CITY OF SATELLITE BEACH

STORMWATER MASTERPLAN UPDATE

Prepared By:

January 2019

6. Hydraulic Boundary Overview

The City of Satellite Beach has a service area comprised of 16 different stormwater basin regions. These regions were identified in the previous Stormwater Master Plan and have remained fairly consistent. See Figure 6.1 for an overall aerial image with all the basin regions identified. The overall boundaries of the 8 main regions correspond primarily to topographic differences of typically higher elevation from which water tends to flow away.

The regions reviewed and analyzed for hydraulic purposes within this report include: The North drainage basin, Grant Street Basin, the Roosevelt Basin, the Park Avenue Basin, the Lori Laine Basin, the Cassia Basin, the Desoto Basin, and the South Ditch Basin. The other regions were not analyzed due to limited City owned infrastructure in those regions.

The analyzed basins comprise an approximate area of 1,140 acres and are served by five outfalls. Outfalls are located at Chevy Chase Blvd (North Drainage), Roosevelt Avenue, Lori Laine Shopping Center, Cassia Blvd, and Desoto Parkway with South Ditch. Roosevelt Avenue shares the outfall with the two other basins (Park Ave and Grant Street) so the basins were modeled together. Desoto and South Ditch, though each basin had a separate outfall, both basin areas share interconnects, so the basins were modeled together. Table 6.1 summarizes the outfall locations, the existing outfall size and the estimated drainage area each outfall serves.

Table 6.1 – Outfalls and Drainage Areas

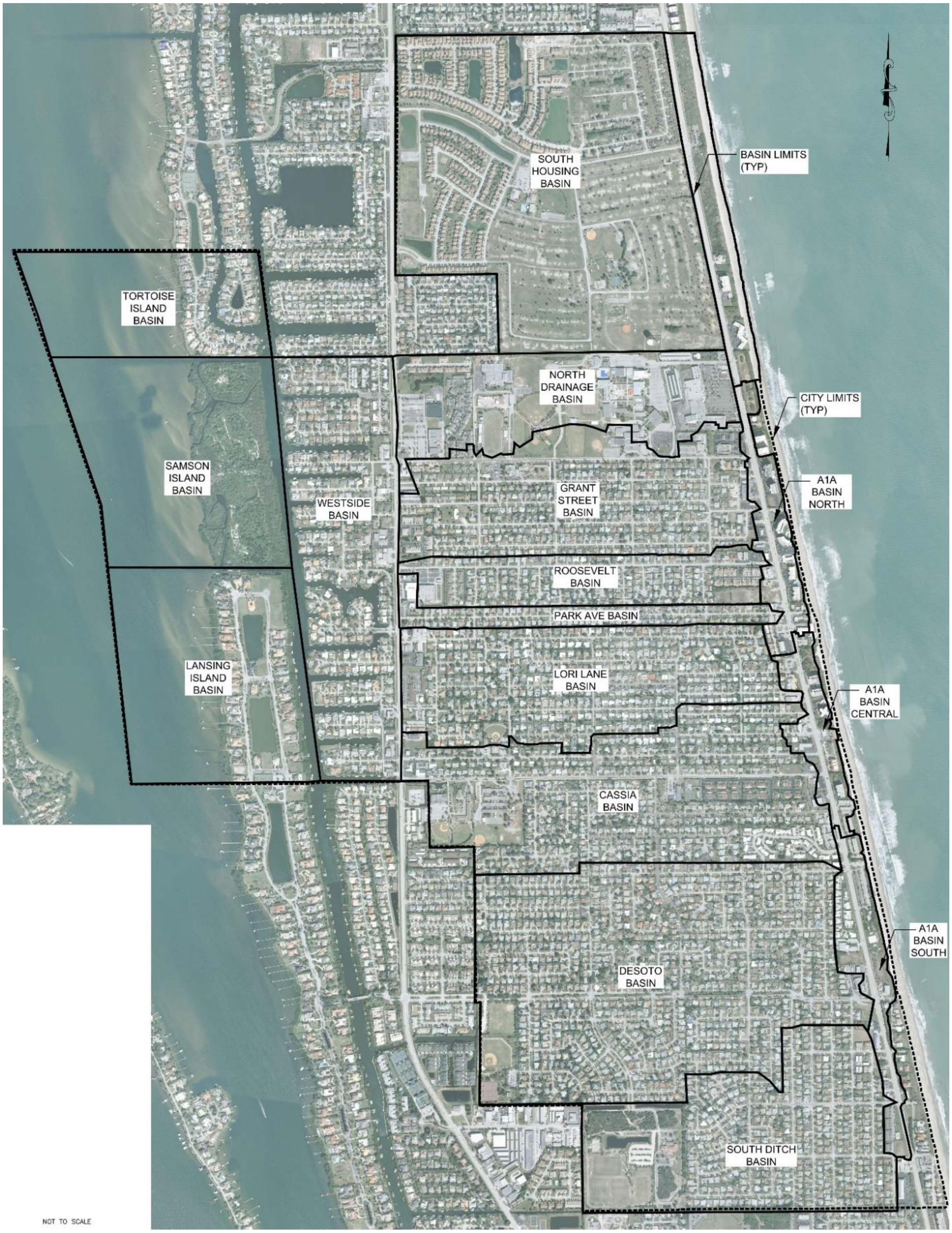
Location of Outfall Along South Patrick Drive	Existing Outfall Size	Drainage Area (Acres)
South Ditch	Ditch/2-48" RCP	157
Desoto Parkway	2-30" RCP	290
Cassia Blvd	4'X8' Box Culvert	192
Lori Laine	42" RCP	154
Roosevelt Ave	5'X10' Box Culvert	240
Chevy Chase Blvd (North Drainage)	2-30" RCPs	107

A. Hydraulic Model and Analyzed Storm Events

In order to evaluate the existing stormwater basins, hydraulic models were analyzed using the Interconnected Pond Routing (ICPR) software, Version 3.1. Hydraulic models available from the previous Stormwater Master Plan or from previously permitted projects were used as the basins of design. Information from the created infrastructure catalog was utilized to update model components and create any missing elements. Additionally, conveyance improvements were added to the hydraulic models to test the proposed improvements. Nodal diagrams of the models can be found within the Appendix.

Once all the stormwater models were finalized, the basins were analyzed by running six different storm events: The Mean Annual-24 hour, the 25 Year-24 hour, the 100 Year-24 hour, Hurricane Irma, a post Hurricane Irma Storm (October 1, 2017), and tropical storm Fay. The data used to create the rainfall distributions of past historical storm events was obtained from NOAA records at nearby weather stations.

Figure 6.1 – Overall Basin Map



B. Hydraulic Model Tailwater Conditions

With the City of Satellite Beach being a coastal community, one of the growing concerns revolves around potential sea level rise. To evaluate the potential effect of sea level rise, each hydraulic model was analyzed by using three (3) different tailwater elevations. The existing tailwater elevation of 1.89' EL used for basis purposes was obtained from nearby NOAA Tidal station. Future elevations of the tailwater condition were estimated at 2.56 EL and 2.97 EL for year 2040 and 2070. These values represent an overall sea level rise of 8 and 13 inches respectively and were based off rates from United States Army Core of Engineers (USACE) for Intermediate Sea Level Change.

C. North Drainage Basin

The North Drainage basin contains approximately 107 acres with the Satellite Beach High School and ball fields comprising most of the region. Most of the stormwater runoff from the basin flows west through piping and ditches on the north side of the basin until reaching the pond along Siena Court. From the pond, stormwater runoff leaves the basin through two 30" RCPs with a baffle box installed on each outfall at Chevy Chase Blvd.

Since the basin is relatively flat, around 5.0 EL, the overall conveyance capabilities are fairly limited with only one trunk line heading west, but this is offset by the large pervious areas reserved by the school and ballfields. As such, the region experiences standing water during severe storm events, but this does not cause any major impacts to any of the surrounding structures.

D. Roosevelt Avenue Outfall

The 5' x 10' box culvert located on Roosevelt Avenue serves as the primary outfall for the Grant, Roosevelt, and Park basins. The overall drainage area is approximately 240 acres and is primarily comprised of residential development with small amounts of apartment complexes or commercial regions located at the east and west ends.

The majority of the runoff from the Grant basin is collected by inlets and transferred west along Grant Street via a 30" RCP main until it reaches A1A. While the 30" main is sufficient to handle minor storm events, the system is not capable of preventing standing water during extreme storm events. See Table 6.2 below for model information regarding the intersection of Grant Street and Pineapple Street, during the 25 Year 24-hour storm event

Table 6.2 - Grant Basin Node Max at Intersection of Grant and Pineapple Street (Node G-S-23)

Tailwater Condition	Mean Annual	25Yr-24Hr	100Yr-24Hr	Hurricane Irma	Tropical Storm Fay	Oct 1, 2017 Storm (5" in 3 Hours)
Tailwater Existing (1.89')	4.81	5.57	6.03	5.96	5.99	5.41
Tailwater 2040 (2.56') 8" increase	4.84	5.59	6.06	6.00	6.14	5.43
Tailwater 2070 (2.97') 13" increase	4.88	5.63	6.10	6.04	6.25	5.46

*Roadway Elevation = +/- 4.6'

The Roosevelt basin conveys runoff primarily by inlets and piping while a large portion of runoff is able to percolate through the installed exfiltration trenches. The intersection of Pineapple Street and Roosevelt however, is a low-lying area compared to the surrounding inlets and likely experiences standing water during major storm events.

The Park Avenue basin conveys stormwater runoff primarily by overland flow as the majority of the basin does not having piping or inlets. This ultimately leads to the low-lying areas along Park Avenue experiencing standing water for extended periods of time. Areas such as the intersection of Park and Orange Street, which is shown in Table 6.3. The conditions at the intersection are not dependent on tailwater.

Table 6.3 - Park Basin Node Max at Intersection of Park and Orange Street (Node P-5)

Tailwater Condition	Mean Annual	25Yr-24Hr	100Yr-24Hr	Hurricane Irma	Tropical Storm Fay	Oct 1, 2017 Storm (5" in 3 Hours)
Tailwater Existing (1.89')	7.52	7.87	8.08	7.71	7.80	7.65
Tailwater 2040 (2.56') 8" increase	7.52	7.87	8.08	7.71	7.80	7.65
Tailwater 2070 (2.97') 13" increase	7.52	7.87	8.08	7.71	7.80	7.65

*Roadway Elevation = +/- 7.3’

Overall, the Grant, Roosevelt, and Park basin areas are limited on conveyance capabilities due to limited head differences to the outfall. The region could potentially benefit from additional connecting piping between the basins. Adding connecting piping would reduce the effects of head loss on the system by giving the runoff multiple paths to take to get to the outfall.

E. Lori Laine Basin

The Lori Laine drainage basin area is approximately 154 acres and predominately compromised of residential development. All the stormwater runoff in the basin reaches the 42” CMP outfall by traveling in a 30” trunkline located in the middle of the basin flowing west. The region experiences standing water on a regular basis in low lying areas primarily due to overall elevation constraints. Table 6.4 shows the model results for the intersection of Hamlin Avenue and Kale Street

Table 6.4 – Lori Laine Node Max at Intersection of Kale St & Hamlin Ave (Node LL-13)

Tailwater Condition	Mean Annual	25Yr-24Hr	100Yr-24Hr	Hurricane Irma	Tropical Storm Fay	Oct 1, 2017 Storm (5" in 3 Hours)
Tailwater Existing (1.89')	4.72	5.56	6.01	5.91	6.24	5.32
Tailwater 2040 (2.56') 8" increase	4.79	5.6	6.04	5.94	6.35	5.36
Tailwater 2070 (2.97') 13" increase	4.83	5.63	6.06	5.96	6.42	5.38

*Roadway Elevation = +/- 4.1’

Additional concerns regarding the conveyance capabilities of the basin revolve around maintaining the 30-inch trunkline. In the existing system, the 30-inch pipe is located behind houses and on the backsides of property lines. This makes the overall concept of maintenance a significant challenge for City employees. To remedy this situation, a new 30” trunkline should be constructed in the City’s accessible right of way with the goal of replacing the old trunkline once completed.

F. Cassia basin

The Cassia drainage basin area is approximately 192 acres of mixed use. While the region is predominately residential region, there is commercial, institutional, and industrial regions present on the east and west ends of the drainage area. Most of the stormwater runoff leaves the basin through dual 36 inch/42-inch HDPE trunklines prior to reaching the 4’x8’ box culvert outfall. The drainage area experiences standing water during extreme storm events. Table 6.5 shows the model results for the intersection of Ocean Spray and Willow Drive.

Table 6.5 – Cassia Basin Node Max at Intersection of Ocean Spray Ave and Willow Drive (Node C-S-40)

Tailwater Condition	Mean Annual	25Yr-24Hr	100Yr-24Hr	Hurricane Irma	Tropical Storm Fay	Oct 1, 2017 Storm (5" in 3 Hours)
Tailwater Existing (1.89')	3.97	5.06	5.60	5.13	5.13	4.79
Tailwater 2040 (2.56') 8" increase	4.10	5.11	5.63	5.16	5.16	4.84
Tailwater 2070 (2.97') 13" increase	4.18	5.14	5.64	5.18	5.18	4.87

*Roadway Elevation = +/- 4.0’

Construction Projects in the Cassia Basin over the past decade have improved the stormwater system. The standing water is now predominated due to an overall lack of elevation change to the outfall. As such, no major conveyance improvements are recommended at this time.

G. Desoto Basin

The Desoto drainage basin area is approximately 290 acres with the majority of the basin being residential. Stormwater runoff from the basin predominately travels through dual 30-inch trunklines before reaching the baffle box at the outfall. See Table 6.6 for the model results of the node on Desoto between Kale Street and Temple street.

Table 6.6 – Desoto Parkway Node Max on Desoto between Temple and Kale Street (Node D-S-20)

Tailwater Condition	Mean Annual	25Yr-24Hr	100Yr-24Hr	Hurricane Irma	Tropical Storm Fay	Oct 1, 2017 Storm (5" in 3 Hours)
Tailwater Existing (1.89')	4.60	5.74	6.40	6.18	6.20	5.47
Tailwater 2040 (2.56') 8" increase	4.67	5.79	6.43	6.24	6.29	5.53
Tailwater 2070 (2.97') 13" increase	4.71	5.82	6.46	6.35	6.35	5.56

*Roadway Elevation = +/- 4.2’

Construction projects in the Desoto basin over the past decade have improved the existing conveyance system. Further improvements will not create as much of a benefit to the system as the overall elevation change to the canal is the driving factor. As such, no major conveyance improvements are recommended at this time.

H. South Ditch Basin

The South Ditch Drainage area is approximately 157 acres with the majority of the region being residential. The western portion of the basin is currently underdeveloped with large pervious areas that could be utilized for future stormwater quality projects.

