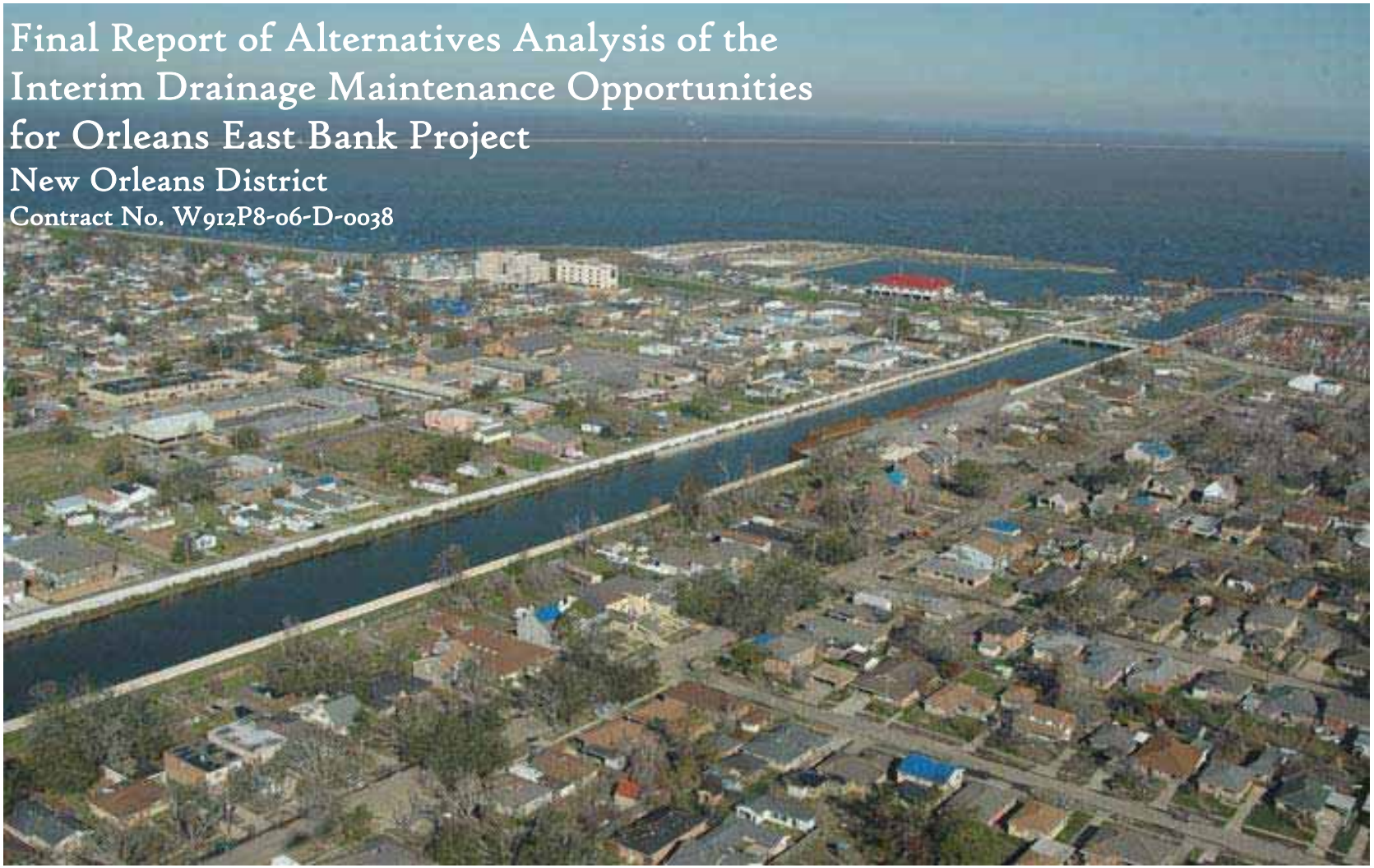
DMJM HARRIS | AECOM

Final Report of Alternatives Analysis of the Interim Drainage Maintenance Opportunities for Orleans East Bank Project

New Orleans District

Contract No. W912P8-06-D-0038



Prepared for
US Army Corps of Engineers
New Orleans District

Prepared by
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August 18, 2006

Appendix B - Projects

APPENDIX B

PROJECTS

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This appendix includes the twenty projects that were identified during this Alternatives Analysis. Various combinations of these projects were developed and further evaluated as alternatives to provide the capacity required at each outfall canal by gate closures during storm surge events. Some of these projects, however, were not suitable to include in the alternatives based on the evaluation factors. All projects considered during the study are documented here. The following is a list of the projects:

1 Add pumping capacity at the lake on the west side of 17th Street Canal

2 Add pumping capacity at the lake on the east side of 17th Street Canal

3 Add pumping capacity at the lake on Orleans Avenue Canal

4 Add pumping capacity at the lake on London Avenue Canal

5 Convert 17th Street Canal to Force Main to lake

6 Convert Orleans Avenue Canal to Force Main to lake

7 Convert London Avenue Canal to Force Main to lake

8 Use City Park as a Detention Area to Relieve the Orleans Avenue Canal

9 Create Detention Area in New Basin Canal from 17th Street Canal

10 Divert flow from DPS 3 via Florida Canal to DPS 19

11 Redirect flow at Monticello Canal to the Mississippi River – Orleans Parish

12 Redirect DPS 2 discharge to DPS 7, and add pumping capacity to DPS 7 and to the Outfall of the Orleans Avenue Canal

13 Redirect DPS 2 discharge to DPS 7 to detention in City Park

14 Redirect flow from DPS 1 to DPS 2

15 Redirect from of DPS 4 from the London Avenue Canal to the Industrial Canal via Prentiss, Peoples, and Dwyer Rights-of-way

16 Redirect flow from Hoey's Basin to the Mississippi River – Jefferson Parish

17 Redirect flow from DPS 3 to Bayou St. John and pump to the lake

18 Redirect flow from DPS 3 to Bayou St. John and store in City Park

19 Redirect flow from DPS 2 to Bayou St. John and pump to the lake

20 Redirect flow from DPS 2 to Bayou St. John and store in City Park

Each discussion begins with a statement of the **Project Objective**, followed by descriptions of:

- The **Existing Conditions** of the canals, pump stations, and other facilities that relate to the project, and
- The **Proposed Work**.

These descriptions are followed, in turn, by the considerations of key elements of the project under discussion. These key elements include **Geotechnical, Structural, Mechanical, Electrical, Construction, and Environmental Considerations**.
The projects were evaluated during their development to assure that each project contributed to at least one viable alternative that would contribute to the objective of at least one canal. If a project was evaluated and determined to no longer be a contribution to a viable alternative, no further work was done from that time in consideration of these key elements.

Each project discussion includes an **Order of Magnitude Cost Estimate**, an **Implementation Time Line**, and a section entitled **Further Considerations** that includes information related to potential risks and other issues that are difficult to categorize.

Each discussion ends with a **Conclusion** that documents how a determination was reached regarding whether or not the project is recommended for further consideration as a constituent part of an alternative in the Summary Report.

In the interest of avoiding repetition in each of the twenty discussions of the projects, a brief review of the **Environmental Considerations** associated with these project follows.

All the projects, like all Federal actions, are subject to the requirements of the National Environmental Policy Act (NEPA). As the alternatives developed from these projects are intended to protect against the threat of flooding, these alternatives would be deemed to

be a change or addition to the on-going Federal actions that are the subject of draft Environmental Assessment #433 - *U.S. Army Corps of Engineers Response to Hurricanes Katrina and Rita in Louisiana.*

In addition, there are considerations that apply to certain projects, which are identified, as appropriate, in the individual project discussion. These considerations include:

- Section 106 of the National Historic Preservation Act.

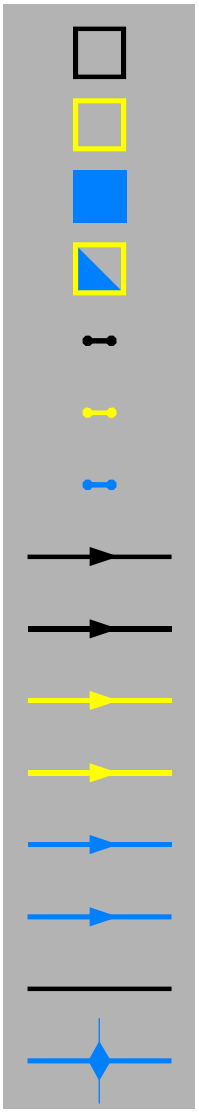
  This states that the Advisory Council on Historic Preservation must be afforded an opportunity to comment on actions that may impact a property eligible for the NRHP. In New Orleans there are numerous buildings, sites, districts, and archaeological sites that are listed on, or eligible for, the NRHP. The properties potentially affected are noted in the project discussions. As the SHPO must be consulted on all projects because of the eligibility of the drainage system, the specific requirements for each project can be determined during the same consultation.
- The Louisiana Natural and Scenic and Historic and Scenic Rivers System created under the Louisiana Natural and Scenic Rivers Act.

  Bayou St. John has been designated a Scenic River. Any project affecting the bayou must obtain a permit from LDWF.
- Executive Order 12898, Federal actions to Address Environmental Justice in Minority Populations and Low-Income Populations.

  This stipulates that Federal agencies must identify and address disproportionately high or adverse human health or environmental effects of its activities on minority and low-income populations. In each project discussion, potentially affected populations are noted.

The **Legend** on the following page applies to all plates found in each of the 20 Project Discussions except for those showing typical sections.

LEGEND:



EXISTING PUMP STATION (NOT AFFECTED)

EXISTING PUMP STATION (AFFECTED)

PROPOSED PUMP STATION

EXISTING PUMP STATION (MODIFIED)

EXISTING GATE STRUCTURE (NOT AFFECTED)

EXISTING GATE STRUCTURE (MODIFIED)

PROPOSED GATE STRUCTURE

EXISTING ABOVE GROUND WATER FLOW (NOT AFFECTED)

EXISTING BELOW GROUND WATER FLOW (NOT AFFECTED)

EXISTING ABOVE GROUND WATER FLOW (AFFECTED)

EXISTING BELOW GROUND WATER FLOW (AFFECTED)

PROPOSED ABOVE GROUND WATER FLOW

PROPOSED BELOW GROUND WATER FLOW

EXISTING LEVEE

PROPOSED LEVEE

IDMO ALTERNATIVES ANALYSIS		
LEGEND		
SCALE: 1" = N.T.S.		
DATE: 08/04/06		

Project No. 1

Add pumping capacity at lake to the west side of the 17th St. Canal

Objective

The objective of this project is to increase the pumping capacity at the 17th St. Canal and Lake Pontchartrain by adding a pumping station and intake basin at the West side of the 17th St. Canal. This pumping station could be temporary or permanent.

Existing Conditions

The 17th Street Canal is located on the west side of the city and straddles the Orleans Parish and Jefferson Parish lines. Three pump stations discharge a total of 10,500 cfs into the 17th Street Canal during normal rainfall events.

A gate structure and temporary pumps are under construction where the 17th St. Canal discharges into Lake Pontchartrain. **See Plate 1-1**, Location Layout. The gate is intended to protect the canal from storm surges and the pumps are intended to discharge storm water otherwise contained in the canal by the gate. Scheduled to be in operation by October 31, 2006, these pumps have a nominal capacity of 6,000 cfs.

Proposed Work

This project provides additional discharge capacity to the 17th Street Canal. It will be necessary to construct an intake basin to the northwest of the canal direction of flow that would leave the canal channel immediately south of the Old Hammond Hwy. bridge. The intake basin would be a concrete U-shaped canal 30' wide by 15' deep in order to accommodate the flow. The pump arrays would discharge into the lake between the US Coast Guard Station and the gates now under construction. A slab bridge would be built over the proposed U-shaped canal at Old Hammond Hwy.. The floodwall along the 17th Street Canal would require removal and reconstruction at the proposed intake. Some developed property along Lake Ave. and II Tonys Restaurant on Old Hammond Hwy. would be relocated by the intake basin.

Construct a pump station housing three 1,000 cfs horizontal pumps and one 300 cfs vertical pump. This could be a temporary installation, or it could be designed to be combined into a future permanent pump station.

The recommended capacity to minimize impacts on interior storm water elevations is 7,300 cfs. Therefore, an additional pumping capacity of, at least, 3,300-7,300 cfs is

needed in the 17th St. Canal, depending on alternate projects selected in conjunction with this project. Under this project the 17th Street Canal would be operated with a water surface elevation of 1.0 NAVD88 at the lake. This level would provide pumping capacity at DPS 6 equivalent to conditions existing during normal "gate open" times. All pump drives would be diesel with back-up generation for engine control panels and auxiliary equipment. Fuel storage would be based on consumption for projected storm periods.

Geotechnical Considerations

- Subsoil Conditions

  Based on borings made in the general area, subsoil conditions at the proposed construction site on the west side of the 17th Street Canal near the Old Hammond Highway would be expected to consist of several feet of surface improvement, underlain by a highly compressible stratum of soft organic clay or humus to about the 10 ft. depth. The subsoils below this primarily consist of very soft to soft clays to about the 65 ft. depth. However, a sand layer would be expected between about the 35 and 40 ft. depths. Beginning at the 65 ft. depth, Pleistocene age soils were encountered and primarily consist of medium dense sand and silty sand to about the 80 ft. depth and then preconsolidated medium stiff to stiff clay below this to at least the 100 ft. depth below ground surface.

- Conceptual Foundation System

  Based on the subsoil conditions described above, it is believed that all important structures should be supported on driven piles. For timber, or composite, piles supporting the pump station and pipe bents on the lake side, a capacity of about 15 tons (FS = 2.0) in compression should be available. This is based on a 70 to 75 ft. long timber, or composite, pile (below existing grade). Piles used to support the open channel would have a capacity of several tons less for the same pile tip depth. For piles subjected to uplift and lateral loading, a composite timber pile should not be considered. Higher capacities on the order of 30 to 50 tons would be available if steel "H" or pipe piles or prestressed concrete piles are used for support. These type piles would probably be required for the proposed bridge at

Old Hammond Highway. They should also be considered if a greater design life than typically provided by timber piles is desired.

- Water Diversion and Cofferdam Arrangement

  Some specialized form of cofferdam system would be required where the U-shaped channel ties into the 17th Street Canal floodwalls south of Old Hammond Highway. A more conventional cofferdam system would be required to construct the U-shaped channel between 17th Street Canal and the proposed pump platform. For cost estimating purposes, a sheet pile penetration of about 60 ft. below ground surface would be expected. The cofferdam should be internally braced at least at one location near the top of the cofferdam walls. Some form of forced dewatering (deep wells, well points, etc.) would probably be required to dewater the shallow sands that would be expected at about the 35 to 40 ft. depth below ground surface.

- Additional Geotechnical Investigations

  In general, the existing geotechnical data that has been developed for the 17th Street Canal floodwall and the existing interim closure structure should be used in the analysis of the proposed new construction. In addition to this, at least soil borings near the intersection with 17th Street Canal, at the proposed bridge and at the proposed pump platform should be made to supplement that data. Geotechnical analyses with the regard to the compression, tension and lateral capacities of piles would be needed for support of the various elements of the structures. Analyses would also be needed relative to the temporary retaining structures (structural and dewatering). Geotechnical analyses should also be made for the specialized cofferdam where the u-shaped channel ties into the 17th Street Canal.

Structural Considerations

- The foundations of the new bridge crossing at Old Hammond Hwy. shall be supported on steel piles to reduce vibration and settlement within the area.
- All foundations shall be designed in accordance with the Geotechnical Report's recommendations. The engine deck for the pump station would be elevated one foot above the base flood elevation as shown on the FIRM map.

