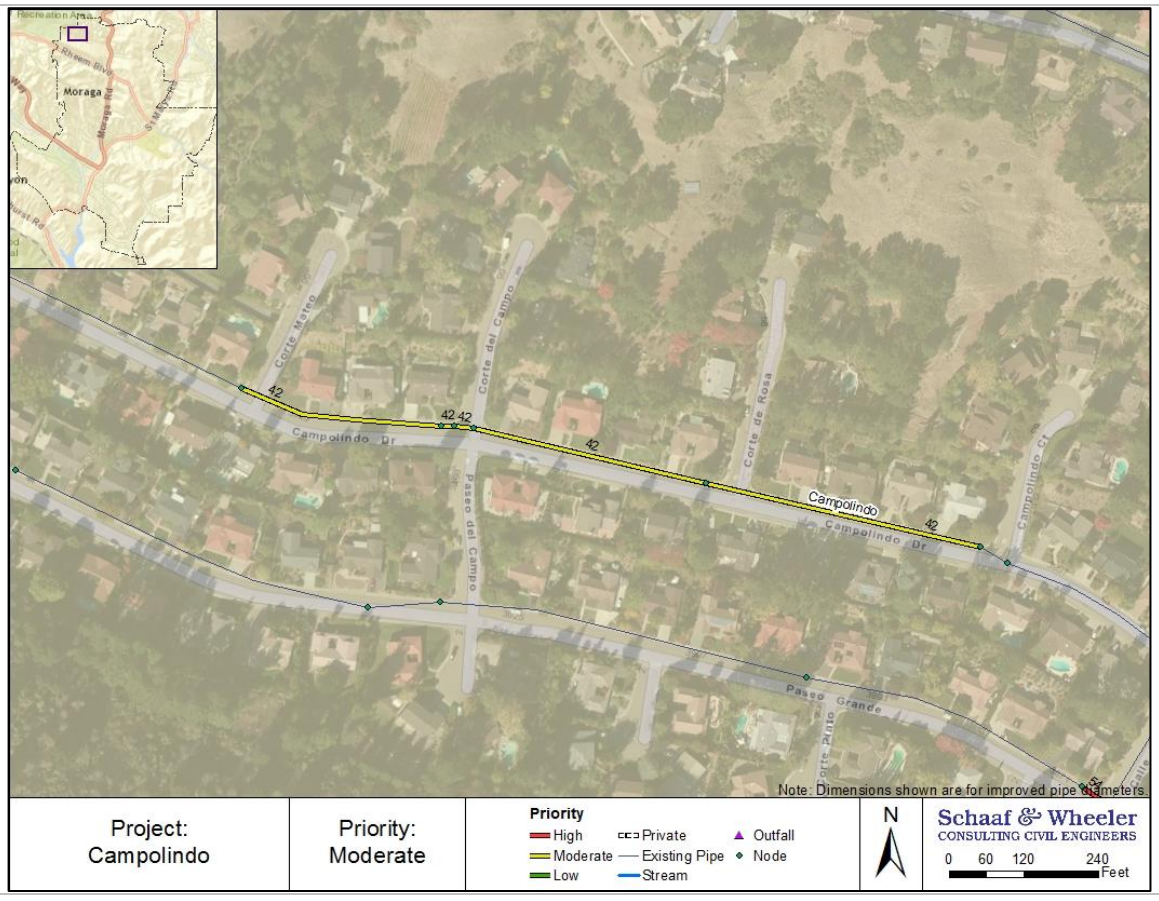
E. Project Description: Overflows caused by undersized pipes occur on Campolindo Dr. Project includes replacing five pipes on Campolindo Dr.

Ex. Diameter (in)	Imp. Diameter (in)	Equivalent Parallel (in)	Length (ft)
30	42	33	453
30	42	33	383
30	42	33	31
30	42	33	21
30	42	33	330

F. Project Cost..... $749,000

G. Design Contingency..... $224,700

H. Total Preliminary CIP Cost..... $973,700



A. Project ID: C04 | **B. Project Name: Devin**

C. Project Location: Devin Dr. near intersection with Moraga Rd.

D. Priority: Moderate (Capacity)

E. Project Description: Overflows caused by undersized pipes occur on Devin Dr. Project includes replacing two pipes under private property on Devin Dr. and one in the public right-of-way on Moraga Rd.

Ex. Diameter (in)	Imp. Diameter (in)	Equivalent Parallel (in)	Length (ft)
24	36	30	249
24	36	30	311
24	36	30	90

F. Project Cost..... $351,000

G. Design Contingency..... $105,300

H. Total Preliminary CIP Cost..... $456,300

A. Project ID: C05 | **B. Project Name: Camino Ricardo 1**

C. Project Location: On Private Property Between Camino Ricardo & Woodside Dr.

D. Priority: Moderate (Capacity)

E. Project Description: Overflows occur behind houses located along Camino Ricardo and Woodside Dr. Project includes replacing one pipe crossing Camino Ricardo and installing five new pipes along Camino Ricardo to move part of the system to public right-of-way.

Ex. Diameter (in)	Imp. Diameter (in)	Equivalent Parallel (in)	Length (ft)
N/A	24	N/A	51
N/A	24	N/A	109
N/A	24	N/A	420
N/A	24	N/A	470
N/A	24	N/A	318
N/A	24	N/A	491
18	36	33	43

F. Project Cost..... $707,300

G. Design Contingency..... $212,200

H. Total Preliminary CIP Cost..... $919,500

A. Project ID: C06 | **B. Project Name: Alta Mesa**

C. Project Location: On Moraga Rd. South of Corner with Alta Mesa

D. Priority: Moderate (Capacity)

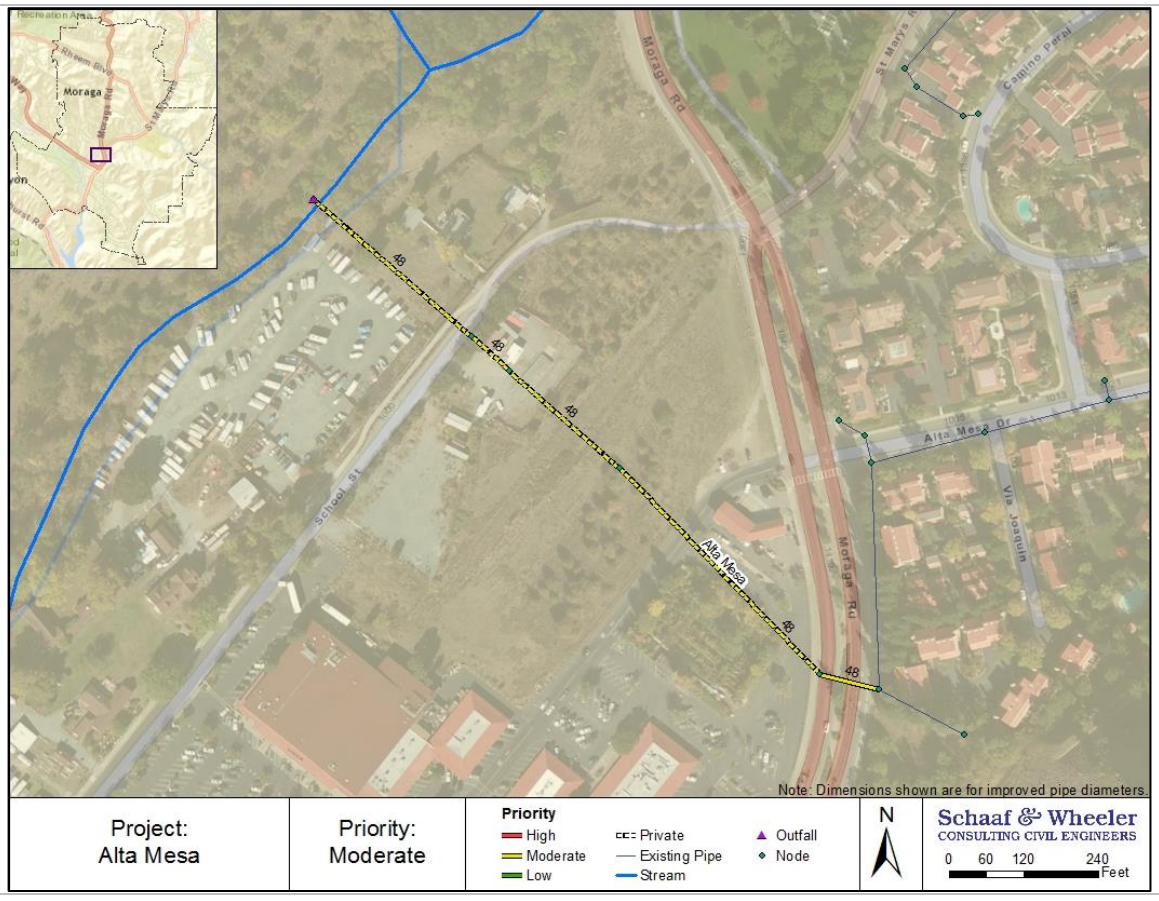
E. Project Description: Significant storm drain overflows adjacent to Moraga Rd. occur where two steep pipes join into one relatively flat, undersized pipe. Project includes replacing one pipe under Moraga Rd. and four pipes that run under private property.

Ex. Diameter (in)	Imp. Diameter (in)	Equivalent Parallel (in)	Length (ft)
36	48	30	337
36	48	30	81
36	48	30	237
36	48	30	462
36	48	30	99

F. Project Cost..... $833,800

G. Design Contingency..... $250,100

H. Total Preliminary CIP Cost..... $1,083,900



A. Project ID: C07 | **B. Project Name: Hazelwood**

C. Project Location: Hazelwood Pl. near intersection with School St.

D. Priority: Moderate (Capacity)

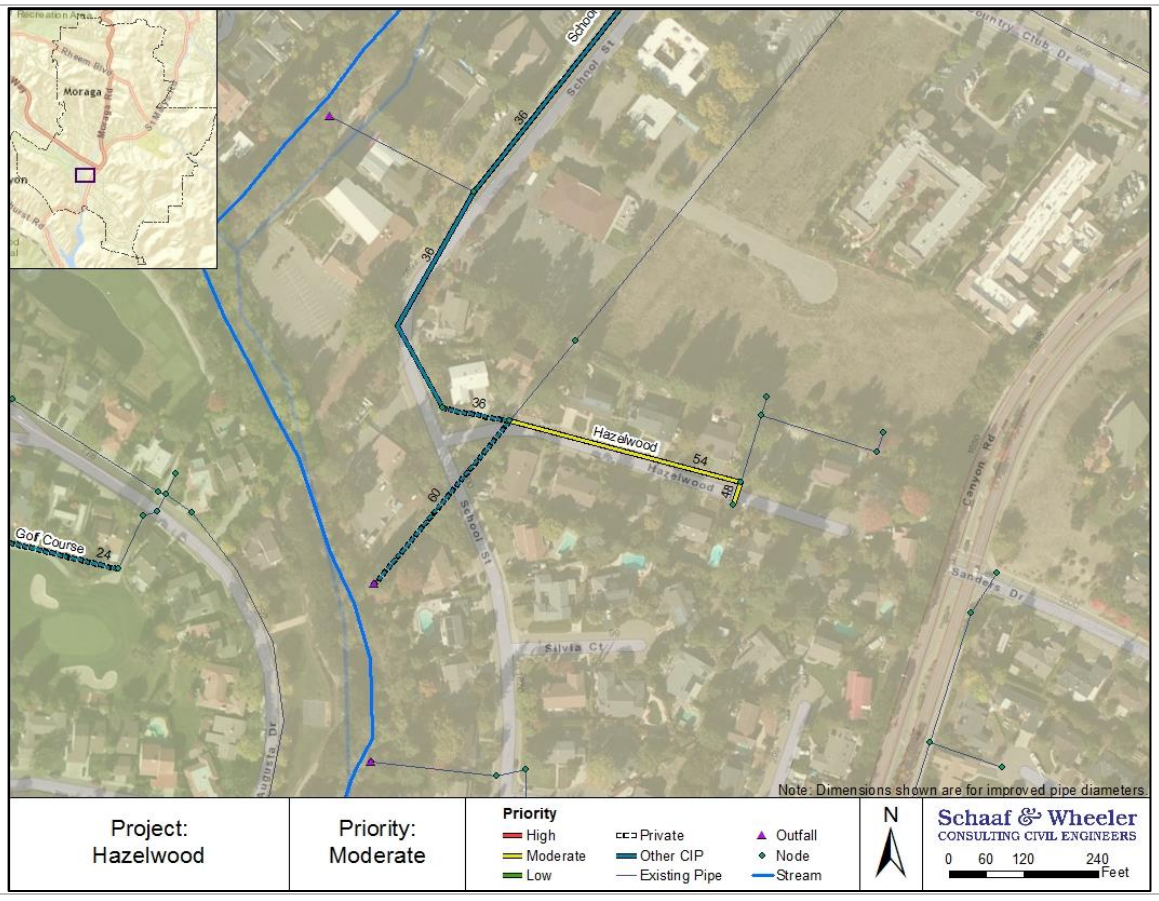
E. Project Description: Overfloes caused by undersized pipes occur on Hazelwood Pl. This project is adjacent to the School St. High Priority Project. Project includes replacing two pipes on Hazelwood Pl.

