Parma Main Street Drainage – 5th to Roswell
City of Parma, Idaho

PSA No. 2015-09

Summary Report

Prepared For:

COMPASS
COMMUNITY PLANNING ASSOCIATION of Southwest Idaho

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Purpose

This report summarizes the analysis of storm drainage issues identified along Main Street between 5th Street and Roswell Boulevard in Parma, ID and presents design alternatives and funding strategies to align the project for final design and construction. The design for this phase of the project was guided by the goals and performance measures outlined in the Project Scoping Memo, attached here as Appendix A. As defined in the Scoping Memo:

The purpose of the Parma Main Street Drainage Project is to reduce stormwater inflow into the City's sewer system. The successful completion of this project will also:

- Reduce the threat of property damage from street flooding during the 25-year storm event for conveyance facilities.
- Reduce system maintenance required by the City
- Enhance the sidewalk along the Main Street Corridor
- Minimize construction impacts on local commerce

The project will also address two goals and two objectives developed in *Communities in Motion 2040*, the regional long-range transportation plan:

- **Goal 1.3** Protect and preserve existing transportation systems and opportunities.
    - **Objective 1.3.1** Maximize the useful life of the existing transportation system.
        - This goal and objective have been met through the project's deliverables that included preliminary design for downtown Parma stormwater improvements. Preliminary design is for improvements to the existing transportation system.
- **Goal 4.2** Promote maintenance and preservation of existing infrastructure.
    - **Objective 4.2.1** Invest in regularly scheduled maintenance and rehabilitation of existing community infrastructure.
        - This goal and objective have been met through the project's deliverables that included preliminary design for downtown Parma stormwater improvements. Preliminary design is for improvements to the existing transportation system.

Project Location

Located in Canyon County Idaho, Parma is a small agricultural community of 2,000 residents. The location and project limits are shown in Figure 1 below.

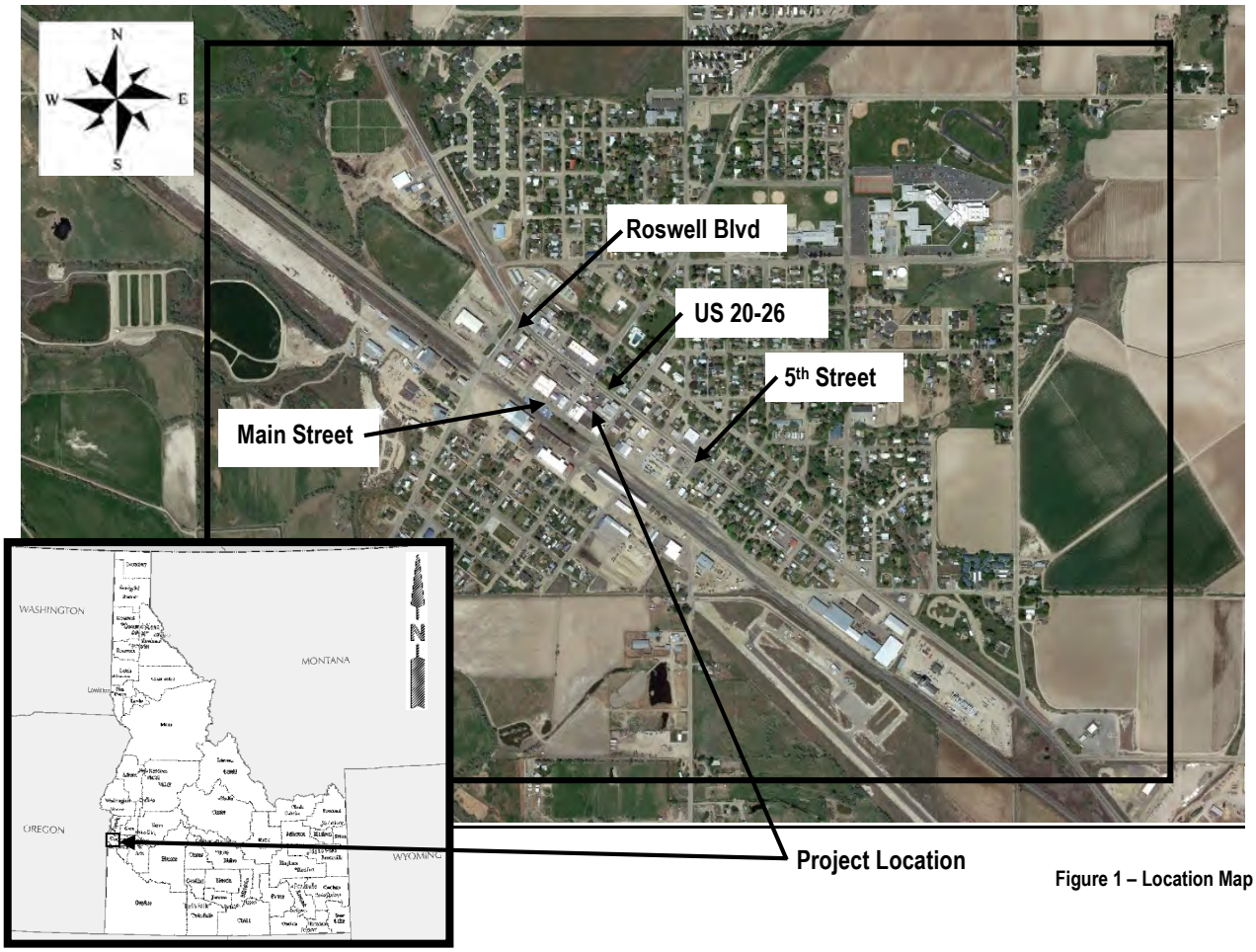


Figure 1 – Location Map

Potential Project Funding

As a part of their scope of work, Horrocks has investigated potential project funding sources for the Parma Main Street Drainage project. Stormwater improvements are classified by Idaho DEQ and USDA Rural Development as public facility improvements; both DEQ and USDA offer only loans for stormwater improvements unless there is an imminent threat to health and safety. Grant funding is currently unavailable through DEQ and USDA for the type of stormwater improvements proposed for the City of Parma.

CDBG funding is potentially available for Parma's Main Street Drainage Project; CDBG funding for public facility improvements can cover up to 50% of the design and construction costs of a public facilities project (at a maximum dollar amount of $500,000.) Horrocks staff has met with Dennis Porter, the State of Idaho's CDBG manager, to review Parma's CDBG application requirements and attended the Department of Commerce's 2015 Idaho CDBG application workshop to ensure that a competitive application can be submitted for Parma. A 50% local match for Parma's downtown stormwater design and construction costs will need to be guaranteed by the City of Parma through a bond measure or through an increase in utility rates. Parma has recently raised utility rates and a portion of this rate increase will be earmarked for the 50% local match required by the CDBG application. Parma received CDBG funding for downtown

improvements eight years ago. While Parma is well-positioned for CDBG funding, it should be noted that CDBG funding is competitive. Parma meets required LMI area-wide criteria for CDBG funding and the type of proposed stormwater improvements meet CDBG eligibility criteria.

Funding Timelines

Parma's CDBG application is due November 20, 2015. Initial application reviews will take place in January 2016 and awards will be made in Summer 2016.

Public Process

Horrocks has worked closely with the City of Parma to ensure that the public participation requirements of the CDBG application have been met. The City of Parma has officially adopted a Citizen participation plan as required by the CDBG application and all public noticing requirements have been met for the public hearing which will be conducted to discuss Parma's Main Street Drainage Plan and Parma's CDBG application. A citizen's advisory committee has also been developed for Parma's Main Street Drainage project.

Environmental Scan

As a part of Horrocks' Scope of Work for the Parma Main Street Drainage Project, our firm is completing an Environmental Scan for the Parma project. The Environmental Scan required for Parma's CDBG application will be completed for the Parma Main Street Drainage Area to fulfill CDBG application requirements; this document is a more extensive environmental document than the document originally specified by Horrocks in their COMPASS Scope of Work.

Existing Drainage Conditions

As shown in figure 1 above the project is located in the downtown area of Parma, Idaho. The project limits consist of 5 city blocks bounded by Roswell Blvd to the east, 5th St to the west, US 20-26 to the North and Main St to the south. For the most part, the existing ground rises gently to the northeast as it crosses Highway 20-26, then rises more steeply to a hill that overlooks the downtown area. Drainage within area is characterized by extremely flat grades between the embankments for Roswell Blvd and the Union Pacific Railroad. These embankments impede the natural flow of surface water that historically drained to Sand Hollow Creek. Due to flat grades and embankment construction, the disposal of storm water has been a challenge for past development. In the past these drainage challenges have been addressed by directly connecting street and roof drains to the City's sewer system where it eventually makes its way to the city's sewage lagoons. Over the years, city growth has increased the volume of sewage that must be treated. Today the extra storm water that makes its way into the sewer system threatens to overwhelm current

treatment capacity and has been identified as an unnecessary contributor to the cost of maintaining the system. The following is a breakdown of specific drainage issues that have been identified during site reconnaissance and through interviews with City staff. A plan sheet depicting the existing facilities can be found in Appendix A: Existing Conditions.