- The intake and discharge basins (open concrete channel) shall be sized to accommodate the hydraulic requirements of this report.

Due to the location and orientation of the pump station architectural considerations shall be coordinated with local agencies. As for the structural integrity of the pump station, all components of the structure shall be designed in accordance with the state and local building code requirements and be able to withstand winds in excess of 150 mph. The foundation shall be supported on composite timber piles (due to water table fluctuations) while the open channel (intake and discharge basins) will be founded on timber piles.

Mechanical/Electrical Considerations

- Mechanical

  The pump station will require three (3) 1000 cfs horizontal pumps, diesel driven with the motors rated at 2000 HP. Sufficient fuel storage would need to be provided at the site to operate the pumps for up to 36 hours.

- Electric Service

  The local electric service is provided by Entergy. The anticipated electrical load at the pump station is including:

  - One (1) 300 cfs vertical pump, motor rated at 700HP, medium voltage or approximate 520 KW
  - Balance of facility loads including power, lighting and auxiliary systems at approximate 300 KW. The electrical system will be stepped down to 480V and 120/208V with transformers and local distribution panels.

  The peak demand in the pumps station is approximate at 0.8 MW. Two service feeders shall be provided by Entergy for redundancy. In case of loss of one feeder the other feeder shall be capable of providing power for the entire pump station demand. Main Substation will consist of MV vacuum type breakers and metering devices to meet Entergy standards. Service availability will be coordinated with Entergy during the design development.

- Standby Power

  Standby power source will be required in case of total black-out on utility grid occurs coincidence with the flood event. There are two options for providing standby power.

- Option A: Locally installed 1-1MW diesel generator to meet the peak demand. The generator will be specified for continuous duty with sufficient fuel storage to operate the pumps up to 36 hours.
- Option B: Select 2MW diesel generators as a module centrally located on a hardened infrastructure to ensure availability. The total generation capacity shall be sufficient to provide backup power to all new pump stations. The fuel storage to operate the pumps up to 36 hours. The advantage on this option is that centralization of generators will make system more reliable and flexible and easier for maintenance. The initial installation cost will be lower because the central generation capacity will be lower than sum of generation capacity at each pump station. But additional cost for transmission from central station to each pump station will be added.

Construction Considerations

- Since the work site is outside the canal in both options, some work can be done in the dry.
- Sheet pile will be required for all excavations. During construction, the contractor will have to protect the existing levees on the lake and the canal.
- Traffic on Old Hammond Hwy must be maintained during construction of the channel and bridge.
- Temporary sheet piling can may used as an alternative for providing stability of the existing levee at the junction points of:
  1) the existing levee and intake basin and
  2) the pump station or pump platforms and levee interface.
- As for the existing roadway, the construction of the bridge shall be phased so that traffic, to some degree, can be maintained. The bridge shall be built prior to the construction of the levee.
- Prior to the construction, the Contractor shall implement a construction procedure that will not impose on the integrity of the existing canal and levee.

Environmental Considerations

This project, like all the others, would satisfy the requirements of NEPA through a supplement to EA #433.

Order of Magnitude Cost Estimate

Cost Estimate - Project 1	
Environmental	$0
Right-of-Way Acquisition	$4,000,000
Design	$4,181,737
Construction	$48,089,977
Total	**$56,271,714**

Roadmap/Timeline

Design – This would be divided into two phases that would be initiated concurrently, M&E and Civil. The M&E would include a fast-track specification of pumps and other equipment with long lead time deliveries. M&E fast-track should take 2 months and other design should take 4 months.

Environmental Clearance – Concurrent with design

Permits – The permits required concern water quality, and are issued by LDNR, this should be coordinated among the agencies to take no more than one month after final design is completed and be concurrent with the construction bid process.

LERRD – Land required for the pump station and relocated levee is owned by various owners. ROW to install the improvement would have to be purchased from these owners. This must be concurrent with Design and could be the critical path of the Civil design.

Construction – The 3300 cfs pump station proposed would take approximately 18 months to complete. The pump station should be ready for pump installation within 18 months.

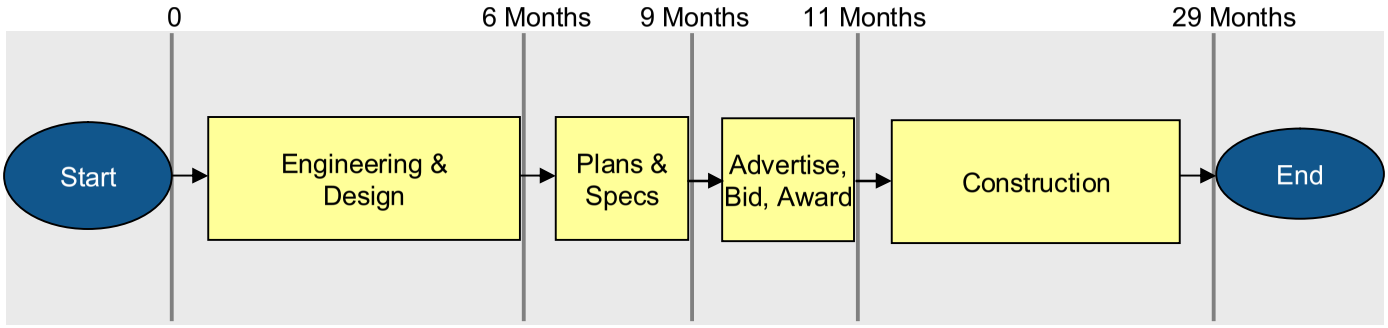
Further Considerations

- The pump station could be combined into a more permanent drainage solution.
- There would be minimal impact to the existing flow in the channel.
- Much of the work could be accomplished in the dry.
- A permanent pump station could be located on the canal while this site continues to operate in the interim.
- Relocation costs would include II Tonys Restaurant on Old Hammond Hwy. and much of the development on the first block of Lake Ave. on the east side of that street.

Conclusions

It is recommended that this project should be analyzed further for possible implementation. The addition of the pump station could either complement the pumps already on site or become a permanent drainage solution. This project would provide a great benefit to the community that would offset the residential and commercial takings.

Project 1



Environmental Compliance – Potential environmental issues, as discussed in the "Environmental Consideration" section, can be addressed during the engineering and design phase in order to keep off the critical path.

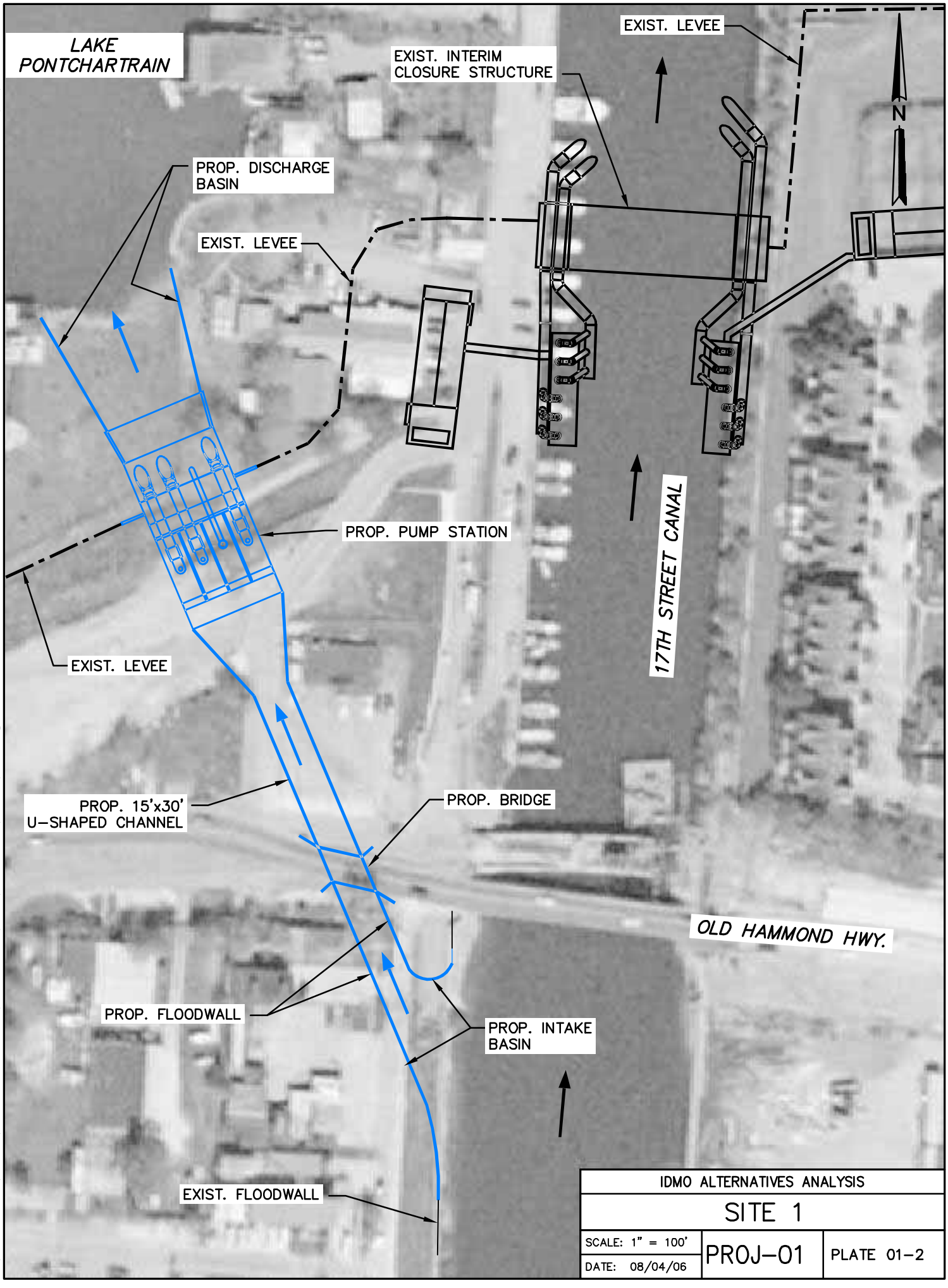
LERRD's – Any potential LERRD's , as discussed in the "Proposed Work" section, can be addressed during the engineering and design phase in order to provide for construction without causing delay.

Pump Procurement – Specifics on pumps can be identified early in the engineering and design phase in order to be delivered on-site, when needed, without causing delay. This should be done concurrent with overall schedule. This is not a critical path item in this flow chart. (estimated 18 month lead time required)

IDMO ALTERNATIVES ANALYSIS

LOCATION LAYOUT

SCALE: 1" = 2000'	PROJ-01	PLATE 01-1
DATE: 08/04/06		



IDMO ALTERNATIVES ANALYSIS		
SITE 1		
SCALE: 1" = 100'	PROJ-01	PLATE 01-2
DATE: 08/04/06		

Looking across Old Hammond Hwy from the lake side to 17th Street Canal

Proposed pumping station to be built behind II Tonys

Gate/Pump construction at 17th Street Canal/Lake Ponchartrain.

Site of proposed pumping station/gate.

Outfall of proposed pumping station/gate to Lake Ponchartrain

Looking from where proposed pump station/gate to 17th Street Canal.

Project No. 2

Add pumping capacity at lake to the east side of the 17th St. Canal

Objective

The objective of this project is to increase the pumping capacity at the 17th St. Canal and Lake Pontchartrain by adding a pumping station and intake basin at the East side of the 17th Street Canal. This pumping station could be temporary or permanent.

Existing Conditions

The 17th Street Canal is located on the west side of the city and straddles the Orleans Parish and Jefferson Parish lines. Three pump stations discharge a total of 10,500 cfs into the 17th Street Canal, which discharges north into Lake Pontchartrain.

A gate structure and temporary pumps are under construction where the 17th St. Canal discharges into Lake Pontchartrain. **See Plate 2-1**. The gate is intended to protect the canal from storm surges and the pumps are intended to discharge storm water otherwise contained in the canal by the gate. Scheduled to be in operation by October 31, 2006, these pumps have a nominal capacity of 6,000 cfs.

Proposed Work

This project provides additional discharge capacity to the 17th Street Canal. It will be necessary to construct an intake basin to the northeast of the canal direction of flow that would open up just north of the Old Hammond Hwy. bridge. The pump arrays would discharge back into the 17th Street Canal on the other side of the existing gate structure. The floodwall along the 17th Street Canal would require removal and reconstruction at the proposed intake. Some developed property including a row of condominiums and tennis courts would need to be removed. The engine platform for the current pumps would also need to be removed and relocated.

Construct a pump station housing three 1,000 cfs horizontal pumps and one 300 cfs vertical pump. This could be a temporary installation, or it could be designed to be combined into a future permanent pump station.

The recommended capacity to minimize impacts on interior storm water elevations is 7,300 cfs. Therefore, an additional pumping capacity of, at least, 3,300-7,300 cfs is needed in the 17th St. Canal, depending on alternate projects selected in conjunction with this project. Under this project the 17th Street Canal would be operated with a water

surface elevation of 1.0 NAVD88 at the lake. This level would provide pumping capacity at DPS 6 equivalent to conditions existing during normal "gate open" times. All pump drives would be diesel with back-up generation for engine control panels and auxiliary equipment. Fuel storage would be based on consumption for projected storm periods.

Construction Considerations

- Prior to the construction of the additional engine platform and pump station foundations, the Contractor shall implement a construction procedure that will not impose on the integrity of the existing canal and levee.
- The construction of the pump station could be installed with tilt-up concrete wall construction.
- The pump station, intake basin, and discharge basin would be built outside the canal so existing flow can be maintained.
- Access to the construction site can be planned to minimize the unnecessary removal of existing structures.
- Sheet pile wall and cofferdams would be used to retain soil and water around excavation. Temporary sheet piling can may used as an alternative for providing stability of the existing levee at the junction points of the new levee and intake/outfall basins.

Environmental Considerations

This project, like all the others, would satisfy the requirements of NEPA through a supplement to EA #433. This would include, but not necessarily be limited to, the following:

- Compliance with applicable Federal and state water protection requirements,
- Preparation of a Phase I Site Assessment in any areas for which one has not been completed,
- Continuing coordination with USFWS and LDWF, and
- Consultation with the SHPO regarding potential effects on the New Orleans drainage system.

Order of Magnitude Cost Estimate

Cost Estimate - Project 2	
Environmental	$0
Right-of-Way Acquisition	$4,000,000
Design	$4,204,323
Construction	$48,349,709
Total	**$56,554,031**

Roadmap / Timeline

Design – This would be divided into two phases that would be initiated concurrently, M&E and Civil. The M&E would include a fast-track specification of pumps and other equipment with long lead time deliveries. M&E fast-track should take 2 months and other design should take 4 months.

Environmental Clearance – Concurrent with design

Permits – The permits required concern water quality, and are issued by LDNR, this should be coordinated among the agencies to take no more than one month after final design is completed and be concurrent with the construction bid process.

LERRD – Land required for the pump station and relocated levee is private residential property. ROW to install the improvement would have to be purchased from the owner of the property. This must be concurrent with Design and could be the critical path of the Civil design.

Construction – The pump station proposed would take approximately 18 months to complete. The pump station should be ready for pump installation within 18 months.