Ex. Diameter (in)	Imp. Diameter (in)	Equivalent Parallel (in)	Length (ft)
18	48	48	38
24	54	48	383

F. Project Cost..... $335,900

G. Design Contingency..... $100,800

H. Total Preliminary CIP Cost..... $436,700



A. Project ID: C08 | **B. Project Name: St. Andrews**

C. Project Location: Corner of St. Andrews Dr. and Augusta Dr.

D. Priority: Moderate (Capacity)

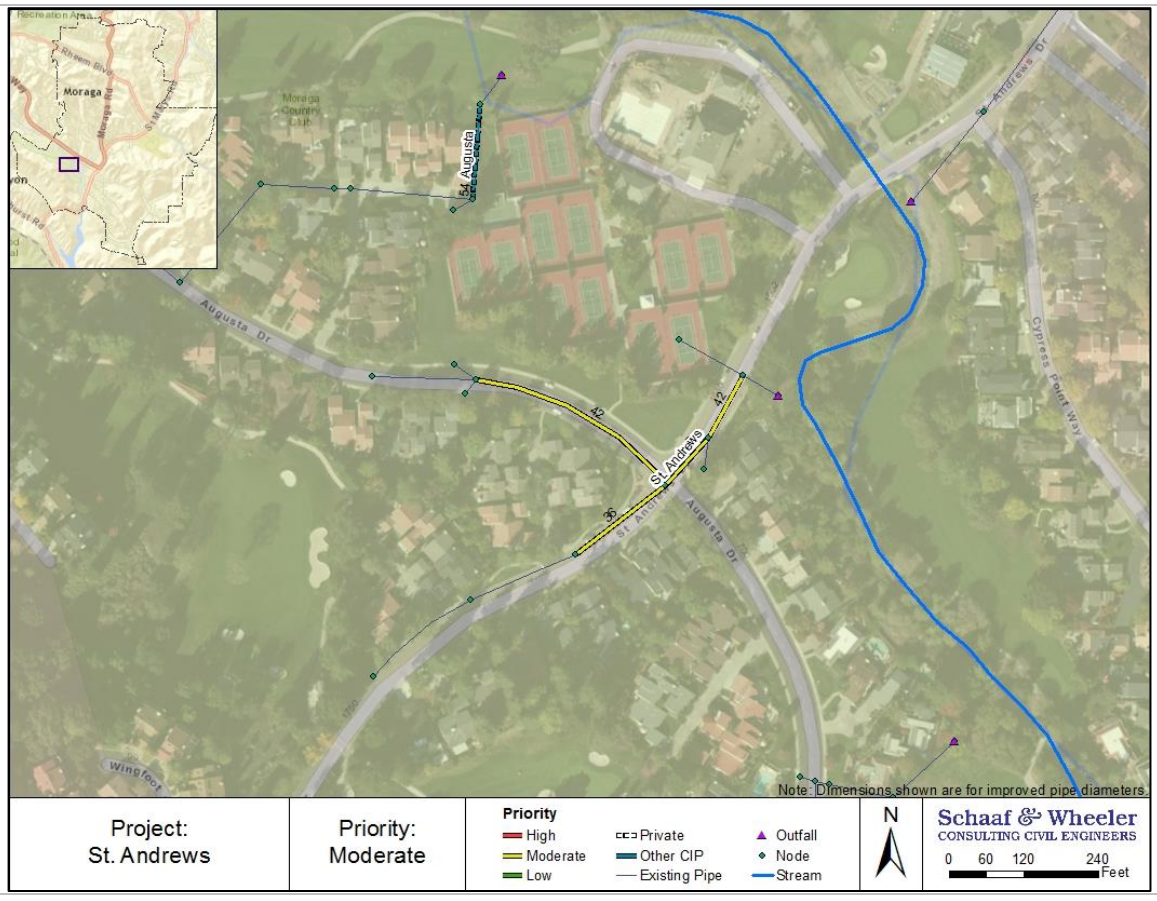
E. Project Description: Overflows caused by undersized pipes occur on the corner of St. Andrew's Dr. and Augusta Dr. Project includes replacing one pipe on Augusta Dr. and three pipes on St. Andrews Dr.

Ex. Diameter (in)	Imp. Diameter (in)	Equivalent Parallel (in)	Length (ft)
24	42	36	51
30	36	24	237
30	42	33	542
36	42	24	192

F. Project Cost..... $466,200

G. Design Contingency..... $139,900

H. Total Preliminary CIP Cost..... $606,100



A. Project ID: C09 | **B. Project Name: Larch**

C. Project Location: Larch Ave. Between Batix Dr. and Sparrow Ct.

D. Priority: Moderate (Capacity)

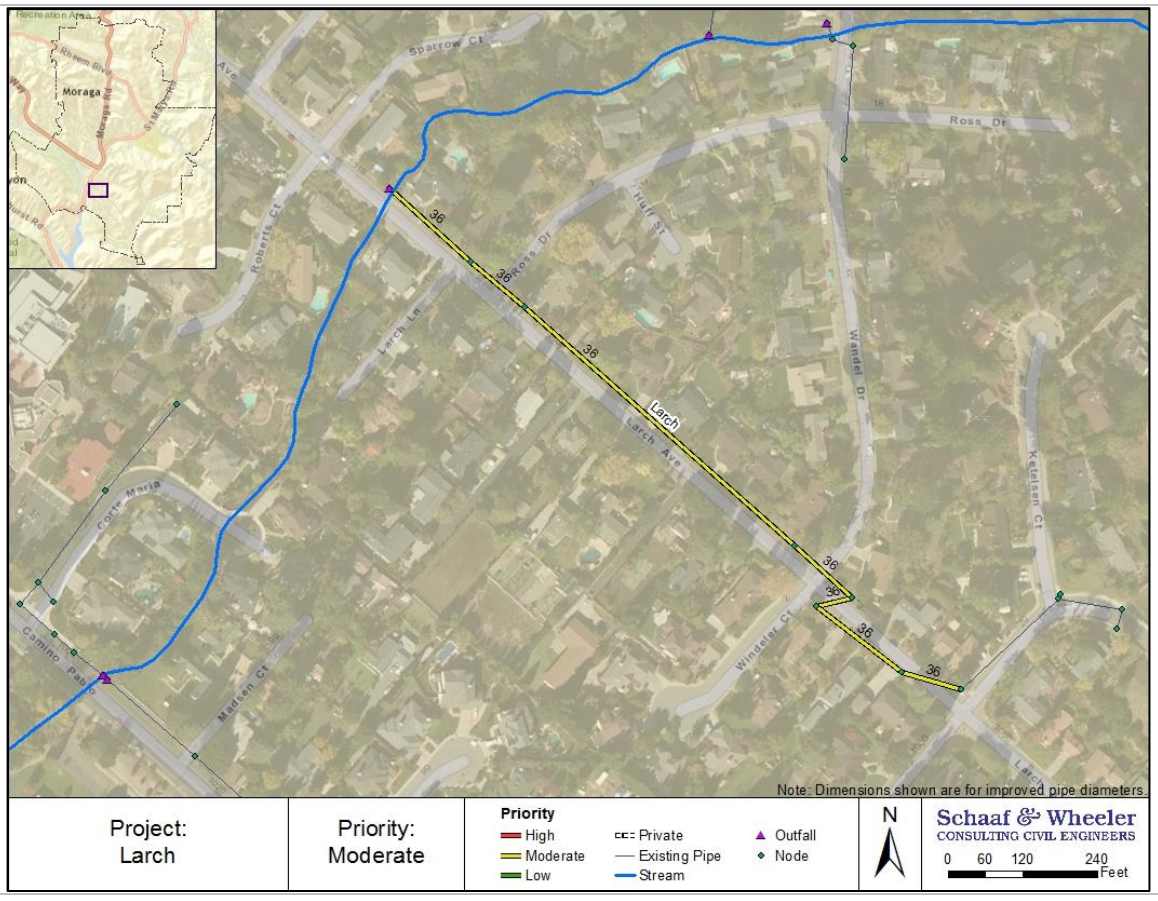
E. Project Description: Overflows caused by undersized pipes occur on the Larch Ave. between Batix Dr. and Wandel Dr. Project includes replacing seven pipes along Larch Ave.

Ex. Diameter (in)	Imp. Diameter (in)	Equivalent Parallel (in)	Length (ft)
18	36	33	172
18	36	33	100
18	36	33	59
18	36	33	124
24	36	30	579
24	36	30	113
24	36	30	175

F. Project Cost..... $713,000

G. Design Contingency..... $213,900

H. Total Preliminary CIP Cost..... $926,900



A. Project ID: C10

B. Project Name: Thune

C. Project Location: Thune Ave. Between Larch Ave. and Dickenson Dr.

D. Priority: Moderate (Capacity)

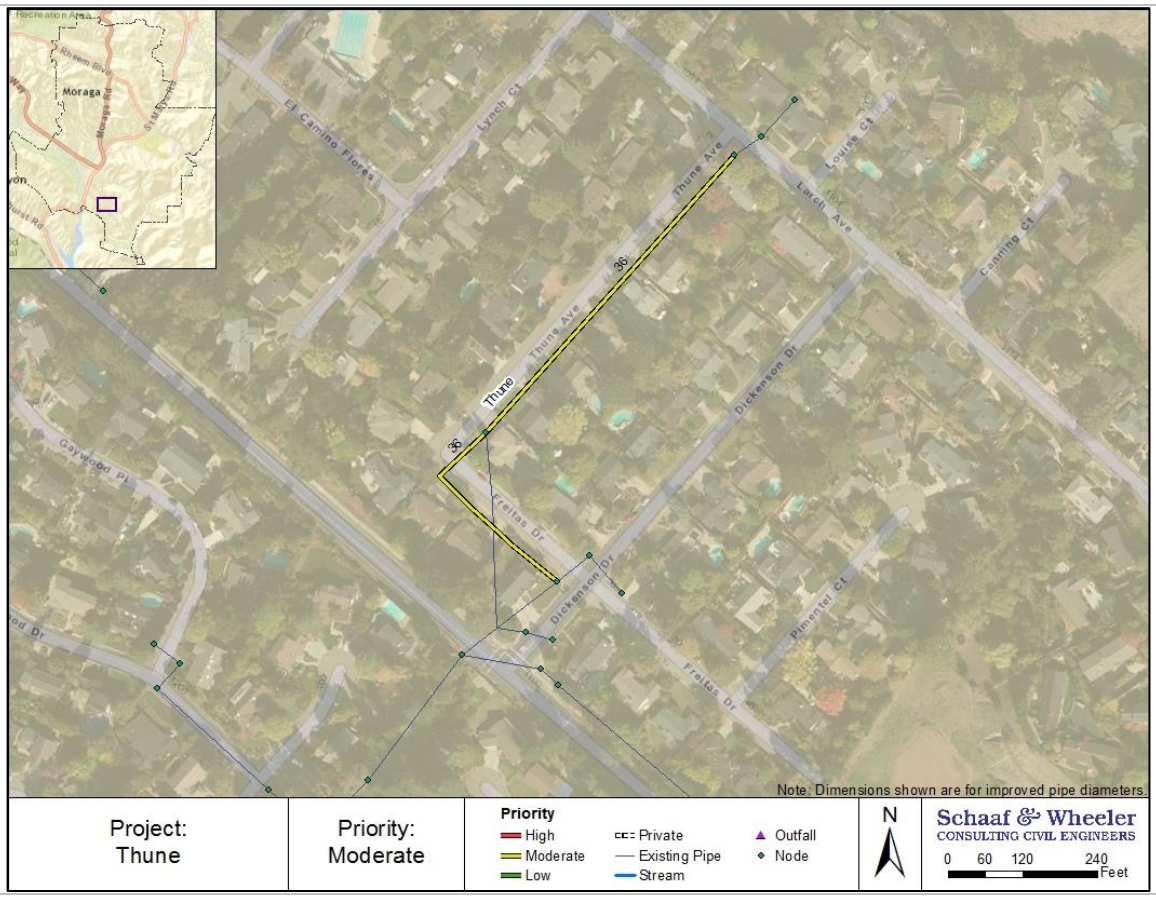
E. Project Description: Overflows caused by undersized pipes occur on Thune Ave. Project includes replacing one pipe on Thune Ave. and moving one pipe on private property to public right-of way.