Roswell Blvd defines the west boundary of the project. The grade of the road slopes up from its intersection with Highway 20-26 and crests at the Union Pacific railroad crossing. A crowned roadway section drains water to the west into curb and gutter which is then conveyed by pipes to a point approximately 500' west along Main St. To the east drainage, runs off onto private property where it is collected at an inlet located in the parking area. The area between Roswell and 1st St (See Area No. 1 in the exhibits and calculations) is approximately half paved/half unpaved, with a fair amount of roof space. This is the only block within the project through which the alley is not continuous. As such, identification of roof drain connections to the sewer was not possible. Without right of way access for a storm drain line, rerouting of roof drains on this block may not be feasible. Three inlets have been located at the southwest corner of the block and it is believed that they capture most of runoff not captured by roof drains direct connected to the sewer. Ultimately the drainage for this block is conveyed via pipe under Roswell Blvd, where it connects with the more recent development to the west.

1st St functions as more of an alley than it does a public street. The width is very narrow, unpaved and is well traveled by equipment used for fabricating agricultural machinery. The block between 1st and 2nd St (See Area No. 2 in the exhibits and calculations) is mostly paved with a high percentage of roof area. Roof drains are abundant along the alleyway and appear to discharge at ground level. Due to the clutter of machinery and materials along the alley, it was impossible to identify roof drain connections to the sewer, but it is assumed that they do exist.

2nd St defines an unofficial border between industrial and business/retail use. The west side of the street is made up of discontinuous sidewalk. If there was once curb and gutter it has been buried by successive paving lifts over time. The east side of the road has continuous curb gutter and sidewalk built within the last five years and is in good condition. The inlets through this area are also new, but not functioning desirably. On multiple visits to the site the inlets and pipes were full of stagnant water. In a brief conversation with the owner of JC Watson it was gathered that the pipe between the two inlets was designed as a siphon. The block between 2nd and 3rd Street (See Area No. 3 in the exhibits and calculations) has the largest percentage of roof area within the project limits. The remainder of the block is paved with a small area of landscaping. A paved alley runs through the center of the block where roof drains discharge into inlets. These inlets in turn discharge directly into the city sewer trunk line that runs along the north side of the alley. As part of recent improvements, the JC Watson Co. installed a system to capture all roof drainage from their building. The details of the system are unknown as the city was unable to obtain design or record drawings from the owner. In addition to the JC Watson system two existing inlets were located within the alley; one about 150' from 3rd St, and the other beneath a covered loading area adjacent to 3rd St.

3rd St: Like Roswell Blvd, 3rd St crosses the railroad tracks south of the project, however the roadway embankment is not quite so high. Two inlets near the intersection of 3rd and Main collect the drainage along most of 3rd St and the block between 3rd and 4th St. These inlets are very old, filled with sediment and only have a 6" pipe outlet that drains back to the sewer line in the alley. 3rd St has also seen successive layers of paving without removal, which has rendered the curb at the corner obsolete. The block between 3nd and 4th

Street (See Area No. 4 in the exhibits and calculations) has shops along 3rd street and some older historic properties along main that have been converted to residential or storage space. A few other buildings are scattered within the block on gravel lots. While nearly all of the buildings have roof drains, a survey of the area was unable to find inlets that might convey stormwater into the sewer system. It is presumed that runoff that does not infiltrate into the gravel lots makes its way overland to the aforementioned inlets at 3rd and Main St.

4th St lacks curb gutter or sidewalk, so all drainage runs off the road into the adjacent unpaved lots or finds its way to the single inlet at the corner of 4th and Main St. The inlet at this location is filled with sediment likely from the gravel lots that drain to this point. A single 3" pipe outlets from this inlet back to the sewer line in the alley. Notable ponding has occurred in this area during rain events as recently the summer of 2015. City maintenance crews are routinely needed to clear debris from this inlet for the ponding to subside. The block between 4th and 5th Street (See Area No. 5 in the exhibits and calculations) is the least developed and split between paved and gravel surfaces. Several residences dot the block including a small home at the corner of 5th and Main where ponding on 5th Ave routinely rises high enough to reach the buildings foundation.

5th St is a paved road that marks the eastern boundary of the project. Like 4th St it lacks curb and gutter, however the roadway pavement is in much worse condition. The road profile forms a sag with the low point near the midblock alley. Two existing inlets were identified near this low point, but like those found on 3rd and 4th the outlet pipes are very small and prone to clogging. Perennial moisture in the roadway base is a likely contributor to the poor condition of the roadway pavement. From discussions with the City Public Works staff it was understood that these inlets drain to a collection system along Hwy 20-26 rather than the sewer line that runs down the alley.

Main St runs the length of the project from Roswell to 5th St. The width of the roadway varies considerably along its length; from 22' near 5th to as wide as 62' west of the 3rd St intersection. The profile of the road slopes gradually down from east to west with a low point midblock between Roswell and 1st before rising to climb the embankment for Roswell St. The roadway has a crowned section which approximately follows the center of pavement. Beginning at Roswell Blvd the City ROW is considerably wider than any other point along the project. This area is currently undeveloped and used as parking for employees working across the street. Along this block there is no curb gutter or sidewalk, so water flows directly off the road to low spots where it ponds on the south side, or to the north where it is collected by one of two inlets. Between 1st and 2nd St the ROW narrows on the south side of the roadway. The area between Main Street and the railroad is leased for material storage by a local irrigation supply company. Similar to the previous block, roadway runoff to the south collects at the toe of the railroad embankment or makes its way north the inlet at the corner of 1st and Main. This inlet is known to direct connect to the City's sewer system. Between 2nd and 3rd St the ROW continues at the same width as the previous block. To the south the city maintains a park strip with trees and lawn divided from the roadway by railroad tie curbing. The north side is a mix of old and new curb gutter and sidewalk. No inlets were encountered along this stretch so it is presumed that all runoff makes its way to the west without being collected. Between 3rd and 4th St the roadway begins to narrow. The roadside to the north consists of mostly old curb gutter and sidewalk with a short stretch of new in front of a few historic buildings that have been converted to residences. The south side of the road is divided from a railroad spur by intermittent timber curbing. It is evident from sediment in the roadway that this area is prone to standing water which is stopped by the embankment for 3rd St. Between 4th and 5th Streets storm water

runs off the road into wide flat gravel shoulders where it infiltrates over time. Some water on the north side may make its way to the inlet at the corner of 4th and main if water ponds high enough to overtop the crown of 4th St. The conditions between 4th and 5th are comparable to those in the previous block. At the corner of 5th and Main St the residence previously mentioned lies in a low spot that takes on water during heavy storm events.

Proposed Alternative Solutions

From the description of the existing drainage conditions there are several opportunities for reducing storm water inputs to the City sewer system and improving drainage throughout the project. The following alternatives outline possible design solutions that address these issues considering the anticipated funding opportunities.

Alternative 1: Stormwater separation without street enhancement

The primary goal of this alternative as well as the other two alternatives is to remove as many storm water inputs to the City sewer system as possible. Accomplishing this goal will require the construction of a new storm water trunk line along Main Street with laterals down the numbered cross streets. These laterals will receive roof drain runoff and convey it back to the trunk line along Main St. Before the laterals discharge into the trunk line the flow will be treated with a sediment box which will help to keep the system free for debris in the future and improve the ease of maintenance for public works staff. Exhibit B: Alternative 1 details the features for this solution.

Beginning at the low point is the proposed retention pond at the far left hand side of the exhibit. The pond shown has been sized to retain the 100-year year storm event, as required by the Association of Canyon Highway Districts Design Criteria Manual. A storm event of this magnitude will generate a depth of approximately 5.5' of water in the pond. At this early stage in project development, the conservative assumption has been made that there will be no infiltration or bypass of stormwater from the pond. As a check, additional calculations were performed demonstrating that it would be possible for the pond to drain within 24 hours if an infiltration rate of 5 in/hr could be achieved into the native soils. The pond may be further reduced in footprint and depth if designed as a retention pond, as the storage requirement for retention facilities is based on the 25 year storm event.. Based on the available GIS parcel data it appears that some land acquisition will be required by the City to construct a pond this size. Conveying the water to the pond from the pipe network will require regrading approximately 600' of roadside ditch along the north side of Main St to ensure that a constant grade. At approximately Sta. 6+00 the existing 18" pipe will be connected to a proposed 30" line at a storm drain manhole. By keeping the lines separate to this point, the new pipeline can remain at 30" rather than being increased to 36". From the manhole at 6+00 to Roswell the pipeline will run along the flowline of the existing ditch with minimal cover. Due to the shallow cover along this stretch it is recommended that the selected pipe material be reinforced concrete to withstand the load of a vehicle driving off the shoulder.

Moving east from the second manhole near Sta. 11+00 the pipe changes to 30" CPP receiving drainage from Area 1 via an inlet at the low point near 14+00 before joining with a manhole at 14+80. At the intersection of 1st and Main another manhole is proposed to realign the trunk line at the shifted edge of

pavement. This manhole also serves as a junction for the lateral that runs up 1st St. Each of these proposed laterals are 12" lines. When the lateral reaches the alley, it makes a 90 degree turn at a manhole. The branch extending down the alley is equipped with inlets at regular intervals to collect the roof drain runoff that empties there. From discussions with City Public Works staff this branch line should be located within the south half of the alley to avoid conflict with the water and sewer lines that occupy the north half.