Further Considerations

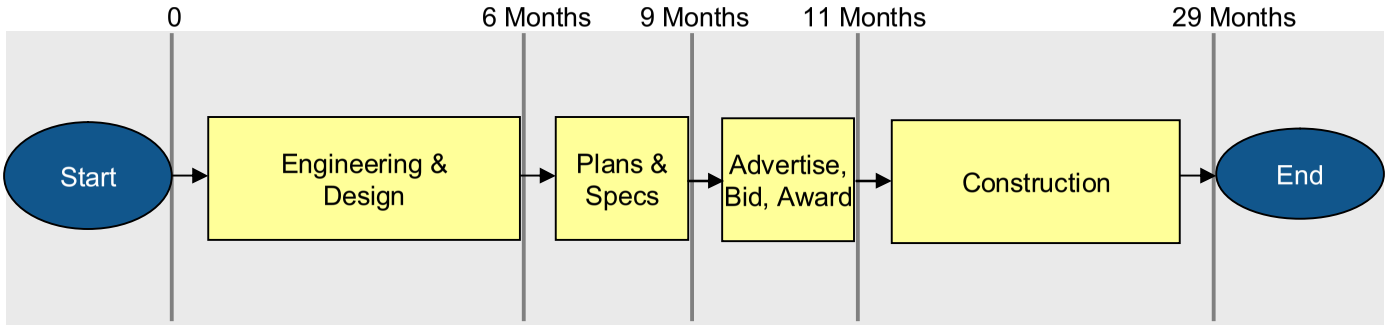
- The pump station could be combined into a more permanent drainage solution.
- There would be minimal impact to the existing flow in the channel.
- Much of the work could be accomplished in the dry.
- Relocation costs would be significant. In addition to a portion of the existing levee, relocations would include the engine deck of the pumps currently under construction and at least 14 condominium town houses.

Conclusion

This project is not recommended for further study. While the concept and benefits are similar to Project No. 1, its location is less attractive. Negative impacts that would occur as a result of the placement of the pump station on the east side of the canal include:

1. Cost and time to relocate the condominiums on the East side of the canal. (~ $35 million),
2. Conflict with the temporary pump station engine platform, and
3. There is not enough space between the Old Hammond Highway bridge and the proposed pump station to develop as good of a transition for the intake basin as defined in Project No. 1.

Project 2



Environmental Compliance – Potential environmental issues, as discussed in the "Environmental Consideration" section, can be addressed during the engineering and design phase in order to keep off the critical path.

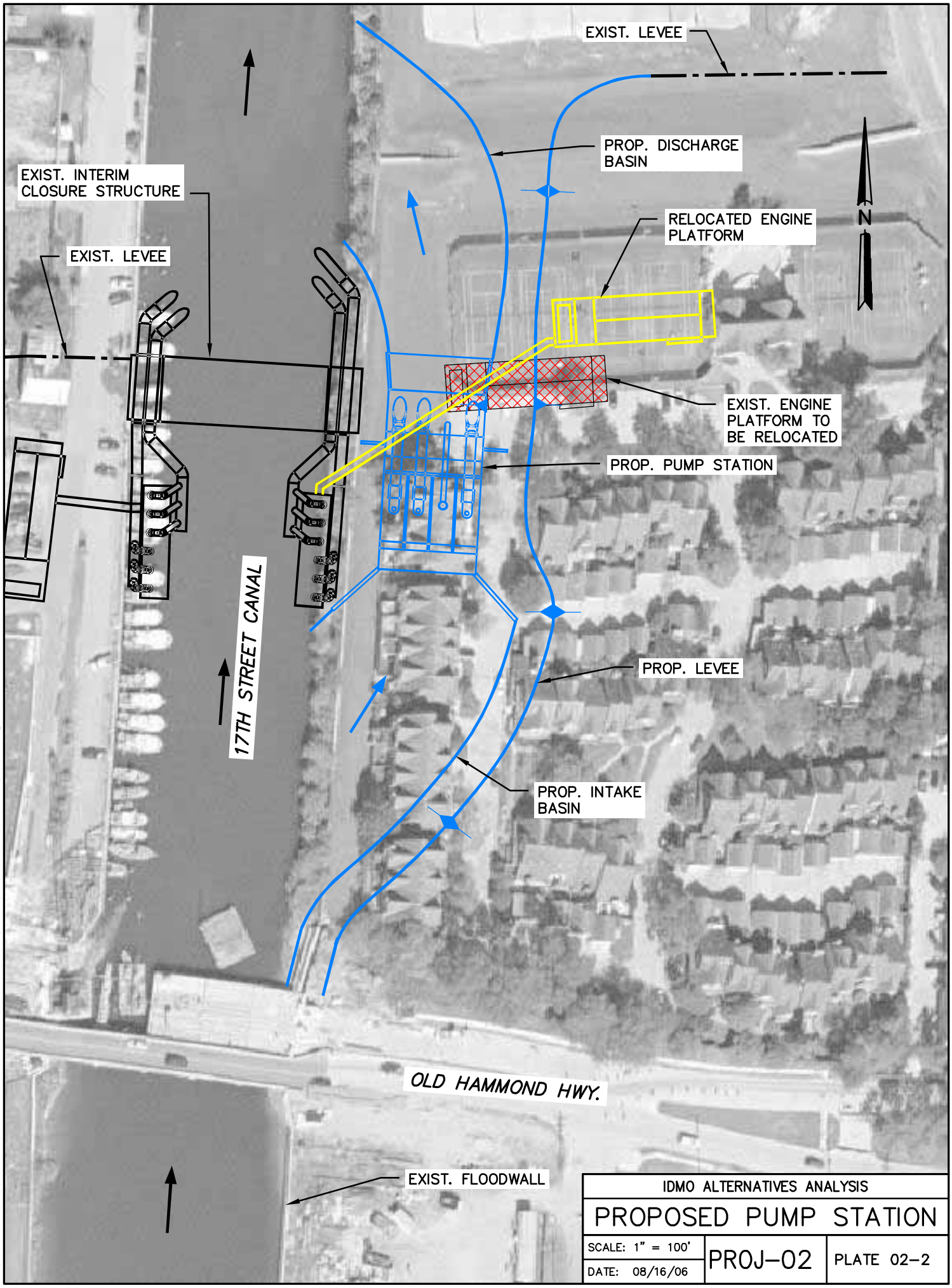
LERRD's – Any potential LERRD's , as discussed in the "Proposed Work" section, can be addressed during the engineering and design phase in order to provide for construction without causing delay.

Pump Procurement – Specifics on pumps can be identified early in the engineering and design phase in order to be delivered on-site, when needed, without causing delay. This should be done concurrent with overall schedule. This is not a critical path item in this flow chart. (estimated 18 month lead time required)

IDMO ALTERNATIVES ANALYSIS

LOCATION LAYOUT

SCALE: 1" = 2000'	PROJ-02	PLATE 02-1
DATE: 08/04/06		



IDMO ALTERNATIVES ANALYSIS

PROPOSED PUMP STATION

SCALE: 1" = 100'	PROJ-02	PLATE 02-2
DATE: 08/16/06		

Temporary Gate Structure at the 17th Street Canal

Condominiums on the far bank to be possibly removed

Project No. 3

Add pumping capacity at lake on the Orleans Avenue Canal

Objective

The objective of this project is to increase the pumping capacity at the Orleans Avenue Canal and Lake Pontchartrain by adding a pumping station and intake basin at the East side of the Orleans Ave Canal. This pumping station could be temporary or permanent. The pumping station would be designed to operate at canal elevations substantially the same as non-storm event levels to provide the maximum pumping capacity at Drainage Pump Station 7.

Existing Conditions

The Orleans Ave. Canal flows from DPS 7 to Lake Pontchartrain. It is an open earthen channel with concrete floodwalls. The safe water elevation in the canal is 9 ft NGVD. A gate structure has been installed near the outfall to protect the canal from intrusion of the lake during a storm surge. Temporary pumps with a nominal capacity of 2,000 cfs have been placed at the gate to maintain drainage while the gates are closed.

The maximum capacity DPS 7 is 2,700 cfs, but the pump station is not able to perform at its maximum capability due to conveyance restrictions on the protected side. The actual maximum capacity at DPS 7 is 1,700 cfs.

Proposed Work

If the conveyance problem is corrected, extra pumps at the gate location would be necessary to discharge the additional 1000 cfs beyond the capacity of the temporary pumps.

Install a Pump Station on the East Side of Orleans Canal

Construct a pump station with a capacity of 1,700-2,700 cfs just east of the gate structure. The pump station would consist of two 1,000 cfs horizontal pumps and three 300 cfs vertical pumps. Intake and outfall basins would be built on either side of the pump station to feed water to the pumps. A 15 ft platform extension would be installed to provide an access road to the existing gate structure installed in the canal. The pump station would be designed to provide for future expansion, and the levee would be relocated to accommodate the expanded pump station. Total added pumping capacity would be 1,700-2,700 cfs. See **Plate 3-2**.

The capacity required for this project would depend on the alternate selected for the London Avenue Canal and whether improvements are made on the intake of Drainage Pumping Station No. 7.

Under this project the Orleans Ave Canal would be operated with a water surface elevation of 1.0 NAVD88 at the lake. This level would provide pumping capacity at DPS 7 equivalent to conditions existing during normal "gate-open" times.

Geotechnical Considerations

- Subsoil Conditions

  Based on available borings made in the general area, the subsoil conditions at the proposed construction site where Orleans Avenue Canal flows into Lake Pontchartrain would be expected to consist of about 10 ft. of fill material that was placed in the mid 1930's when that area of land was reclaimed by dredging operations. This fill material probably consists of granular material. The subsoils below the fill would also be expected to primarily consist of sand to about the 30 to 40 ft. depth. These granular soils would be underlain by normally consolidated clays to about the 60 ft. depth where the Pleistocene age soils would be expected to occur. These Pleistocene age soils would primarily consist of preconsolidated medium stiff to stiff clays to at least the 100 ft. depth below ground surface, but they could also include interbedded strata of medium dense to dense sand.

- Conceptual Foundation System

  Based on the subsoil conditions described above, it is believed that the pump station, as well as the intake and outfall basins, should be supported on driven piles. For timber, or composite, piles supporting the pump station, a capacity of 15 tons (F.S. = 2.0) in compression should be available. This is based on a 60 to 70 ft. long timber, or composite, pile (below existing grade). Piles used to support the intake and outfall basins would have a capacity of several tons less for the same pile tip depth. For piles subjected to uplift and lateral loading, a composite timber pile should not be considered. Higher capacities on the order of 30 to 50 tons would be available if steel "H" or pipe piles or prestressed concrete piles are used for support. These type piles should also be considered if a greater design life than typically provided by timber piles is desired. It is believed that the

relocated levee to the east side of the proposed pump platform could be constructed with normal procedures. Side slopes of 1 vertical on 3 horizontal on the canal side and 1 vertical of 4 horizontal on the land side should be satisfactory. However, it may be necessary to utilize high strength geotextile fabric to preclude the need of constructing wide stability berms on both sides of the levee should the subsoil conditions be inadequate to support the weight of the levee without them.

- Water Diversion and Cofferdam Arrangement

  The intake and discharge basins for the new pump platform would have to be constructed within cofferdams, internally braced at least at one location near the top of the cofferdam walls. For cost estimating purposes, a sheet pile penetration of about 60 ft. below ground surface would be expected. Some form of forced dewatering (deep wells, well points, etc.) would probably be required to dewater the shallow sands that would be expected down to about the 30 to 40 ft. depth below ground surface.

- Additional Geotechnical Investigations

  In general, the existing geotechnical data that has been developed for the existing gates and cellular cofferdams in the area should be used in the analysis of the proposed new construction. In addition to this, at least three (3) new soil borings, one at the proposed pump platform and one on both sides of the platform should be made to supplement that data. Geotechnical analyses with regard to compression, tension and lateral capacities of piles would be needed for support of the various elements of the pump facility. Analyses would also be needed relative to the stability and underseepage of the relocated levee. This should include consideration of the stability relative to the inflow and outfall canal of the new pump station and the effect of dredging of the inflow and outfall canals on the existing levee stability. In addition, analyses would be needed for the temporary retaining structure (structural and dewatering).

Structural Considerations

- Pump foundations shall be supported on composite timber piles due to water table fluctuations.

- All foundations shall be designed in accordance with the Geotechnical Report's recommendations.
- The pumps have been sized to accommodate the hydraulic requirements of this report.
- For relocation and orientate the existing engine platform see **Plate 3-2**.
- As for the structural integrity of the pump platform, along with the intake and outfall basins, and engine platforms (new and relocated), all components of the structure shall be designed in accordance with the state and local building code requirements and be able to withstand winds in excess of 150 mph. Their foundations shall be supported on composite timber piles due to water table fluctuations.
- All foundations shall be designed in accordance with the Geotechnical Report's recommendations.
- The engine deck for the pump station and engine platform would be elevated a minimum of one foot above the base flood elevation as shown on the FIRM map.
- Reconstruction of the levee at the proposed pump house shall be in accordance with the Geotechnical Report's recommendations.

Mechanical/Electrical Considerations

- Mechanical

  The pump station will require two (2) 1000 cfs horizontal pumps, diesel driven with the motors rated at 2000 HP. Sufficient fuel storage would need to be provided at the site to operate the pumps for up to 36 hours.

- Electric Service

  The local electric service is provided by Entergy. The anticipated electrical load at the pump station is including:

  - Three (3) 300 cfs vertical pump, motor rated at 700HP, medium voltage or approximate 1,560 KW
  - Balance of facility loads including power, lighting and auxiliary systems at approximate 300 KW. The electrical system will be stepped down to 480V and 120/208V with transformers and local distribution panels.

  The peak demand in the pumps station is approximate at 1.9 MW. Two service feeders shall be provided by Entergy for redundancy. In case of loss of one feeder the other feeder shall be capable of providing power for the entire pump station

demand. Main Substation will consist of MV vacuum type breakers and metering devices to meet Entergy standards. Service availability will be coordinated with Entergy during the design development.

- Standby Power

  Standby power source will be required in case of total black-out on utility grid occurs coincidence with the flood event. There are two options for providing standby power.

  - Option A: Locally installed 1-2 MW diesel generator to meet the peak demand. The generator will be specified for continuous duty with sufficient fuel storage to operate the pumps up to 36 hours.
  - Option B: Central Generation Plant. See description on Project 1.

Construction Considerations

All excavations will have to be supported with sheet piles.

The contractor will have to protect the existing levee during construction until the relocated levee is complete.

In all options, the site preparation could be accomplished while the pumps are on order.

- Prior to the construction, the Contractor shall implement construction procedures that will not impose on the integrity of the existing canal and its gate structures and levees.
- Temporary sheet piling can may used as an alternative for providing stability of the existing levee at the junction points of the new levee and intake/outfall basins.

Environmental Considerations

This project, like all the others, would satisfy the requirements of NEPA through a supplement to EA #433.

For this project, additional consultation with the SHPO is required because the proposed pumping station is in a neighborhood that may be eligible for the NRHP.

Order of Magnitude Cost Estimate

Cost Estimate - Project 3A	
Environmental	$5,000
Right-of-Way Acquisition	$0
Design	$3,181,809
Construction	$36,590,805
Total	**$39,777,614**

Cost Estimate - Project 3B	
Environmental	$5,000
Right-of-Way Acquisition	$0
Design	$2,031,809
Construction	$23,365,805
Total	**$25,402,614**

Roadmap/Timeline

Design – This would be divided into two phases that would be initiated concurrently, M&E and Civil. The M&E would include a fast-track specification of pumps and other equipment with long lead time deliveries. M&E fast-track should take 2 months and other design should take 4 months.

Environmental Clearance – Concurrent with design

Permits – The permits required concern water quality, and are issued by LDNR, this should be coordinated among the agencies to take no more than one month after final design is completed and be concurrent with the construction bid process.

LERRD – Land required for the pump station and relocated levee is within the drainage ROW. There would be no extra ROW acquisition required.

Construction – The 2700 cfs pump station proposed would take approximately 18 months to complete, and 1700 cfs pump station proposed would take approximately 16 months to complete. The pump station should be ready for pump installation within 18 months.