Ex. Diameter (in)	Imp. Diameter (in)	Equivalent Parallel (in)	Length (ft)
24	36	36	598
N/A	36	N/A	356

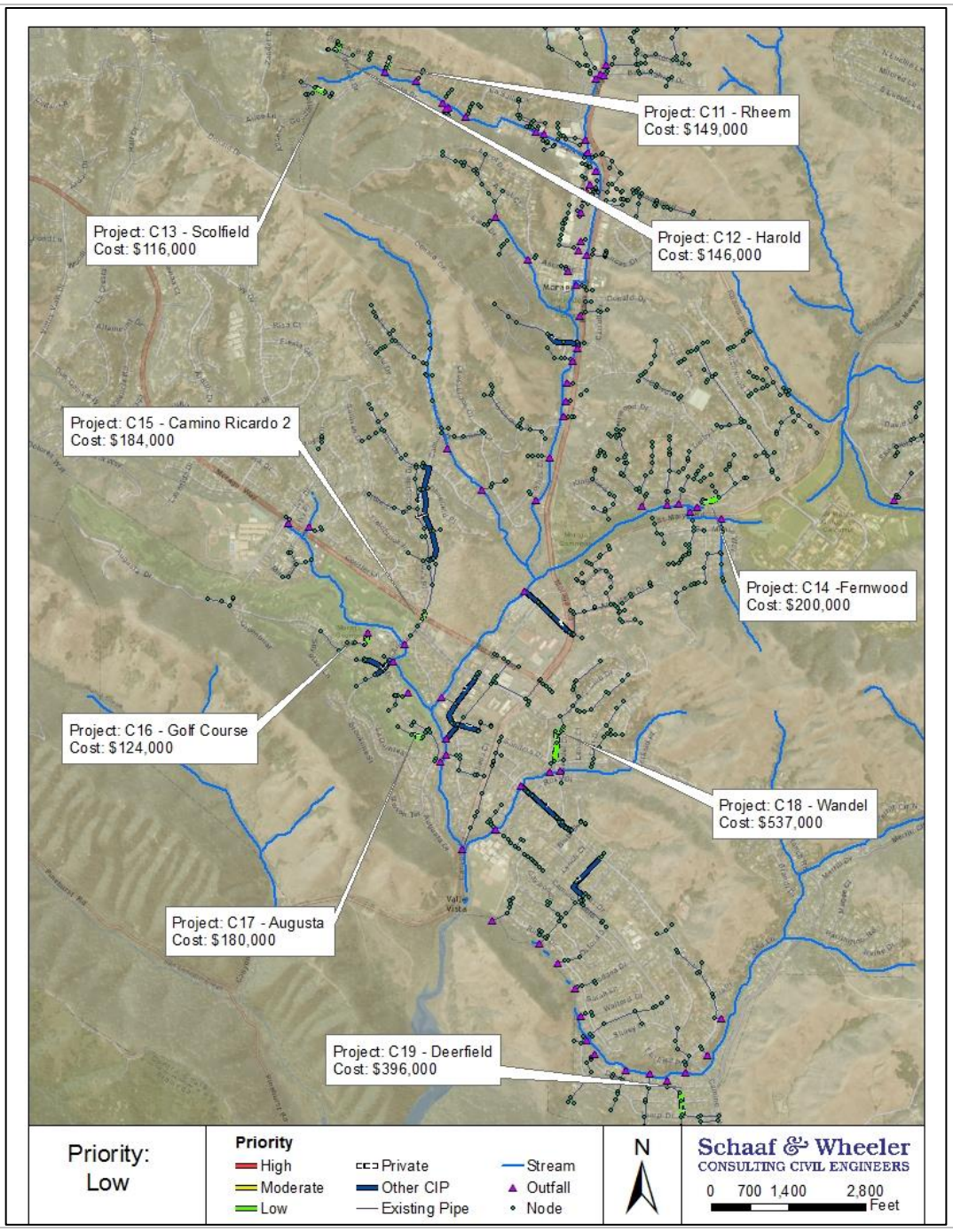
F. Project Cost..... $478,500

G. Design Contingency..... $143,600

H. Total Preliminary CIP Cost..... $622,100



A. **Project ID: C11 – C19**	B. **Project Name:**
C. **Project Location:**	
D. **Priority: Low (Capacity)**	
E. **Project Description:** Minor overflows from Low Priority projects are shown in the figure below. See pages A.12 – A.14 for individual project descriptions.	
F. **Low Priority Projects Cost**.....**$1,563,000**	
G. **Design Contingency**.....**$470,000**	
H. **Total Preliminary Low Priority CIP Cost**.....**$2,032,000**	



A. Project ID: C11 | **B. Project Name: Rheem**

C. Project Location: Rheem Blvd. Between Harold Dr. and Scofield Dr.

D. Priority: Low (Capacity)

E. Project Description: Minor overflows on Rheem Blvd. caused by undersized pipes crossing Rheem Blvd. Project includes pipes located on private property.

Ex. Diameter (in)	Imp. Diameter (in)	Equivalent Parallel (in)	Length (ft)
18	24	18	71
18	24	18	63
18	24	18	75

F. Total Preliminary CIP Cost..... $149,000

A. Project ID: C12 | **B. Project Name: Harold**

C. Project Location: Adjacent to Corner of Harold Dr. and Rheem Blvd.

D. Priority: Low (Capacity)

E. Project Description: Minor overflows on Rheem Blvd. caused by undersized pipes. Project includes pipes located on private property.

Ex. Diameter (in)	Imp. Diameter (in)	Equivalent Parallel (in)	Length (ft)
21	30	24	124
21	30	24	62

F. Total Preliminary CIP Cost..... $146,000

A. Project ID: C13 | **B. Project Name: Scofield**

C. Project Location: 214 Scofield Dr.

D. Priority: Low (Capacity)

E. Project Description: Minor overflows on Scofield Dr. caused by an undersized pipe on Scofield Dr.

Ex. Diameter (in)	Imp. Diameter (in)	Equivalent Parallel (in)	Length (ft)
18	24	18	206

F. Total Preliminary CIP Cost..... $116,000

A. Project ID: C14 | **B. Project Name: Fernwood**

C. Project Location: 821 Fernwood Dr.

D. Priority: Low (Capacity)

E. Project Description: Minor flooding on Fernwood Dr. caused by an undersized pipe on Fernwood Dr.

Ex. Diameter (in)	Imp. Diameter (in)	Equivalent Parallel (in)	Length (ft)
18	30	24	323

F. Total Preliminary CIP Cost..... $200,000

A. Project ID: C15 | **B. Project Name: Camino Ricardo 2**

C. Project Location: Corner of Moraga Way, Camino Ricardo, and St. Andrews

D. Priority: Low (Capacity)

E. Project Description: Minor overflows on Camino Ricardo caused by an undersized pipe flowing under Moraga Way.

Ex. Diameter (in)	Imp. Diameter (in)	Equivalent Parallel (in)	Length (ft)
48	54	30	159

F. Total Preliminary CIP Cost..... $184,000

A. Project ID: C16 | **B. Project Name: Golf Course**

C. Project Location: Behind 782 Augusta Dr.

D. Priority: Low (Capacity)

E. Project Description: Minor overflows on golf course property caused by an undersized pipe behind 782 Augusta Dr. Pipe is located on private property.

Ex. Diameter (in)	Imp. Diameter (in)	Equivalent Parallel (in)	Length (ft)
18	24	18	227

F. Total Preliminary CIP Cost..... $124,000

A. Project ID: C17 | **B. Project Name: Augusta**

C. Project Location: On Golf Course Property near 651 Augusta Dr.

D. Priority: Low (Capacity)

E. Project Description: Minor overflows on Golf Course property caused by an undersized pipe traveling between 651 Augusta Dr. and the tennis courts. Pipe flows on private property.

Ex. Diameter (in)	Imp. Diameter (in)	Equivalent Parallel (in)	Length (ft)
48	54	30	154

F. Total Preliminary CIP Cost..... $180,000

A. Project ID: C18 | **B. Project Name: Wandel**

C. Project Location: Between houses located on Wandel Dr. and Flueti Dr.

D. Priority: Low (Capacity)

E. Project Description: Undersized pipes located on private property cause minor overflows between houses.

Ex. Diameter (in)	Imp. Diameter (in)	Equivalent Parallel (in)	Length (ft)
30	36	24	89
30	36	24	116
30	36	24	217
34	36	18	334

F. Total Preliminary CIP Cost..... $537,000

G. Project ID: C19 | **H. Project Name: Deerfield**

I. Project Location: Deerfield Dr. between Stonefield Pl. and Tharp Dr.

J. Priority: Low (Capacity)

K. Project Description: Minor overflows on Deerfield Dr. caused by undersized pipes.

Ex. Diameter (in)	Imp. Diameter (in)	Equivalent Parallel (in)	Length (ft)
24	42	36	245
36	42	24	51
36	42	24	249