From the intersection of 1st and Main St the trunk line continues east decreasing in diameter with the drainage area it serves. At the intersections of 3rd, 4th, and 5th Streets flow is intercepted by a sediment boxes before advancing to the trunk line. Lateral lines extend up the street where they receive roof drainage from the alley branch line. Inlets have also been placed near the intersections with Main St, and in some cases, midblock near the alley.

2nd St requires additional explanation as existing conditions there are a special case. 2nd St has seen recent improvement on the corner occupied by the JC Watson Co. building. It is proposed that the closed system installed with those improvements be connected to the new storm drain system. This includes the two perpetually surcharged inlets along 2nd St and the roof drain collection system within the alley. The 2nd to 3rd St block is also unique due to the existing inlets within the alley. Currently these inlets are directly connected to the sewer line. Effort should be made to salvage these inlets and re-route storm water into the proposed branch line described above.

In summary, Alternative 1 meets the primary goals of the Purpose and Need Statement while avoiding the additional cost of street improvements. Estimated construction costs for this alternative approach $545K excluding the cost for the acquisition of any private property or final engineering design.

Alternative 2: Stormwater separation with street enhancement

Alternative 2 builds on the drainage improvements of Alternative 1 by addressing a secondary goal to enhance city streets as needed. As pointed out in the discussion of existing conditions, there are several sections of sidewalk, curb and gutter, and even roadway in a failing condition. Alternative 2 seeks to address these deficiencies concurrently with the drainage improvements so that if additional funding is available duration of community impacts will be reduced.

As noted in the existing conditions section of this report, successive layers of paving have accumulated on 3rd St raising the grade even with the elevation of the sidewalk near the intersection with Main St. Prior to the installation of the lateral would be an ideal time remove this excess asphalt and grade the roadway to match the design elevations of the proposed inlets. Costs for pavement restoration include the full roadway width from Main St to the midblock alley. The sidewalks on either side of 3rd St are also in poor condition and recommended for replacement if sufficient funding is available. Sidewalk restoration should begin at approximately Sta. 20+40 on main street and rounding the corner to the alley on 3rd St. Sidewalk restoration should also continue along the east side of 3rd St from the midblock alley around the corner along Main St, ending at the new section of sidewalk near Sta. 24+00.

The pavement on 5th St from Main to the midblock alley is also in poor condition and in need of replacement. Following the installation of the lateral on 5th St would be an ideal time remove this crumbling asphalt and grade the roadway to match the design elevations of the proposed inlets.

The additional cost of addressing these pavement and sidewalk issues is estimated at approximately $86K, bringing the total cost of Alternative 2 to approximately $631K.

Alternative 3: "Green" Stormwater Solutions

At the specific request of the Compass Project Manager, a solution incorporating "Green" Stormwater best management practices has been included for consideration. Due to the developed urban setting within the project limits, slope of the land and minimal ROW there are few options for where such a treatment and storage system can be located. Without acquiring additional ROW or lease rights from the Union Pacific Railroad the only available site is located at the southeast corner of Roswell Blvd and Main St. This area of wider ROW measures 36' deep from the edge of pavement to the railroad property line and 333' in length. This site is the natural low point for the project area on the east side of Roswell from elevations taken in the field. Currently this site is used as parking for employees in the area. The "Green" stormwater method selected for this alternative is a subsurface storage and infiltration facility. This type of system is superior in in its protection of the environment as it allows for a higher level of water quality treatment than conventional options.

The key to a successful subsurface storage and infiltration facility is adequate separation from high groundwater. In lieu of active groundwater monitoring at this exact location, the best data available is from recent development in the area. A request for information from a local geotechnical engineering firm found that they have encountered groundwater from 14.1 to 16.8 feet below ground surface at locations near Parma. Another data point is the Jacksons Food Stores site where groundwater was encountered at depths ranging from 5.2 to 7.2 feet below ground surface. City Public Works staff were also interviewed regarding the depth to groundwater in the area. A recent excavation in the center of Main St to repair a water line extended to a depth of 4 feet. At this depth soils were moist but dewatering was not required. This suggests that ground water is below the 4 foot mark.

At a minimum a subsurface storage/infiltration facility will require 3 feet of separation from the bottom of the facility to high ground water, 3.5 feet of depth for the facility itself and 1.5 feet of cover if the area is to remain open for parking or vehicle traffic after construction, for a total of 8 feet. As long as groundwater is at least 8' below existing ground this "Green" alternative should be a viable option. If the city intends to pursue this option they should begin a ground water monitoring program immediately. If the City is not required to maintain the area for public parking they might consider landscaping on top of the stormwater storage facility similar to the railroad park between 2nd and 3rd St on the side of Main St. Without traffic loads the required depth to groundwater could be reduced by a foot. Not only would landscaping improve the evapotranspiration potential of the facility, but it would also enhance the roadside and buffer Main St from the local railroad traffic.

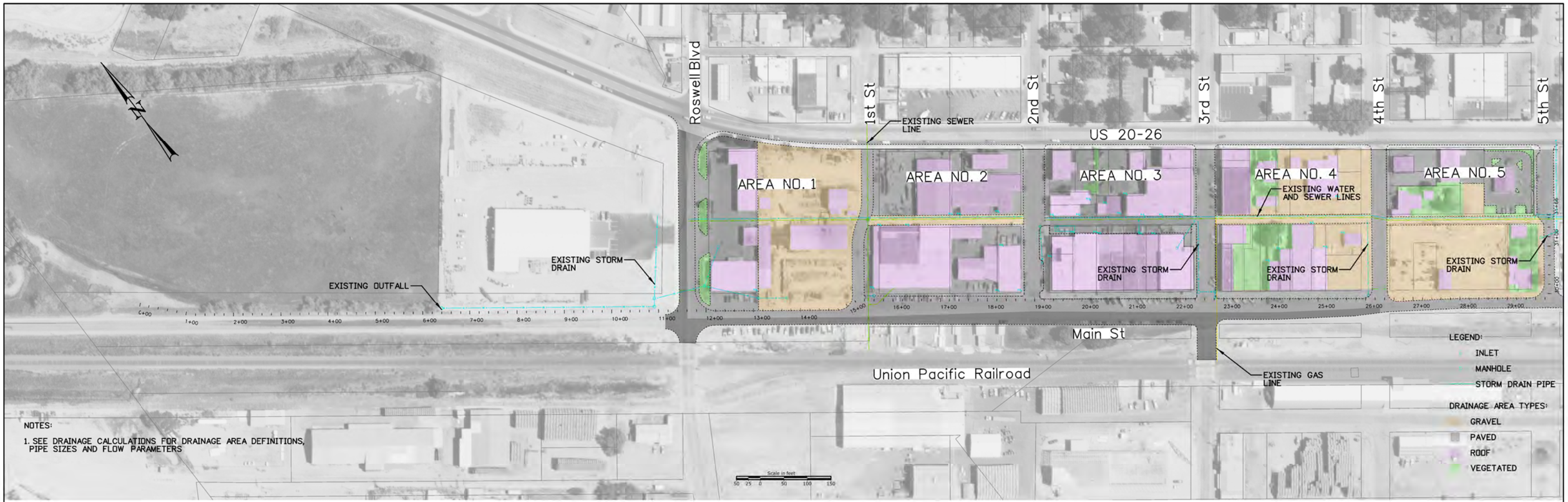
Storm water collection for this alternative would end with Pipe 3 shown in Appendix D: Alternative 3, where it would cross Main St and enter the storage infiltration facility. Storm water from Area 1 would be captured by the existing pipe network, discharge at the roadside swale, where it would ultimately be collected at a smaller pond than the one used in Alternatives 1 and 2. This results in a marginally smaller amount of stormwater to store and a significantly less large diameter pipe when compared to Alternatives 1 and 2. Because flows in the existing storm water line crossing Roswell Peak sooner than the flows headed to subsurface system there will be available capacity within the existing line. The drainage calcuations for this

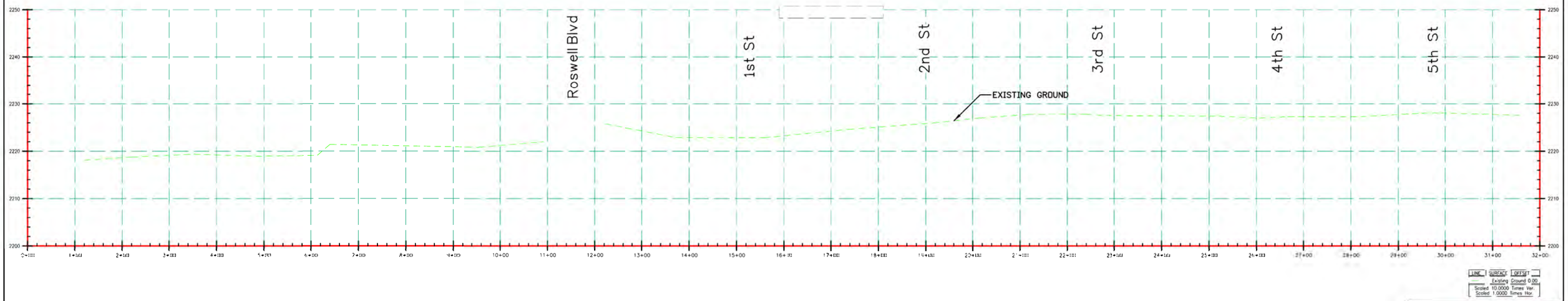
system take advantage of this capacity and help relieve the burden on subsurface infiltration. There are several proprietary systems available that will meet the subsurface storage and infiltration needs for this project. One product that is commonly used is the StormTech Chamber System. Based on the design specifications of the StormTech SC-740 Chamber and the available area,the maximum amount of storage possible at this location is 23,500 cubic feet. Assuming the maximum allowable infiltration rate allowed, a peak volume of approximately 30,500 cubic feet will be required, 700 cubic feet more than is available at this site. In addition to the possible ground water challenges, Alternative 3 will require an area slightly larger than what is currently available inside the right-of-way. The total estimated cost for Alternative 3 is approximately $766K, which does not include the possible acquisition of right-of-way or lease agreement to accommodate the entire facility adjacent to Main St.