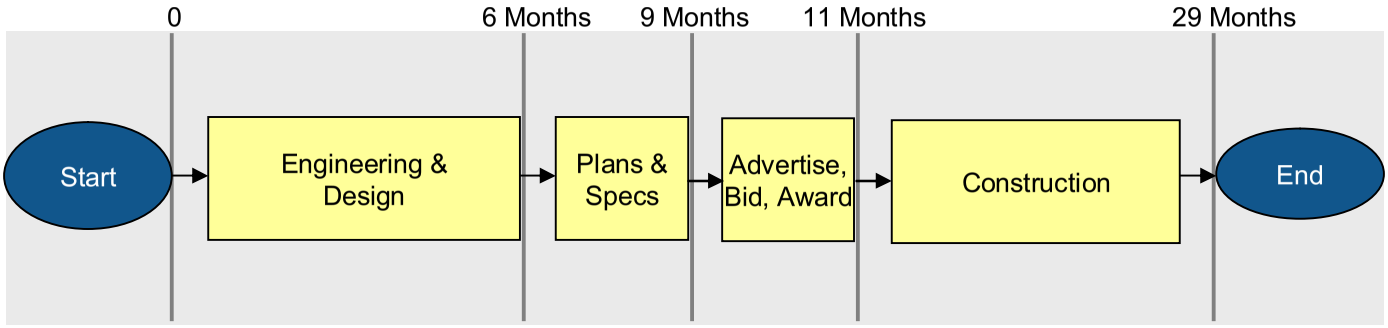
Show Stoppers

For the additional pump station to be effective, conveyance issues would have to be corrected upstream. Therefore, this project must be built in conjunction with other recommended projects to improve flow into the Orleans Avenue Canal.

Conclusion

This project is recommended for further study. The addition of a pump station adjacent to the closure gate at the outfall of the Orleans Avenue Canal would complement the pumps already in place. It could also be a permanent drainage solution with the flexibility to add capacity as needed.

Project 3A
2700 cfs

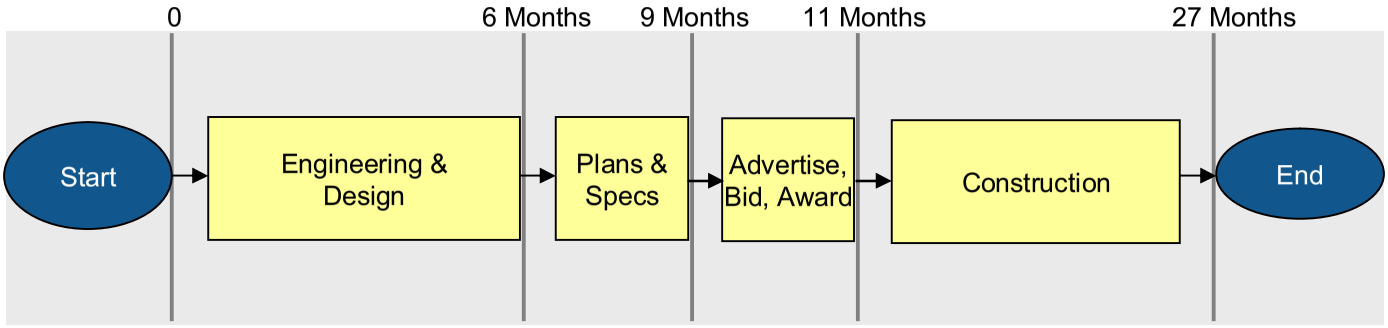


Environmental Compliance – Potential environmental issues, as discussed in the "Environmental Consideration" section, can be addressed during the engineering and design phase in order to keep off the critical path.

LERRD's – Any potential LERRD's , as discussed in the "Proposed Work" section, can be addressed during the engineering and design phase in order to provide for construction without causing delay.

Pump Procurement – Specifics on pumps can be identified early in the engineering and design phase in order to be delivered on-site, when needed, without causing delay. This should be done concurrent with overall schedule. This is not a critical path item in this flow chart. (estimated 18 month lead time required)

Project 3B
1700 cfs



Environmental Compliance – Potential environmental issues, as discussed in the "Environmental Consideration" section, can be addressed during the engineering and design phase in order to keep off the critical path.

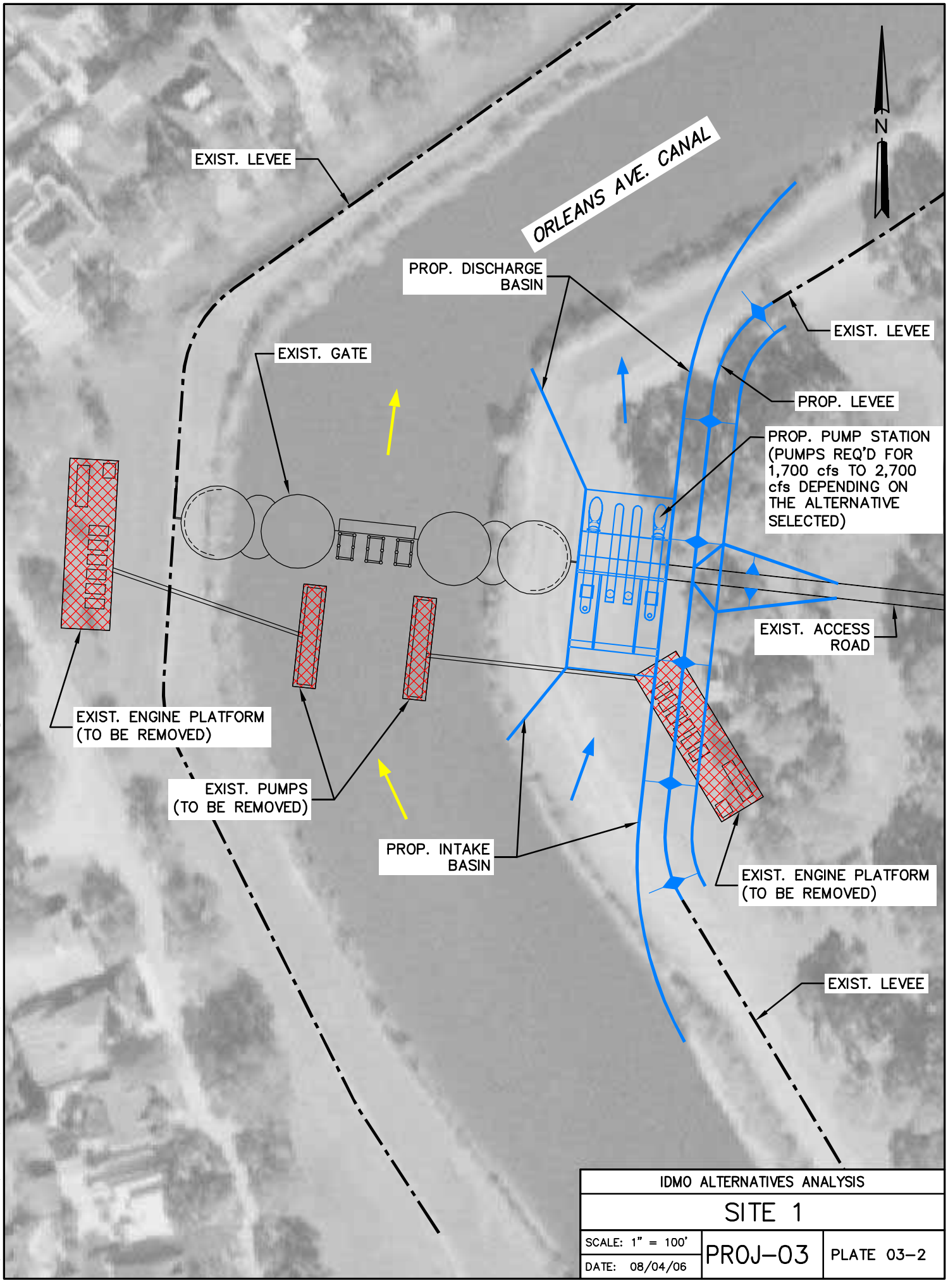
LERRD's – Any potential LERRD's , as discussed in the "Proposed Work" section, can be addressed during the engineering and design phase in order to provide for construction without causing delay.

Pump Procurement – Specifics on pumps can be identified early in the engineering and design phase in order to be delivered on-site, when needed, without causing delay. This should be done concurrent with overall schedule. This is not a critical path item in this flow chart. (estimated 18 month lead time required)

IDMO ALTERNATIVES ANALYSIS

LOCATION LAYOUT

SCALE: 1" = 2000'	PROJ-03	PLATE 03-1
DATE: 08/04/06		



IDMO ALTERNATIVES ANALYSIS		
SITE 1		
SCALE: 1" = 100'	PROJ-03	PLATE 03-2
DATE: 08/04/06		

Orleans Avenue Canal Gate (Looking at the south side of Orleans Avenue Canal gate.)

Orleans Avenue Canal (Looking North)

Project No. 4

Add pumping capacity at the lake on London Avenue Canal

Objective

The objective of this project is to increase the conveyance capacity of the London Avenue Canal by adding an intake basin and pumps to the east side of the London Avenue Canal to discharge into the lake when the floodgates are closed. These pumps could be temporary or permanent. The pumping station would be designed to operate at canal elevations substantially the same as non-storm event levels to provide the maximum pumping capacity at Drainage Pump Station 3 and 4.

Existing Conditions

The London Ave. Canal runs through Gentilly from DPS 3 northward to the lake. There are two pumping stations that discharge into the London Ave. Canal, DPS 3 at the southern terminus of the canal at Florida Avenue and N. Broad Street and DPS 4 at Prentiss Ave. on the east bank of the canal.

DPS 3 contains seven pumps with a combined capacity of 4,260 cfs. The pumps include five horizontal pumps, and two centrifugal pumps. The pumps are driven by seven 25 Hz electric motors.

DPS 4 contains six pumps with a combined capacity of 3,720 cfs. The pumps include three horizontal pumps, two centrifugal pumps and one vertical constant duty pump. The pumps are driven by four 25 Hz and two 60 Hz electric motors. DPS 4 also contains a 10’ and 2’ steel siphon over the canal to bring water from the west bank of the canal to the pump station with a capacity of 1,000 cfs.

A gate structure and temporary pumps are under construction where the London Ave. Canal discharges into Lake Pontchartrain. See Plate 04-1, Location Layout. The gate is intended to protect the canal from storm surges and the pumps are intended to discharge storm water otherwise contained in the canal by the gate. Scheduled to be in operation by October 31, 2006, these pumps have a combined capacity of 4,400 cfs. The London Ave. Canal has a theoretical conveyance capability of 7,980 cfs, as referenced from Memorandum for Task Force Hope, dated May 31, 2006. Previous studies indicate that a total capacity of 4,800 cfs would minimize impacts on interior storm water elevations.

Therefore, an additional pumping capacity of at least 400 cfs in the London Ave. Canal is needed.

Proposed Work

The proposed work is to install a pump station on the East Bank of London Avenue Canal A pump station would be built just east of the gate structure. Part of the existing cofferdam will be removed to construct this pump station. An intake and an outfall basin would be built on either side of the pump station to feed water to the pumps. The pump station would be built to provide for future expansion. The levee would be relocated to accommodate the pump station. The excavation and pump house can be constructed while the pumps are on order. Total added pumping capacity is 1,100 to 4,800 cfs. This would allow for the existing temporary pumps to be removed. See **Plate 04-2**.

This project for the London Ave. Canal would be operated with a water surface elevation of 1.0 NAVD88 at the lake. This level would provide pumping capacity at DPS 3 and 4 equivalent to conditions existing during normal "gate open" times.

Geotechnical Considerations

- Subsoil Conditions

  Based on available soil borings in the general area, the subsoil conditions at the project location are anticipated to consist of very soft to soft clay and organic clay to about the 15 ft. depth. The subsoil below this are more granular in character and generally consist of medium dense to very dense sands to about the 40 ft. depth. These sands are underlain by normally consolidated clay to about the 65 to 75 ft. depth where a stratum of dense to very dense sand was encountered. This sand stratum extends to at least the 100 ft. depth.

- Conceptual Foundation System

  Based on these subsoil conditions described above, it is believed that the pump station, as well as the intake and outfall basins, should be supported on driven piles. For timber, or composite, piles supporting the pump station, a capacity of 15 tons (F.S. = 2.0) in compression should be available. This is based on a 60 to 70 ft. long timber, or composite, pile (below existing grade). Piles used to support the intake and outfall basins would have a capacity of several tons less for the same pile tip elevation. For piles subjected to uplift and lateral loading, a

composite timber pile should not be considered. Higher capacities on the order of 30 to 50 tons would be available if steel "H" or pipe piles or prestressed concrete piles are used for support. These type piles should also be considered if a greater design life than typically provided by timber piles is desired. It is believed that the relocated levee to the east side of the proposed pump platform could be constructed with normal procedures. Side slopes of 1 vertical on 3 horizontal on the canal side and 1 vertical of 4 horizontal on the land side should be satisfactory. However, it may be necessary to utilize high strength geotextile fabric to preclude the need of constructing wide stability berms on both sides of the levee should the subsoil conditions be inadequate to support the weight of the levee without them.

- Water Diversion and Cofferdam Arrangement

  The intake and discharge basins for the new pump platform would have to be constructed within cofferdams, internally braced at least at one location near the top of the cofferdam walls. For cost estimating purposes, a sheet pile penetration of about 60 ft. below ground surface would be expected. Some form of forced dewatering (deep wells, well points, etc.) would probably be required to dewater the shallow sands that would be expected down to about the 40 ft. depth below ground surface.

- Additional Geotechnical Investigations

  In general, the existing geotechnical data that has been developed for the existing gates and cellular cofferdams should be used in the analysis of the proposed new construction. In addition to this at least three (3) new soils borings, one at the proposed pump platform and one on both sides of the platform should be made to supplement that data. Geotechnical analyses with regard to compression, tension and lateral capacities of piles would be needed for support of the various elements of the pump facility. Analyses would also be needed relative to the stability and underseepage of the relocated levee. This should include consideration of the stability relative to the inflow and outfall canal of the new pump station and the effect of dredging of the inflow and outfall canals on the existing levee stability.

In addition, analyses would be needed for the temporary retaining structures (structural and dewatering).

Structural Considerations

- As for the structural integrity of the pump platform, along with the intake and discharge basins, and engine platforms, both new and relocated, all components of the structure shall be designed in accordance with the state and local building code requirements and be able to withstand winds in excess of 150 mph.
- Their foundations shall be supported on composite timber piles due to water table fluctuations.
- All foundations shall be designed in accordance with the Geotechnical Report's recommendations.
- The engine platform for would be elevated a minimum of one foot above the base flood elevation as shown on the FIRM map.
- Reconstruction of the levee at the proposed pump house shall be in accordance with the Geotechnical Report's recommendations.

Mechanical/Electrical Considerations

- Mechanical

  The pump station will require four (4) 1000 cfs horizontal pumps, diesel driven with the motors rated at 2000 HP. Sufficient fuel storage would need to be provided at the site to operate the pumps for up to 36 hours.

- Electric Service

  The local electric service is provided by Entergy. The anticipated electrical load at the pump station is including:

  - Three (3) 300 cfs vertical pump, motor rated at 700HP, medium voltage or approximate 1,560 KW
  - Balance of facility loads including power, lighting and auxiliary systems at approximate 300 KW. The electrical system will be stepped down to 480V and 120/208V with transformers and local distribution panels.

  The peak demand in the pumps station is approximate at 1.9 MW. Two service feeders shall be provided by Entergy for redundancy. In case of loss of one feeder the other feeder shall be capable of providing power for the entire pump station

demand. Main Substation will consist of MV vacuum type breakers and metering devices to meet Entergy standards. Service availability will be coordinated with Entergy during the design development.