All of the runoff from the basin area is collected and conveyed west in an open ditch at the south end of the City's service areas. See Table 6.7 for the model results of the intersection of Satellite Avenue and Verbenia Drive.

Table 6.7 – South Ditch Node Max at Intersection of Satellite Ave and Verbenia Drive (Node SD-4-1)

Tailwater Condition	Mean Annual	25Yr-24Hr	100Yr-24Hr	Hurricane Irma	Tropical Storm Fay	Oct 1, 2017 Storm (5" in 3 Hours)
Tailwater Existing (1.89')	3.89	6.34	7.41	6.52	6.73	5.75
Tailwater 2040 (2.56') 8" increase	4.10	6.39	7.43	6.56	6.75	5.82
Tailwater 2070 (2.97') 13" increase	4.27	6.44	7.46	6.60	6.78	5.89

*Roadway Elevation = +/- 5.3'

Overall the South Ditch basin only experiences standing water in the southern region during extreme storm events. The properties in this southern portion appear to be elevated above the roadway elevation such that the extreme storm event will likely not cause severe structural impact. As such, no conveyance improvements are recommended for this basin at this time.

7. Capital Projects

Reviewing the renewal and replacement program projects and modeling the basins, a total of 33 projects were proposed. These projects were for renewal/replacement, conveyance, and treatment of the existing basins. After these projects were created, they were prioritized into a ten-year implementation plan, shown in Table 1 of the Executive Summary. These proposed projects can be located on the Mapping product found within the Appendix and the Ten-year implementation plan and separate cost estimates can be found within Table 1 of the Executive Summary and the Appendix respectively.

A. North Drainage Bam Filter (N-1)

The North Drainage Basin consists of school, commercial and residential properties. This basin drains west into the Banana River with some treatment in the form of two existing baffle boxes near the outfall along Chevy Chase Blvd. The baffle box only removes floating materials and the associated nutrient load. To further remove nutrients at this outfall, the addition of a Bio-Sorption Activated Media (BAM) filter to the baffle boxes will increase the reduction of nutrients, such as Total Nitrogen and Total Phosphorus. The estimated cost of the project is $138,661.25

B. Emerald Court Inlet Baskets (N-2)

This project consists of inserting an inlet trap at the end of Emerald Court located in the North Drainage Basin. A pipe from this inlet runs northwards out of the City limits to Brevard County. This stormwater runoff sheet flows to the inlet, coming from a residential area of 2.34 acres in size. Due to the small dimension of the inlet, it may be necessary to reconstruct the inlet to accommodate inlet trap dimensions. With proper maintenance, the inlet trap will remove debris and sediment from the runoff. The Cost of the inlet trap and inlet modification is approximately $20,815.

C. Jackson Ct Treatment Facility (J-1)

The southern side of the Community center drains via a 34" x 53" pipe across South Patrick Dr. to a residential canal between Jackson Ct and South Hedgecock Square. Stormwater is discharged with no treatment to the canal. On the west side of South Patrick Dr., north of Jackson Court, there is a vacant parcel of land. The 34" x 53" pipe crosses this vacant land, making this the location a perfect place for a wet and dry retention pond system to treat the stormwater before entering the canal. The drainage basin for this outfall is 12.13 acres of commercial and residential property. No land acquisition would be required for this project as this parcel is owned by the City. The estimated cost of this project is $232,156.

D. Jackson St. Outfall Connection (J-2)

The Community center at Jackson Ave drains via a 34" x 53" pipe across South Patrick Dr. to a residential canal between Jackson Ct and South Hedgecock square. To the east of South Patrick, there is an existing stormwater pipe that crosses the 34" X 53" pipe. To alleviate the flooding, an interconnect between the south running pipe and the 34" x 53" pipe would reduce the effects of head loss on the system by giving the runoff multiple paths to take to get to the outfall. The estimated cost for this project is $42,636.25.

E. Schechter Center Bioretention (J-3)

The Schechter Community Center has a drainage system along the parking lot of the community center that drains to the canal. There is no treatment to the stormwater before it enters the canal. To treat the stormwater, a bioretention system would be implemented within the parking lot of the Community center. The estimated cost for this project is $116,840.

F. Jackson-Avocado interconnect (GS-1)

This project would entail the connection of two existing pipes along Jackson Avenue, one pipe goes along Avocado street and ends at Jackson while the other pipe goes along Jackson from South Patrick to Sunset Street. The project would lay pipe from Sunset St to Avocado to allow for interconnections within the system, which would help alleviate flooding. An 18" pipe would connect to the exiting pipes. The estimated cost for this project is $133,239.

G. Roosevelt BAM Filter (R-1)

The Roosevelt Basin consists of residential properties along Roosevelt Avenue. This basin drains west into the Banana River with some treatment in the form of an existing baffle box near the outfall along Roosevelt near Mar Brisa Ct. The baffle box only removes floating materials and the associated nutrient load.

To further remove nutrients at this outfall, the addition of a BAM filter to the baffle box will increase the reduction of nutrients, such as Total Nitrogen and Total Phosphorus. The estimated cost of the project is $93,696.25

H. Roosevelt-Grant Connection (R-2)

This project entails the connection of two existing basins connected along avocado Street. The Roosevelt and Grant basins would be connected along Avocado Street between Grant avenue and Roosevelt Avenue. This will also connect to the proposed Park Avenue interconnect; which in turn connects to the Lori Laine Trunk Replacement. These connections will allow for a better stormwater system that would help alleviate flooding through the interconnected system. A 30" pipe would connect the existing pipes. The estimated cost for this project is $221,248.50.

I. Park Avenue Interconnect #1 (P-1)

This project connects three of the existing basins connected along Avocado Street. The Roosevelt, Park, and Lori Lane basin would be connected along Avocado Street between Roosevelt avenue and Sherwood Avenue to connect to the proposed Lori Laine Trunk Replacement. These connections will allow for a better stormwater system that would help alleviate flooding through the interconnected system. A 48" pipe would connect the existing pipes. The estimated cost for this project is $465,752.30.

J. Park Avenue Interconnect #2 (P-2)

This project would be another Interconnect for the Roosevelt, Park, and Lori Laine basins. The interconnect would occur along Orange Street from Roosevelt Avenue to Sherwood Avenue to the proposed Lori Laine Trunk replacement. Like the previous project, these connections will allow for a better stormwater system that would help alleviate flooding through the interconnected system. A 24" pipe would connect the existing pipes. The estimated cost for this project is $311,707.50.

K. Lori Laine Trunk Replacement (LL-1)

The Lori Lain Basin consists of residential properties along Sherwood to Hardwood Avenues. The stormwater branches from an existing trunk line that flows between Glenwood and Hamlin Avenues. This main trunk line is in a poor condition and in the rear of residential lots. To reconcile this, a new Lori Laine Trunk line has been recommended. The trunk line will connect to the existing main pipe on Lemon street. From there it extends to the north until Sherwood Avenue. The trunk will go along Sherwood avenue until Temple Street and it will go south to the existing pipes. Additionally, there will be an interconnect to other pipes along the main trunk line along Kale street. Most of the pipe that will be installed will be a 36" pipe. The estimated cost for this project is $2,195,137.25. The pathing can be found within the Mapping product in the appendix.

L. Glenwood Road Narrowing (LL-2)

Glenwood Avenue east of Temple Street has a 30-foot width roadway. To help alleviate flooding problems, this project proposes to add swales along Glenwood from Temple Street to A1A. This would collect some of the stormwater and help direct the stormwater towards the existing drainage system. With the 30-foot roadways, the streets can be narrowed to construct these proposed swales on both sides of the road way. The estimated cost for this project is $241,868.

M. Lori Laine Outfall Treatment (LL-3)

The Lori Laine Outfall conveys 184 Acres of drainage area. With this volume of area, it is a surprise that the majority of the stormwater is not treated before it leaves the system. This project proposes to treat the Lori Laine basin stormwater. This treatment comes in the form of a baffle box along the basin outfall. This project is estimated at $173,707.50.

N. Elwood/Temple Facility Upgrade (LL-4)

At the southeast corner of Elwood Avenue and Temple Street, there is an existing dry retention pond owned by the City that provides treatment for 8.76 acres of residential land. This project consists of converting the dry pond to a wet pond. Adjacent storm drain pipe would be diverted to the pond, giving treatment for another 26.3 acres. This pond would also provide more flood attenuation than the existing pond. Cost are estimated at $43,580.11.

O. Lemon Street Repair/Replace #1 (LL-5)

The City of Satellite Beach surveyed the existing stormwater system for aging and poor-quality pipes. The pipe along Lemon street between Teakwood and Glenwood was found to be in poor condition. This project seeks to replace the existing pipe with an 18" pipe. This project is estimated at $63,887.10.

P. Lemon Street Repair/Replace #2 (LL-6)

The City surveyed the existing stormwater for aging and poor-quality pipes. The pipe along Lemon street between Hardwood and Norwood was found to be in poor condition. This project seeks to replace the existing pipe with a larger 15" pipe. This project is estimated at $89,821.33.

Q. Thyme Street Repair/Replace #1 (LL-7)

The City surveyed the existing pipes for aging and poor-quality pipes. The pipe along Thyme street between the Lori Laine Trunk to Glenwood was another pipe found in a poor condition. This project seeks to replace the existing pipe. with an 18" pipe. This project is estimated at $68,330.70.

R. Thyme Street Repair/Replace #2 (LL-8)

The City surveyed the existing pipes for aging and poor-quality pipes. The pipe along Thyme street from Harwood to Norwood was found to be in poor condition. This project seeks to replace the existing pipe with a larger 15” pipe. This project is estimated at $64,799.63.

S. Cassia & Desoto Interconnect (C-1)

This project entails the connection of two existing basins, Cassia and Desoto basins. The Cassia and Desoto basins would be connected along Temple Street between Greenway avenue and Maple Drive. These connections will allow for a better stormwater system that would help alleviate flooding through the distribution of stormwater flows between the interconnected systems. An 18” pipe would be installed to connect the existing pipes. The estimated cost for this project is $158,085.90.

T. City Hall Pond BeeMats/Living Shoreline (C-2)

This project consists of installing BeeMats in the deep sections of the ditch in front of city hall and install a living shoreline along the city hall pond area. The BeeMats and living shoreline would enhance the pollutant removals of the Cassia treatment and aid in educating the population about pollutant treatment methods. The cost of this project is $40,480.

U. Jamaica/Caiman Repair/Replacement (Relocation) (D-1)

The City of Satellite Beach surveyed the existing pipes for aging and poor-quality pipes. The pipe going from Jamaica Boulevard, though personal property, and out on Caiman Street was found to be in poor condition. This project seeks to replace the existing pipe. Since the pipe went through private property, the new pipe will follow Caiman St until Lynn avenue, and go east until Jamaica Blvd. The pipe will be replaced with an 18 and 24-inch pipe. This project is estimated at $138,284.34.

V. Desoto/Carrisa Repair/Replacement (Relocation) (D-2)

The City of Satellite Beach surveyed the existing pipes for aging and poor-quality pipes. The pipe going from Carissa Drive, though personal property, and out on Desoto Parkway was found to be in poor condition. This project seeks to replace the existing pipe. Since the pipe went through private property, the new pipe will follow Carissa Drive to the east and connect to the pipes along Temple Street. The pipe will be replaced with an 18-inch pipe. This project is estimated at $150,696.00.

W. Temple Street Repair/Replacement #1 (D-3)

The City surveyed the existing pipes for aging and poor-quality pipes. The pipe along Temple street from Elm to Desoto was found to be in poor condition. This project seeks to replace the existing pipe with a 15 and 36-inch pipe. This project is estimated at $224,458.44.

X. Elm Avenue Repair/Replace (D-4)

The City surveyed the existing pipes for aging and poor-quality pipes. The pipe along Elm Avenue from Temple to Rosada Street was found to be in poor condition. This project seeks to replace the existing pipe with a 24” pipe. This project is estimated at $190,900.

Y. Temple Street Repair/Replacement #2 (D-5)

The City surveyed the existing pipes for aging and poor-quality pipes. Another length of pipe along Temple street from Maple to Cherry Drive was found to be in poor condition. This project seeks to replace the existing pipe with an 18 and 24-inch pipe. This project is estimated at $92,843.24.

Z. Desoto Parkway Repair/Replace (D-6)

The City surveyed the existing pipes for aging and poor-quality pipes. The pipe along Desoto Parkway from Rosada to Verbenia Court was found to be in poor condition. This project seeks to replace the existing pipe with a 30-inch pipe. This project is estimated at $117,362.39

AA. Jamaica Pond Outfall BAM Filter (S-1)

Above the Satellite Beach sports park is the Jamaica Ponds. The Jamaica Ponds are a series of three detention ponds from the Desoto Boulevard drainage system, which then outfalls at the south pond through two 19” x 30” RCPs west towards the Banana River.

To further remove nutrients at this outfall, the addition of a BAM filter to the outfalls will increase the reduction of required nutrients, such as Total Nitrogen and Total Phosphorus. The estimated cost of the project is $69,575.

BB. South Ditch Bam Swales (S-2)

Along the south boundary of Satellite Beach is vacant right of way with a storm drain pipe flowing westward to a large outfall ditch. The right of way is grassed except for the paved street ends. There are a series of inlets at the ends of the streets catching water running southward. This project consists of constructing a 1,520-foot-long cascading grasses swale in the right-of-way, excavating two feet below existing grade. The asphalt cul-de-sacs would be modified and surrounding land regraded, so water would not flow directly into the inlets. If necessary, the inlets could be reconstructed. The cost is estimated to be $148,580.

CC. Sports Park Treatment (S-3)

Along the South-West Boundary of Satellite Beach, there is a large plot of land owned by the City. This plot of land is used primarily as a sports park. Along the south end of the park, there is an existing ditch that connects to the South Ditch Basin outfall. This project proposes to install in-ditch BAM to the existing drainage ditch to allow for stormwater treatment before the stormwater reaches the outfall. The cost is estimated at $102,292.50.

DD. Robert Way Diversion/Library Dry Retention (S-4)

The Connection between Robert and Robin way pipe was surveyed and found to be in poor condition. Given that the pipe passed through private property, the pipe could not be replaced. This project consists of constructing a 1.63 acres dry retention pond on vacant land to the north of the library. The existing Robert Way stormwater will be diverted to the pond via an 18” pipe, for treatment and flood alleviation. No land acquisition would be required for this project as this is City owned property. Estimated costs for this project are $150,960.50.

EE. Robin Way Diversion/Library Dry Retention (S-5)

At the southeast corner of the library park, another retention pond is proposed. This pond will divert stormwater from Robin way via a 30” pipe, treating 19.13 acres of residential property. This project will not require land acquisition as it occurs on City owned property. The costs are estimated at $151,026.63.