Conclusions

Based on the goals set forth in the Project Scoping Memo and the Purpose and Need Statement, Alternative 2 most fully meets the criteria for a successful project. As shown in Appendix F: Cost Estimates, the additional road and sidewalk improvements come at the added cost of approximately $86K. If the City is unable to procure this additional funding, Alternative 3 will probably not be a viable option either, as it is approximately $216K more costly to construct than Alternative 1. With the added challenges of groundwater and ROW acquisition, Alternative 3 becomes a less and less attractive for selection. Ultimately Alternative 1 combines the best mix of price and goal achievement of the three alternatives evaluated, and is thus recommended for selection. This alternative provides a separation between the costs of the drainage improvements from the street and sidewalk rehabilitation, allowing the City of Parma flexibility in funding and implementing the project

Appendix A: Existing Conditions





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COMPASS COMMUNITY PLANNING ASSOCIATION of Southwest Idaho
CITY OF PARMA CANYON COUNTY, IDAHO
HORROCKS ENGINEERS

PROJECT NO.
PSA 2015-09

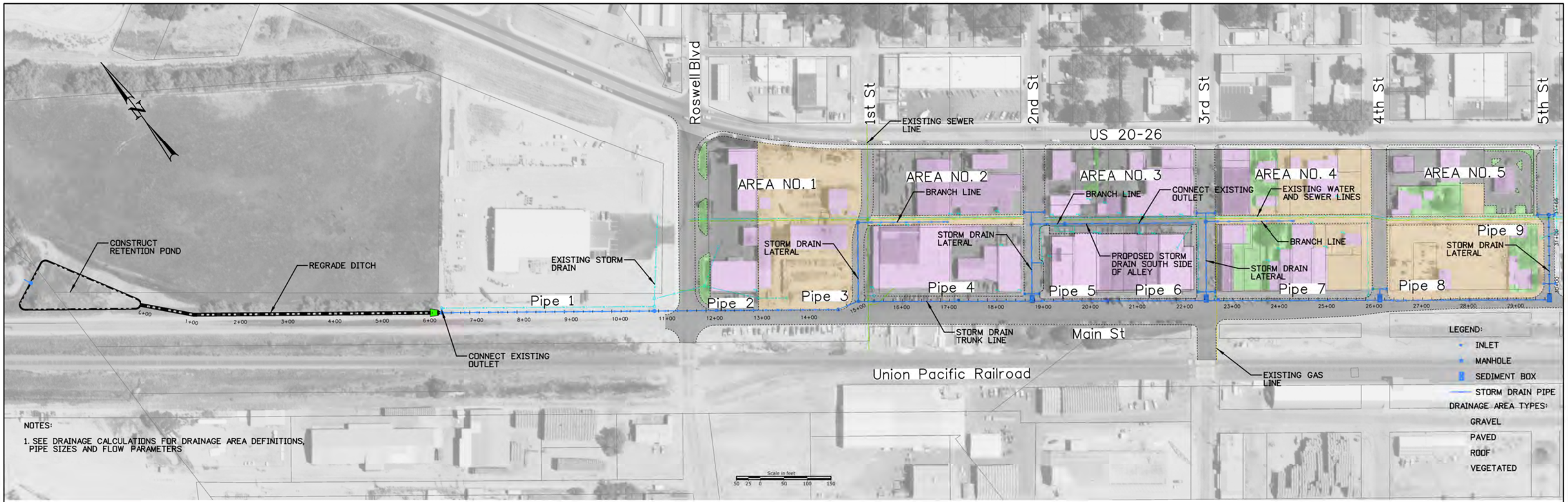
PROJECT EXHIBIT
PARMA MAIN STREET DRAINAGE
5TH TO ROSWELL
EXISTING CONDITIONS

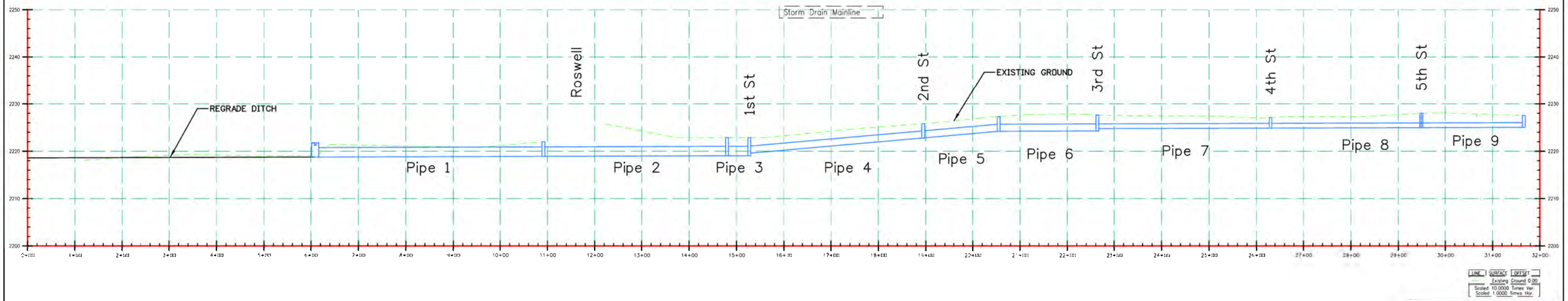
English
COUNTY CANYON

SHEET 1 OF 4

NOT APPROVED PRELIMINARY FOR CONSTRUCTION

Appendix B: Alternative 1





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HORROCKS ENGINEERS

PROJECT NO.
PSA 2015-09

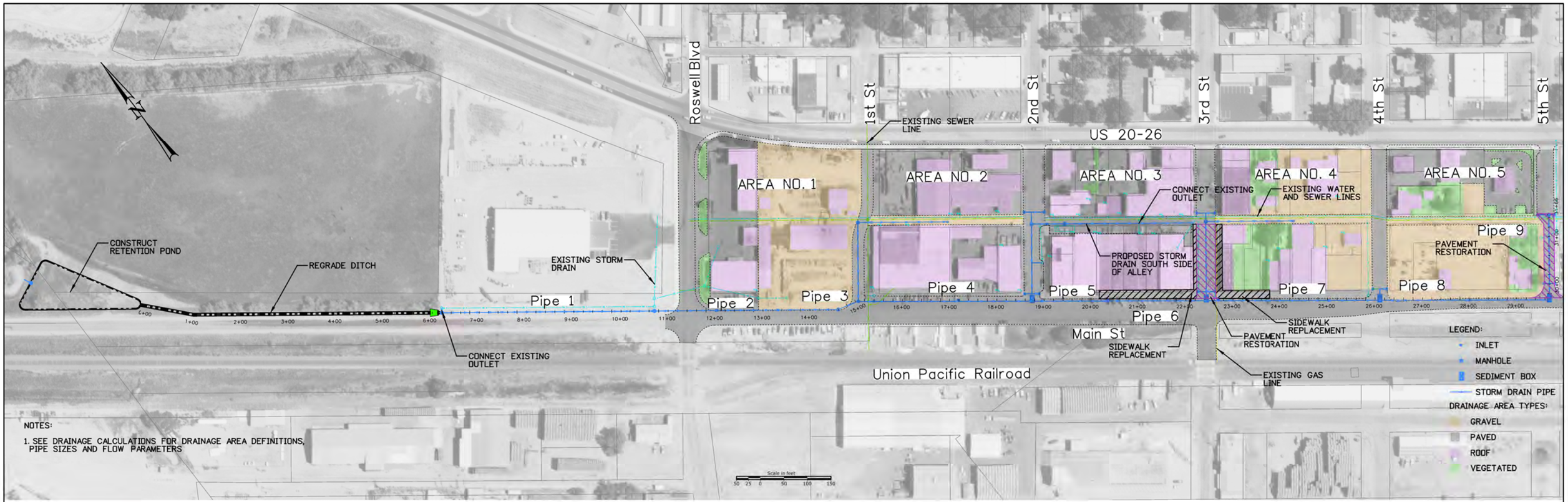
PROJECT EXHIBIT
PARMA MAIN STREET DRAINAGE
5TH TO ROSWELL
ALTERNATIVE 1

English
COUNTY CANYON

SHEET 2 OF 4