L. Total Preliminary CIP Cost..... $396,000

APPENDIX E

Culvert Improvement Project Sheets

A. Project ID: CC01 | **B. Project Name: Moraga Creek at St Andrews Drive (MC3)**

C. Project Location: St. Andrews Drive near Moraga Country Club Tennis Courts

D. Priority: High (Capacity)

E. Project Type: Culvert

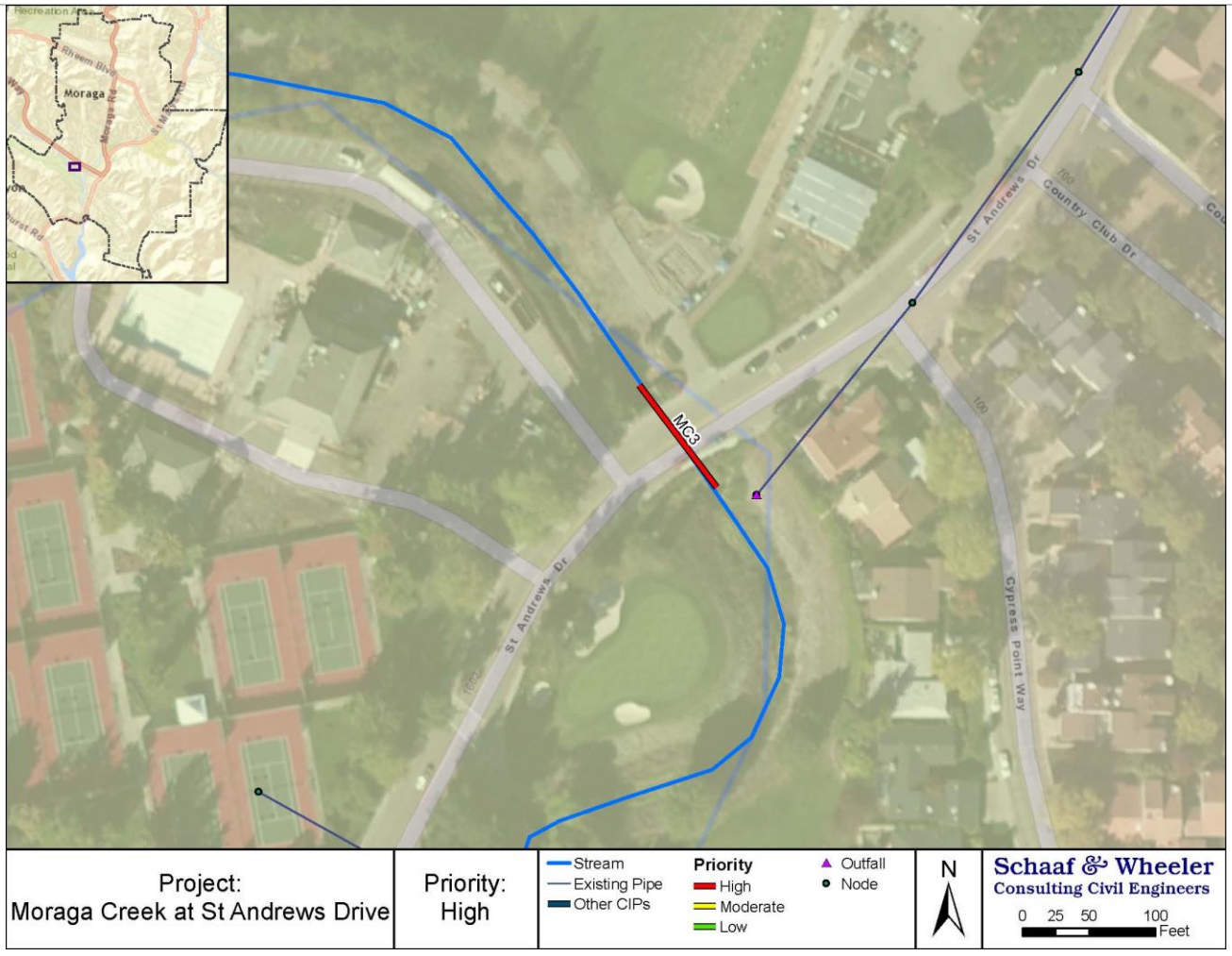
F. Project Description: Creek flooding occurs at Moraga Country Club upstream of the culvert under St Andrews Drive. Upsizing the existing arch culvert to convey the 100-year flood flow and reduce creek flooding to below building pad elevations is recommended.

Ex. Size	Imp. Size	Length (ft)
22' x 8' Arch	22' x 10' Box	60

G. Project Cost $725,000

H. Contingency $218,000

I. Total Preliminary CIP Cost $943,000



A. Project ID: CC02 | **B. Project Name: South Moraga Cr. at Camino Pablo (SMC2)**

C. Project Location: South Moraga Creek culvert under Camino Pablo

D. Priority: High (Capacity)

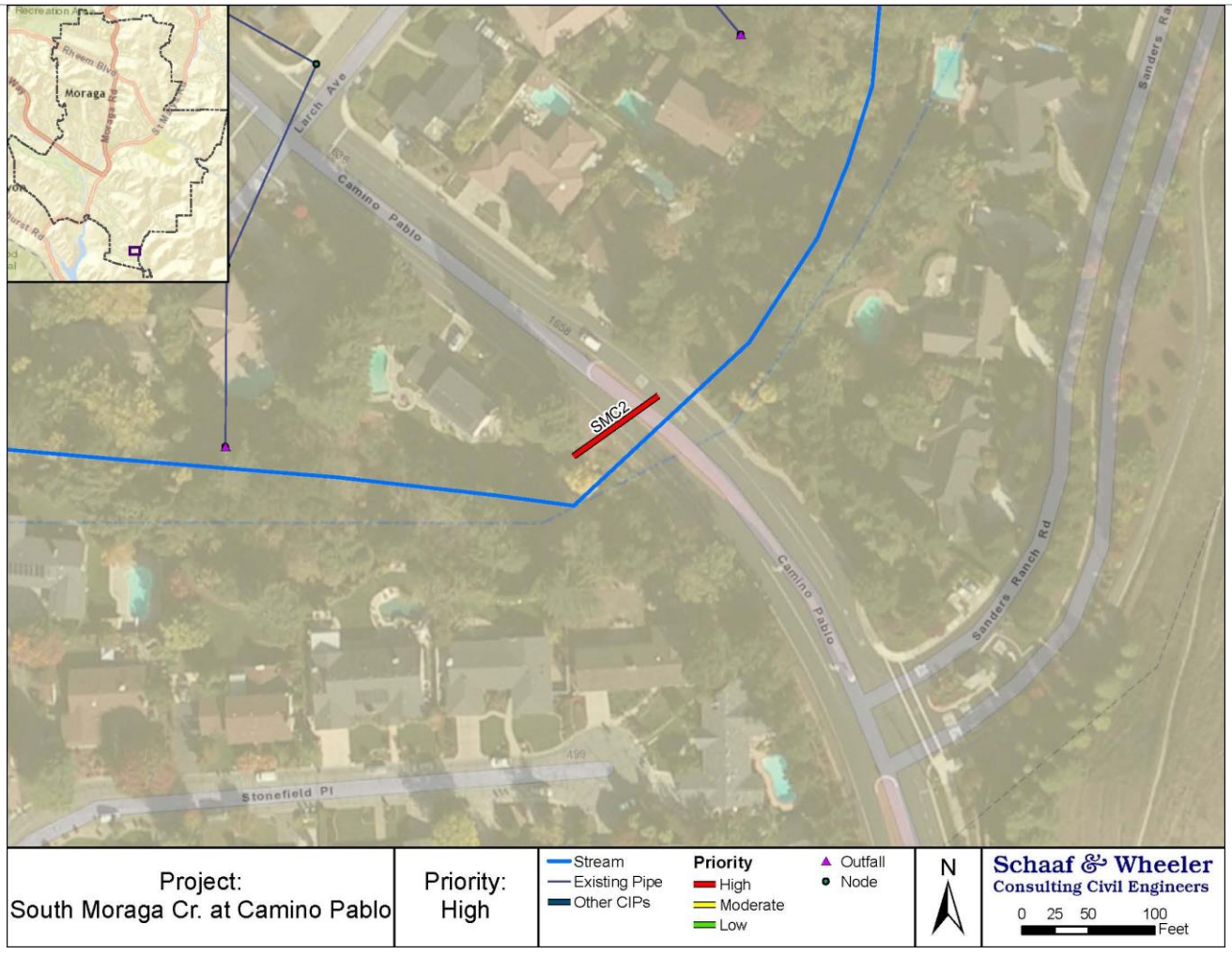
E. Project Description: Creek flooding occurs upstream of the culvert between Larch Ave. and Sanders Ranch Rd. Upsizing the existing pipe culvert to convey 100-year flood flow is recommended.

Ex. Size	Imp. Size	Length (ft)
78" Pipe	96" Pipe	120

F. Project Cost $267,000

G. Contingency $80,000

H. Total Preliminary CIP Cost $347,000



A. Project ID: CC03

B. Project Name: Laguna Creek at Woodford (LC2)

C. Project Location: Laguna Creek culvert under Woodford Drive at Moraga Road

D. Priority: High (Capacity)

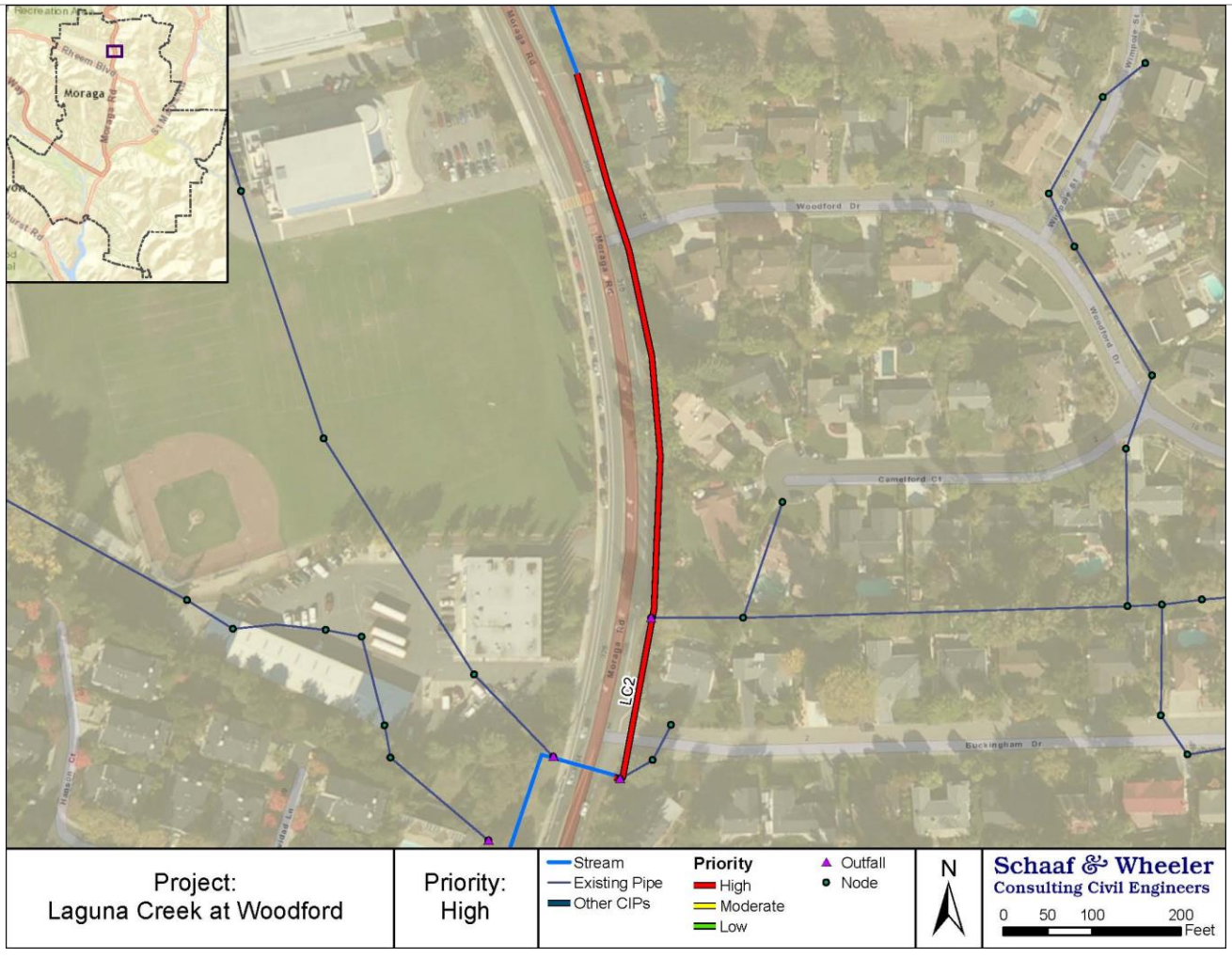
E. Project Description: Creek flooding occurs upstream of Woodford Dr. near Campolindo High School. Upsizing the existing pipe culvert under Woodford Dr. to convey the 100-year flood flow is recommended.