- Standby Power

  Standby power source will be required in case of total black-out on utility grid occurs coincidence with the flood event. There are two options for providing standby power.

  - Option A: Locally installed 1-1.5 MW diesel generator to meet the peak demand. The generator will be specified for continuous duty with sufficient fuel storage to operate the pumps up to 36 hours.
  - Option B: Central Generation Plant. See description on Project 1.

Construction Considerations

- Prior to the construction of the additional engine platform and pump station foundations, the Contractor shall implement a construction procedure that will not impose on the integrity of the existing canal and levee.
- Temporary sheet piling can may used as an alternative for providing stability of the existing levee at the junction points of the new levee and intake/outfall basins.
- In addition, the Contractor should take precautions when removing the existing temporary pumps from the canal.

Environmental Considerations

This project, like all the others, would satisfy the requirements of NEPA through a supplement to EA #433.

For this project, additional consultation with the SHPO is required because the proposed pumping station is in a neighborhood that may be eligible for the NRHP.

Order of Magnitude Cost Estimate

Cost Estimate - Project 4 (A)	
Environmental	$5,000
Right-of-Way Acquisition	$0
Design	$5,635,590
Construction	$64,809,280
Total	**$70,449,870**

Cost Estimate - Project 4 (B)	
Environmental	$5,000
Right-of-Way Acquisition	$0
Design	$1,380,590
Construction	$15,876,780
Total	**$17,262,370**

Road Map/Time line

Design – This would be divided into two phases that would be initiated concurrently, M&E and Civil. The M&E would include a fast-track specification of pumps and other equipment with long lead time deliveries. M&E fast-track should take 2 months and other design should take 4 months.

Environmental Clearance – Concurrent with design

Permits – The permits required concern water quality, and are issued by LDNR, this should be coordinated among the agencies to take no more than one month after final design is completed and be concurrent with the construction bid process.

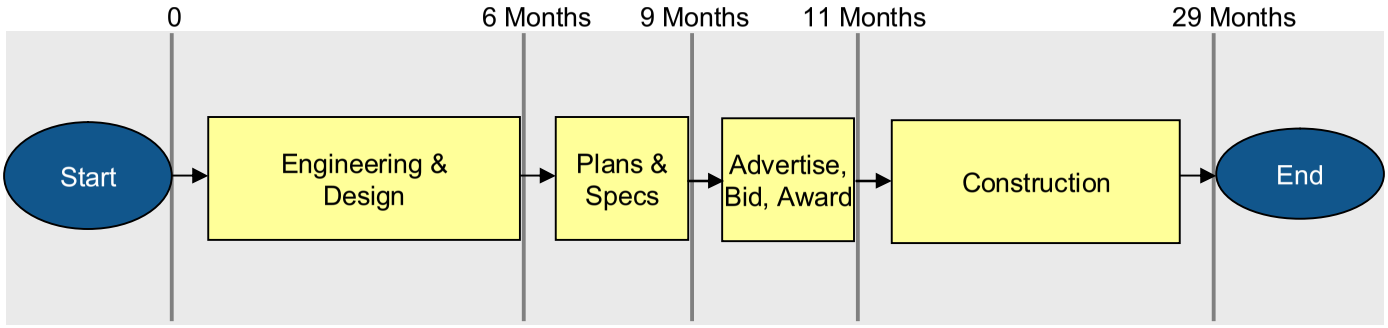
LERRD – Land required for the pump station and relocated levee is owned by the University of New Orleans. ROW to install the improvement would have to be purchased from the university. This must be concurrent with Design and could be the critical path of the Civil design.

Construction –The 4800 cfs pump station proposed would take approximately 18 months to complete, and 1100 cfs pump station proposed would take approximately 15 months to complete. The pump station should be ready for pump installation within 18 months.

Conclusion

This project is recommended for further study. The addition of a pump station adjacent to the closure gate at the outfall of the London Avenue Canal would complement the pumps already in place. It could also be a permanent drainage solution with the flexibility to add capacity as needed.

Project 4A
4800 cfs

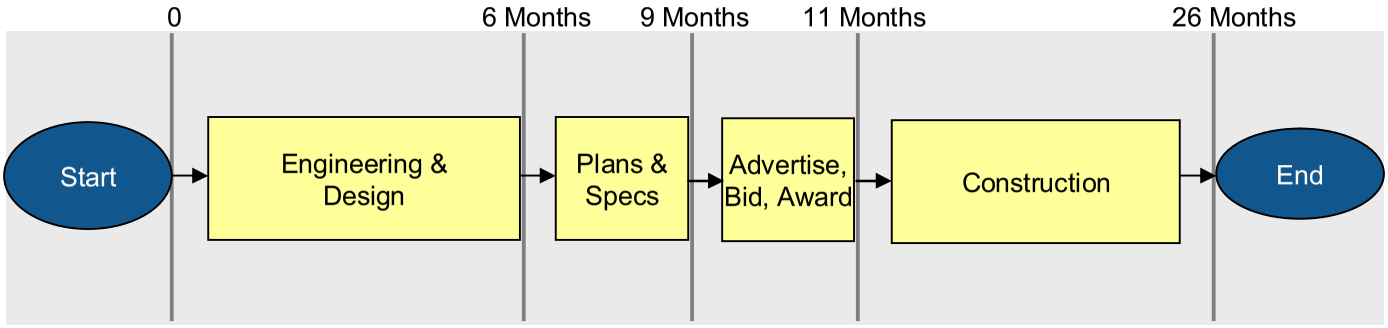


Environmental Compliance – Potential environmental issues, as discussed in the "Environmental Consideration" section, can be addressed during the engineering and design phase in order to keep off the critical path.

LERRD's – Any potential LERRD's , as discussed in the "Proposed Work" section, can be addressed during the engineering and design phase in order to provide for construction without causing delay.

Pump Procurement – Specifics on pumps can be identified early in the engineering and design phase in order to be delivered on-site, when needed, without causing delay. This should be done concurrent with overall schedule. This is not a critical path item in this flow chart. (estimated 18 month lead time required)

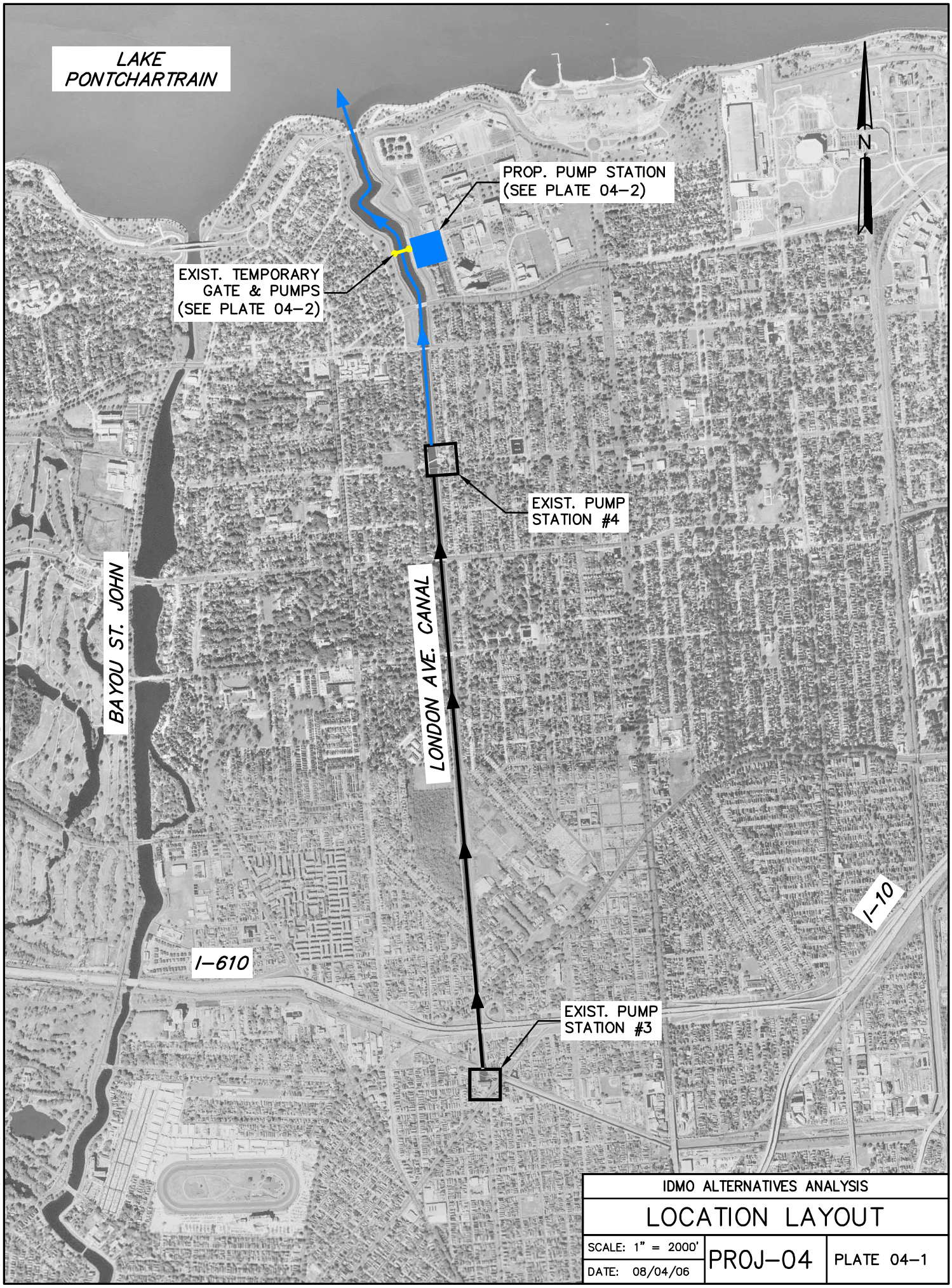
Project 4B
1100 cfs



Environmental Compliance – Potential environmental issues, as discussed in the "Environmental Consideration" section, can be addressed during the engineering and design phase in order to keep off the critical path.

LERRD's – Any potential LERRD's , as discussed in the "Proposed Work" section, can be addressed during the engineering and design phase in order to provide for construction without causing delay.

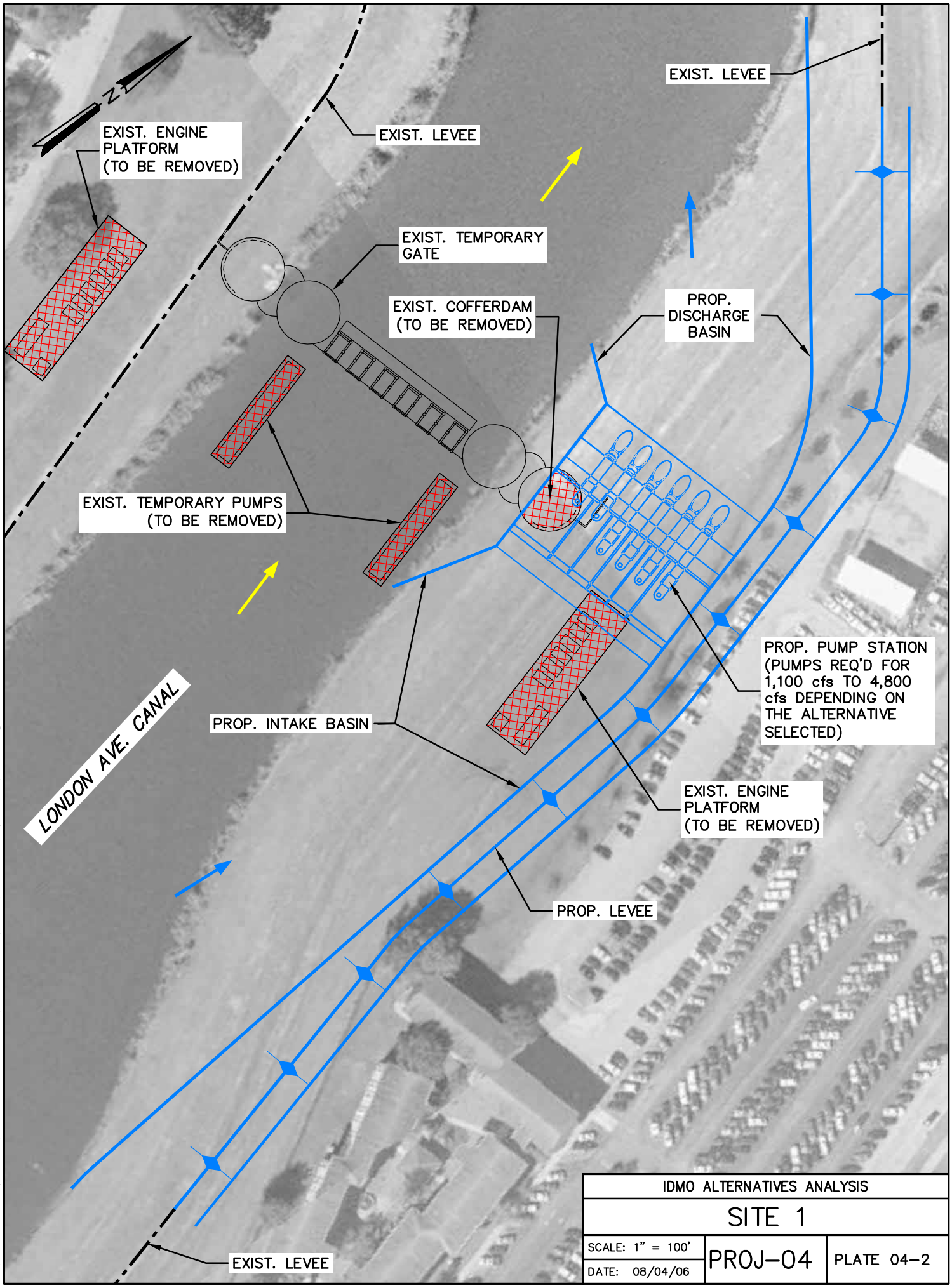
Pump Procurement – Specifics on pumps can be identified early in the engineering and design phase in order to be delivered on-site, when needed, without causing delay. This should be done concurrent with overall schedule. This is not a critical path item in this flow chart. (estimated 12 month lead time required)



IDMO ALTERNATIVES ANALYSIS

LOCATION LAYOUT

SCALE: 1" = 2000'	PROJ–04	PLATE 04–1
DATE: 08/04/06		



IDMO ALTERNATIVES ANALYSIS		
SITE 1		
SCALE: 1" = 100'	PROJ-04	PLATE 04-2
DATE: 08/04/06		

London Avenue Canal Gate (Looking southwest, from the lake side)

Discharge tubes on the east bank of canal (Looking southwest, from the lake side)

London Avenue Canal Gate (Looking northeast, from the canal side)

Temporary pumps on the west bank of canal (Looking northeast, from the canal side)

Project No. 5

Convert 17th Street Canal to Force Main to Lake

Objective

The objective of this project is to eliminate capacity constraints in the 17th Street Canal by converting it to a force main, consisting of a series of box culverts, from the DPS 6 to Lake Pontchartrain.

Existing Conditions

The 17th Street Canal is located on the west side of the city and straddles the Orleans Parish and Jefferson Parish lines. Three pump stations discharge a total of 10,500 cfs into the 17th Street Canal, which discharges north into Lake Pontchartrain.

DPS 6 is located on Orpheum Ave. at the southern end of the channel. It contains 15 pumps with a total capacity of 9,480 cfs including nine horizontal and six vertical pumps, which are driven by seven 25 Hz motors and eight 60Hz motors. It is fed by the Palmetto Canal and parts of two tributary areas consisting of 8,100 acres.