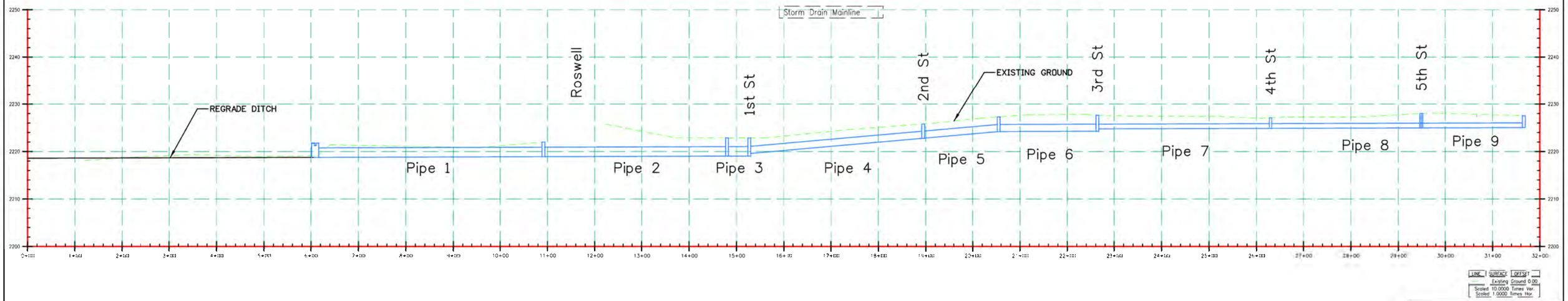
NOT APPROVED PRELIMINARY FOR CONSTRUCTION

Appendix C: Alternative 2



NOTES:

1. SEE DRAINAGE CALCULATIONS FOR DRAINAGE AREA DEFINITIONS, PIPE SIZES AND FLOW PARAMETERS



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CITY OF PARMA CANYON COUNTY, IDAHO
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PROJECT NO.
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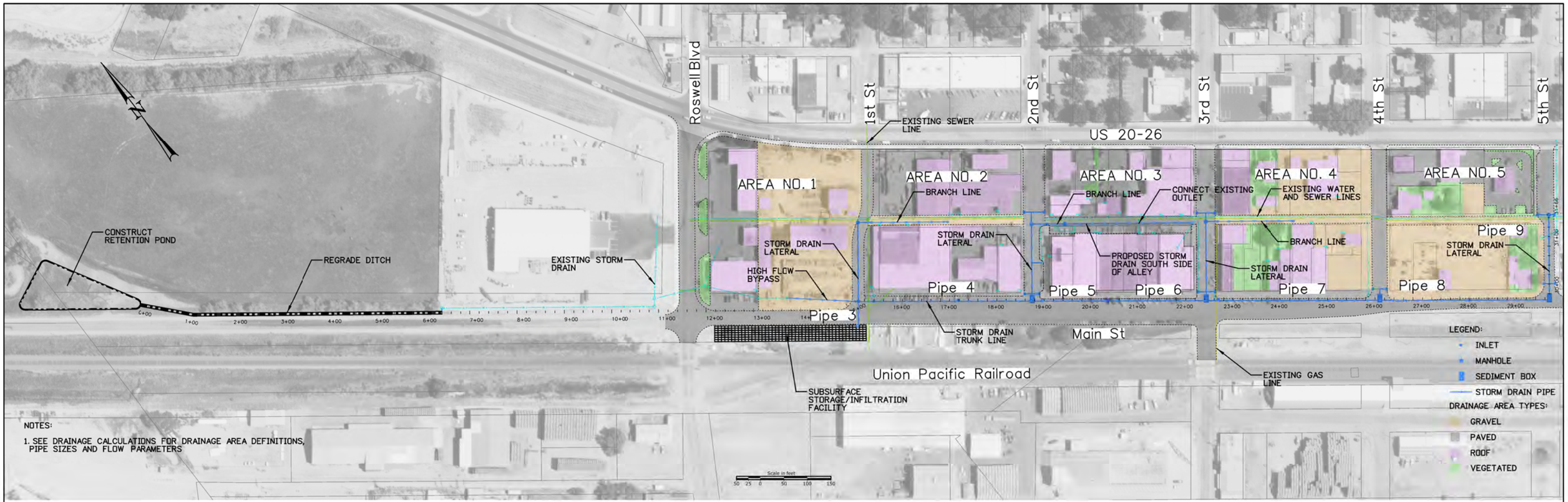
PROJECT EXHIBIT
PARMA MAIN STREET DRAINAGE
5TH TO ROSWELL
ALTERNATIVE 2

English
COUNTY CANYON

SHEET 3 OF 4

NOT APPROVED PRELIMINARY FOR CONSTRUCTION

Appendix D: Alternative 3



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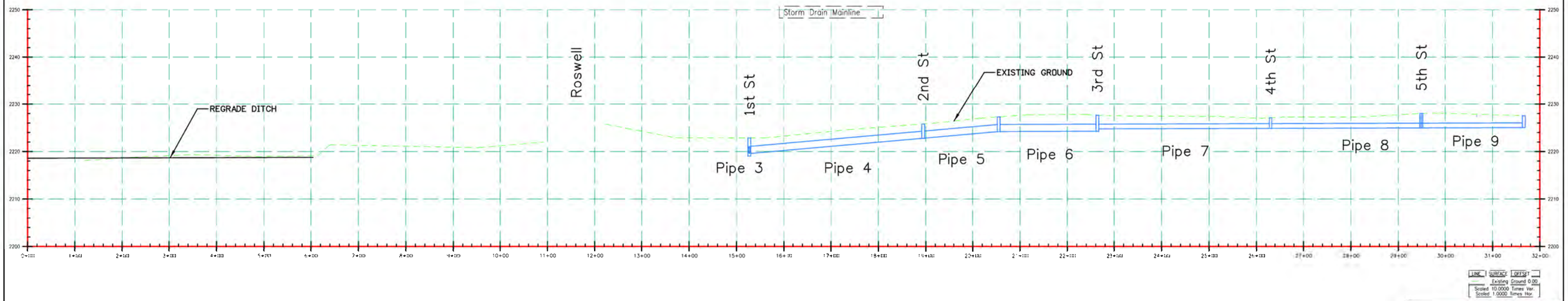

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PROJECT EXHIBIT
PARMA MAIN STREET DRAINAGE
5TH TO ROSWELL
ALTERNATIVE 3

English
COUNTY CANYON

SHEET 4 OF 4

NOT APPROVED PRELIMINARY FOR CONSTRUCTION

Appendix E: Stormwater Calculations

Time of Concentration Calculations

Time of Concentration =	20.7	min
Saturation Time =	**0**	min
Sheet Flow Travel Time =	**1.9**	min
n =	0.011	
L =	30	
I =	1	in/hr
s =	0.01	feet/foot
Shallow Concentrated Flow Time =	**12.3**	
k =	2.03	
L =	150	feet
s =	0.01	feet/foot
Pipe Flow Travel Time =	**6.5**	min
L =	2500	ft
V =	6.402857	fps

$$Tsheet = \frac{0.9333\ (nL)^{0.6}}{(I)^{0.4} s^{0.3}}$$

$$T_{con} = \frac{L}{60\ k\ s^{0.5}}$$

Conveyance and Volume Calculations

Areas and distances derived from H:\!2015\BE-389-1507 Parma Main Street Drainage\Project_Development\Roadway\CADD\City of Parma_Main Street Storm Drainage_2D.dgn
Pipe size calculated using Bentely Flow Master

Drainage Areas — **Surface Type**: **C = 0.93** | **C = 0.95** | **C = 0.8** | **C = 0.3**