FF. Rosada Street Repair/Replacement (S-6)

The City surveyed the existing pipes for aging and poor-quality pipes. The pipe along Rosada from the South Ditch swale to the intersection of Richard Street was found to be in poor condition. This project seeks to replace the existing pipe with a 15 and 30-inches pipe. This project is estimated at $252,823.

GG. Robin Way Repair/Replacement (S-7)

The City surveyed the existing pipes for aging and poor-quality pipes. The pipe along Robin Way from Villa Del Bar Street to Satellite Avenue was found to be in poor condition. This project seeks to replace the existing pipe with a 30-inch pipe. This project is estimated at $73,726.50.

8. Funding

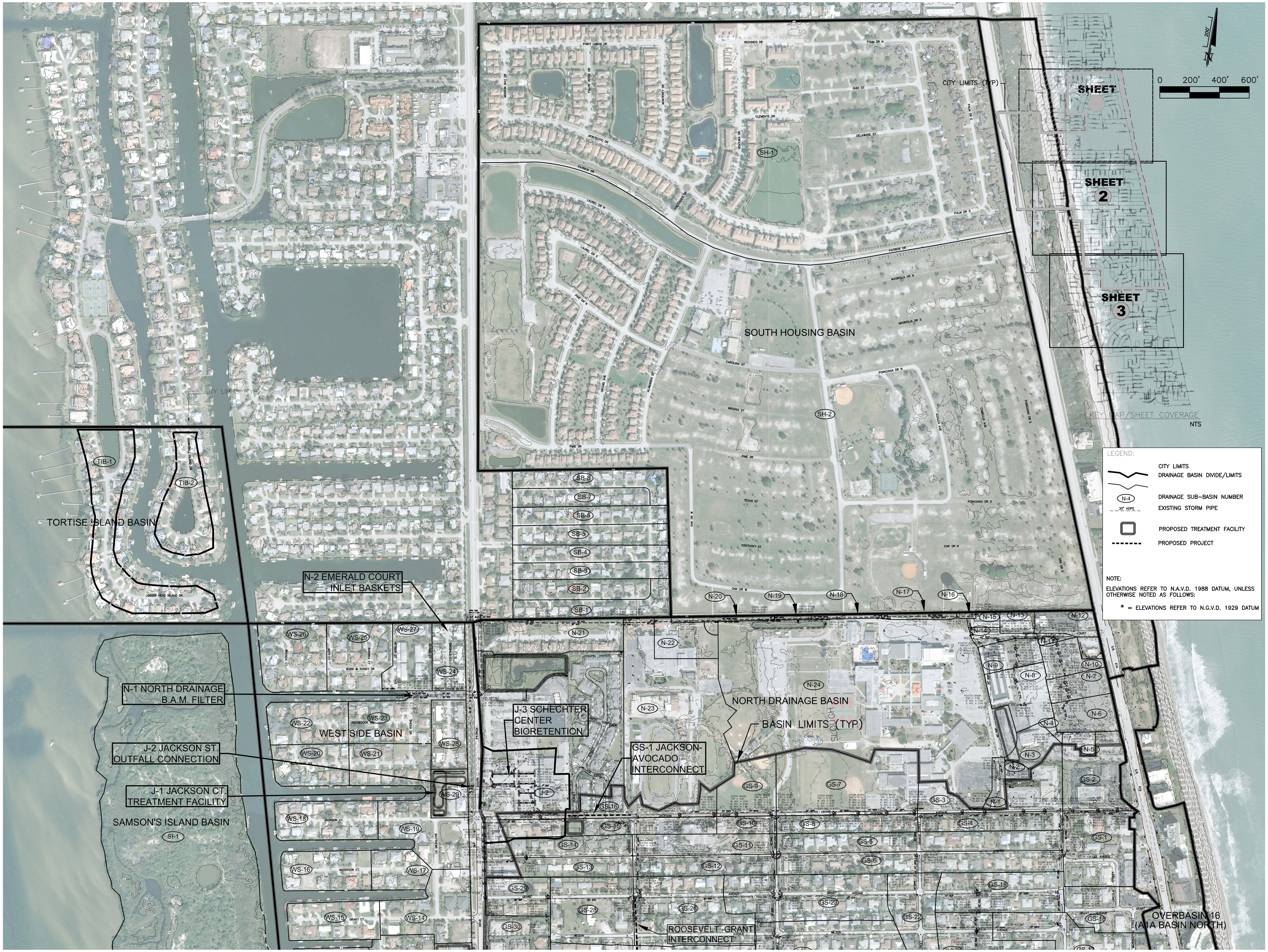
As stated in Section 3-C, Satellite Beach has a stormwater utility fee with an ERU rate of $104 a year. Annual revenue generated from the fee is approximately $512,000. On September 5, 2018, the City Council of Satellite Beach discussed the annual stormwater utility assessment for the next fiscal year (2018/19). In that assessment, the City Council increased the stormwater utility fee to $200 per ERU. Given the doubling of the rate, the stormwater utility fee will generate approximately $1,000,000 annually with this increase to the rates. With the given estimated cost of the projects, additional sources of funding should be investigated. Possible sources of funding include:

- State Revolving Fund Program – FEDP operates the State Revolving Loan Program in which communities borrow funds from the State to implement many CIP projects on an accelerated basis and repay the loan over a long period of time at a low interest rate, comparable to bonding. The City's Stormwater Utility fees would be pledged as collateral for the loan. Several years of lead time is required to qualify for the loan and to be placed on the funding list. Satellite Beach may wish to investigate these types of loans.
- Grant Funding – Many communities obtain grant funding for stormwater CIP projects to leverage their utility fees. There are several sources of funding available from state and federal agencies for stormwater projects. Much of the funding is focused on stormwater quality projects, but there is flood control funding also available. Satellite Beach has successfully acquired grant funding from several sources in the past. The City should pursue additional grants for proposed stormwater projects from the following programs:
  - FDEP Federal Clean Water Act Section 319(h) Grants
  - FDEP Water Quality Restoration Grants
  - SJRWMD District Cost-Share funding
  - FEMA Hazard Mitigation Grant Program (HMGP)
- Bank Loans – Satellite Beach as secured bank loans for previous stormwater projects. Additional borrowing from banks could be pursued for future projects.
- Inter-local Cost Sharing – All of the communities along the Indian River are facing funding issues. With the inclusion of the Indian Lagoon sales tax initiative, more funding for CIP projects can occur.
- Save Our Indian River Lagoon (SOIRL) grant funding – All of the communities along the Indian River are facing issues with nutrient and sediment loading within the Indian River Lagoon. With the Indian Lagoon sales tax, municipalities can apply for grants that focus on water quality projects. Satellite Beach may will to apply for the grants for the stormwater treatment projects.

Based upon the City's past grant acquisition performance, it is recommended that the City program 75% of the project costs, assuming the remaining 25% will come from grant sources. This equates to a total program cost of $5,084,983 or $508,498 average per year. These estimated costs do not include the stormwater system operation costs, or the cost of the renewal and replacement program, of approximately $280,000 per year after the first five years. Table 1 in the executive summary displays the estimated costs for the 33 recommended projects within the 10-year planning period.

Appendix

Mapping Product



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CITY OF SATELLITE BEACH

CITY OF SATELLITE BEACH
STORMWATER MASTER PLAN UPDATE

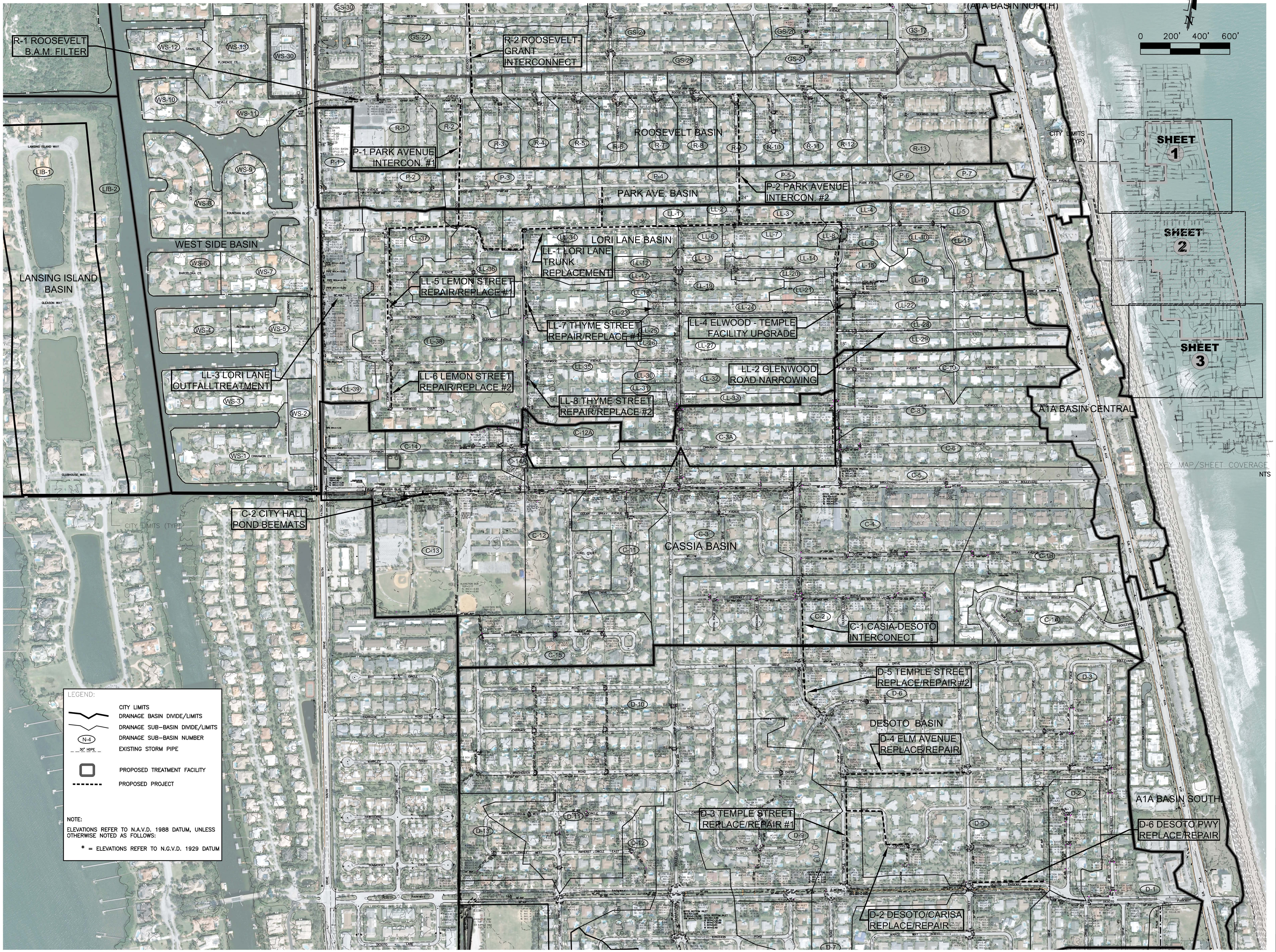
565 CASSIA BLVD
SATELLITE BEACH, FL 32937

ISSUED
XX/XX/XX DESCRIPTION

M&H NO.: 1000716-172383.01
DATE: October, 2018
DESIGNED BY: - -
DRAWN BY: - -
CHECKED BY: - -
DO NOT SCALE DRAWINGS

SHEET CONTENTS
Existing and Proposed Map

SHEET NO. of
1



Mead & Hunt

Mead and Hunt, Inc.
4401 Eastport Parkway
Port Orange, FL 32127
phone: 386-761-6810
meadhunt.com

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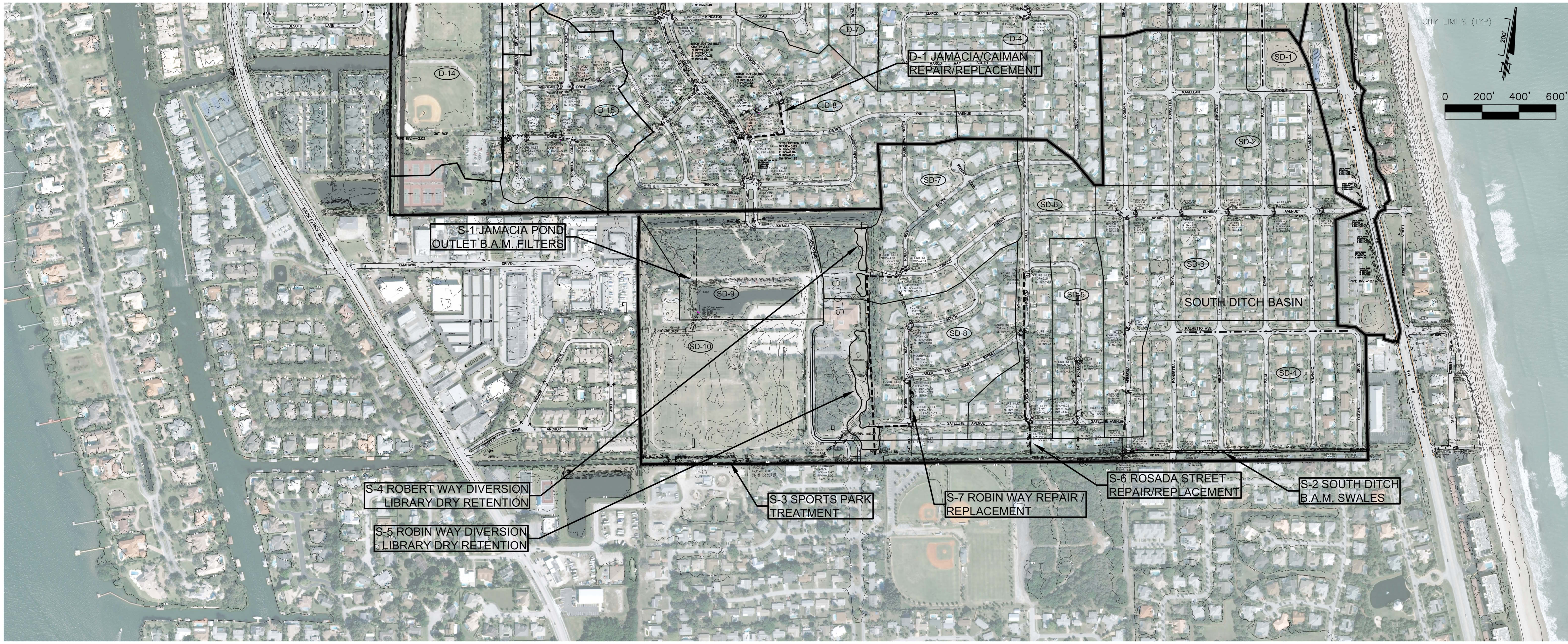
SHEET CONTENTS
Existing and Proposed Map