The Canal Street Pump Station in Jefferson Parish is located on the west side of the canal at the end of Canal Street. It contains 4 vertical pumps with a capacity of 160 cfs that are driven by four 60 Hz motors. The Canal Street Pump Station is fed by a tributary area consisting of 2,500 acres.

The I-10 Pump Station is located on the east side of the canal on Academy Dr. next to Interstate 10 (I-10). It contains 4 pumps with a capacity of 860 CFS including three vertical pumps and one centrifugal pump that are driven by four 60 Hz motors. Its function is to drain water that accumulates in the low area where I-10 passes under the railroad bridge just north of the City Park Ave interchange.

Roadway bridges cross the canal between DPS 6 and the lake at I-10, Veterans Blvd., and Old Hammond Hwy. There is also a railroad bridge located near DPS 6. See **Plate 5-1**.

Along the west side of the canal there are overhead transmission lines that start around Pink Street and proceed north to Paris Ave. The foundations for these poles are in the canal.

Proposed Work

The existing open channel of the 17th Street Canal would be replaced with a force main system that would consist of the following:

- Five 10' x 20' box culverts from DPS 6 to Lake Pontchartrain;
- A 5' siphon from the Canal St. Pump Station to the location of the existing outfall of the I-10 pump station into the 17th Street Canal; and
- One 10'x 10' box culvert from the location of the existing I-10 pump station outfall at the 17th Street Canal to Lake Pontchartrain.

New pumps would be required at DPS 6 to meet the required total system head to pump to the lake. The required head elevation at the discharge of the pump station is 34 ft NGVD. This would require a total system head of 37 ft. The total capacity of the force main system would be 12,500 cfs based on the planned increased capacity of DPS 6 to 11,480 cfs. New pumps would also be required at the I-10 Pump Station to meet the required total system head to pump to the lake. The required head elevation at the discharge of this pump station is 31 ft NGVD. This would require a total system head of 39 ft. The total capacity of the force main system would be 1,020 cfs based on the 860 cfs from the I-10 pump station and 160 cfs from the Canal Street Pump Station. The roadway bridges between DPS 6 and Lake Pontchartrain would be removed once the culverts are installed, and the levee would be extended across the right-of-way of the canal.

Construction Considerations

- Prior to construction the Contractor shall implement a construction procedure that will not impose on the integrity of the existing canal.
- The overhead transmission lines from Pink Street to Paris Ave on the west side on the canal will need to be relocated.
- Work must be coordinated with the Norfolk Southern Railroad.
- During construction of the culverts the following services must be maintained:
    - The existing drainage pattern;
    - Traffic on all three roadway bridge crossings; and
    - Rail traffic.

Environmental Considerations

This project, like all the others, would satisfy the requirements of NEPA through a supplement to EA #433. This would include, but not necessarily be limited to, the following:

- Compliance with applicable Federal and state water protection requirements,
- Preparation of a Phase I Site Assessment in any areas for which one has not been completed,
- Continuing coordination with USFWS and LDWF, and
- Consultation with the SHPO regarding potential effects on the New Orleans drainage system.

Order of Magnitude Cost Estimate

Cost Estimate - Project 5

Environmental	$0
Right-of-Way Acquisition	$0
Design	$50,674,910
Construction	$582,761,463
Total	**$633,436,373**

Roadmap / Timeline

Design – This would be divided into two phases that would be initiated concurrently, M&E and Civil. The M&E would include a fast-track specification of pumps and other equipment with long lead time deliveries. M&E fast-track should take 4 months and other design should take 8 months.

Environmental Clearance – Concurrent with design

Permits – The permits required concern water quality, and are issued by LDNR, this should be coordinated among the agencies to take no more than one month after final design is completed and be concurrent with the construction bid process.

LERRD – Land required for the pump station and force mains are in the existing ROW of the canal. No extra ROW is required.

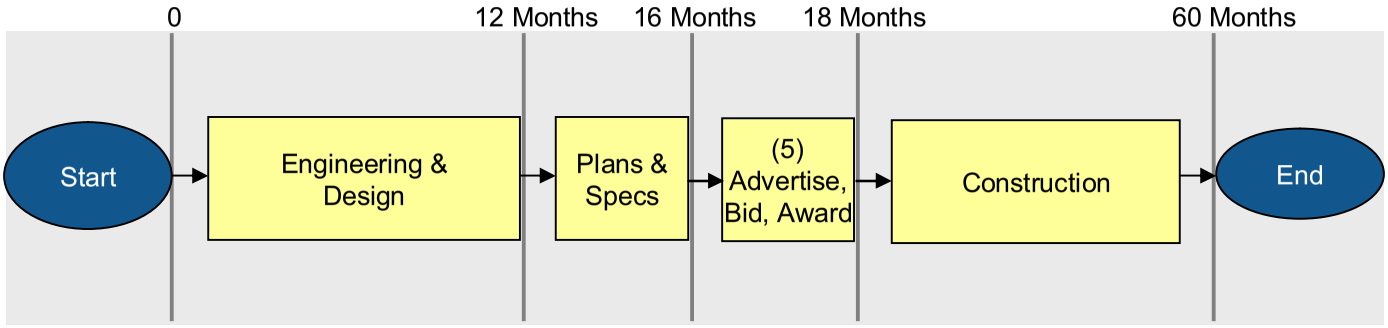
Construction – The force main and pump stations proposed would be completed in approximately 42 months under 5 simultaneous contracts.

Conclusion

This project is not recommended for further study. While the completed project is possible, the costs, time, and impacts required to complete the project would be significant. Therefore, this project has been eliminated for the following reasons:

1. Cost of box culvert to lake and complete reconstruction of DPS 6, along with changing equipment at the I-10 and Canal Street Stations is excessive.
2. Construction of the discharge box culvert would interfere with normal drainage for several years.
3. The reconstruction of DPS 6 would interfere with normal drainage for several years
4. Energy cost to operate the pumping station would increase substantially.

Project 5

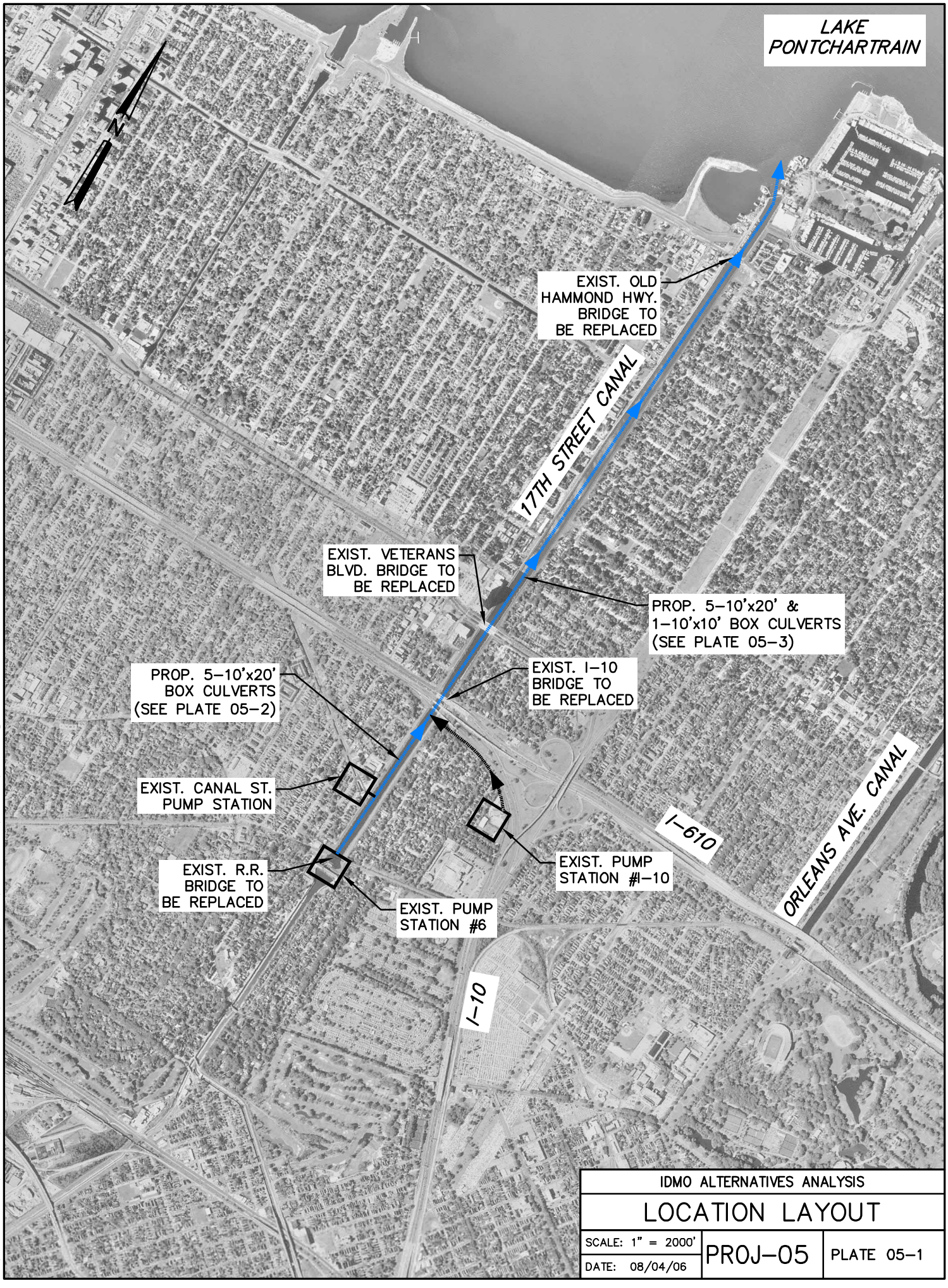


Environmental Compliance – Potential environmental issues, as discussed in the "Environmental Consideration" section, can be addressed during the engineering and design phase in order to keep off the critical path.

LERRD's – Any potential LERRD's , as discussed in the "Proposed Work" section, can be addressed during the engineering and design phase in order to provide for construction without causing delay.

Pump Procurement – Specifics on pumps can be identified early in the engineering and design phase in order to be delivered on-site, when needed, without causing delay. This should be done concurrent with overall schedule. This is not a critical path item in this flow chart. (estimated 18 month lead time required)

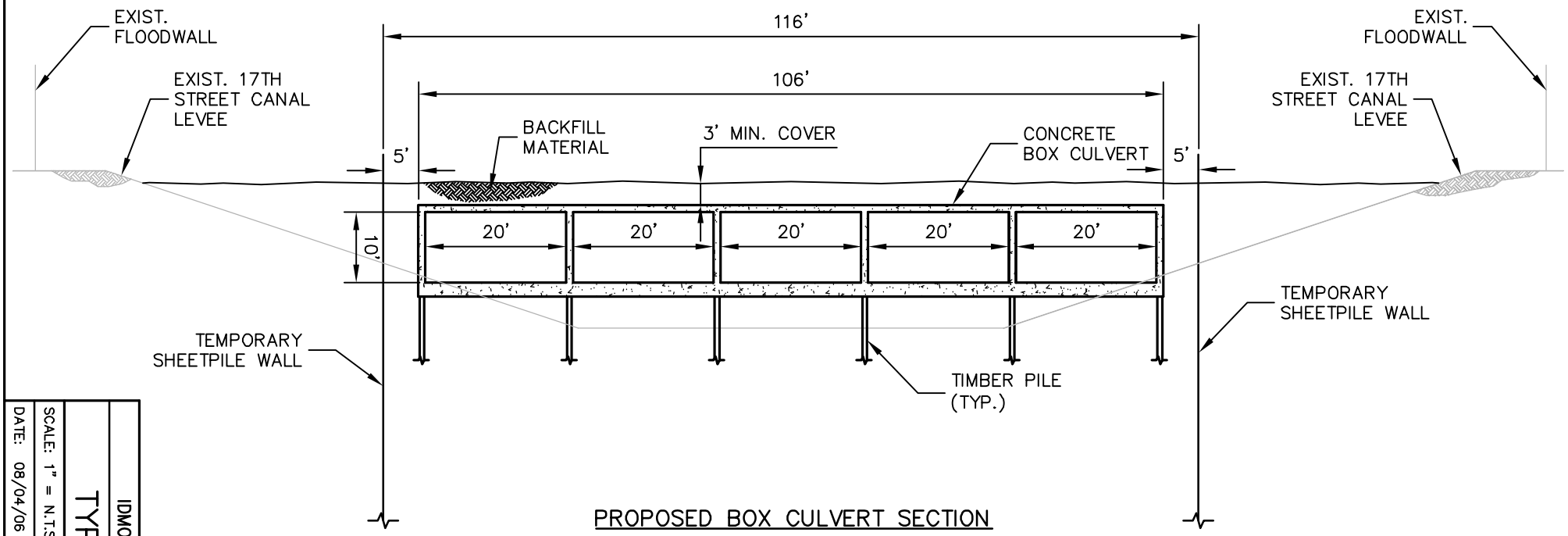
Contract Administration – Construction could be implemented with 5 separate; concurrent contracts for the boxes and pumps in order to expedite the process. Estimated time shown above reflects this approach.



IDMO ALTERNATIVES ANALYSIS

LOCATION LAYOUT

SCALE: 1" = 2000'	PROJ–05	PLATE 05–1
DATE: 08/04/06		



PROPOSED BOX CULVERT SECTION

(FROM PUMP STATION #6 TO I-10 PUMP STATION)

17TH STREET CANAL

N.T.S.

IDMO ALTERNATIVES ANALYSIS

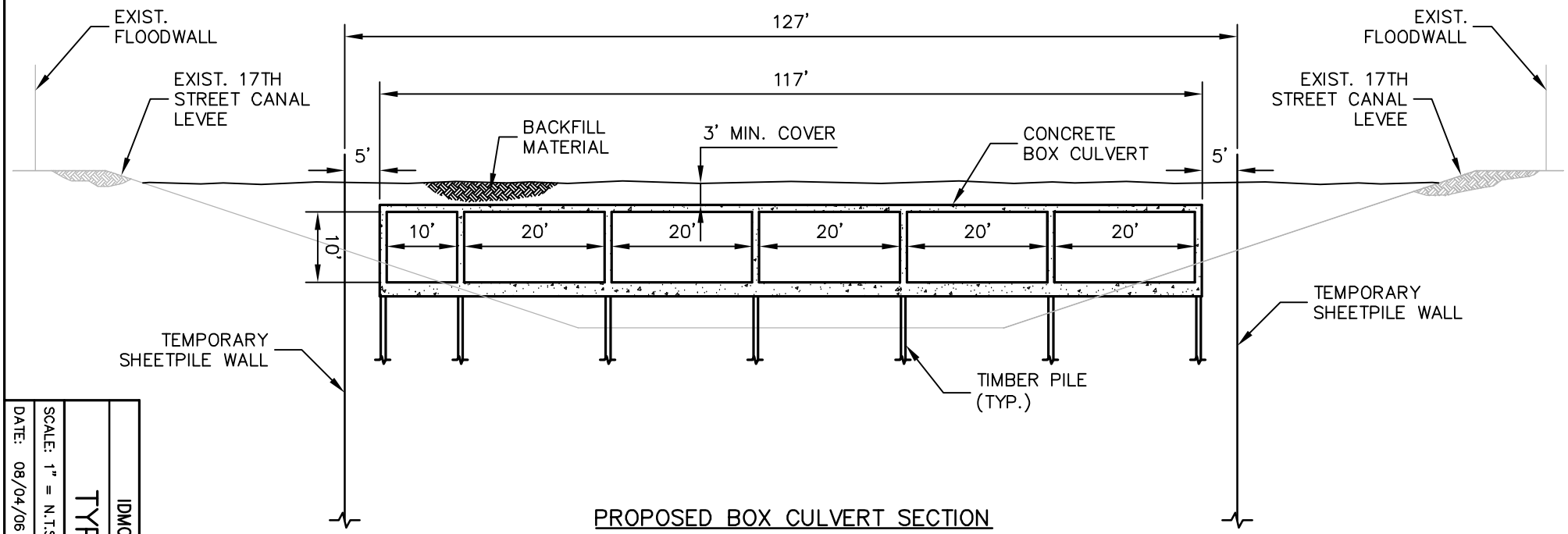
TYPICAL SECTION

SCALE: 1" = N.T.S.