Description	Area No.	Paved Area, SF	%	Roof Area, SF	%	Gravel Area, SF	%	Vegetated Area, SF	%	Area, SF	Area, Acres	Weighted Run-off Coefficient	T_c, min	25 Year Storm: i, in/hr	Q_p, cfs	Q_{sum}, cfs	Pipe No.	Pipe Size, in	100 Year Storm: i, in/hr	Q_p, cfs	Q_{sum}, cfs	Pipe No.	Pipe Size, in	
Roswell Blvd - 1st S	1	62,571	*41%*	25,299	*17%*	59,749	*39%*	4,555	*3%*	152,173	3.49	0.86	20.7	1.9	5.73	**28.30**	1	30	2.5	7.54	**37.24**	1	-	
1st St - 2nd St	2	72,405	*54%*	54,652	*41%*	6,539	*5%*	-	*0%*	133,596	3.07	0.93		1.9	5.43	**22.57**	3	24	2.5	7.14	**29.70**	3	-	
2nd St - 3rd St	3	129,535	*69%*	58,344	*31%*	-	*0%*	1,194	*1%*	189,073	4.34	0.93		1.9	7.69	**17.14**	4	24	2.5	10.12	**22.55**	4	-	
3rd St - 4th St	4	38,632	*29%*	34,630	*26%*	41,854	*32%*	17,315	*13%*	132,431	3.04	0.81		1.9	4.69	**9.45**	6	18	2.5	6.17	**12.44**	6	-	
4th St - 5th St	5	55,002	*41%*	13,568	*10%*	50,903	*38%*	14,845	*11%*	134,318	3.08	0.81		1.9	**4.76**		7	18	2.5	6.27		7	-	
Total Area, SF		358,144	*48%*	186,494	*25%*	159,045	*21%*	37,909	*5%*	741,592	Runoff Volume, CF			47,001					61,844					
Total Area, Acres		8.22		4.28		3.65		0.87		17.02	3.49	0.86	60.0	0.88	2.65	**13.11**	1	-	1.15	3.47	**17.13**	1	-	
											3.07	0.93		0.88	2.51	**10.45**	3	-	1.15	3.29	**13.66**	3	-	
											4.34	0.93		0.88	3.56	**7.94**	4	-	1.15	4.65	**10.37**	4	-	
											3.04	0.81		0.88	2.17	**4.38**	6	-	1.15	2.84	**5.72**	6	-	
											3.08	0.81		0.88	**2.21**		7	-	1.15	2.88		7	-	
											Runoff Volume, CF			62,998					82,326					Alternatives 1 and 2
																			65,656					Alternative 3

Required Storage Volume, CF = 82,326

Bottom of Pond, SF 15264
Depth Pond, FT **5.4**

Area of subsurface infiltration facility = 14484

Pond Name:	Retention Pond	Parma Main Street Drainage	Pond Type:	Retention

October 15, 2015

Watershed Properties

Design Event (yr)	Watershed Area (ac)	Land Use Breakdown			[A] Watershed Area			Notes
		Land Type	[C] C	%	(sq ft)	(ac)	(sq mi)	
25	17.02	Paved	0.93	48.29%	358144	8.22	0.01	
		Roof	0.95	25.15%	186494	4.28	0.01	
		Gravel	0.80	21.4%	159045	3.65	0.01	
Composite CA		Vegitated	0.30	5.1%	37909	0.87	0.00	
14.9		Composite	**0.87**	100.0%	741592	17.02	0.03	

Pond Properties

Average Release Rate		Available Volume	Available Volume	Bottom Elev	Design Water Elev	Infiltration Rate	
(cfs)	(cfs/ac)	(cu ft)	(ac ft)	(ft)	(ft)	(in/hr)	(min/in)
0.00	0.000	45792	1.05	3052.0	3055.50	4.0	10950.0

Elapsed Time (min)	Accumulated Rainfall (in)	[i] Rainfall Intensity (in/hr)	[Q] Accumulated Flow - CiA (cfs)	Accumulated Volume (cu ft)	Accumulated Volume (ac ft)	Infiltration Volume (cu ft)	Required Storage (cu ft)	Required Storage (ac ft)	Pond Volume OK?
10	0.40	2.37	35.62	21370	0.49	848	20522	0.47	OK
15	0.50	2.00	30.08	27068	0.62	1272	25796	0.59	OK
30	0.69	1.39	20.84	37515	0.86	2544	34972	0.80	OK
60	0.88	0.88	13.19	47488	1.09	5088	42400	0.97	OK
120	1.01	0.50	7.57	54535	1.25	10176	44359	1.02	OK
180 (3 Hrs)	1.12	0.37	5.62	60651	1.39	15264	45387	1.04	OK
360 (6 Hrs)	1.40	0.23	3.50	75674	1.74	30527	45147	1.04	OK
720 (12 Hrs)	1.80	0.15	2.25	97296	2.23	61055	36241	0.83	OK
1,440 (24 Hrs)	2.20	0.09	1.38	118917	2.73	122110	-3193	-0.07	OK

Pond Volume Needed	
Water Volume Required (cf)	45387
Water Volume Required (ac-ft)	1.04
Forebay Water Volume Required (cf)	0
Forebay Water Volume Required (ac-ft)	0.00
Main Pond Water Volume Required (cf)	45387
	1.04
Forebay Total Volume Req'd (cf) 15% Added	0
Forebay Total Volume Req'd (ac-ft) 15% Added	0.00
Total Volume (Main+Forbay w/ Sediment) Req'd (cf)	45387
Total Volume (Main+Forbay w/ Sediment) Req'd (ac-ft)	1.04

Pond Name:	Retention Pond	Parma Main Street Drainage	Pond Type:	Retention

October 15, 2015

Watershed Properties

Design Event (yr)	Watershed Area (ac)
100	17.02

Composite CA
14.9

Land Use Breakdown			[A] Watershed Area		
Land Type	[C] C	%	(sq ft)	(ac)	(sq mi)
Paved	0.93	48.29%	358144	8.22	0.01
Roof	0.95	25.15%	186494	4.28	0.01
Gravel	0.80	21.4%	159045	3.65	0.01
Vegitated	0.30	5.1%	37909	0.87	0.00
Composite	0.87	100.0%	741592	17.02	0.03

Notes

Pond Properties

Average Release Rate		Available Volume	Available Volume	Bottom Elev	Design Water Elev	Infiltration Rate	
(cfs)	(cfs/ac)	(cu ft)	(ac ft)	(ft)	(ft)	(in/hr)	(min/in)
0.00	0.000	82400	1.89	3052.0	3055.50	5.0	8760.0

Elapsed Time (min)	Accumulated Rainfall (in)	[i] Rainfall Intensity (in/hr)	[Q] Accumulated Flow - CiA (cfs)	Accumulated Volume (cu ft)	Accumulated Volume (ac ft)	Infiltration Volume (cu ft)	Required Storage (cu ft)	Required Storage (ac ft)	Pond Volume OK?
10	0.52	3.11	46.66	27994	0.64	1060	26934	0.62	OK
15	0.66	2.62	39.40	35460	0.81	1590	33870	0.78	OK
30	0.91	1.82	27.30	49146	1.13	3180	45966	1.06	OK
60	1.15	1.15	17.28	62210	1.43	6360	55850	1.28	OK
120	1.31	0.66	9.86	70981	1.63	12720	58261	1.34	OK
180 (3 Hrs)	1.45	0.48	7.28	78595	1.80	19080	59515	1.37	OK
360 (6 Hrs)	1.80	0.30	4.50	97296	2.23	38159	59136	1.36	OK
720 (12 Hrs)	2.30	0.19	2.88	124322	2.85	76319	48003	1.10	OK
1,440 (24 Hrs)	2.80	0.12	1.75	151349	3.47	152637	-1289	-0.03	OK

Pond Volume Needed	
Water Volume Required (cf)	59515
Water Volume Required (ac-ft)	1.37
Forebay Water Volume Required (cf)	0
Forebay Water Volume Required (ac-ft)	0.00
Main Pond Water Volume Required (cf)	59515
Main Pond Water Volume Required (ac-ft)	1.37
Forebay Total Volume Req'd (cf) 15% Added	0
Forebay Total Volume Req'd (ac-ft) 15% Added	0.00
Total Volume (Main+Forbay w/ Sediment) Req'd (cf)	59515
Total Volume (Main+Forbay w/ Sediment) Req'd (ac-ft)	1.37

Pond Name:	Pond 2-Yr	Parma Main Street Drainage	Pond Type:	Retention

October 15, 2015

Watershed Properties

Design Event (yr)	Watershed Area (ac)	Land Use Breakdown			[A] Watershed Area			Notes
		Land Type	[C] C	%	(sq ft)	(ac)	(sq mi)	
100	13.94	Paved	0.93	48.29%	293277	6.73	0.01	
		Roof	0.95	25.15%	152716	3.51	0.01	
		Gravel	0.80	21.4%	130238	2.99	0.00	
Composite CA		Vegitated	0.30	5.1%	31043	0.71	0.00	
12.2		Composite	0.87	100.0%	607274	13.94	0.02	

Pond Properties

Average Release Rate		Available Volume	Available Volume	Bottom Elev	Design Water Elev	Infiltration Rate	
(cfs)	(cfs/ac)	(cu ft)	(ac ft)	(ft)	(ft)	(in/hr)	(min/in)
0.00	0.000	45792	1.05	3052.0	3055.50	8.0	5475.0

Elapsed Time (min)	Accumulated Rainfall (in)	[i] Rainfall Intensity (in/hr)	[Q] Accumulated Flow - CiA (cfs)	Accumulated Volume (cu ft)	Accumulated Volume (ac ft)	Infiltration Volume (cu ft)	Required Storage (cu ft)	Required Storage (ac ft)	Pond Volume OK?
10	0.52	3.11	38.21	22924	0.53	1609	21315	0.49	OK
15	0.66	2.62	32.26	29037	0.67	2414	25048	0.58	OK
30	0.91	1.82	22.36	40244	0.92	4828	29494	0.68	OK
60	1.15	1.15	14.15	50942	1.17	9656	23898	0.55	OK
120	1.31	0.66	8.07	58125	1.33	19312	-11587	-0.27	OK
180 (3 Hrs)	1.45	0.48	5.96	64360	1.48	28968	-40208	-0.92	OK
360 (6 Hrs)	1.80	0.30	3.69	79673	1.83	57936	-129463	-2.97	OK
720 (12 Hrs)	2.30	0.19	2.36	101805	2.34	115872	-316467	-7.27	OK
1,440 (24 Hrs)	2.80	0.12	1.43	123936	2.85	231744	-712608	-16.36	OK