Ex. Size	Imp. Size	Length (ft)
42" Pipe	84" Pipe	820

F. Project Cost $1,528,000

G. Contingency $458,000

H. Total Preliminary CIP Cost $1,986,000



A. Project ID: CC04 | **B. Project Name: Laguna Creek at Hacienda (LC5)**

C. Project Location: Laguna Creek culvert at Hacienda de las Flores

D. Priority: High

E. Project Type: Culvert

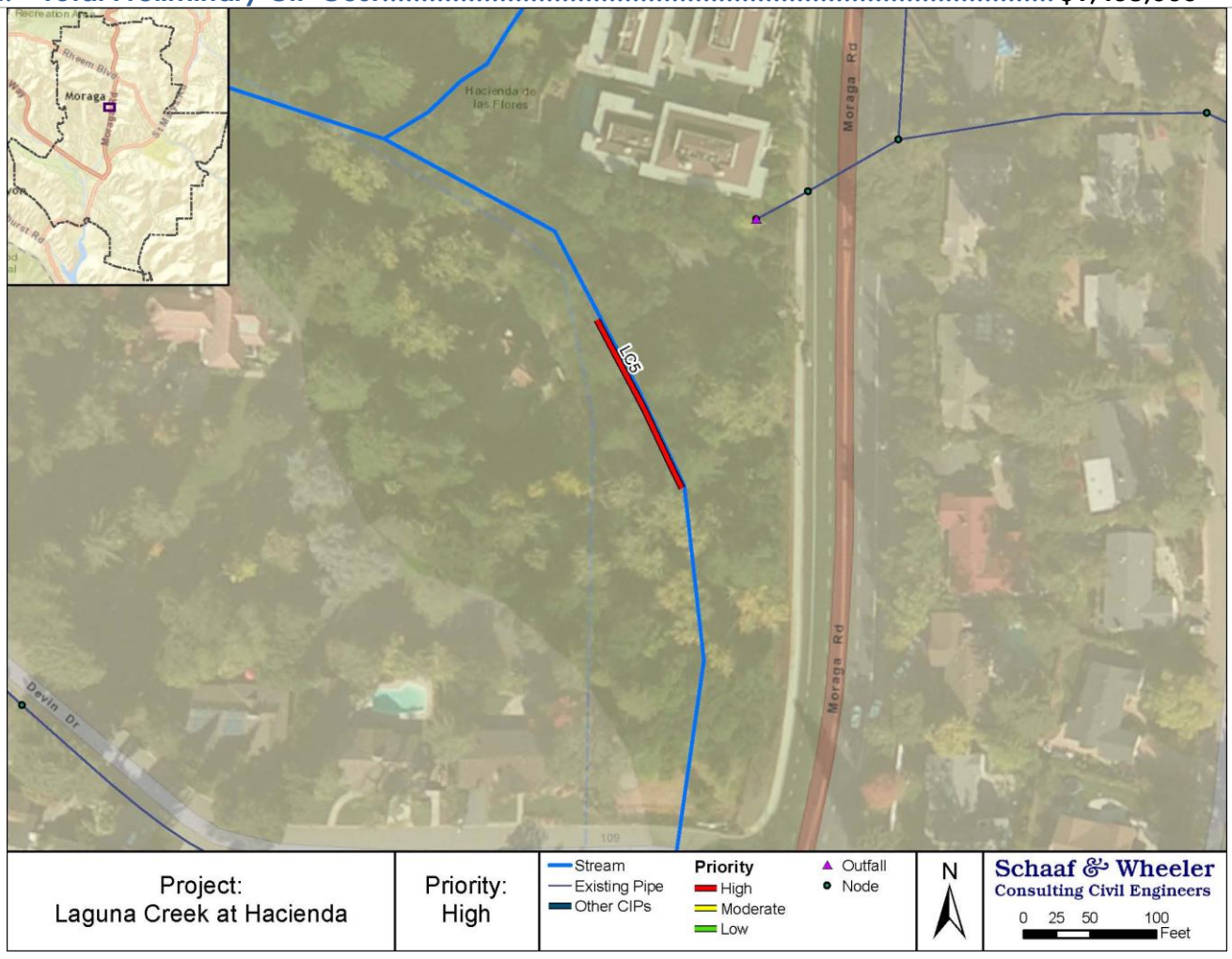
F. Project Description: Creek flooding occurs upstream of the culvert in the Hacienda de las Flores development. Upsizing the existing pipe culvert to convey 100–year flood flow is recommended. This project is currently being studied by WRECA and improvements should be coordinated with the detailed study.

Ex. Size	Imp. Size	Length (ft)
96" Pipe	8' x 10' Box	225

G. Project Cost **$1,106,000**

H. Contingency **$332,000**

I. Total Preliminary CIP Cost **$1,438,000**



A. Project ID: CC05 | **B. Project Name: Moraga Creek at Ivy Drive (MC1)**

C. Project Location: Moraga Creek culvert under Ivy Drive at Moraga Way

D. Priority: Moderate

E. Project Type: Culvert

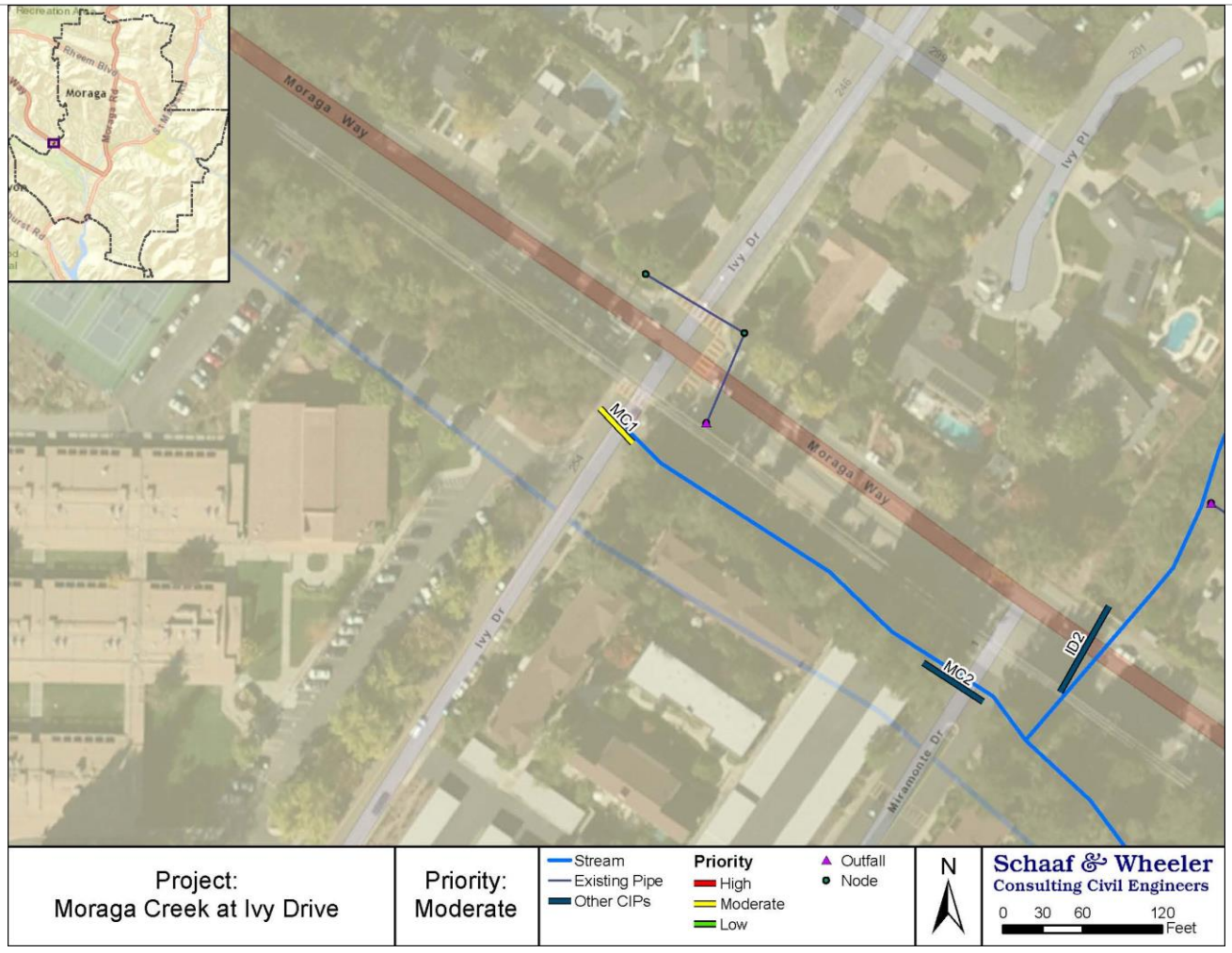
F. Project Description: Some creek flooding occurs upstream of Ivy Drive. Upsizing the existing arch culvert under Ivy Drive to convey 100-year flood flow is recommended. This project lies on the border between Orinda and Moraga, and will require coordination with the City of Orinda.

Ex. Size	Imp. Diameter (in)	Length (ft)
12.6' x 8' Arch	15' x 9' Box	46

G. Project Cost **$354,000**

H. Contingency **$106,000**

I. Total Preliminary CIP Cost **$460,000**



A. Project ID: CC06	B. Project Name: St. Mary's Tributary at St. Mary's Rd. (STM2)

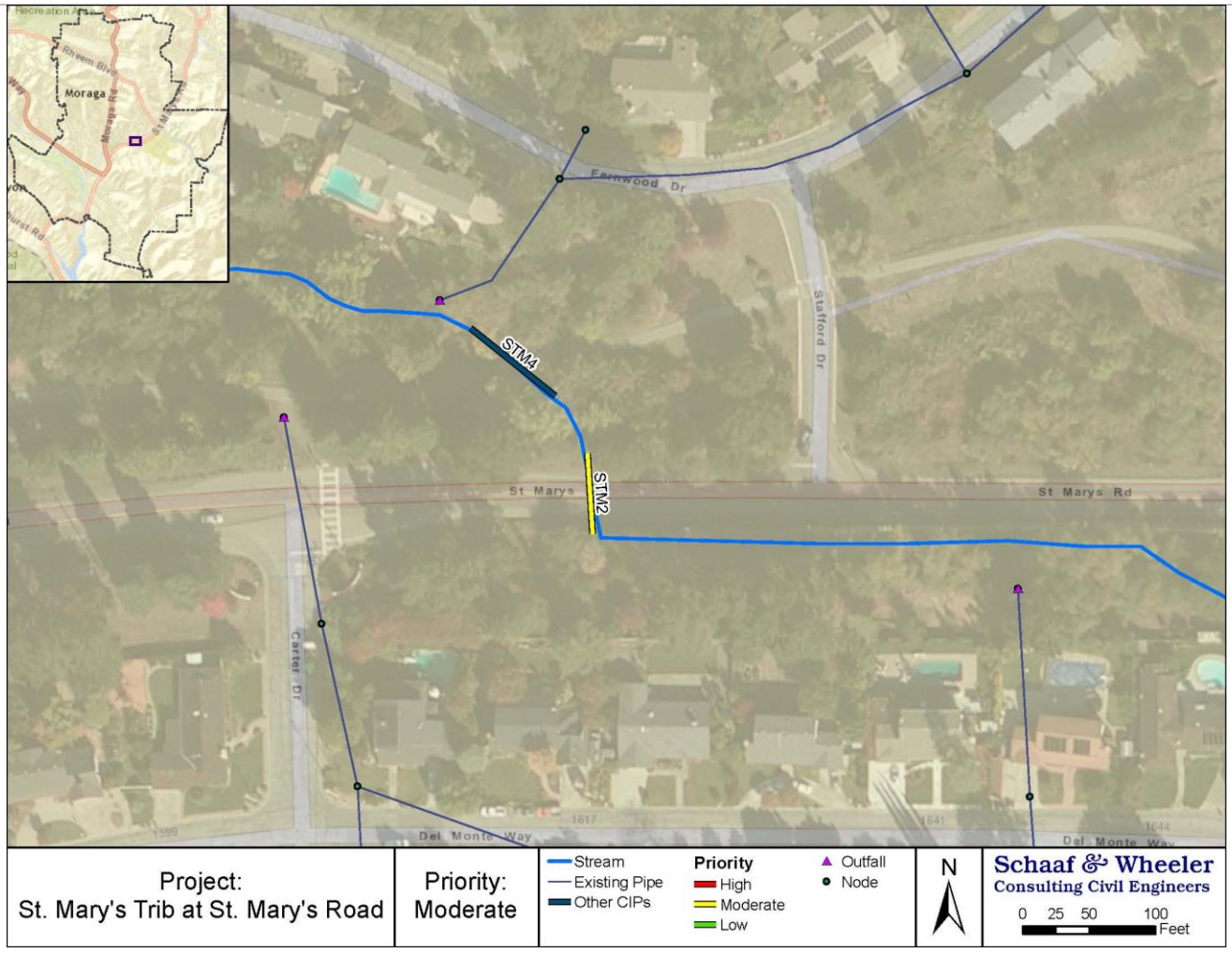
C. Project Location: St. Mary's Tributary culvert under St. Mary's Road

D. Priority: Moderate

E. Project Description: Creek flooding occurs on the south side of St. Mary's Road. Upsizing the existing double barrel pipe culvert under St Mary's Road to a larger box section to convey 100-year flood flow is recommended.