DATE: 08/04/06

PROJ-05

PLATE 05-2



PROPOSED BOX CULVERT SECTION
(FROM I-10 PUMP STATION TO LAKE)
17TH STREET CANAL
N.T.S.

IDMO ALTERNATIVES ANALYSIS

TYPICAL SECTION

SCALE: 1" = N.T.S.

DATE: 08/04/06

PROJ-05

PLATE 05-3

17th Street Canal (Looking Northwest)

17th Street Canal (Looking South)

Project No. 6

Convert Orleans Ave. Canal to Force Main to Lake

Objective

The objective of this project is to eliminate capacity constraints in the Orleans Avenue Canal by converting it to a force main, consisting of a series of box culverts, from the DPS 7 to Lake Pontchartrain.

Existing Conditions

DPS 7 is located at I-610 and the southern terminus of the Orleans Avenue Canal. It contains six pumps with a combined capacity of 2,690 cfs. The pumps include three horizontal and three centrifugal pumps that are driven by five 25 Hz electric motors and one 60 Hz electric motor. The Pump Station is fed by a tributary area consisting of 3,960 acres generally bounded by Pontchartrain Blvd., I-10, Lopez St., Orleans Ave., N. Carrollton Ave., Bayou St. John, and Harrison Ave. This includes a large portion of City Park including all the area south of I-610 and about a third of the area north of I-610. DPS 7 discharges into the Orleans Avenue Canal, which flows north towards it's outfall at Lake Pontchartrain.

Five roadway bridges cross the Orleans Avenue Canal: I-610, Harrison Ave., Filmore Ave., Robert E. Lee Blvd., and Lakeshore Dr. There also is a 30" water line that crosses the canal at Bragg Street. See **Plate 6-1**.

Proposed Work

The existing open channel would be replaced with two 10' x 20' box culverts from DPS 7 to Lake Pontchartrain. The total capacity of the force main would be 2,690 cfs. North of Robert E. Lee, the canal right-of-way would be straightened to the extent possible without impacting Marconi Drive, and the levee would be relocated to close the opening at the mouth of the canal. New pumps would be required at DPS 7 station to meet the required total system head to pump to the lake. The required head elevation at the discharge of the pump station is 20 ft NGVD. This would require a total system head of 23 ft. The roadway bridges between DPS 7 and Lake Pontchartrain, other than I-610, would be removed once the culverts are installed, and the levee would be extended across the right-of-way of the canal. See **Plates 6-2** Typical Section.

Construction Considerations

- Prior to the construction of the new double box culvert, the Contractor shall implement a construction procedure that will not impose on the integrity of the existing canal.
- Prior to construction in the immediate area, temporary bracing will be required for the 30" water pipe. After construction, it could remain in its current location.
- During construction of the culverts the following services must be maintained:
    - The existing drainage pattern; and
    - Traffic on all roadways crossing the canal.
- Another major consideration would be the phasing of the construction of the culverts between Robert E. Lee and Lakeshore to assure that the new levee construction is accomplished prior to the levee removal resulting from straightening the right-of-way.

Environmental Considerations

This project, like all the others, would satisfy the requirements of NEPA through a supplement to EA #433.

For this project, additional consultation with the SHPO is required because the project area includes neighborhoods that are eligible for the NRHP.

Order of Magnitude Cost Estimate

Cost Estimate - Project 6

Environmental	$5,000
Right-of-Way Acquisition	$0
Design	$19,404,139
Construction	$223,147,597
Total	**$242,556,736**

Roadmap / Timeline

Design – This would be divided into two phases that would be initiated concurrently, M&E and Civil. The M&E would include a fast-track specification of pumps and other

equipment with long lead time deliveries. M&E fast-track should take 3 months and other design should take 6 months.

Environmental Clearance – Concurrent with design

Permits – The permits required concern water quality, and are issued by LDNR, this should be coordinated among the agencies to take no more than one month after final design is completed and be concurrent with the construction bid process.

LERRD – Land required for the pump station and force mains are in the existing ROW of the canal. No extra ROW is required.

Construction – The force main and pump stations proposed would be completed in approximately 30 months under 3 simultaneous contracts.

Further Considerations

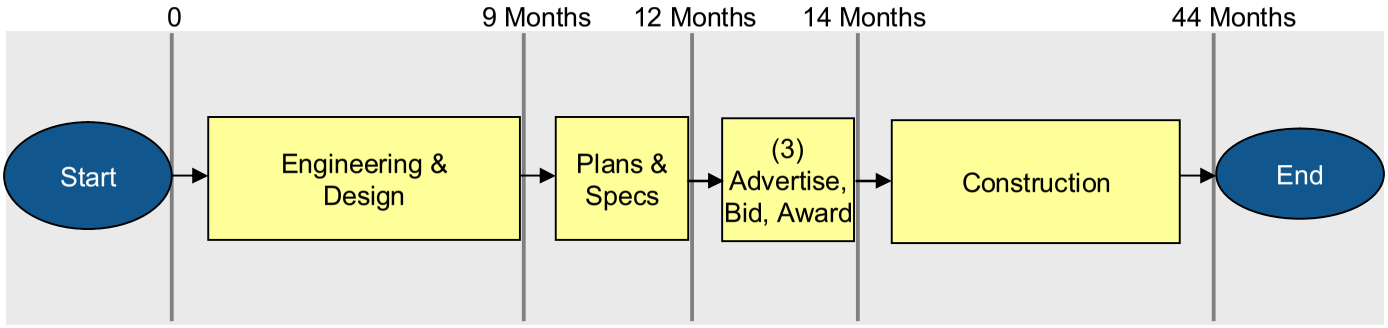
- Project sponsors should be prepared for a possible controversy over physical changes between Robert E. Lee Blvd. and Lakeshore Dr. if community coordination is not early and thorough because the neighborhoods on each side of the Orleans Avenue Canal north of Robert E. Lee, especially the "Bird Streets" on the east, are eligible for the NRHP. Potentially, as no buildings or contributing elements such as the streets and lanes are directly impacted, Section 106 could be fast-tracked if the community is not opposed to project. If the neighbors apply for a district as a means of slowing or blocking implementation of this project, the Lakeshore Parkway system likely would be included, and an option to fast-track the Section 106 process would no longer apply.
- The concrete box culvert force main can be part of a permanent solution.

Conclusion

This project is not recommended for further study. While the completed project is possible, the costs, time, and impacts required to complete the project would be significant. Therefore, this project has been eliminated for the following reasons:

1. Cost of box culvert to lake, along with complete reconstruction of DPS 7 is excessive.
2. Construction of the discharge box culvert would interfere with normal drainage for several years.
3. The reconstruction of DPS 7 would interfere with normal drainage for several years
4. Energy cost to operate the pumping station would increase substantially.

Project 6

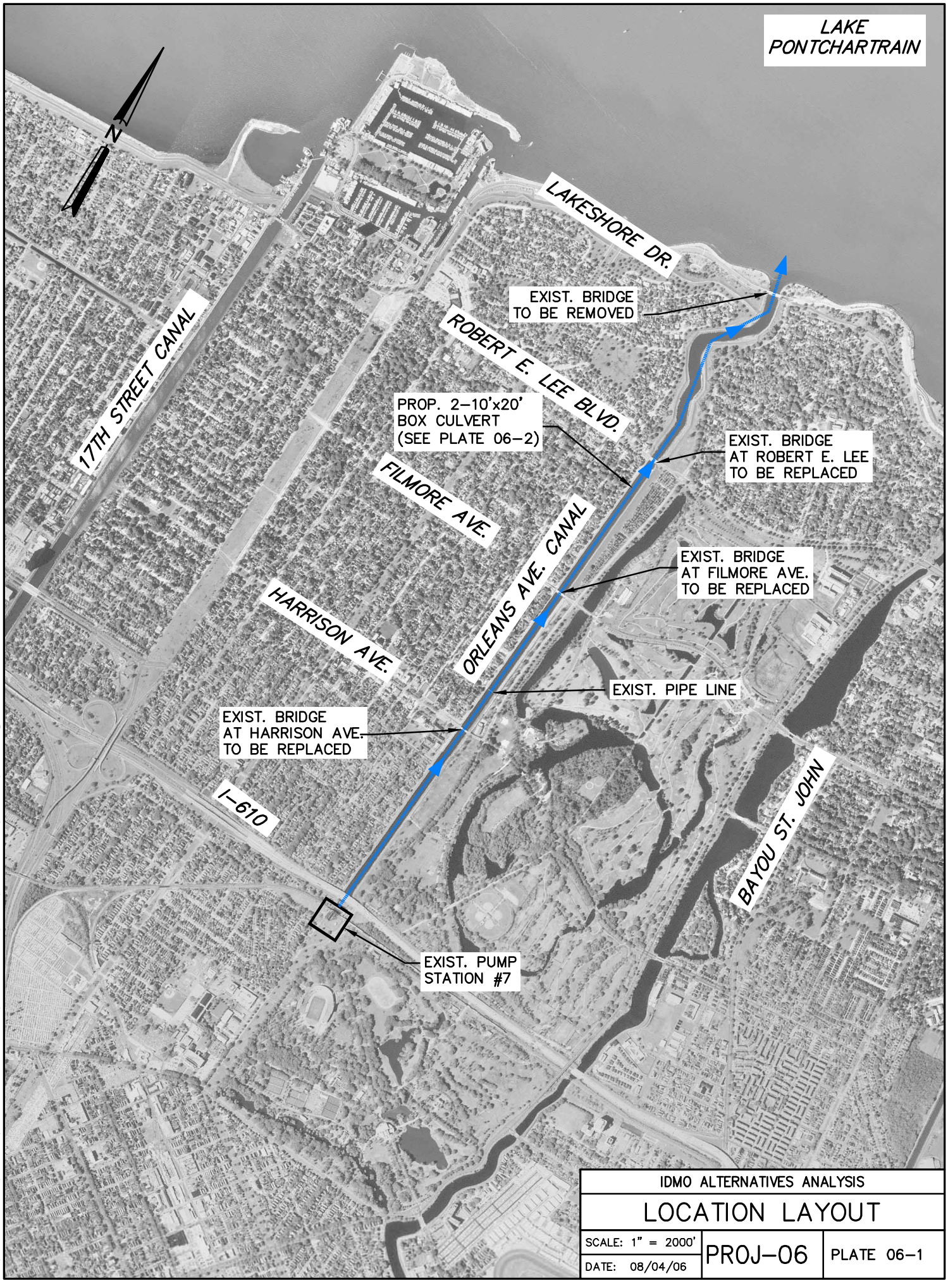


Environmental Compliance – Potential environmental issues, as discussed in the "Environmental Consideration" section, can be addressed during the engineering and design phase in order to keep off the critical path.

LERRD's – Any potential LERRD's , as discussed in the "Proposed Work" section, can be addressed during the engineering and design phase in order to provide for construction without causing delay.

Pump Procurement – Specifics on pumps can be identified early in the engineering and design phase in order to be delivered on-site, when needed, without causing delay. This should be done concurrent with overall schedule. This is not a critical path item in this flow chart. (estimated 18 month lead time required)

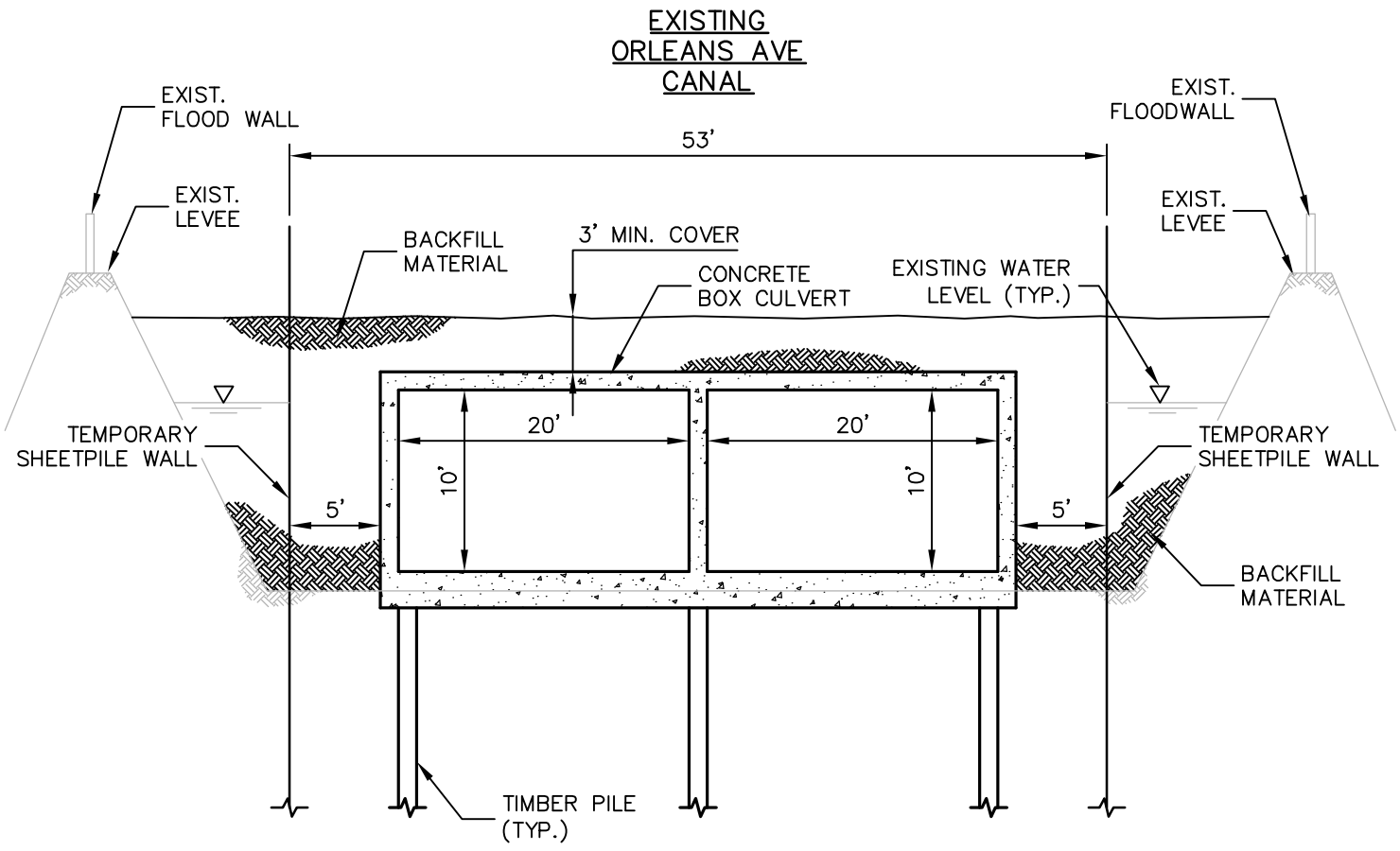
Contract Administration – Construction could be implemented with 3 separate; concurrent contracts for the boxes and pumps in order to expedite the process. Estimated time shown above reflects this approach.