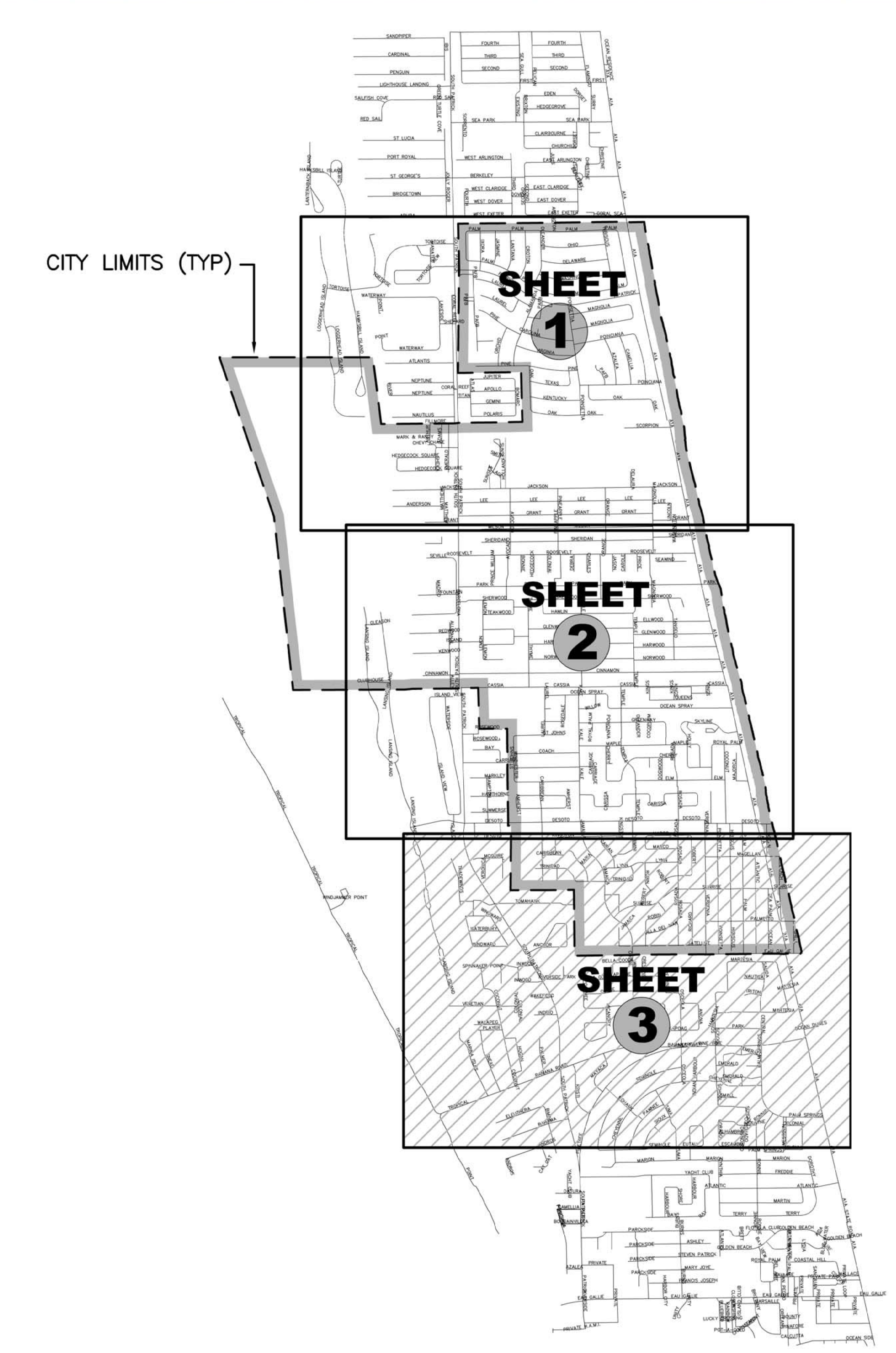
SHEET NO. of
2



LEGEND:

CITY LIMITS
DRAINAGE BASIN DIVIDE/LIMITS
DRAINAGE SUB-BASIN DIVIDE/LIMITS
N-4 DRAINAGE SUB-BASIN NUMBER
30" HDPE EXISTING STORM PIPE
PROPOSED TREATMENT FACILITY
PROPOSED PROJECT

NOTE:
ELEVATIONS REFER TO N.A.V.D. 1988 DATUM, UNLESS OTHERWISE NOTED AS FOLLOWS:
* = ELEVATIONS REFER TO N.G.V.D. 1929 DATUM



KEY MAP/SHEET COVERAGE
NTS

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SHEET CONTENTS:
Existing and Proposed Map

SHEET NO.: 3 of 3

Cost Estimates

Project	Estimated Cost
N-1	$138,661

N-1 **North Drainage BAM Filter**

Item Number	Item Description	Quantity	Unit	Unit Cost	Amount
1	Mobilization	1	LS	$5,000.00	$5,000.00
2	Demolition	1	LS	$5,000.00	$5,000.00
3	Survey/As-builts	1	LS	$2,000.00	$2,000.00
4	Maintenance of traffic	1	LS	$7,500.00	$7,500.00
5	Baffle Box Modification	2	EA	$8,000.00	$16,000.00
6	BAM Filter	2	EA	$25,000.00	$50,000.00
7	Piping	1	LS	$10,000.00	$10,000.00
8	Restoration	1	LS	$10,000.00	$10,000.00

Qualifications (if applicable)

1. Utility relocation costs are not included.
2. Mobilization not calculated in Sub-Total, only in Sub-Total of Construction Cost

SUB-TOTAL		$100,500.00
- Contingencies @	15%	$15,075.00
SUB-TOTAL OF CONSTRUCTION COST		$120,575.00
Engineering/Administration	15%	$18,086.25
TOTAL PROJECT COST		**$138,661**

Project	Estimated Cost
N-2	$20,815

N-2 **Emerald Court Inlet Baskets**

Item Number	Item Description	Quantity	Unit	Unit Cost	Amount
1	Mobilization	1	LS	$2,000.00	$2,000.00
2	Inlet Baskets	2	EA	$3,000.00	$6,000.00
3	Inlet Modification	2	EA	$3,000.00	$6,000.00
4	Restoration	1	LS	$2,000.00	$2,000.00

Qualifications (if applicable)

1. Utility relocation costs are not included.
2. Mobilization not calculated in Sub-Total, only in Sub-Total of Construction Cost

SUB-TOTAL		$14,000.00
- Contingencies @	15%	$2,100.00
SUB-TOTAL OF CONSTRUCTION COST		$18,100.00
Engineering/Administration	15%	$2,715.00
TOTAL PROJECT COST		**$20,815**

Project	Estimated Cost
J-1	$232,156

J-1 **Jackson Ct. Treatment Facility**

Item Number	Item Description	Quantity	Unit	Unit Cost	Amount
1	Mobilization	1	LS	$15,000.00	$15,000.00
2	Clearing, grubbing, precon video	1	LS	$20,000.00	$20,000.00
3	Survey/As-builts	1	LS	$5,000.00	$5,000.00
4	Maintenance of traffic	1	LS	$10,000.00	$10,000.00
5	Piping	1	LS	$30,000.00	$30,000.00
6	Wet Ponds	1	EA	$10,000.00	$10,000.00
7	Dry Ponds	2	EA	$6,000.00	$12,000.00
8	Control Structures	3	EA	$3,500.00	$10,500.00
9	Inlets/Junction Boxes	5	EA	$3,000.00	$15,000.00
10	Restoration	1	LS	$25,000.00	$25,000.00
11	Landscaping/Irrigation	1	LS	$25,000.00	$25,000.00

Qualifications (if applicable)

1. Utility relocation costs are not included.
2. Costs of drainage easement (if required) acquisition are not included.
3. Mobilization not calculated in Sub-Total, only in Sub-Total of Construction Cost

SUB-TOTAL		$162,500.00
- Contingencies @	15%	$24,375.00
SUB-TOTAL OF CONSTRUCTION COST		$201,875.00
Engineering/Administration	15%	$30,281.25
TOTAL PROJECT COST		**$232,156**

Project	Estimated Cost
J-2	$42,636

J-2 **Jackson St. Outfall Connection**

Item Number	Item Description	Quantity	Unit	Unit Cost	Amount
1	Mobilization	1	LS	$2,000.00	$2,000.00
2	Demolition	1	LS	$5,000.00	$5,000.00
3	Survey/As-builts	1	LS	$2,000.00	$2,000.00
4	Maintenance of traffic	1	LS	$2,000.00	$2,000.00
5	Control Structures	1	EA	$3,500.00	$3,500.00
6	Piping	1	LS	$10,000.00	$10,000.00
7	Restoration	1	LS	$8,000.00	$8,000.00

Qualifications (if applicable)

1. Utility relocation costs are not included.
2. Costs of drainage easement acquisition are not included.
3. Mobilization not calculated in Sub-Total, only in Sub-Total of Construction Cost

SUB-TOTAL		$30,500.00
- Contingencies @	15%	$4,575.00
SUB-TOTAL OF CONSTRUCTION COST		$37,075.00
Engineering/Administration	15%	$5,561.25
TOTAL PROJECT COST		**$42,636**

Project	Estimated Cost
J-3	$116,840

J-3	Schechter Community Center Bioretention				
Item Number	Item Description	Quantity	Unit	Unit Cost	Amount
1	Mobilization	1	LS	$5,000.00	$5,000.00
2	Demolition	1	LS	$25,000.00	$25,000.00
3	Survey/As-builts	1	LS	$4,000.00	$4,000.00
4	Maintenance of traffic	1	LS	$5,000.00	$5,000.00
5	Excavation/Grading	1	LS	$15,000.00	$15,000.00
6	Landscaping/Irrigation	1	LS	$10,000.00	$10,000.00
7	Seal/stripe parking lot	1	LS	$15,000.00	$15,000.00
8	Restoration	1	LS	$10,000.00	$10,000.00

Qualifications (if applicable)

1. Utility relocation costs are not included.
2. Mobilization not calculated in Sub-Total, only in Sub-Total of Construction Cost

SUB-TOTAL		$84,000.00
- Contingencies @	15%	$12,600.00
SUB-TOTAL OF CONSTRUCTION COST		$101,600.00
Engineering/Administration	15%	$15,240.00
TOTAL PROJECT COST		**$116,840**

Project	Estimated Cost
GS-1	$133,239

GS-1 **Jackson-Avocado interconnect**

Item Number	Item Description	Quantity	Unit	Unit Cost	Amount
1	Mobilization	1	LS	$5,000.00	$5,000.00
2	Demolition	1	LS	$5,000.00	$5,000.00
3	Survey/As-builts	1	LS	$3,000.00	$3,000.00
4	Maintenance of traffic	1	LS	$5,000.00	$5,000.00
5	18" RCP	650	LF	$96.00	$62,400.00
6	Structures	3	EA	$2,800.00	$8,400.00
7	Restoration	1	LS	$12,600.00	$12,600.00

Qualifications (if applicable)

1. Utility relocation costs are not included.
2. Costs of drainage easement acquisition are not included.
3. Mobilization not calculated in Sub-Total, only in Sub-Total of Construction Cost

SUB-TOTAL		$96,400.00
- Contingencies @	15%	$14,460.00
SUB-TOTAL OF CONSTRUCTION COST		$115,860.00
Engineering/Administration	15%	$17,379.00
TOTAL PROJECT COST		**$133,239**

Project	Estimated Cost
R-1	$93,696

R-1 **Roosevelt BAM Filter**

Item Number	Item Description	Quantity	Unit	Unit Cost	Amount
1	Mobilization	1	LS	$5,000.00	$5,000.00
2	Demolition	1	LS	$8,000.00	$8,000.00
3	Survey/As-builts	1	LS	$2,000.00	$2,000.00
4	Maintenance of traffic	1	LS	$7,500.00	$7,500.00
5	Baffle Box Modifications	1	EA	$10,000.00	$10,000.00
6	BAM Filter	1	EA	$25,000.00	$25,000.00
7	Piping	1	LS	$8,000.00	$8,000.00
8	Restoration	1	LS	$6,000.00	$6,000.00

Qualifications (if applicable)

1. Utility relocation costs are not included.
2. Mobilization not calculated in Sub-Total, only in Sub-Total of Construction Cost

SUB-TOTAL		$66,500.00
Contingencies @	15%	$9,975.00
SUB-TOTAL OF CONSTRUCTION COST		$81,475.00
Engineering/Administration	15.0%	$12,221.25
TOTAL PROJECT COST		**$93,696**

Project	Estimated Cost
R-2	$221,249

R-2	**Roosevelt-Grant Connection**				
Item Number	**Item Description**	**Quantity**	**Unit**	**Unit Cost**	**Amount**
1	Mobilization	1	LS	$10,000.00	$10,000.00
2	Demolition	1	LS	$20,000.00	$20,000.00
3	Survey/As-builts	1	LS	$8,000.00	$8,000.00
4	Maintenance of traffic	1	LS	$25,000.00	$25,000.00
5	30" RCP	800	LF	$107.00	$85,600.00
6	Structures	3	EA	$3,600.00	$10,800.00
7	Restoration	1	LS	$9,200.00	$9,200.00

Qualifications (if applicable)

1. Utility relocation costs are not included.
2. Mobilization not calculated in Sub-Total, only in Sub-Total of Construction Cost

SUB-TOTAL		$158,600.00
Contingencies @	15%	$23,790.00
SUB-TOTAL OF CONSTRUCTION COST		$192,390.00
Engineering/Administration	15%	$28,858.50
TOTAL PROJECT COST		**$221,249**

Project	Estimated Cost
P-1	$465,752

P-1 **Park Avenue Interconnect #1**

Item Number	Item Description	Quantity	Unit	Unit Cost	Amount
1	Mobilization	1	LS	$10,000.00	$10,000.00
2	Demolition	1	LS	$35,000.00	$35,000.00
3	Survey/As-builts	1	LS	$8,000.00	$8,000.00
4	Maintenance of traffic	1	LS	$22,600.00	$22,600.00
5	48 inch Pipe	820	LF	$214.00	$175,480.00
6	Structures	4	EA	$5,600.00	$22,400.00
7	Restoration	1	LS	$80,000.00	$80,000.00

Qualifications (if applicable)

1. Utility relocation costs are not included.
2. Mobilization not calculated in Sub-Total, only in Sub-Total of Construction Cost

SUB-TOTAL		$343,480.00
Contingencies @	15%	$51,522.00
SUB-TOTAL OF CONSTRUCTION COST		$405,002.00
Engineering/Administration	15%	$60,750.30
TOTAL PROJECT COST		**$465,752**