Ex. Size	Imp. Size	Length (ft)
Two 48" Pipes	9' x 5' Box	75

F. Project Cost $216,000
G. Contingency $65,000
H. Total Preliminary CIP Cost $281,000



A. Project ID: CC07 | **B. Project Name: Ivy Drive Tributary at Moraga Way (ID2)**

C. Project Location: Ivy Drive Tributary culvert under Moraga Way

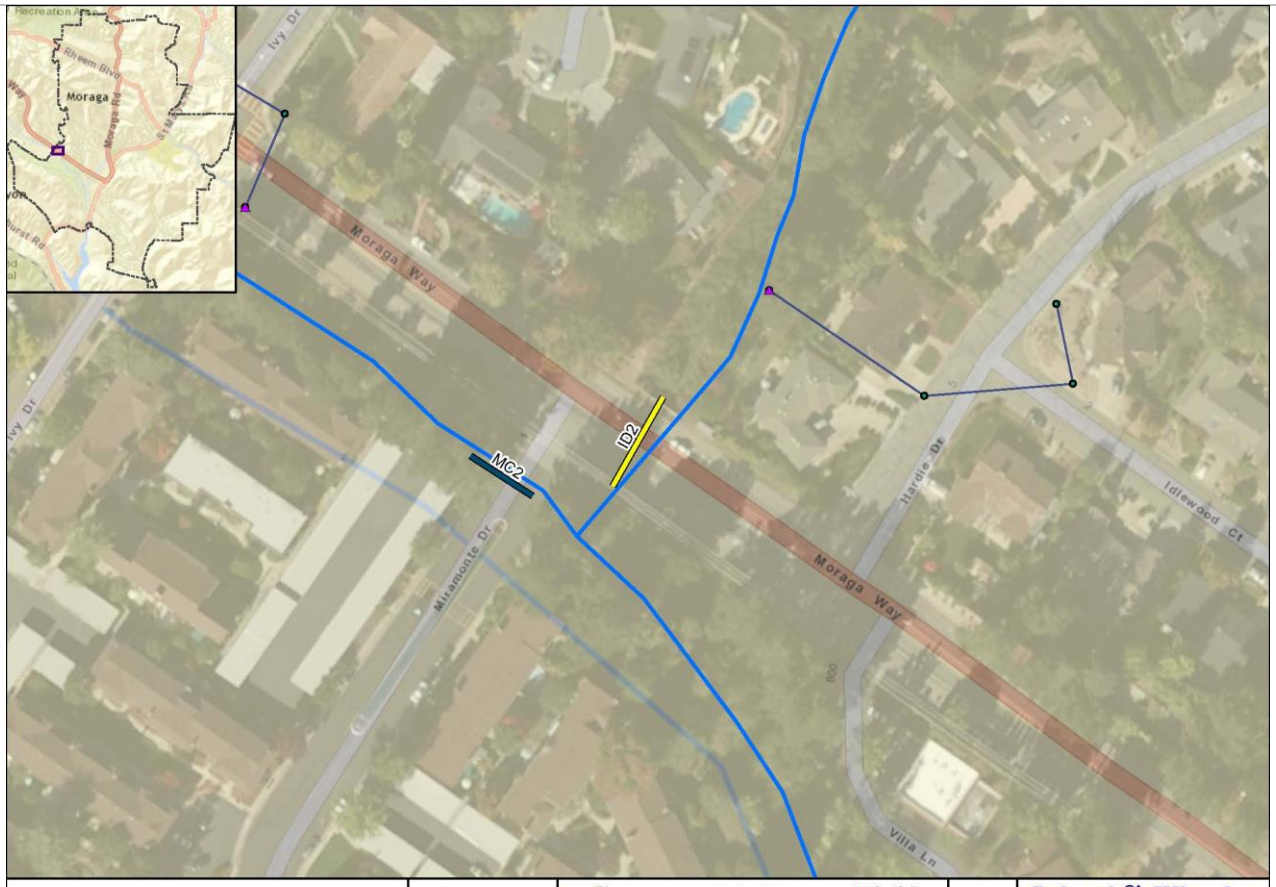
D. Priority: Moderate

E. Project Type: Culvert

F. Project Description: Creek flooding occurs on the Ivy Drive Tributary upstream of Moraga Way near residences. Upsizing the existing pipe culvert to convey 100-year flood flow into Moraga Creek is recommended.

Ex. Size	Imp. Size	Length (ft)
66" Pipe	8' x 5.5' Box	85

G. Project Cost $242,000
H. Contingency $73,000
I. Total Preliminary CIP Cost $315,000



A. Project ID: CC08 | **B. Project Name: Corliss Drive Tributary at Corliss Drive (CD1)**

C. Project Location: Corliss Drive Tributary culvert under Corliss Drive

D. Priority: Moderate

E. Project Type: Culvert

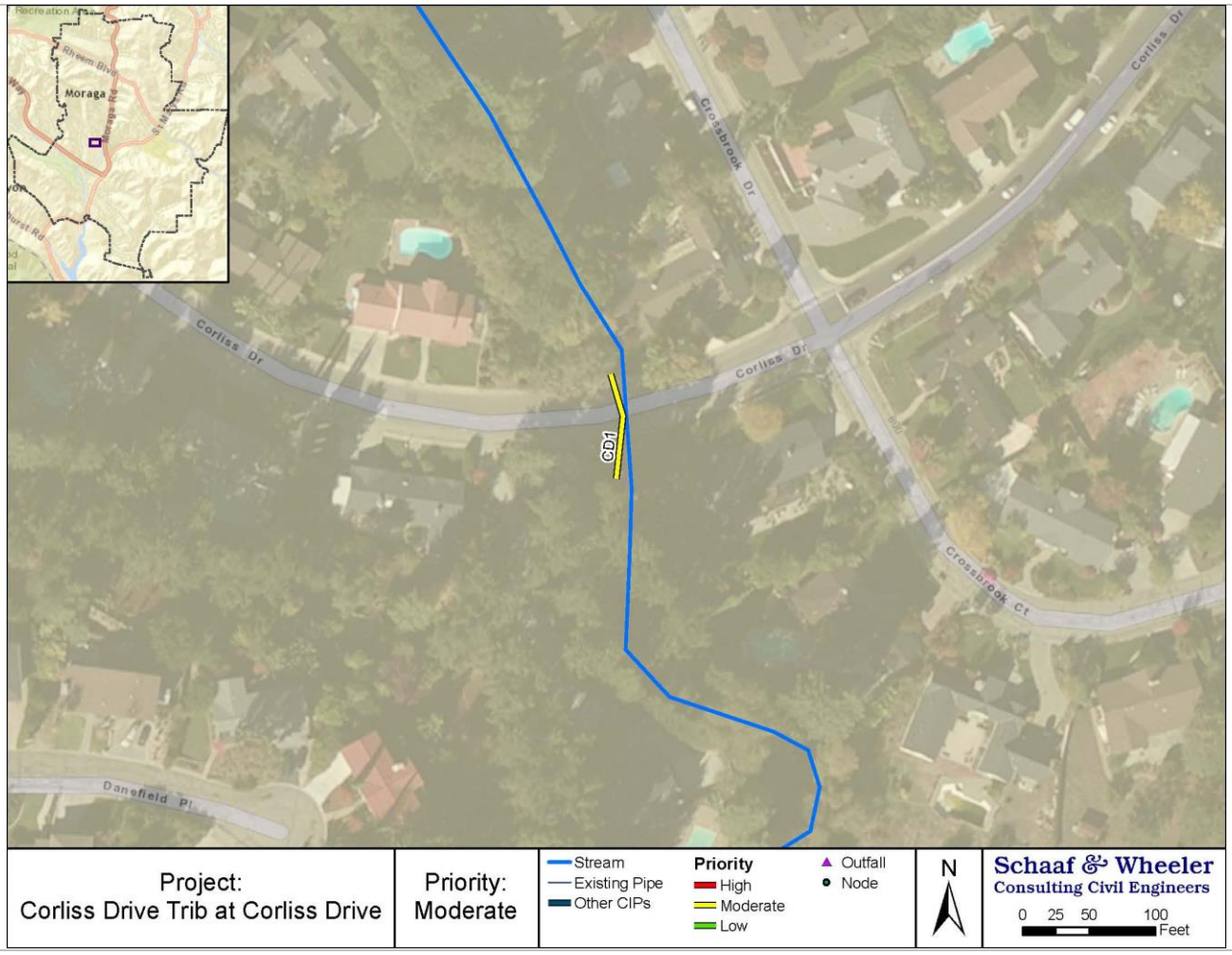
F. Project Description: Minor creek flooding occurs upstream of Corliss Drive near Crossbrook Drive. Upsizing the existing pipe culvert to convey the 100-year flood flow is recommended.