Pond Volume Needed	
Water Volume Required (cf)	29494
Water Volume Required (ac-ft)	#REF!
Forebay Water Volume Required (cf)	0
Forebay Water Volume Required (ac-ft)	0.00
Main Pond Water Volume Required (cf)	29494
	0.68
Forebay Total Volume Req'd (cf) 15% Added	0
Forebay Total Volume Req'd (ac-ft) 15% Added	0.00
Total Volume (Main+Forbay w/ Sediment) Req'd (cf)	29494
Total Volume (Main+Forbay w/ Sediment) Req'd (ac-ft)	0.68

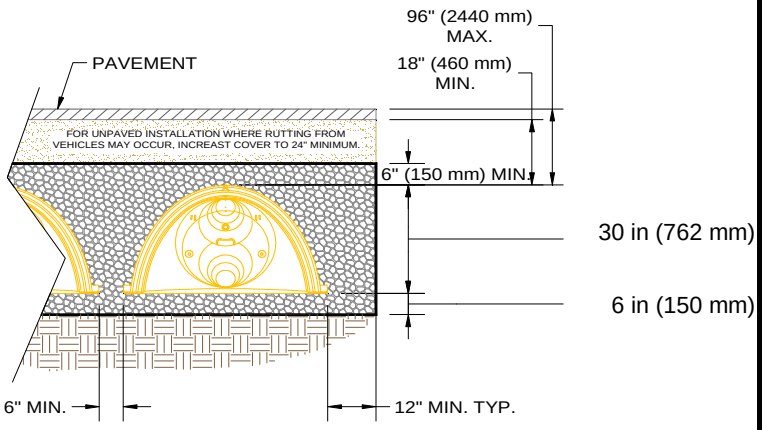
StormTech
Detention • Retention • Recharge
Subsurface Stormwater Management™

Units: **Imperial**

Project: Parma Main Street Drainage
By:
Point of Contact
Date:

System Requirements

Required Storage Volume	**30,500**	CF
Select Stormtech Chamber System	SC-740	
Stone Porosity (Industry Standard = 40%)	**40%**	
Stone Foundation Depth	6	Inches
Storage Volume Per Chamber	74.90	CF
Avg Cover over Chambers (18 in min. & 96 in max.)	18	Inches



Number of Chambers Required - 408

Approximate Bed Size Required	14,484	SF
Tons of Stone Required	1,658	Tons
Volume of Excavation	2,414	CY
Area of Filter Fabric	3,927	SY
# of End Caps Required	**62**	Each
Length of ISOLATOR ROW	**99.68**	FT
ISOLATOR FABRIC	**55**	SY

Is the limiting dimension for the bed the width or length? **width**

Controlled by Width (Rows)

Width	**150**	FT
# of Chambers Long	14	EA
# of Rows	31	EA
Actual Length	103.28	FT
Actual Width	148.75	FT

26 of the chambers rows will contain only 13 chambers

Controlled by Length

Length	**100**	FT
# of Chambers long	-	EA
# of Rows	-	EA
Actual Length	-	FT
Actual Width	-	FT

Material Estimate

To use this sheet: Please enter data into the blue and green cells. If switching between Imperial and Metric units please check the correct units and data is input in the green cells.

Please call StormTech @ 888-892-2694 for conceptual cost estimates.

Rainfall Depth (DDF)											
Precipitation Frequency Estimates (inches)											
Time (min) \ Yr	1	2	5	10	25	50	100	200	500	1000	
5											
10		0.201 in	0.278 in	0.327 in	0.395 in	0.454 in	0.518 in				
15		0.255 in	0.352 in	0.415 in	0.501 in	0.575 in	0.656 in				
30		0.353 in	0.488 in	0.575 in	0.694 in	0.797 in	0.909 in				
60		0.447 in	0.617 in	0.727 in	0.879 in	1.009 in	1.151 in				
120		0.535 in	0.713 in	0.845 in	1.009 in	1.157 in	1.313 in				
180 (3 Hrs)		0.612 in	0.796 in	0.948 in	1.122 in	1.285 in	1.454 in				
360 (6 Hrs)		0.800 in	1.000 in	1.200 in	1.400 in	1.600 in	1.800 in				
720 (12 Hrs)		1.000 in	1.300 in	1.600 in	1.800 in	2.100 in	2.300 in				
1,440 (1 Day)		1.200 in	1.600 in	2.000 in	2.200 in	2.600 in	2.800 in				
2,880 (2 Day)											
4,320 (3 Day)	*0.00 in*	*0.00 in*	*0.00 in*	*0.00 in*	*0.00 in*	*0.00 in*	*0.00 in*	*0.00 in*	*0.00 in*	*0.00 in*	*interpolated*
5,760 (4 Day)											
10,080 (7 Day)											
14,400 (10 Day)											
28,800 (20 Day)											
43,200 (30 Day)											
64,800 (45 Day)											
86,400 (60 Day)											

Rainfall Intensity (IDF)										
Precipitation Frequency Estimates (inches/hr)										
Time (min) \ Yr	1	2	5	10	25	50	100	200	500	1000
5	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr
10	0.00 in/hr	1.21 in/hr	1.67 in/hr	1.96 in/hr	2.37 in/hr	2.73 in/hr	3.11 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr
15	0.00 in/hr	1.02 in/hr	1.41 in/hr	1.66 in/hr	2.00 in/hr	2.30 in/hr	2.62 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr
30	0.00 in/hr	0.71 in/hr	0.98 in/hr	1.15 in/hr	1.39 in/hr	1.59 in/hr	1.82 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr
60	0.00 in/hr	0.45 in/hr	0.62 in/hr	0.73 in/hr	0.88 in/hr	1.01 in/hr	1.15 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr
120	0.00 in/hr	0.27 in/hr	0.36 in/hr	0.42 in/hr	0.50 in/hr	0.58 in/hr	0.66 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr
180 (3 Hrs)	0.00 in/hr	0.20 in/hr	0.27 in/hr	0.32 in/hr	0.37 in/hr	0.43 in/hr	0.48 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr
360 (6 Hrs)	0.00 in/hr	0.13 in/hr	0.17 in/hr	0.20 in/hr	0.23 in/hr	0.27 in/hr	0.30 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr
720 (12 Hrs)	0.00 in/hr	0.08 in/hr	0.11 in/hr	0.13 in/hr	0.15 in/hr	0.18 in/hr	0.19 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr
1,440 (1 Day)	0.00 in/hr	0.05 in/hr	0.07 in/hr	0.08 in/hr	0.09 in/hr	0.11 in/hr	0.12 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr
2,880 (2 Day)	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr

4,320 (3 Day)	*0.00 in/hr*	*0.00 in/hr*	*0.00 in/hr*	*0.00 in/hr*	*0.00 in/hr*	*0.00 in/hr*	*0.00 in/hr*	*0.00 in/hr*	*0.00 in/hr*	*0.00 in/hr*	*interpolated*
5,760 (4 Day)	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	
10,080 (7 Day)	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	
14,400 (10 Day)	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	
28,800 (20 Day)	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	
43,200 (30 Day)	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	
64,800 (45 Day)	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	
86,400 (60 Day)	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	0.00 in/hr	

Circular Pipe (25-Year Conveyance.fm8) Report

Label	Solve For	Friction Method	Roughness Coefficient
Circular Pipe - 1	Normal Depth	Manning Formula	0.010
Circular Pipe - 2	Normal Depth	Manning Formula	0.010
Circular Pipe - 3	Normal Depth	Manning Formula	0.010
Circular Pipe - 4	Normal Depth	Manning Formula	0.010
Circular Pipe - 5	Normal Depth	Manning Formula	0.010
Circular Pipe - 6	Normal Depth	Manning Formula	0.010
Circular Pipe - 7	Normal Depth	Manning Formula	0.010

Channel Slope (ft/ft)	Normal Depth (ft)	Diameter (ft)	Discharge (ft^3/s)
0.00300	1.98	2.50	28.30
0.00300	1.98	2.50	28.30
0.00300	1.65	2.50	22.57
0.00877	1.14	2.00	17.14
0.00877	1.14	2.00	17.14
0.00300	1.10	2.00	9.45
0.00300	0.87	1.50	4.76

Flow Area (ft^2)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	Top Width (ft)
4.17	5.49	0.76	2.03
4.17	5.49	0.76	2.03
3.44	4.74	0.72	2.37
1.85	3.43	0.54	1.98
1.85	3.43	0.54	1.98
1.77	3.34	0.53	1.99
1.06	2.60	0.41	1.48