Project	Estimated Cost
P-2	$311,708

P-2 **Park Avenue Interconnect #2**

Item Number	Item Description	Quantity	Unit	Unit Cost	Amount
1	Mobilization	1	LS	$10,000.00	$10,000.00
2	Demolition	1	LS	$35,000.00	$35,000.00
3	Survey/As-builts	1	LS	$10,000.00	$10,000.00
4	Maintenance of traffic	1	LS	$28,400.00	$28,400.00
5	24 inch Pipe	800	LF	$105.00	$84,000.00
6	Structures	3	EA	$3,200.00	$9,600.00
7	Restoration	1	LS	$60,000.00	$60,000.00

Qualifications (if applicable)

1. Utility relocation costs are not included.
2. Mobilization not calculated in Sub-Total, only in Sub-Total of Construction Cost

SUB-TOTAL		$227,000.00
Contingencies @	15%	$34,050.00
SUB-TOTAL OF CONSTRUCTION COST		$271,050.00
Engineering/Administration	15%	$40,657.50
TOTAL PROJECT COST		**$311,708**

Project	Estimated Cost
LL-1	$2,195,137

LL-1 **Lori Laine Trunk Replacement**

Item Number	Item Description	Quantity	Unit	Unit Cost	Amount
1	Mobilization	1	LS	$25,000.00	$25,000.00
2	Demolition	1	LS	$50,000.00	$50,000.00
3	Survey/As-builts	1	LS	$25,000.00	$25,000.00
4	Maintenance of traffic	1	LS	$20,000.00	$20,000.00
5	36 inch x 12 inch Pipe/Exfiltration	4,500	LF	$230.00	$1,035,000.00
6	24 inch x 12 inch Pipe/Exfiltration	300	LF	$150.00	$45,000.00
7	18 inch Pipe	250	LF	$96.00	$24,000.00
8	15 inch Pipe	100	LF	$91.00	$9,100.00
9	Inlets/Manholes	40	EA	$4,000.00	$160,000.00
10	Control Structures	5	EA	$9,000.00	$45,000.00
11	Remove/Modify Existing Pipe	1	LS	$80,000.00	$80,000.00
12	BAM Barrier	1	LS	$45,000.00	$45,000.00
13	Restoration	1	LS	$100,000.00	$100,000.00

Qualifications (if applicable)

1. Utility relocation costs are not included.
2. Costs of drainage easement acquisition (if required) are not included.
3. Mobilization not calculated in Sub-Total, only in Sub-Total of Construction Cost

SUB-TOTAL		$1,638,100.00
- Contingencies @	15%	$245,715.00
SUB-TOTAL OF CONSTRUCTION COST		$1,908,815.00
Engineering/Administration	15%	$286,322.25
TOTAL PROJECT COST		**$2,195,137**

Project	Estimated Cost
LL-2	$241,868

LL-2 **Glenwood Road Narrowing**

Item Number	Item Description	Quantity	Unit	Unit Cost	Amount
1	Mobilization	1	LS	$7,000.00	$7,000.00
2	Demolition	1	LS	$40,000.00	$40,000.00
3	Survey/As-builts	1	LS	$10,000.00	$10,000.00
4	Maintenance of traffic	1	LS	$10,400.00	$10,400.00
5	Swale Construction	2,540	LF	$10.00	$25,400.00
6	Driveway	34	EA	$1,500.00	$51,000.00
7	Restoration	1	LS	$40,000.00	$40,000.00

Qualifications (if applicable)

1. Utility relocation costs are not included.
2. Mobilization not calculated in Sub-Total, only in Sub-Total of Construction Cost

SUB-TOTAL		$176,800.00
Contingencies @	15%	$26,520.00
SUB-TOTAL OF CONSTRUCTION COST		$210,320.00
Engineering/Administration	15%	$31,548.00
TOTAL PROJECT COST		**$241,868**

Project	Estimated Cost
LL-3	$173,708

LL-3 **Lori Laine Outfall treatment**

Item Number	Item Description	Quantity	Unit	Unit Cost	Amount
1	Mobilization	1	LS	$5,000.00	$5,000.00
2	Demolition	1	LS	$10,000.00	$10,000.00
3	Survey/As-builts	1	LS	$8,000.00	$8,000.00
4	Maintenance of traffic	1	LS	$9,000.00	$9,000.00
5	Treatment BMP	1	LS	$80,000.00	$80,000.00
6	Restoration	1	LS	$20,000.00	$20,000.00

Qualifications (if applicable)

1. Utility relocation costs are not included.
2. Does not include the cost of easement/property
3. Mobilization not calculated in Sub-Total, only in Sub-Total of Construction Cost

SUB-TOTAL		$127,000.00
- Contingencies @	15%	$19,050.00
SUB-TOTAL OF CONSTRUCTION COST		$151,050.00
Engineering/Administration	15%	$22,657.50
TOTAL PROJECT COST		**$173,708**

Project	Estimated Cost
LL-4	$43,580

LL-4 **Elwood/Temple Facility Upgrade**

Item Number	Item Description	Quantity	Unit	Unit Cost	Amount
1	Mobilization	1	LS	$5,000.00	$5,000.00
2	Survey/As-builts	1	LS	$10,000.00	$10,000.00
3	Maintenance of traffic	1	LS	$3,000.00	$3,000.00
4	BMP Additions	1	LS	$8,000.00	$8,000.00
5	Landscaping	1	LS	$5,000.00	$5,000.00
6	Restoration	1	LS	$2,605.00	$2,605.00

Qualifications (if applicable)

1. Utility relocation costs are not included.
2. Mobilization not calculated in Sub-Total, only in Sub-Total of Construction Cost

SUB-TOTAL		$28,605.00
Contingencies @	15%	$4,290.75
SUB-TOTAL OF CONSTRUCTION COST		$37,895.75
Engineering/Administration	15%	$5,684.36
TOTAL PROJECT COST		**$43,580**

Project	Estimated Cost
LL-5	$63,887

LL-5 **Lemon Street Repair/Replace #1**

Item Number	Item Description	Quantity	Unit	Unit Cost	Amount
1	Mobilization	1	LS	$5,000.00	$5,000.00
2	Demolition	1	LS	$7,400.00	$7,400.00
3	Survey/As-builts	1	LS	$3,000.00	$3,000.00
4	Maintenance of traffic	1	LS	$5,000.00	$5,000.00
5	18 inch pipe	135	LF	$96.00	$12,960.00
6	Structure	2	EA	$2,800.00	$5,600.00
7	Restoration	1	LS	$10,000.00	$10,000.00

Qualifications (if applicable)

1. Utility relocation costs are not included.
2. Mobilization not calculated in Sub-Total, only in Sub-Total of Construction Cost

SUB-TOTAL		$43,960.00
Contingencies @	15%	$6,594.00
SUB-TOTAL OF CONSTRUCTION COST		$55,554.00
Engineering/Administration	15%	$8,333.10
TOTAL PROJECT COST		**$63,887**

Project	Estimated Cost
LL-6	$89,821

LL-6 **Lemon Street Repair/Replace #2**

Item Number	Item Description	Quantity	Unit	Unit Cost	Amount
1	Mobilization	1	LS	$5,000.00	$5,000.00
2	Demolition	1	LS	$10,000.00	$10,000.00
3	Survey/As-builts	1	LS	$5,000.00	$5,000.00
4	Maintenance of traffic	1	LS	$6,800.00	$6,800.00
5	15 inch pipe	270	LF	$91.00	$24,570.00
6	Structure	3	EA	$2,400.00	$7,200.00
7	Restoration	1	LS	$10,000.00	$10,000.00

Qualifications (if applicable)

1. Utility relocation costs are not included.
2. Mobilization not calculated in Sub-Total, only in Sub-Total of Construction Cost

SUB-TOTAL		$63,570.00
Contingencies @	15%	$9,535.50
SUB-TOTAL OF CONSTRUCTION COST		$78,105.50
Engineering/Administration	15%	$11,715.83
TOTAL PROJECT COST		**$89,821**

Project	Estimated Cost
LL-7	$68,331

LL-7	Thyme Street Repair/Replace #1				
Item Number	**Item Description**	**Quantity**	**Unit**	**Unit Cost**	**Amount**
1	Mobilization	1	LS	$5,000.00	$5,000.00
2	Demolition	1	LS	$8,400.00	$8,400.00
3	Survey/As-builts	1	LS	$3,000.00	$3,000.00
4	Maintenance of traffic	1	LS	$4,000.00	$4,000.00
5	18 inch pipe	170	LF	$96.00	$16,320.00
6	Structure	2	EA	$2,800.00	$5,600.00
7	Restoration	1	LS	$10,000.00	$10,000.00

Qualifications (if applicable)

1. Utility relocation costs are not included.
2. Mobilization not calculated in Sub-Total, only in Sub-Total of Construction Cost

SUB-TOTAL		$47,320.00
Contingencies @	15%	$7,098.00
SUB-TOTAL OF CONSTRUCTION COST		$59,418.00
Engineering/Administration	15%	$8,912.70
TOTAL PROJECT COST		**$68,331**

Project	Estimated Cost
LL-8	$64,800

LL-8	Thyme Street Repair/Replace #2				
Item Number	**Item Description**	**Quantity**	**Unit**	**Unit Cost**	**Amount**
1	Mobilization	1	LS	$5,000.00	$5,000.00
2	Demolition	1	LS	$8,000.00	$8,000.00
3	Survey/As-builts	1	LS	$3,000.00	$3,000.00
4	Maintenance of traffic	1	LS	$5,200.00	$5,200.00
5	15 inch pipe	150	LF	$91.00	$13,650.00
6	Structure	2	EA	$2,400.00	$4,800.00
7	Restoration	1	LS	$10,000.00	$10,000.00
					$0.00

Qualifications (if applicable)

1. Utility relocation costs are not included.
2. Mobilization not calculated in Sub-Total, only in Sub-Total of Construction Cost

SUB-TOTAL		$44,650.00
Contingencies @	15%	$6,697.50
SUB-TOTAL OF CONSTRUCTION COST		$56,347.50
Engineering/Administration	15%	$8,452.13
TOTAL PROJECT COST		**$64,800**

Project	Estimated Cost
C-1	$158,086

C-1 Cassia & Desoto Interconnect

Item Number	Item Description	Quantity	Unit	Unit Cost	Amount
1	Mobilization	1	LS	$10,000.00	$10,000.00
2	Demolition	1	LS	$12,000.00	$12,000.00
3	Survey/As-builts	1	LS	$5,000.00	$5,000.00
4	Maintenance of traffic	1	LS	$12,800.00	$12,800.00
5	18 inch Pipe	415	LF	$96.00	$39,840.00
6	Structures	4	EA	$2,800.00	$11,200.00
7	Restoration	1	LS	$30,000.00	$30,000.00

Qualifications (if applicable)

1. Utility relocation costs are not included.
2. Mobilization not calculated in Sub-Total, only in Sub-Total of Construction Cost

SUB-TOTAL		$110,840.00
Contingencies @	15%	$16,626.00
SUB-TOTAL OF CONSTRUCTION COST		$137,466.00
Engineering/Administration	15%	$20,619.90
TOTAL PROJECT COST		**$158,086**

Project	Estimated Cost
C-2	$40,480

C-2 **City Hall Pond Beemats/Living Shoreline**

Item Number	Item Description	Quantity	Unit	Unit Cost	Amount
1	Mobilization	1	LS	$3,000.00	$3,000.00
2	Mats/Planting	1	LS	$25,000.00	$25,000.00
3	Restoration	1	LS	$3,000.00	$3,000.00

Qualifications (if applicable)

1. Utility relocation costs are not included.
2. Mobilization not calculated in Sub-Total, only in Sub-Total of Construction Cost

SUB-TOTAL		$28,000.00
Contingencies @	15%	$4,200.00
SUB-TOTAL OF CONSTRUCTION COST		$35,200.00
Engineering/Administration	15%	$5,280.00
TOTAL PROJECT COST		**$40,480**

Project	Estimated Cost
D-1	$138,284

D-1 **Jamacia/Caiman Repair/Replacement (Relocation)**

Item Number	Item Description	Quantity	Unit	Unit Cost	Amount
1	Mobilization	1	LS	$5,000.00	$5,000.00
2	Demolition	1	LS	$10,000.00	$10,000.00
3	Survey/As-builts	1	LS	$4,000.00	$4,000.00
4	Maintenance of traffic	1	LS	$10,000.00	$10,000.00
5	24 inch pipe	335	LF	$105.00	$35,175.00
6	18 inch pipe	115	LF	$96.00	$11,040.00
7	Structures	6	EA	$3,000.00	$18,000.00
8	Restoration	1	LS	$12,000.00	$12,000.00

Qualifications (if applicable)

1. Utility relocation costs are not included.
2. Mobilization not calculated in Sub-Total, only in Sub-Total of Construction Cost

SUB-TOTAL		$100,215.00
Contingencies @	15%	$15,032.25
SUB-TOTAL OF CONSTRUCTION COST		$120,247.25
Engineering/Administration	15%	$18,037.09
TOTAL PROJECT COST		**$138,284**

Project	Estimated Cost
D-2	$150,696

D-2 **Desoto/Carrisa Repair/Replacement (Relocation)**

Item Number	Item Description	Quantity	Unit	Unit Cost	Amount
1	Mobilization	1	LS	$5,000.00	$5,000.00
2	Demolition	1	LS	$10,000.00	$10,000.00
3	Survey/As-builts	1	LS	$4,000.00	$4,000.00
4	Maintenance of traffic	1	LS	$10,000.00	$10,000.00
5	18 inch pipe	600	LF	$96.00	$57,600.00
6	Structures	5	EA	$2,800.00	$14,000.00
7	Restoration	1	LS	$14,000.00	$14,000.00

Qualifications (if applicable)

1. Utility relocation costs are not included.
2. Mobilization not calculated in Sub-Total, only in Sub-Total of Construction Cost

SUB-TOTAL		$109,600.00
Contingencies @	15%	$16,440.00
SUB-TOTAL OF CONSTRUCTION COST		$131,040.00
Engineering/Administration	15%	$19,656.00
TOTAL PROJECT COST		**$150,696**

Project	Estimated Cost
D-3	$224,458

D-3 **Temple Street Repair/Replace #1**

Item Number	Item Description	Quantity	Unit	Unit Cost	Amount
1	Mobilization	1	LS	$5,000.00	$5,000.00
2	Demolition	1	LS	$10,000.00	$10,000.00
3	Survey/As-builts	1	LS	$5,000.00	$5,000.00
4	Maintenance of traffic	1	LS	$10,000.00	$10,000.00
5	36 inch pipe	735	LF	$142.00	$104,370.00
6	15 inch pipe	55	LF	$91.00	$5,005.00
7	Structures (36 inch pipe)	2	EA	$4,000.00	$8,000.00
8	Structures (15 inch pipe)	2	EA	$2,400.00	$4,800.00
9	Restoration	1	LS	$18,200.00	$18,200.00

Qualifications (if applicable)