Ex. Size	Imp. Size	Length (ft)
68" Pipe	8' x 5' Box	80

G. Project Cost **$206,000**

H. Contingency **$62,000**

I. Total Preliminary CIP Cost **$268,000**



A. Project ID: CC09 | **B. Project Name: Moraga Creek at Miramonte Drive (MC2)**

C. Project Location: Moraga Creek culvert under Miramonte Drive at Moraga Way

D. Priority: Moderate

E. Project Type: Culvert

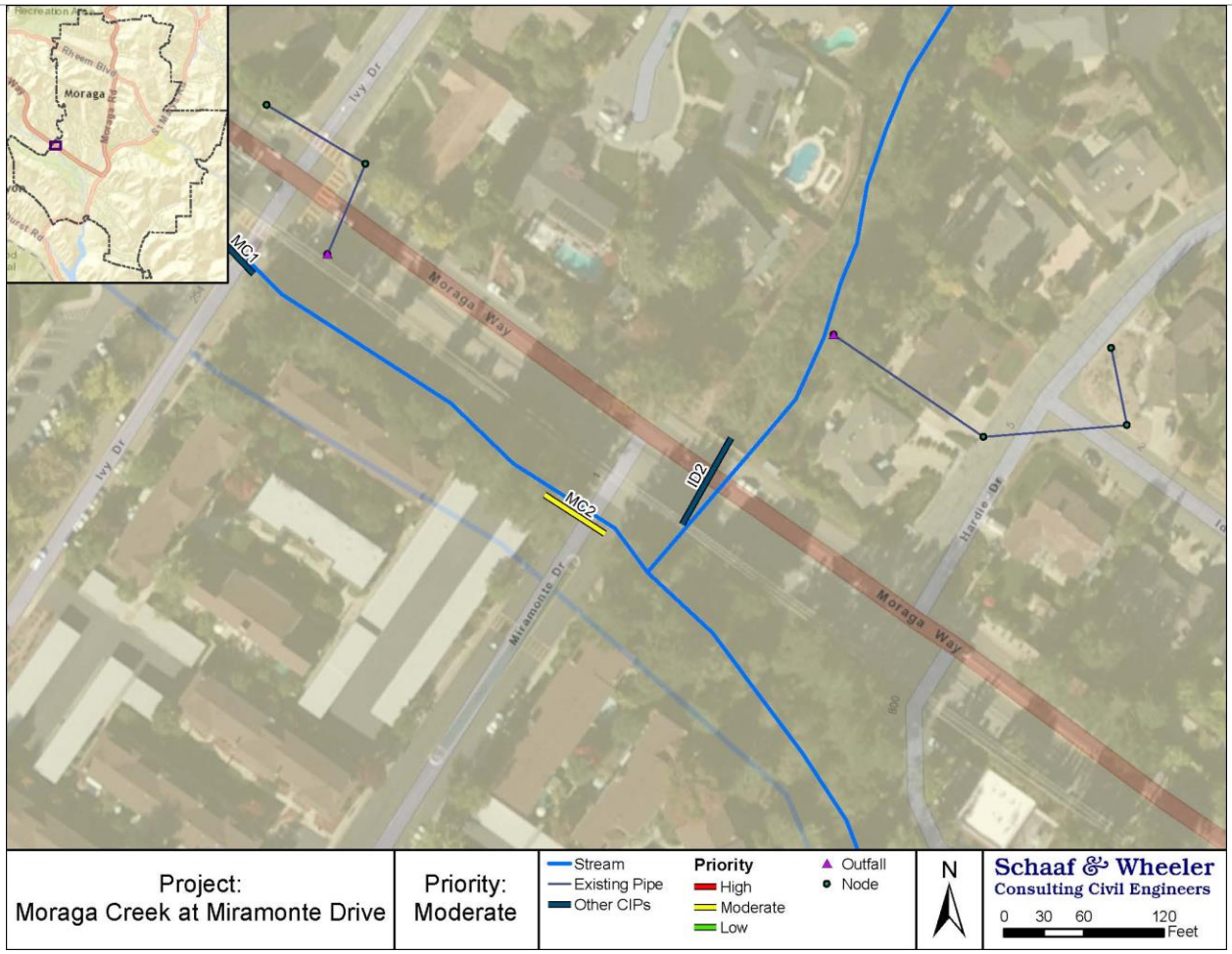
F. Project Description: Creek flooding occurs at Miramonte Drive. Upsizing the culvert under Miramonte Drive to convey 100-year flood flow is recommended.

Ex. Size	Imp. Size	Length (ft)
15' x 8.5' Arch	20' x 9' Box	70

G. Project Cost **$699,000**

H. Contingency **$210,000**

I. Total Preliminary CIP Cost **$909,000**



A. Project ID: CC10

B. Project Name: Ivy Drive Tributary at Ivy Drive (ID1)

C. Project Location: Ivy Drive Tributary culvert under Ivy Drive near Ramona Drive

D. Priority: Moderate

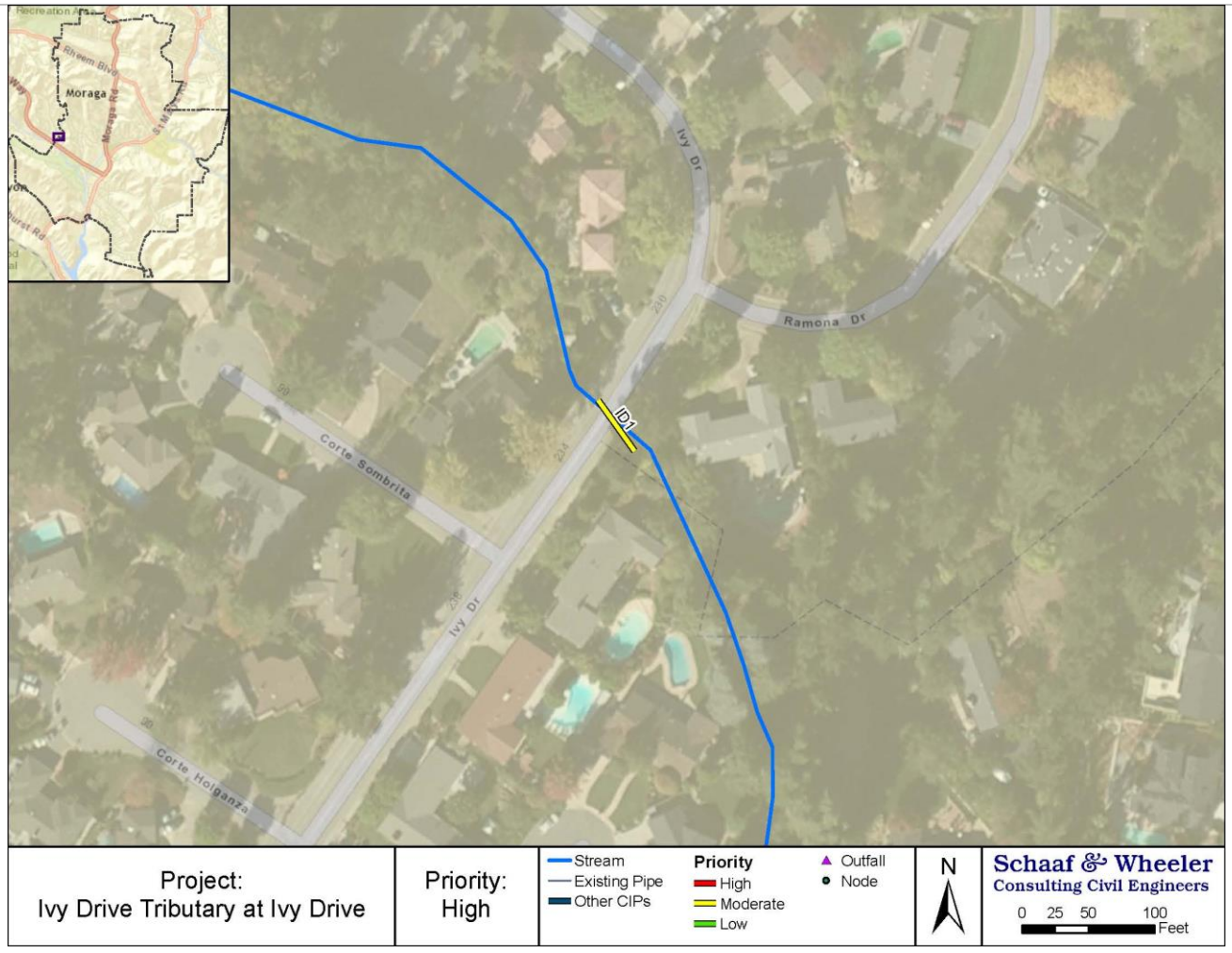
E. Project Description: Creek flooding occurs on Ivy Drive Tributary upstream of Ivy Drive, between residences. Upsizing the culvert under Ivy Drive is recommended. This project lies on or near the border between Orinda and Moraga, and will require coordination with the City of Orinda.

Ex. Size	Imp. Size	Length (ft)
Two 5.8' x 3.75' Arches	Two 6' x 4.5' Boxes	37

F. Project Cost **$71,000**

G. Contingency **$21,000**

H. Total Preliminary CIP Cost **$92,000**



A. Project ID: CC11 | **B. Project Name: Rheem Tributary at Hacienda (RT3)**

C. Project Location: Rheem Tributary culvert under Rheem Boulevard to Laguna Creek

D. Priority: Moderate

E. Project Type: Culvert

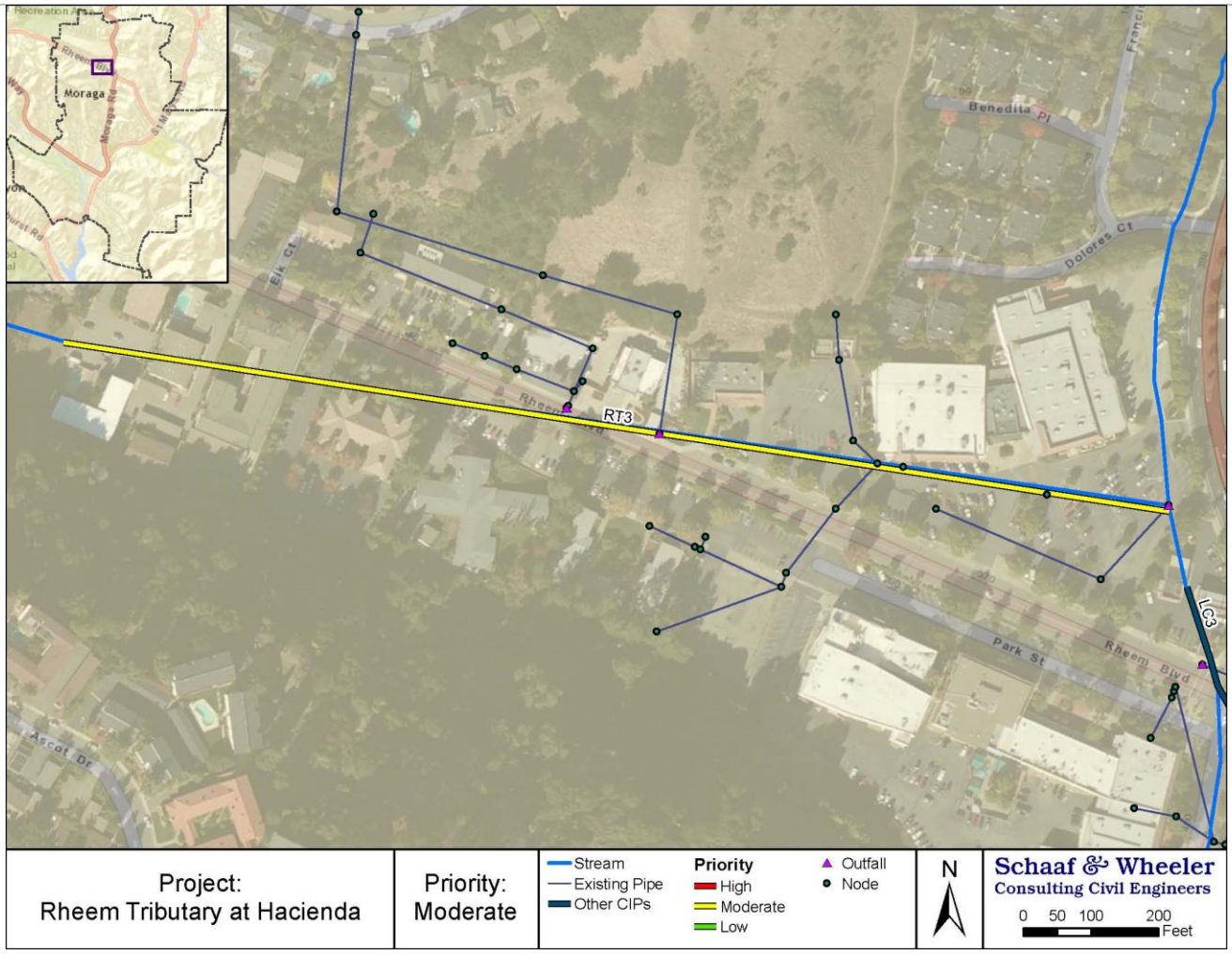
F. Project Description: Creek flooding on Rheem Boulevard is caused by an undersized culvert under Rheem Boulevard, connecting to Laguna Creek. Upsizing this culvert to convey 100-year flood flow is recommended.