Circular Pipe (25-Year Conveyance.fm8) Report

Critical Depth (ft)	Percent Full (%)	Critical Slope (ft/ft)	Velocity (ft/s)
1.81	79.3	0.00367	6.78
1.81	79.3	0.00367	6.78
1.62	66.0	0.00318	6.57
1.49	57.1	0.00413	9.24
1.49	57.1	0.00413	9.24
1.10	55.1	0.00302	5.33
0.84	57.9	0.00336	4.48

Velocity Head (ft)	Specific Energy (ft)	Froude Number	Maximum Discharge (ft^3/s)
0.71	2.70	0.83	31.42
0.71	2.70	0.83	31.42
0.67	2.32	0.96	31.42
1.33	2.47	1.68	29.62
1.33	2.47	1.68	29.62
0.44	1.54	1.00	17.33
0.31	1.18	0.93	8.05

Discharge Full (ft^3/s)	Slope Full (ft/ft)	Flow Type	Notes
29.20	0.00282	SubCritical	
29.20	0.00282	SubCritical	
29.20	0.00179	SubCritical	
27.54	0.00340	SuperCritical	
27.54	0.00340	SuperCritical	
16.11	0.00103	SubCritical	
7.48	0.00122	SubCritical	

Circular Pipe (25-Year Conveyance.fm8) Report

Messages

Appendix F: Cost Estimate

City of Parma
Main Street Drainage
ENGINEER'S Estimated Construction Costs

Prepared by: Chris Melander, P.E.
Project Manager: Bryan Foote, P.E.
Date: Oct, 2015

Base Bid Schedule - Main Street Drainage Improvements

Item No.	Description	Unit	Estimated Quantity	Unit Price	Total Price
201.4.1.D.1.A	Removal of Asphalt	SY	1,782	$ 3.75	$ 6,683
201.4.1.E.1.D	Removal of 12" Pipe Culvert	LF	1	$ 22.00	$ 22
201.4.1.F.1.F	Removal of Catch Basin	EACH	5	$ 500.00	$ 2,500
201.4.1.F.1.G	Removal of Grate	EACH	5	$ 100.00	$ 500
202.4.1.B.1	Excavation	CY	2,376	$ 10.00	$ 23,762
202.4.8.A.1	Dust Abatement Water	MG	100	$ 15.00	$ 1,500
307.4.1.F.8	Sawcut Type "P" Asphalt Roadway	LF	4,866	$ 2.00	$ 9,732
501.4.1.C.1	CCTV Inspection	LF	1,500	$ 1.45	$ 2,175
502.4.1.B.1.B	Storm Drain Manhole - Type A	EACH	8	$ 5,000.00	$ 40,000
601.4.1.A.05.A	12 inch Storm Drain Pipe, Class CPP	LF	1,706	$ 35.00	$ 59,707
601.4.1.A.05.B	18 inch Storm Drain Pipe, Class CPP	LF	726	$ 47.00	$ 34,123
601.4.1.A.05.C	24 inch Storm Drain Pipe, Class CPP	LF	737	$ 59.00	$ 43,458
601.4.1.A.05.D	30 inch Storm Drain Pipe, Class CPP	LF	46	$ 75.00	$ 3,441
602.4.1.G.1.A	Catch Basin - Type II	EACH	26	$ 1,500.00	$ 39,000
0602.4.1.H.1	Precast Sediment Box - Size 1000 Gallon	EACH	4	$ 2,500.00	$ 10,000
802.4.1.B.1.C	3/4" Minus Crushed Aggregate for Base Type I	TON	294	$ 25.00	$ 7,351
810.4.1.A.1.C	Plant Mix Pavement, Superpave-2 (Roadway)	TON	301	$ 80.00	$ 24,059
1001.4.1.A.1	Sediment Control	LS	1	$ 8,500.00	$ 8,500
1006.4.1.C.1	Inlet Protection	EACH	26	$ 150.00	$ 3,900
1103.4.1.A.1	Construction Traffic Control	LS	1	$ 8,000.00	$ 8,000
1103.4.1.I.1	Traffic Control Flaggers	MH	16	$ 45.00	$ 720
1103.4.1.J.1	Traffic Control Maintenance	MH	60	$ 50.00	$ 3,000
1103.4.1.L.1	Traffic Control Detour	LS	1	$ 2,800.00	$ 2,800
2010.4.1.A.1	Mobilization	LS	1	$ 27,000.00	$ 27,000
				Construction Subtotal	$361,932
				Contingency (10% of Subtotal)	$36,190
				Estimated Construction Total	$398,122

Item No.	Description	Unit	Estimated Quantity	Unit Price	Total Price
Alternate 1 - Drainage Improvements without Street Enhancement					
202.4.1.B.1	Excavation	CY	768	$ 10.00	$ 7,678
206.4.1.A.1	Seed Bed Preparation	AC	0.463	$ 2,000.00	$ 925
206.4.1.B.1	Seeding (Broadcasting/Hydro-Seeding)	AC	0.463	$ 2,000.00	$ 925
206.4.1.E.1	Mulch Anchoring (tack)	AC	0.463	$ 3,000.00	$ 1,388
206.4.1.G.1	Fertilizing	AC	0.463	$ 1,000.00	$ 463
206.4.1.H.3.B	Loose Riprap Size 6" Dia	CY	16	$ 200.00	$ 3,159
303.4.1.A.3	Exploratory Excavation (Groundwater)	HR	4	$ 325.00	$ 1,300
502.4.1.B.1.B	Storm Drain Manhole - Type A	EACH	3	$ 5,000.00	$ 15,000
601.4.1.A.05.B	18 inch Storm Drain Pipe, Class CPP	LF	10	$ 47.00	$ 470
601.4.1.A.01	30 inch Storm Drain Pipe, Class III RCP	LF	451	$ 90.00	$ 40,617
601.4.1.A.05.D	30 inch Storm Drain Pipe, Class CPP	LF	388	$ 75.00	$ 29,133
1003.4.1.C.1	Silt Fence	LF	984	$ 6.00	$ 5,906
2050.4.1.B.1	Riprap/Erosion Control Geotextile	SY	47	$ 50.00	$ 2,370
SP-1	Ditch Grading	LF	616	$ 10.00	$ 6,160
SP-2	Pond Grading	SY	1,830	$ 10.00	$ 18,299
				Construction Subtotal	$133,792
				Contingency (10% of Subtotal)	$13,380
				Estimated Construction Total	$147,172
				Base Schedule and Alternate 1	$545,294

Item No.	Description	Unit	Estimated Quantity	Unit Price	Total Price
Alternate 2 - Drainage Improvements from Base and Alt 1 with Street Enhancement					
201.4.1.D.1.A	Removal of Asphalt	SY	891	$ 3.75	$ 3,340
706.4.1.A.1	Standard 6 inch Vertical Curb and Gutter	LF	629	$ 25.00	$ 15,733
706.4.1.E.1	Concrete Sidewalks, thickness 5-inch	SY	973	$ 45.00	$ 43,806
802.4.1.B.1.C	3/4" Minus Crushed Aggregate for Base Type I	TON	147	$ 25.00	$ 3,674
810.4.1.A.1.C	Plant Mix Pavement, Superpave-2 (Roadway)	TON	150	$ 80.00	$ 12,026
				Construction Subtotal	$78,580
				Contingency (10% of Subtotal)	$7,860
				Estimated Construction Total	$86,440
				Base Schedule and Alternate 1 & 2	$631,734

Item No.	Description	Unit	Estimated Quantity	Unit Price	Total Price
Alternate 3 - Green Storm Water Management					
201.4.1.D.1.A	Removal of Asphalt	SY	74	$ 3.75	$ 277
202.4.1.B.1	Excavation	CY	1,539	$ 10.00	$ 15,385
206.4.1.A.1	Seed Bed Preparation	AC	0.463	$ 2,000.00	$ 925
206.4.1.B.1	Seeding (Broadcasting/Hydro-Seeding)	AC	0.463	$ 2,000.00	$ 925
206.4.1.E.1	Mulch Anchoring (tack)	AC	0.463	$ 3,000.00	$ 1,388
206.4.1.G.1	Fertilizing	AC	0.463	$ 1,000.00	$ 463
502.4.1.B.1.B	Storm Drain Manhole - Type A	EACH	3	$ 5,000.00	$ 15,000
601.4.1.A.05.D	30 inch Storm Drain Pipe, Class CPP	LF	237	$ 75.00	$ 17,741
802.4.1.B.1.C	3/4" Minus Crushed Aggregate for Base Type I	TON	12	$ 25.00	$ 305
810.4.1.A.1.C	Plant Mix Pavement, Superpave-2 (Roadway)	TON	12	$ 80.00	$ 999
SP-3	"Green" Stormwater Facility	LS	1	$ 250,125.00	$ 250,125.00
2050.4.1.B.1	Riprap/Erosion Control Geotextile	SY	47	$ 50.00	$ 2,370
SP-1	Ditch Grading	LF	616	$ 10.00	$ 6,160
SP-2	Pond Grading	SY	1,830	$ 10.00	$ 18,299
				Construction Subtotal	$330,361
				Contingency (10% of Subtotal)	$33,040
				Estimated Construction Total	$363,400
				Base Schedule and Alternate 3	$761,522