1. Utility relocation costs are not included.
2. Mobilization not calculated in Sub-Total, only in Sub-Total of Construction Cost

SUB-TOTAL		$165,375.00
Contingencies @	15%	$24,806.25
SUB-TOTAL OF CONSTRUCTION COST		$195,181.25
Engineering/Administration	15%	$29,277.19
TOTAL PROJECT COST		**$224,458**

Project	Estimated Cost
D-4	$190,900

D-4 **Elm Avenue Repair/Replace**

Item Number	Item Description	Quantity	Unit	Unit Cost	Amount
1	Mobilization	1	LS	$5,000.00	$5,000.00
2	Demolition	1	LS	$10,000.00	$10,000.00
3	Survey/As-builts	1	LS	$5,000.00	$5,000.00
4	Maintenance of traffic	1	LS	$10,000.00	$10,000.00
5	24 inch pipe	800	LF	$105.00	$84,000.00
6	Structures	4	EA	$3,200.00	$12,800.00
7	Restoration	1	LS	$18,200.00	$18,200.00

Qualifications (if applicable)

1. Utility relocation costs are not included.
2. Mobilization not calculated in Sub-Total, only in Sub-Total of Construction Cost

SUB-TOTAL		$140,000.00
Contingencies @	15%	$21,000.00
SUB-TOTAL OF CONSTRUCTION COST		$166,000.00
Engineering/Administration	15%	$24,900.00
TOTAL PROJECT COST		**$190,900**

Project	Estimated Cost
D-5	$92,843

D-5 **Temple Street Repair/Replace #2**

Item Number	Item Description	Quantity	Unit	Unit Cost	Amount
1	Mobilization	1	LS	$5,000.00	$5,000.00
2	Demolition	1	LS	$7,000.00	$7,000.00
3	Survey/As-builts	1	LS	$2,800.00	$2,800.00
4	Maintenance of traffic	1	LS	$4,000.00	$4,000.00
5	24 inch pipe	215	LF	$105.00	$22,575.00
6	18 inch pipe	130	LF	$96.00	$12,480.00
7	Structures	3	EA	$3,000.00	$9,000.00
8	Restoration	1	LS	$8,000.00	$8,000.00

Qualifications (if applicable)

1. Utility relocation costs are not included.
2. Mobilization not calculated in Sub-Total, only in Sub-Total of Construction Cost

SUB-TOTAL		$65,855.00
Contingencies @	15%	$9,878.25
SUB-TOTAL OF CONSTRUCTION COST		$80,733.25
Engineering/Administration	15%	$12,109.99
TOTAL PROJECT COST		**$92,843**

Project	Estimated Cost
D-6	$117,362

D-6 Desoto Parkway Repair/Replace

Item Number	Item Description	Quantity	Unit	Unit Cost	Amount
1	Mobilization	1	LS	$5,000.00	$5,000.00
2	Demolition	1	LS	$7,800.00	$7,800.00
3	Survey/As-builts	1	LS	$2,500.00	$2,500.00
4	Maintenance of traffic	1	LS	$5,000.00	$5,000.00
5	30 inch pipe	485	LF	$107.00	$51,895.00
6	Structures	2	EA	$3,600.00	$7,200.00
7	Restoration	1	LS	$10,000.00	$10,000.00

Qualifications (if applicable)

1. Utility relocation costs are not included.
2. Mobilization not calculated in Sub-Total, only in Sub-Total of Construction Cost

SUB-TOTAL		$84,395.00
Contingencies @	15%	$12,659.25
SUB-TOTAL OF CONSTRUCTION COST		$102,054.25
Engineering/Administration	15%	$15,308.14
TOTAL PROJECT COST		**$117,362**

Project	Estimated Cost
S-1	$69,575

S-1	Jamacia Pond Outfall BAM Filter				
Item Number	**Item Description**	**Quantity**	**Unit**	**Unit Cost**	**Amount**
1	Mobilization	1	LS	$3,000.00	$3,000.00
2	BAM Filter	1	LS	$25,000.00	$25,000.00
3	Piping	1	LS	$10,000.00	$10,000.00
4	Structures	1	LS	$10,000.00	$10,000.00
5	Restoration	1	LS	$5,000.00	$5,000.00

Qualifications (if applicable)

1. Utility relocation costs are not included.
2. Mobilization not calculated in Sub-Total, only in Sub-Total of Construction Cost

SUB-TOTAL		$50,000.00
Contingencies @	15%	$7,500.00
SUB-TOTAL OF CONSTRUCTION COST		$60,500.00
Engineering/Administration	15%	$9,075.00
TOTAL PROJECT COST		**$69,575**

Project	Estimated Cost
S-2	$148,580

S-2 South Ditch BAM Swales

Item Number	Item Description	Quantity	Unit	Unit Cost	Amount
1	Mobilization	1	LS	$5,000.00	$5,000.00
2	Demolition	1	LS	$10,000.00	$10,000.00
3	Survey/As-builts	1	LS	$5,000.00	$5,000.00
4	Maintenance of traffic	1	LS	$3,000.00	$3,000.00
5	Excavation/ Grading	1	LS	$20,000.00	$20,000.00
6	BAM Placement	1	LS	$20,000.00	$20,000.00
7	Control Structures	4	EA	$4,000.00	$16,000.00
8	Modify Inlets	8	EA	$2,000.00	$16,000.00
9	Piping	1	LS	$8,000.00	$8,000.00
10	Restoration	1	LS	$10,000.00	$10,000.00

Qualifications (if applicable)

1. Utility relocation costs are not included.
2. Costs of drainage easement acquisition are not included.
3. Mobilization not calculated in Sub-Total, only in Sub-Total of Construction Cost

SUB-TOTAL		$108,000.00
Contingencies @	15%	$16,200.00
SUB-TOTAL OF CONSTRUCTION COST		$129,200.00
Engineering/Administration	15%	$19,380.00
TOTAL PROJECT COST		**$148,580**

Project	Estimated Cost
S-3	$102,293

S-3 **Sports Park Treatment**

Item Number	Item Description	Quantity	Unit	Unit Cost	Amount
1	Mobilization	1	LS	$5,000.00	$5,000.00
2	Demolition	1	LS	$5,000.00	$5,000.00
3	Survey/As-builts	1	LS	$3,000.00	$3,000.00
4	BMP Installation	1	LS	$40,000.00	$40,000.00
5	Excavation/ Grading	1	LS	$10,000.00	$10,000.00
6	Piping/Structures	1	LS	$10,000.00	$10,000.00
7	Restoration	1	LS	$5,000.00	$5,000.00

Qualifications (if applicable)
1. Utility relocation costs are not included.
2. Costs of drainage easement acquisition are not included.
3. Mobilization not calculated in Sub-Total, only in Sub-Total of Construction Cost

SUB-TOTAL		$73,000.00
Contingencies @	15%	$10,950.00
SUB-TOTAL OF CONSTRUCTION COST		$88,950.00
Engineering/Administration	15%	$13,342.50
TOTAL PROJECT COST		**$102,293**

Project	Estimated Cost
S-4	$150,961

S-4	Robert Way Diversion/Library Dry Retention				
Item Number	**Item Description**	**Quantity**	**Unit**	**Unit Cost**	**Amount**
1	Mobilization	1	LS	$5,000.00	$5,000.00
2	Demolition	1	LS	$12,800.00	$12,800.00
3	Survey/As-builts	1	LS	$8,000.00	$8,000.00
4	Maintenance of traffic	1	LS	$10,000.00	$10,000.00
5	Excavation / Grading	1	LS	$18,000.00	$18,000.00
6	24 inch Pipe	160	LF	$105.00	$16,800.00
7	Structures	6	EA	$3,200.00	$19,200.00
8	Control Structures	1	EA	$5,000.00	$5,000.00
9	Restoration	1	LS	$20,000.00	$20,000.00

Qualifications (if applicable)
1. Utility relocation costs are not included.
2. Costs of drainage easement acquisition are not included.
3. Mobilization not calculated in Sub-Total, only in Sub-Total of Construction Cost

SUB-TOTAL		$109,800.00
Contingencies @	15%	$16,470.00
SUB-TOTAL OF CONSTRUCTION COST		$131,270.00
Engineering/Administration	15%	$19,690.50
TOTAL PROJECT COST		**$150,961**

Project	Estimated Cost
S-5	$151,027

S-5 **Robin Way Diversion/Library Dry Retention**

Item Number	Item Description	Quantity	Unit	Unit Cost	Amount
1	Mobilization	1	LS	$5,000.00	$5,000.00
2	Demolition	1	LS	$10,000.00	$10,000.00
3	Survey/As-builts	1	LS	$8,000.00	$8,000.00
4	Maintenance of traffic	1	LS	$8,000.00	$8,000.00
5	30/24 inch pipe	225	LF	$106.00	$23,850.00
6	Excavation/Grading	1	LS	$18,000.00	$18,000.00
7	Structures	3	EA	$4,000.00	$12,000.00
8	Control Structures	1	EA	$5,000.00	$5,000.00
9	Restoration	1	LS	$25,000.00	$25,000.00

Qualifications (if applicable)

1. Utility relocation costs are not included.
2. Costs of drainage easement acquisition are not included.
3. Mobilization not calculated in Sub-Total, only in Sub-Total of Construction Cost

SUB-TOTAL		$109,850.00
Contingencies @	15%	$16,477.50
SUB-TOTAL OF CONSTRUCTION COST		$131,327.50
Engineering/Administration	15%	$19,699.13
TOTAL PROJECT COST		**$151,027**

Project	Estimated Cost
S-6	$252,823

S-6 **Rosada Street Repair/Replacement**

Item Number	Item Description	Quantity	Unit	Unit Cost	Amount
1	Mobilization	1	LS	$10,000.00	$10,000.00
2	Demolition	1	LS	$15,000.00	$15,000.00
3	Survey/As-builts	1	LS	$10,000.00	$10,000.00
4	Maintenance of traffic	1	LS	$10,000.00	$10,000.00
5	30 inch pipe	220	LF	$107.00	$23,540.00
6	24 Inch pipe	445	LF	$105.00	$46,725.00
7	18 inch pipe	325	LF	$96.00	$31,200.00
8	15 inch pipe	110	LF	$91.00	$10,010.00
9	Structures	7	EA	$3,000.00	$21,000.00
10	Restoration	1	LS	$15,000.00	$15,000.00

Qualifications (if applicable)

1. Utility relocation costs are not included.
2. Mobilization not calculated in Sub-Total, only in Sub-Total of Construction Cost

SUB-TOTAL		$182,475.00
Contingencies @	15%	$27,371.25
SUB-TOTAL OF CONSTRUCTION COST		$219,846.25
Engineering/Administration	15%	$32,976.94
TOTAL PROJECT COST		**$252,823**

Project	Estimated Cost
S-7	$73,727

S-7 **Robin Way Repair/Replacement**

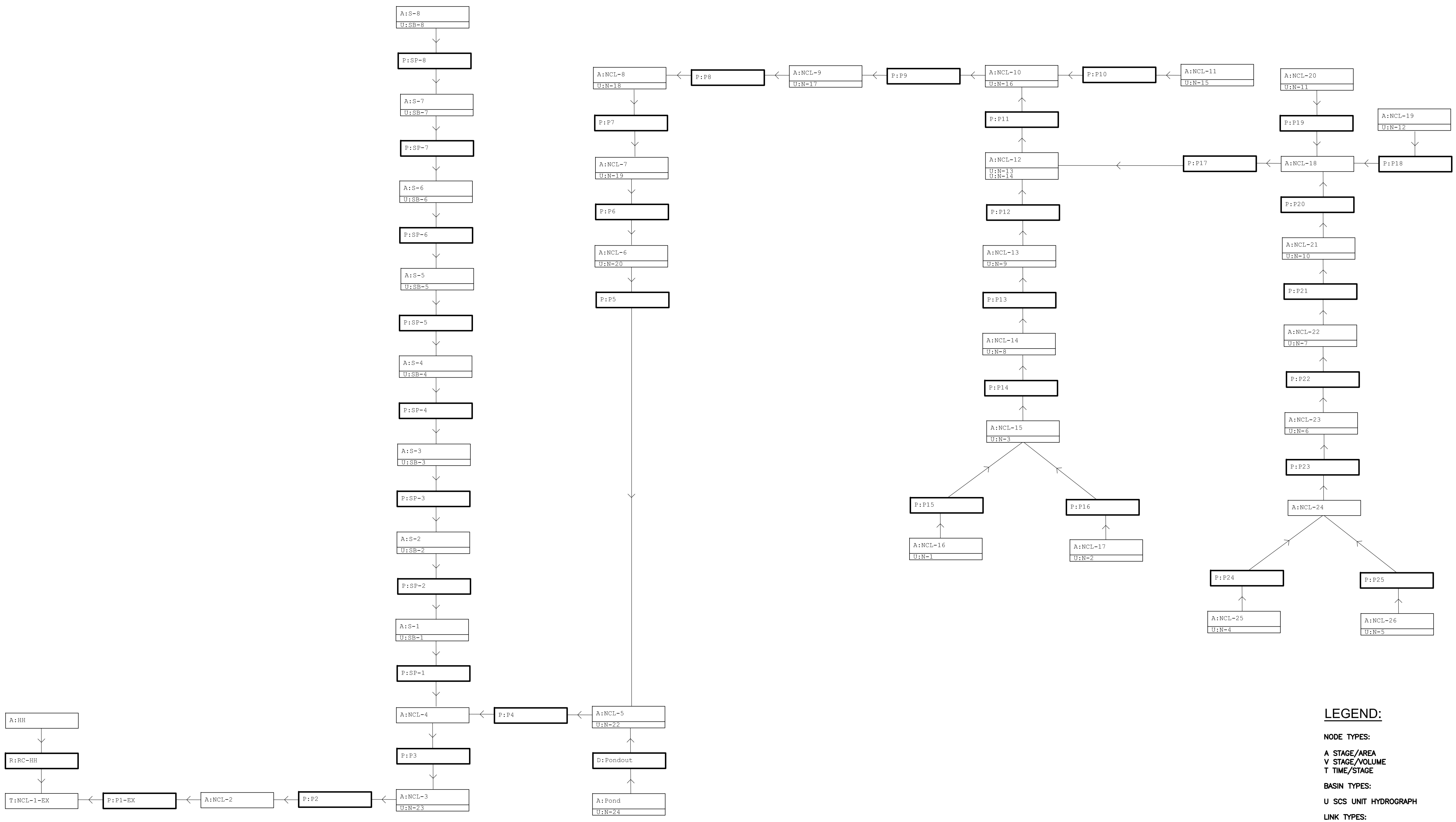
Item Number	Item Description	Quantity	Unit	Unit Cost	Amount
1	Mobilization	1	LS	$5,000.00	$5,000.00
2	Demolition	1	LS	$7,800.00	$7,800.00
3	Survey/As-builts	1	LS	$2,000.00	$2,000.00
4	Maintenance of traffic	1	LS	$3,000.00	$3,000.00
5	30 inch pipe	200	LF	$107.00	$21,400.00
6	Structures	2	EA	$3,600.00	$7,200.00
7	Restoration	1	LS	$10,000.00	$10,000.00