Ex. Size	Imp. Size	Length (ft)
54" Pipe	60" Pipe	1,830

G. Project Cost **$2,445,000**

H. Contingency **$734,000**

I. Total Preliminary CIP Cost **$3,179,000**



A. Project ID: CC12 | **B. Project Name: Rheem Tributary at Scofield Drive (RT1)**

C. Project Location: Rheem Tributary culvert under Scofield Drive

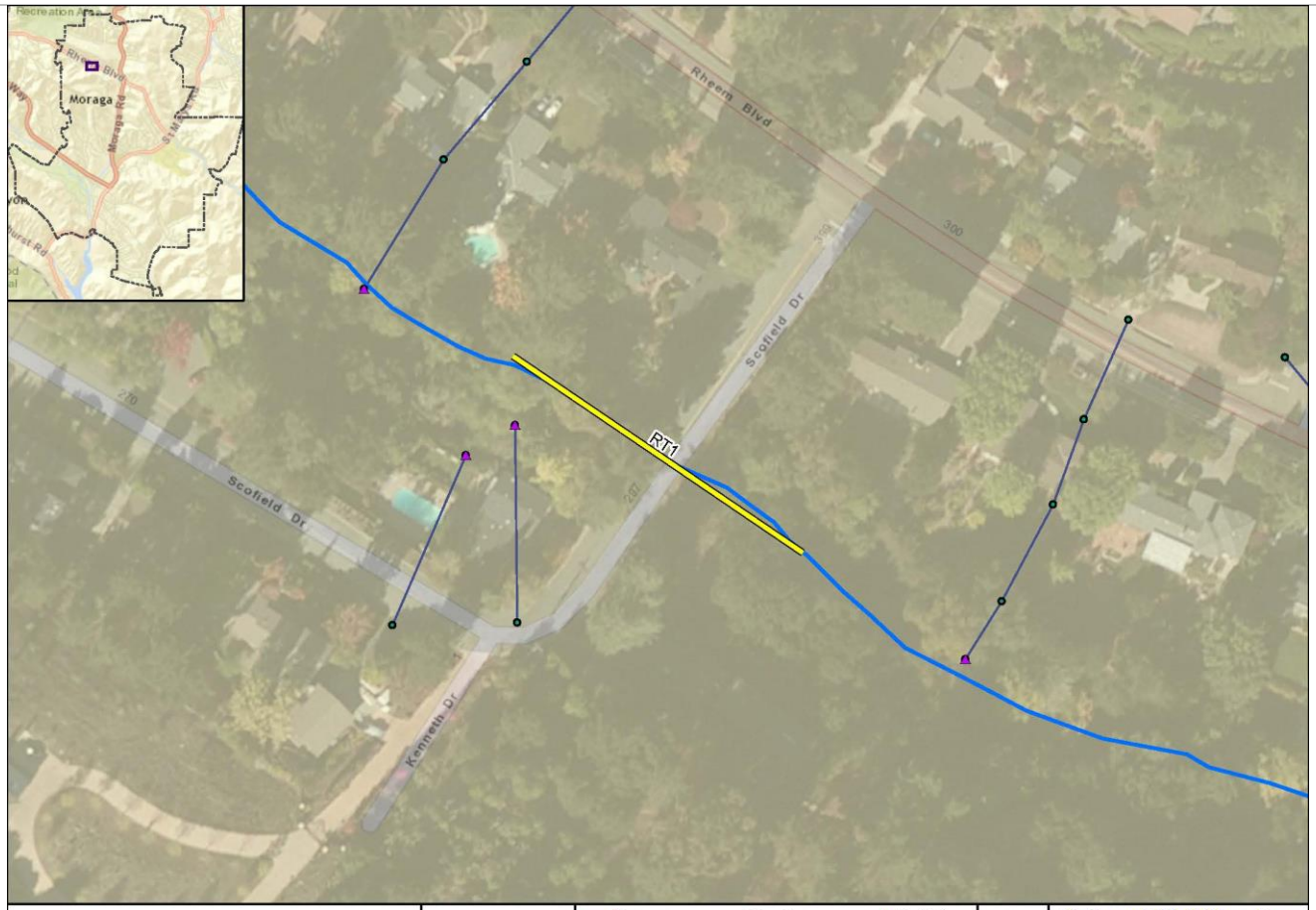
D. Priority: Moderate

E. Project Type: Culvert

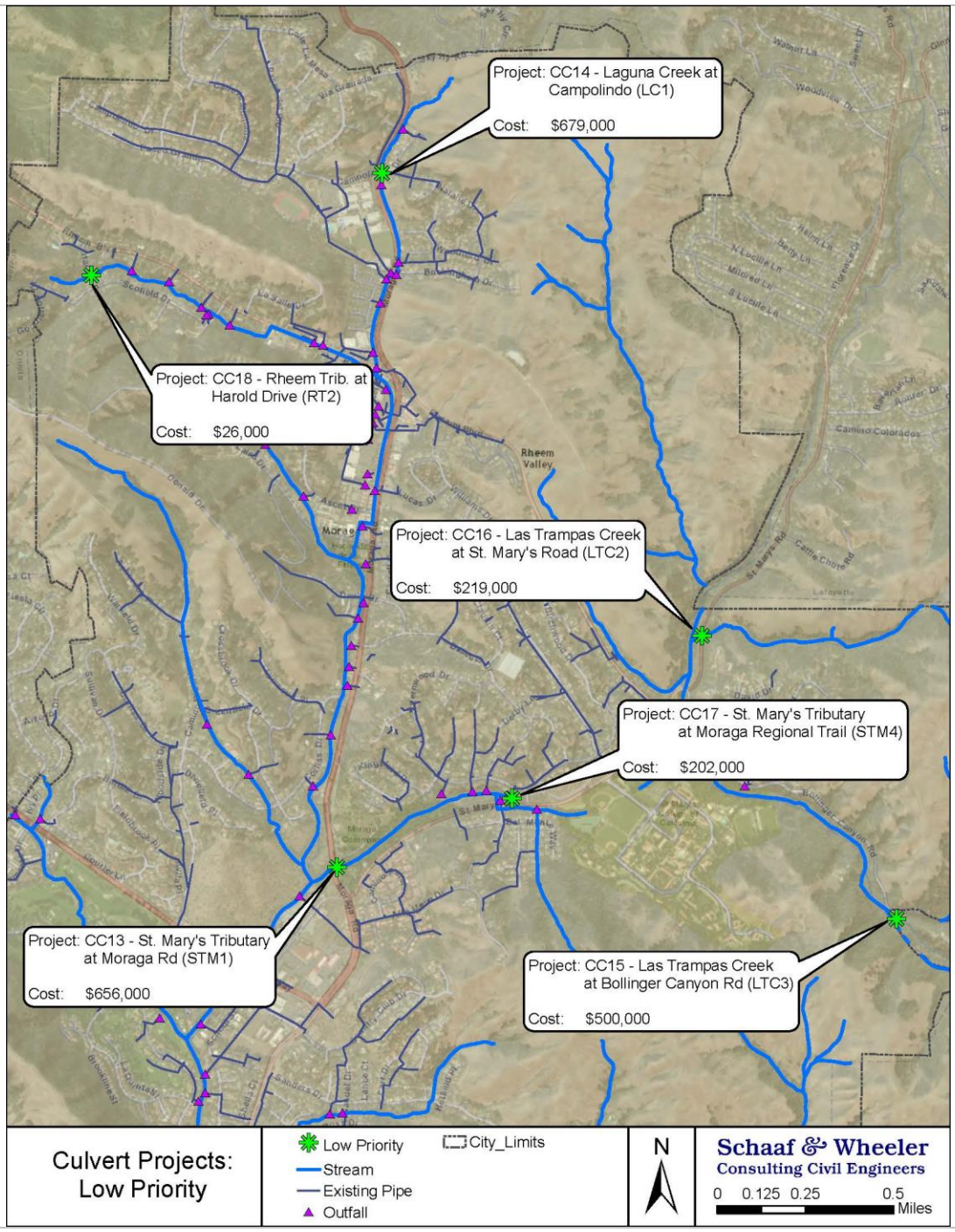
F. Project Description: The Rheem Tributary culvert under Scofield Drive is filled with sediment, and may be collapsed. Cleaning this culvert and assessing potential need for replacement is recommended (Replacement CIP estimate provided below).

Ex. Size	Length (ft)
60" Pipe	110

G. Cleaning Project Cost	**$25,000**
H. Contingency	**$8,000**
I. Total Preliminary CIP Cost	**$33,000**
J. Replacement Cost	**$161,000**
K. Replacement Contingency	**$48,000**
L. Total Replacement CIP Cost	**$209,000**



A. **Project ID: CC13-19**	B. **Project Name: Various Projects**
C. **Project Location: Various Locations**	
D. **Priority: Low**	
E. **Project Description:** Low Priority culvert projects are shown in the figure below. See pages E.13 – E.14 for individual project descriptions.	
F. **Low Priority Projects Cost** **$1,754,000**	
G. **Contingency** **$527,000**	
H. **Total Preliminary Low Priority CIP Cost** **$2,281,000**	



A. Project ID: CC13 | **B. Project Name: St. Mary's Trib at Moraga Road (STM1)**

C. Project Location: St. Mary's Tributary culvert under Moraga Road

D. Priority: Low (Capacity)

E. Project Type: Culvert

F. Project Description: Minor creek flooding occurs in Moraga Commons Park. Upsizing the existing pipe culvert under Moraga Road is recommended.

Ex. Size	Imp. Size	Length (ft)
60" Pipe	84" Pipe	250

G. Project Cost **$505,000**
H. Contingency **$152,000**
I. Total Preliminary CIP Cost **$657,000**

A. Project ID: CC14 | **B. Project Name: Laguna Creek at Campolindo (LC1)**

C. Project Location: Laguna Creek culvert under Campolindo Drive

D. Priority: Low

E. Project Type: Culvert

F. Project Description: Minor creek flooding occurs upstream of Campolindo Drive near residences. Upsizing this culvert to convey 100-year flood flow is recommended.

Ex. Size	Imp. Size	Length (ft)
48" Pipe	7' x 4' Box	260

G. Project Cost **$522,000**
H. Contingency **$157,000**
I. Total Preliminary CIP Cost **$679,000**

A. Project ID: CC15 | **B. Project Name: Las Trampas Creek at Bollinger Canyon (LTC3)**

C. Project Location: Las Trampas Creek culvert under Bollinger Canyon Road

D. Priority: Low

E. Project Type: Culvert

F. Project Description: Minor creek flooding occurs upstream of Bollinger Canyon Road. Upsizing the culver to convey 100-year flood flow is recommended. This project lies on the border between Orinda and Moraga, and will require coordination with the City of Orinda.

Ex. Size	Imp. Size	Length (ft)
13' x 5' Arch	12' x 10' Box	70

G. Project Cost **$384,000**
H. Contingency **$115,000**
I. Total Preliminary CIP Cost **$499,000**

A. Project ID: CC16 | **B. Project Name: Las Trampas Creek at St. Mary's Road (LTC1)**

C. Project Location: Las Trampas Creek culvert under Bollinger Canyon Road

D. Priority: Low (Capacity)

E. Project Description: Minor creek flooding occurs upstream of Bollinger Canyon Road. Upsizing the existing box culvert to convey the 100-year flood flow is recommended.

Ex. Size	Imp. Size	Length (ft)
4.5' x 2.67' Arch	5' x 3' Box	80

F. Project Cost $168,000
G. Contingency $50,000
H. Total Preliminary CIP Cost $218,000

A. Project ID: CC17 | **B. Project Name: St. Mary's Tributary under Trail (STM4)**

C. Project Location: St. Mary's Tributary culvert under Lafayette/Moraga Regional Trail

D. Priority: Low (Capacity)

E. Project Description: Creek flooding occurs between the trail and St. Mary's Road. Upsizing the culvert under the trail to convey the 100-year flood flow is recommended.

Ex. Size	Imp. Size	Length (ft)
72" Pipe	8' x 6' Box	50

F. Project Cost $155,000
G. Contingency $47,000
H. Total Preliminary CIP Cost $202,000

A. Project ID: CC18 | **B. Project Name: Rheem Tributary at Harold Drive (RT2)**

C. Project Location: Rheem Tributary culvert under Harold Drive at Scofield Drive

D. Priority: Low (Capacity)

E. Project Description: The existing pipe culvert is more than 50% full of sediment. While no creek flooding occurs currently, further sedimentation could cause creek flooding for nearby residences. Cleaning the pipe to ensure its full capacity is available is recommended.

Ex. Size	Length (ft)
42" Pipe	130

F. Project Cost $20,000
G. Contingency $6,000
H. Total Preliminary CIP Cost $26,000