Qualifications (if applicable)

1. Utility relocation costs are not included.
2. Mobilization not calculated in Sub-Total, only in Sub-Total of Construction Cost

SUB-TOTAL		$51,400.00
Contingencies @	15%	$7,710.00
SUB-TOTAL OF CONSTRUCTION COST		$64,110.00
Engineering/Administration	15%	$9,616.50
TOTAL PROJECT COST		**$73,727**

Nodal Diagrams



LEGEND:

NODE TYPES:

A STAGE/AREA
V STAGE/VOLUME
T TIME/STAGE

BASIN TYPES:

U SCS UNIT HYDROGRAPH

LINK TYPES:

P PIPE
W WEIR
C CHANNEL
D DROP STRUCTURE
R RATING CURVE

FLOW DIRECTION

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CITY OF SATELLITE BEACH
STORMWATER MASTER PLAN
UPDATE

565 CASSIA BLVD
SATELLITE BEACH, FL 32937

ISSUED

M&H NO.:	1000716-172383.01
DATE:	OCTOBER 2018
DESIGNED BY:	MKS
DRAWN BY:	- -
CHECKED BY:	- -

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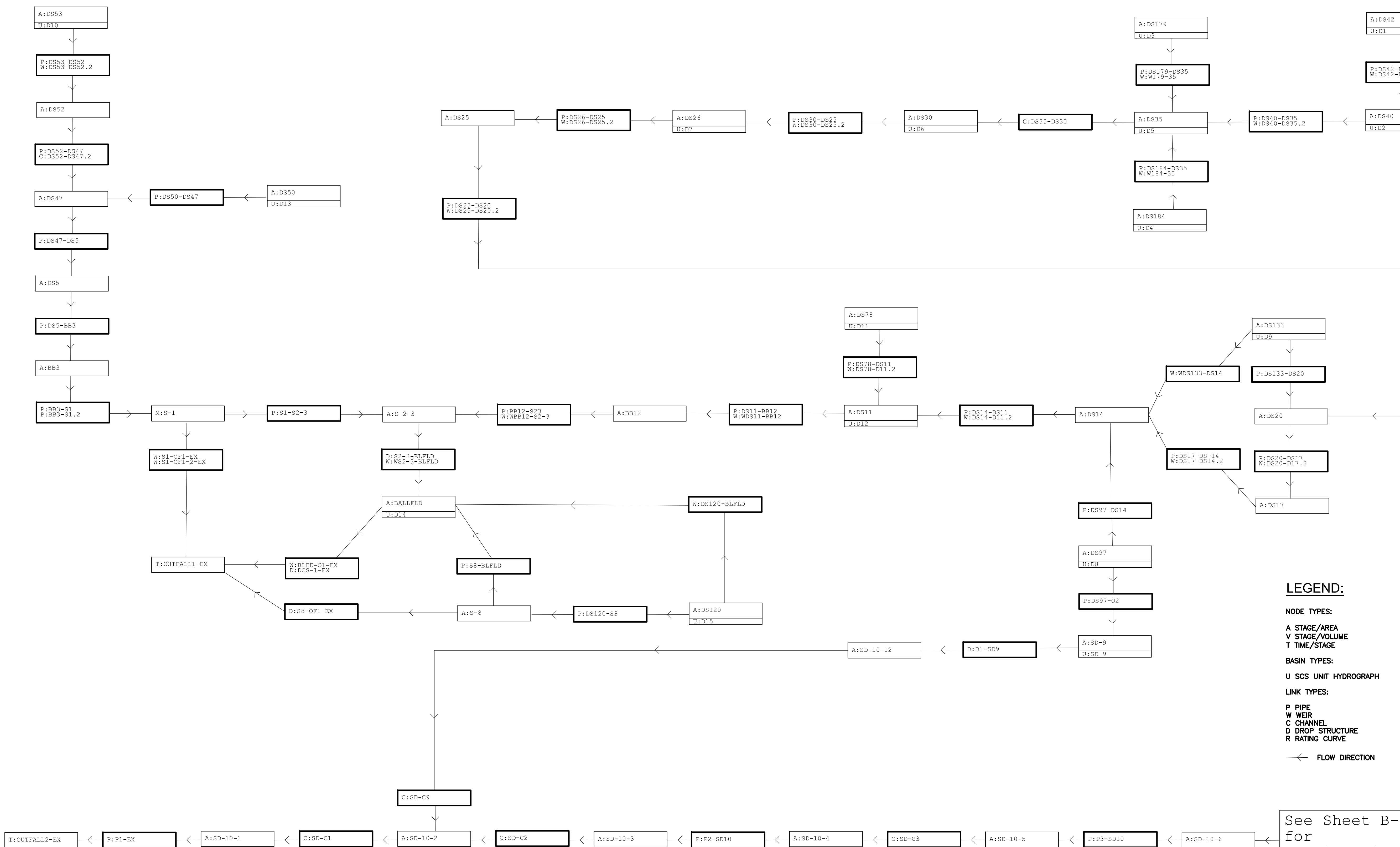
SHEET CONTENTS

NORTH DRAINAGE
BASIN STORMWATER
IMPROVEMENTS

SHEET NO. of

FIG A



See Sheet B-2 for Continuation

LEGEND:

NODE TYPES:

A STAGE/AREA
V STAGE/VOLUME
T TIME/STAGE

BASIN TYPES:

U SCS UNIT HYDROGRAPH

LINK TYPES:

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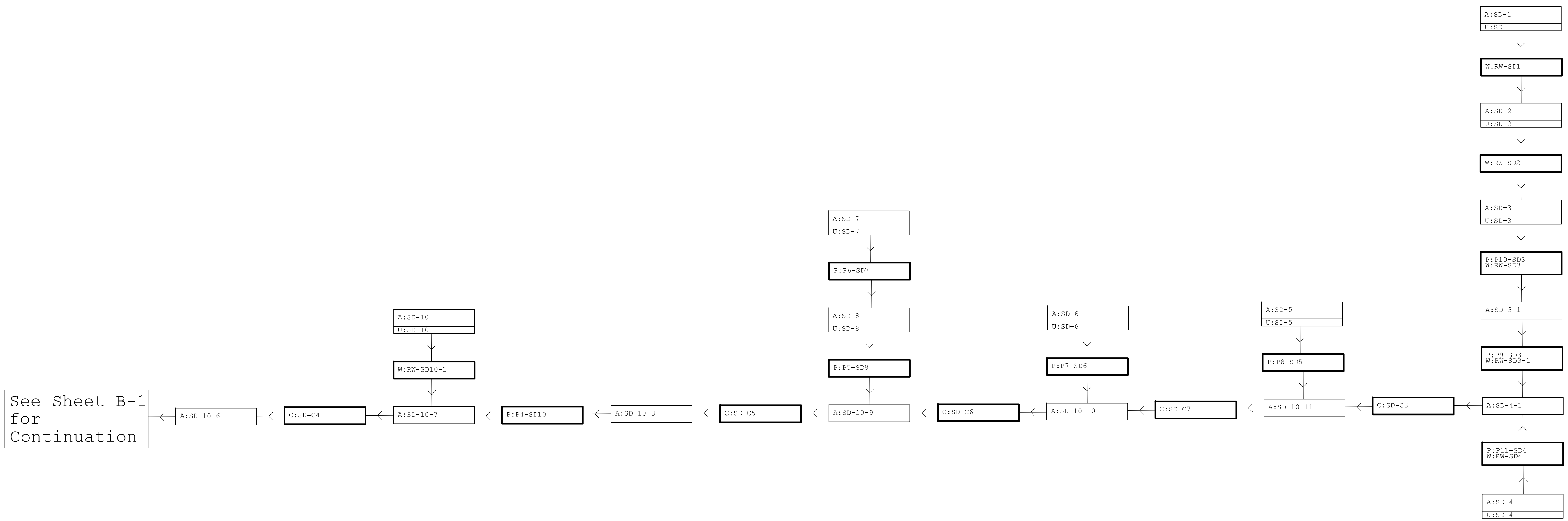
SHEET CONTENTS
DESOTO & SOUTH DITCH BASIN STORMWATER IMPROVEMENTS PRE-IMPROVEMENT NODAL DIAGRAM

SHEET NO. of

FIG B-1



LEGEND:

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T TIME/STAGE

BASIN TYPES:

U SCS UNIT HYDROGRAPH

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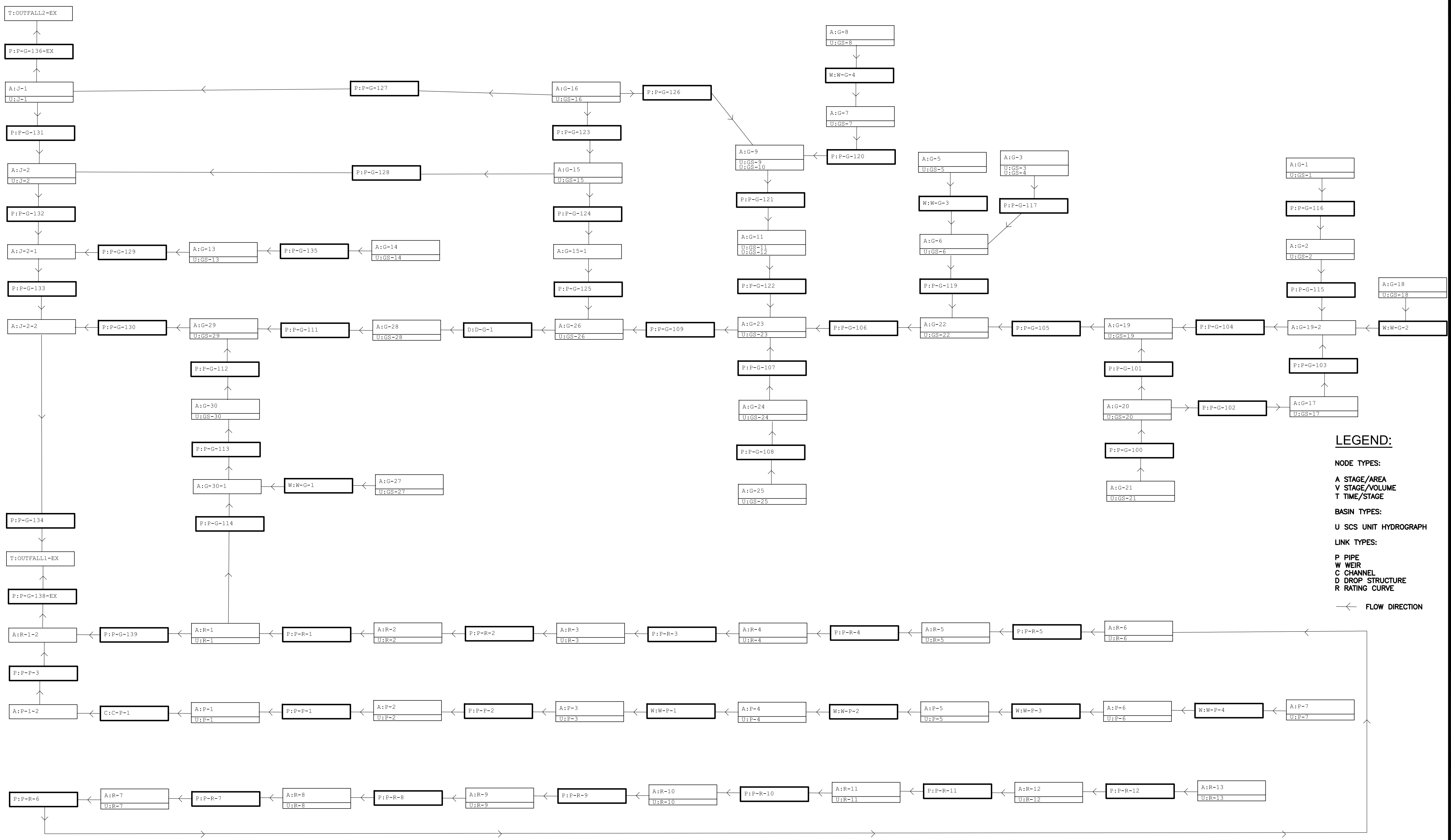
DESOTO & SOUTH DITCH BASIN STORMWATER IMPROVEMENTS PRE-IMPROVEMENT NODAL DIAGRAM

SHEET NO. of

FIG B-2



LEGEND:

NODE TYPES:

A STAGE/AREA
V STAGE/VOLUME
T TIME/STAGE

BASIN TYPES:

U SCS UNIT HYDROGRAPH

LINK TYPES:

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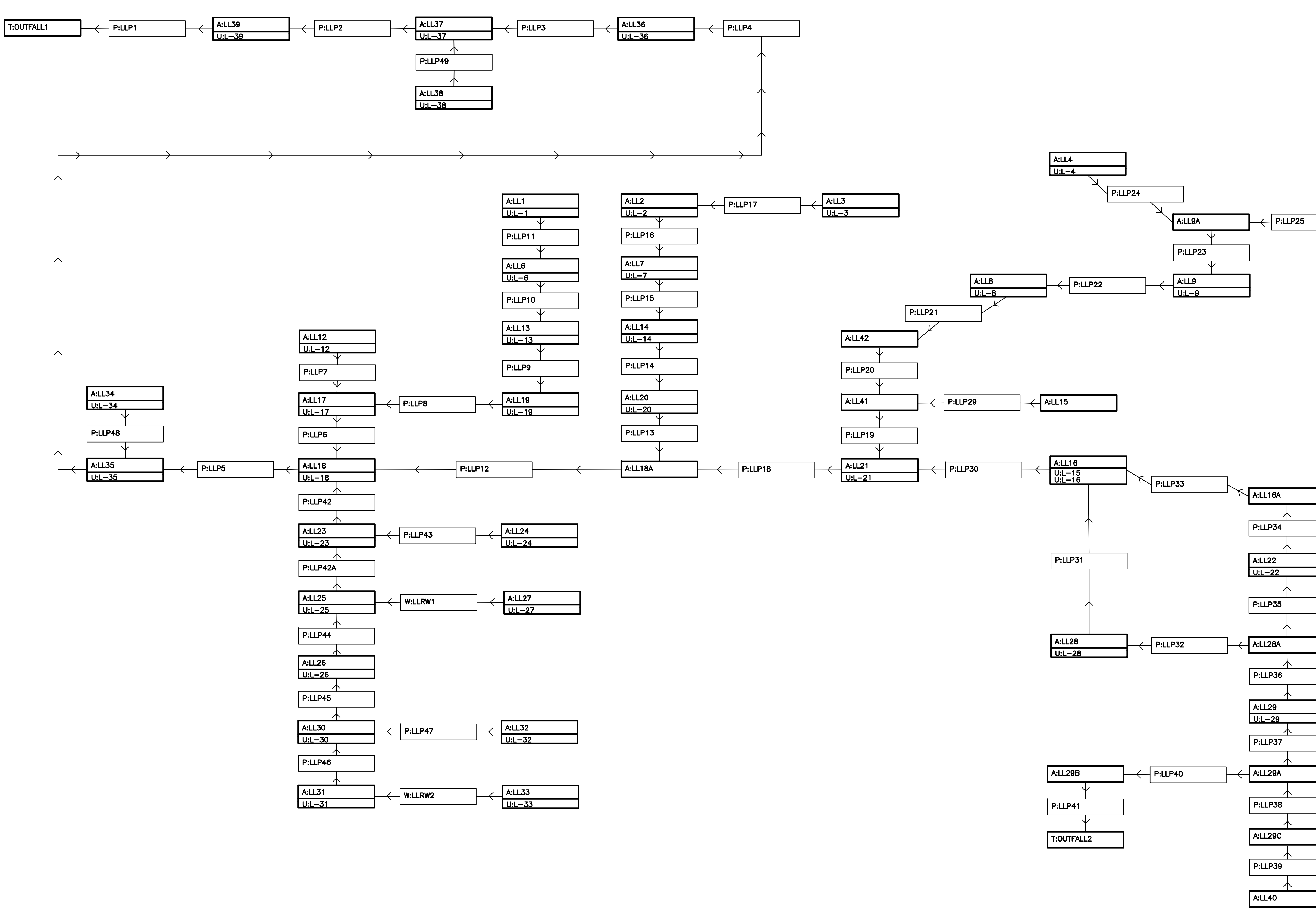
SHEET CONTENTS
GRANT BASIN STORMWATER IMPROVEMENTS PRE IMPROVEMENT NODAL DIAGRAM

SHEET NO. of

FIG C



NORTH
(APPROX.)

LEGEND:

NODE TYPES:

A STAGE/AREA
V STAGE/VOLUME
T TIME/STAGE

BASIN TYPES:

U SCS UNIT HYDROGRAPH

LINK TYPES:

P PIPE
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R RATING CURVE

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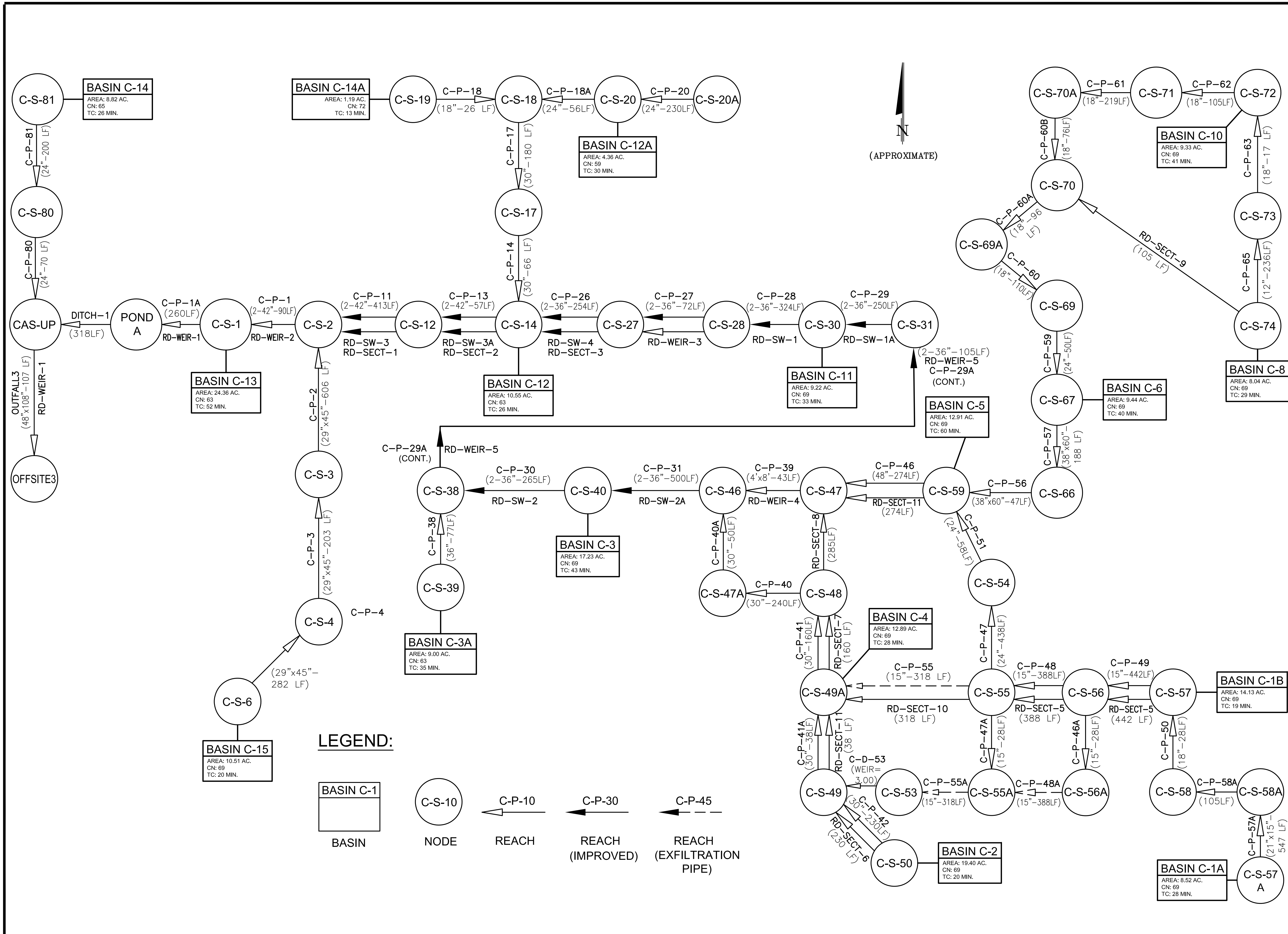
SHEET CONTENTS
LORI LAINE BASIN STORMWATER IMPROVEMENTS PRE-IMPROVEMENT NODAIL DIAGRAM

SHEET NO.
of

FIG D



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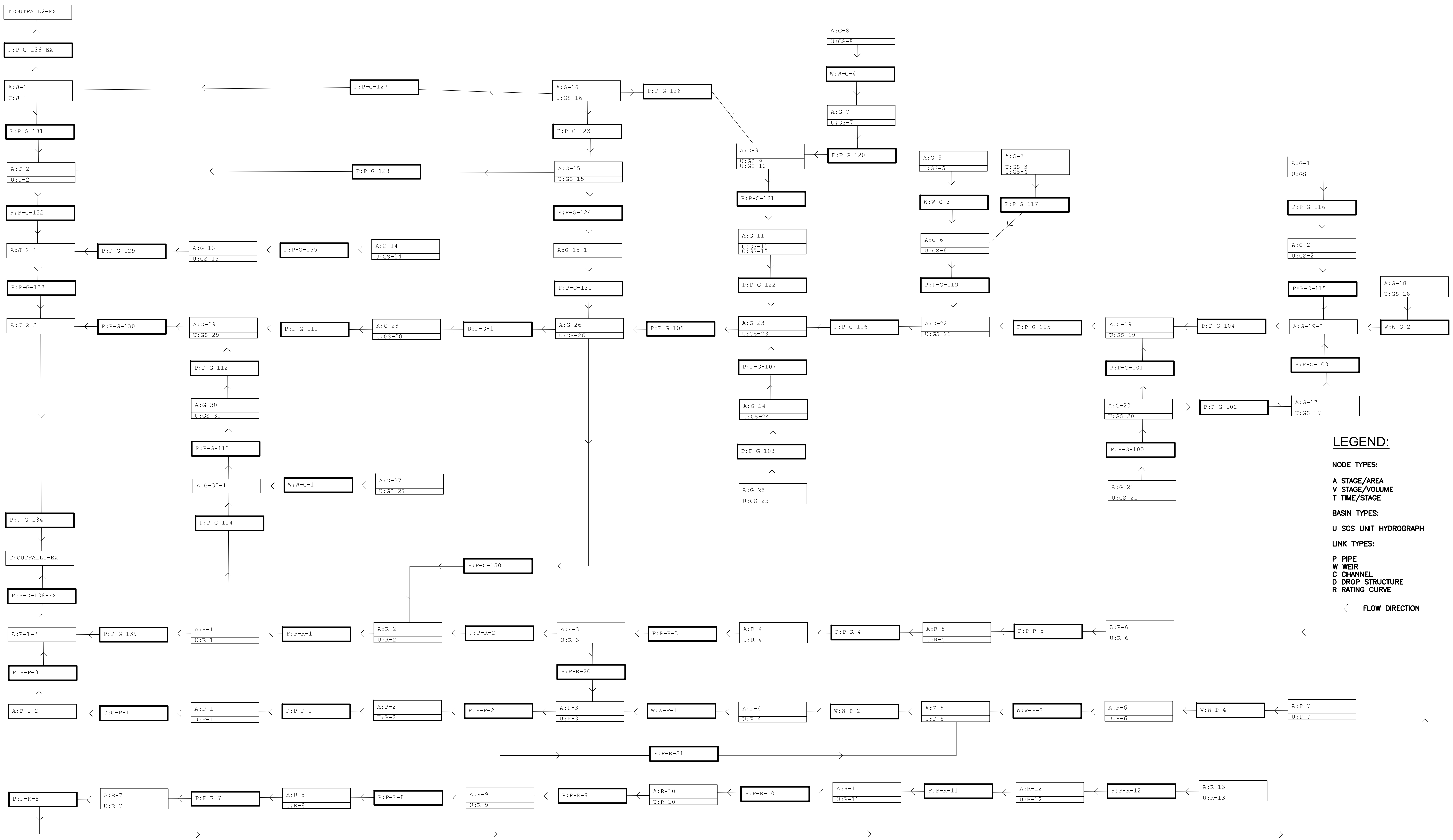
SHEET CONTENTS
CASSIA BASIN STORMWATER IMPROVEMENTS PRE IMPROVEMENT MODEL DIAGRAM

SHEET NO. of

FIG E



LEGEND:

NODE TYPES:

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V STAGE/VOLUME
T TIME/STAGE

BASIN TYPES:

U SCS UNIT HYDROGRAPH

LINK TYPES:

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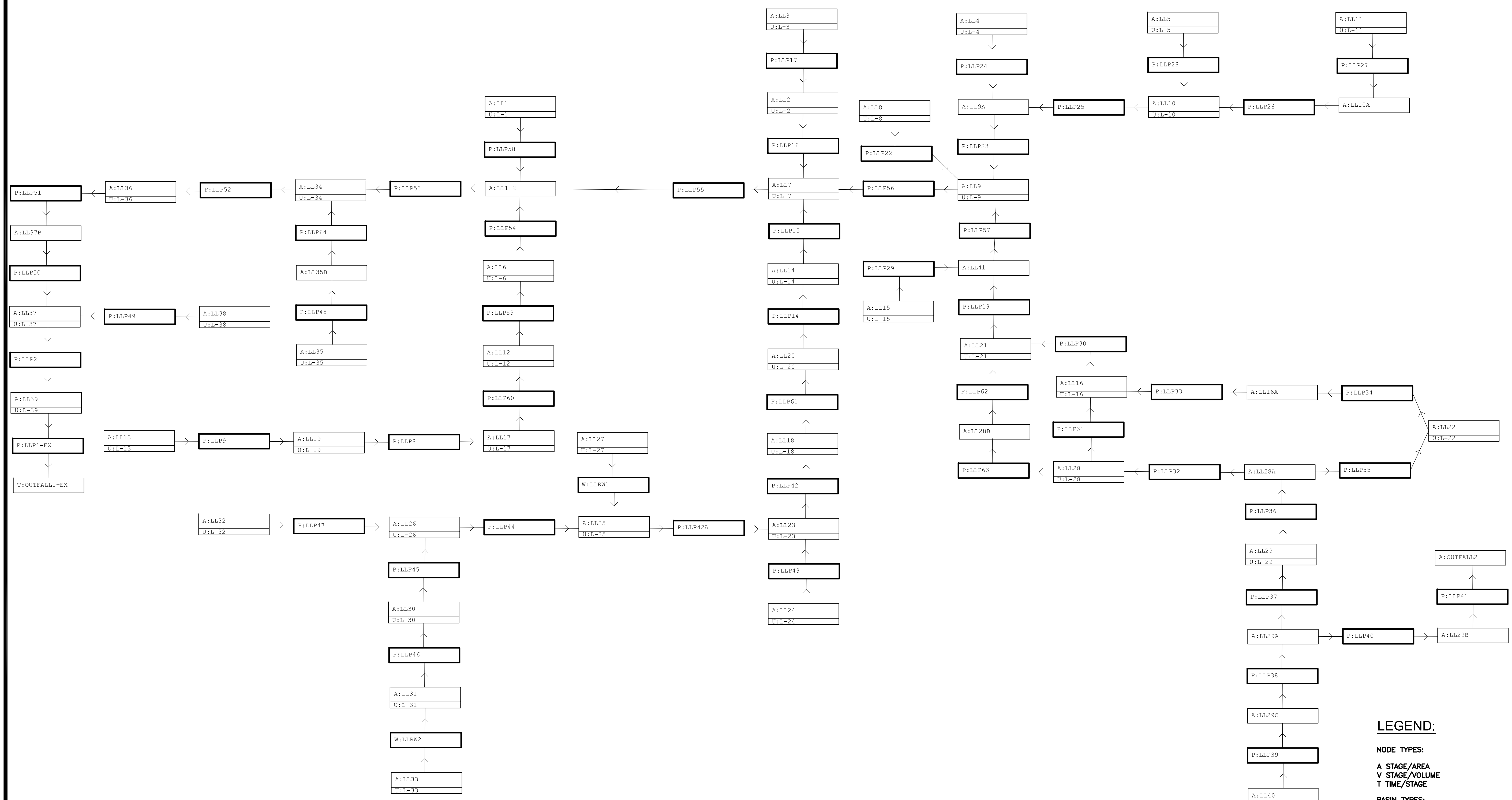
SHEET CONTENTS
GRAIN BASIN STORMWATER IMPROVEMENTS POST -IMPROVMENT NODAL DIAGRAM

SHEET NO.
of

FIG F



LEGEND:

NODE TYPES:

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T TIME/STAGE

BASIN TYPES:

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SHEET CONTENTS
LORI LAINE
STORMWATER
IMPROVMENTS
POST-IMPROVEMENT
NODAL DIAGRAM

SHEET NO.
of

FIG G