IDMO ALTERNATIVES ANALYSIS

LOCATION LAYOUT

SCALE: 1" = 2000'	PROJ-06	PLATE 06-1
DATE: 08/04/06		



DOUBLE BOX CULVERT SECTION
N.T.S.

IDMO ALTERNATIVES ANALYSIS		
TYPICAL SECTION		
SCALE: 1" = N.T.S.	PROJ-06	PLATE 06-2
DATE: 08/04/06		

Pump Station No. 7 at Orleans Avenue Canal

Orleans Avenue Canal at Pump Station No. 7 (Looking North)

Orleans Avenue Canal at Lakeshore Drive (Looking North)

Project No. 7

Convert London Avenue Canal to Force Main to Lake

Objective

The objective of this project is to eliminate capacity constraints in the London Avenue Canal by converting it to a force main, consisting of a series of box culverts, from the DPS 3 to Lake Pontchartrain.

Existing Conditions

DPS 3 is located in the intersection of N. Broad St. and Florida Ave. It contains 5 horizontal pumps with a combined capacity of 4,260 cfs that are driven by five 25 Hz electric motors. The principal tributary area of DPS 3 contains of 3,080 acres. It extends from Mirabeau Ave. to the Mississippi River between Bayou St. John, N. Carrollton Ave. and Orleans Ave. on the west and Paris Ave., N. Miro St., and Elysian Fields Ave. on the east. Three of the pumps empty into the London Avenue Canal, which discharges into Lake Pontchartrain. The other two are capable discharging into the London Ave. canal or of pumping 1100 cfs into the Florida Ave. Canal draining east to DPS 19, which discharges into the Industrial Canal.

DPS 4 contains six pumps with a combined capacity of 3,720 CFS. The pumps include one vertical, three horizontal, and two centrifugal pumps that are driven by six 25 Hz electric motors. DPS 4 also contains a 10' and 2' steel siphon over the canal to bring water from the west bank of the canal to the pump station.

Seven roadway bridges and one railroad bridge cross the London Avenue Canal. From south to north, these are I-610, Gentilly Blvd., Mirabeau Ave., Filmore Ave., Robert E. Lee Blvd., Leon C. Simon Blvd., and Lakeshore Dr. The railroad bridge is just north of DPS 3.

There are also two utility crossing over the London Avenue Canal:

- A 50" water line crosses south of the Filmore Ave. Bridge and
- Electrical conduit to the south of DPS 4.

Proposed Work

The existing open channel would be replaced with two 10'x20' box culverts from DPS 3 to the lake. From DPS 4 to the lake, two additional 10'x20' box culverts would be

required. The existing canal servitude would become green space. With the exception for I-610, the bridge crossings would be replaced with roadways over the top of the culverts.

New pumps would be required at DPS 3 station to meet the required total system head to pump the flow from DPS 3 to Lake Pontchartrain. The required head elevation at the discharge of the pump station is 31 ft NGVD. This would require a total system head of 36 ft. The total capacity of the force main system, from DPS 3, would be 4,260 cfs.

New pumps would also be required at DPS 4 to meet the required total system head to pump to the lake. The required head elevation at the discharge of this pump station is 31 ft NGVD. This would require a total system head of 36 ft. The total capacity of the force main system would be 3,720 cfs from DPS 4.

The total capacity of the two force main systems combined would be 7980 cfs.

Construction Considerations

The contractor will have to maintain the existing flow in the canal during construction of the force main by either temporary pumping or creating a bypass within the existing channel.

Temporary bracing will be required for the 50" water line and the electrical conduit. After construction, the conduits would remain as is.

The I-610 bridge would remain in place, but the other six bridges would be replaced with roadways over the culverts as the bridge would no longer be necessary once the vault is completed.

Environmental Considerations

This project, like all the others, would satisfy the requirements of NEPA through a supplement to EA #433. This would include, but not necessarily be limited to, the following:

- Compliance with applicable Federal and state water protection requirements,
- Preparation of a Phase I Site Assessment in any areas for which one has not been completed,
- Continuing coordination with USFWS and LDWF, and
- Consultation with the SHPO regarding potential effects on the New Orleans drainage system.

For this project, additional consultation with the SHPO is required because the project area includes neighborhoods that are eligible for the NRHP.

Order of Magnitude Cost Estimate

Cost Estimate - Project 7	
Environmental	$10,000
Right-of-Way Acquisition	$0
Design	$33,905,897
Construction	$389,917,812
Total	**$423,833,708**

Roadmap / Timeline

Design – This would be divided into two phases that would be initiated concurrently, M&E and Civil. The M&E would include a fast-track specification of pumps and other equipment with long lead time deliveries. M&E fast-track should take 4 months and other design should take 8 months.

Environmental Clearance – Concurrent with design

Permits – The permits required concern water quality, and are issued by LDNR, this should be coordinated among the agencies to take no more than one month after final design is completed and be concurrent with the construction bid process.

LERRD – Land required for the pump station and force mains are in the existing ROW of the canal. No extra ROW is required.

Construction – The force main and pump stations proposed would be completed in approximately 42 months under 4 simultaneous contracts.

Further Considerations

- Project sponsors should be prepared for a protracted controversy over physical changes between Robert E. Lee Blvd. and Lakeshore Dr. if community coordination is not early and thorough because the neighborhood west of the London Avenue Canal north of Robert E. Lee Blvd. may be eligible for the NRHP. Potentially, as no buildings or contributing elements such as the streets and lanes are directly impacted, Section 106 could be fast-tracked. If the neighbors apply for a district as a means of

slowing or blocking implementation of this project, however, the Lakeshore Parkway system would be included, and an option to fast-track the Section 106 process would no longer apply.

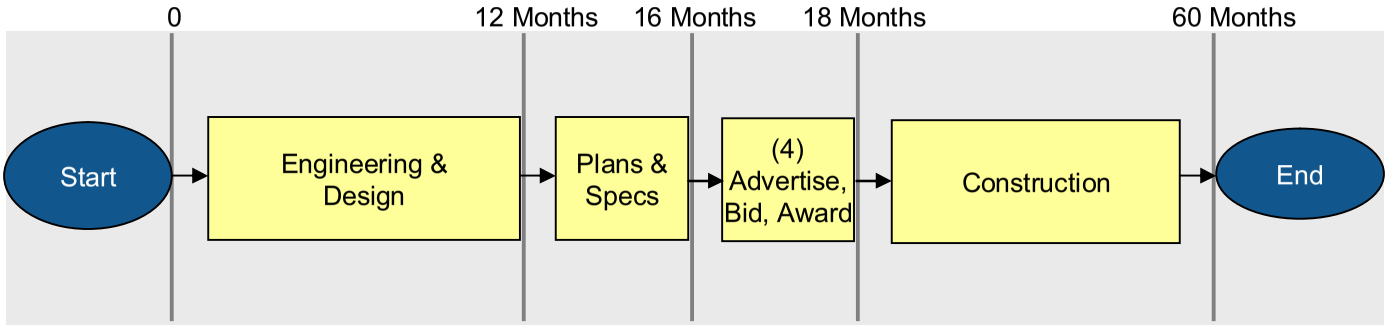
- The concrete box culvert force main can be part of a permanent solution.

Conclusions

This project is not recommended for further study. While the completed project is possible, the costs, time, and impacts required to complete the project would be significant. Therefore, this project has been eliminated for the following reasons:

1. Cost of box culvert to lake, along with complete reconstruction of DPS 3 and DPS 4 excessive.
2. Construction of the discharge box culvert would interfere with normal drainage for several years.
3. The reconstruction of DPS 3 and DPS 4 would interfere with normal drainage for several years
4. Energy cost to operate the pumping station would increase substantially.

Project 7

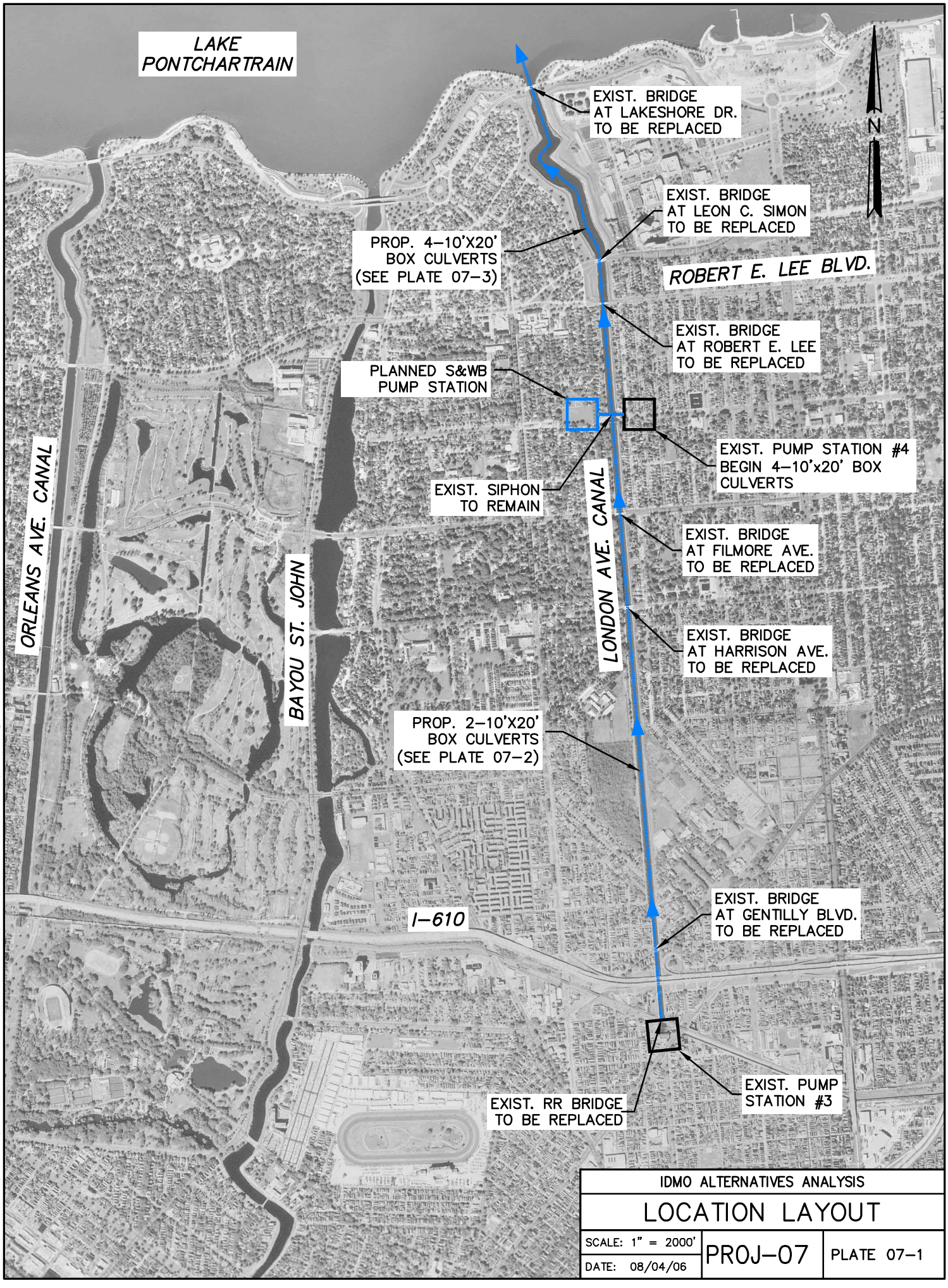


Environmental Compliance – Potential environmental issues, as discussed in the "Environmental Consideration" section, can be addressed during the engineering and design phase in order to keep off the critical path.

LERRD's – Any potential LERRD's , as discussed in the "Proposed Work" section, can be addressed during the engineering and design phase in order to provide for construction without causing delay.

Pump Procurement – Specifics on pumps can be identified early in the engineering and design phase in order to be delivered on-site, when needed, without causing delay. This should be done concurrent with overall schedule. This is not a critical path item in this flow chart. (estimated 18 month lead time required)

Contract Administration – Construction could be implemented with 4 separate; concurrent contracts for the boxes and pumps in order to expedite the process. Estimated time shown above reflects this approach.

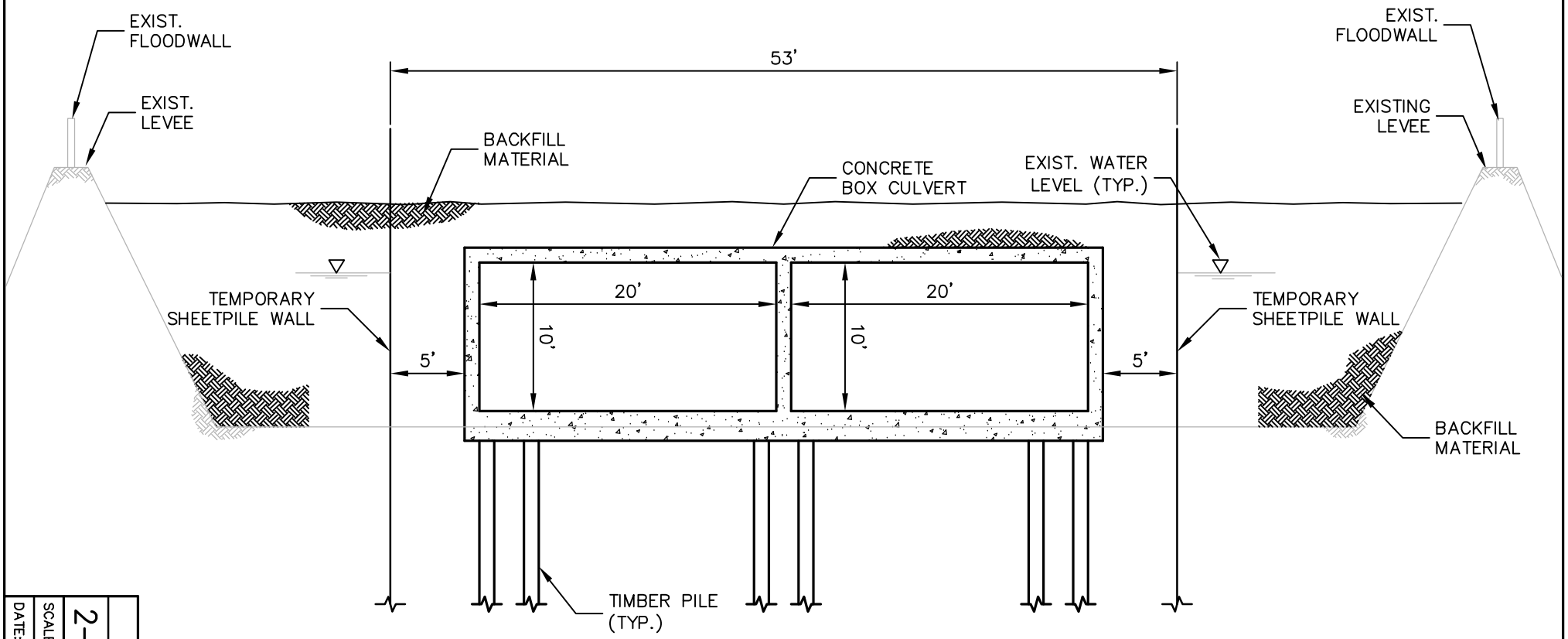


IDMO ALTERNATIVES ANALYSIS

LOCATION LAYOUT

SCALE: 1" = 2000'	PROJ–07	PLATE 07–1
DATE: 08/04/06		

EXISTING
LONDON AVE
CANAL



2-10'x20' BOX CULVERT SECTION
(FROM DPS 3 TO DPS 4)
LONDON CANAL AVE.
N.T.S.

IDMO ALTERNATIVES ANALYSIS

2-10'x20' RCB TYP. SECTION

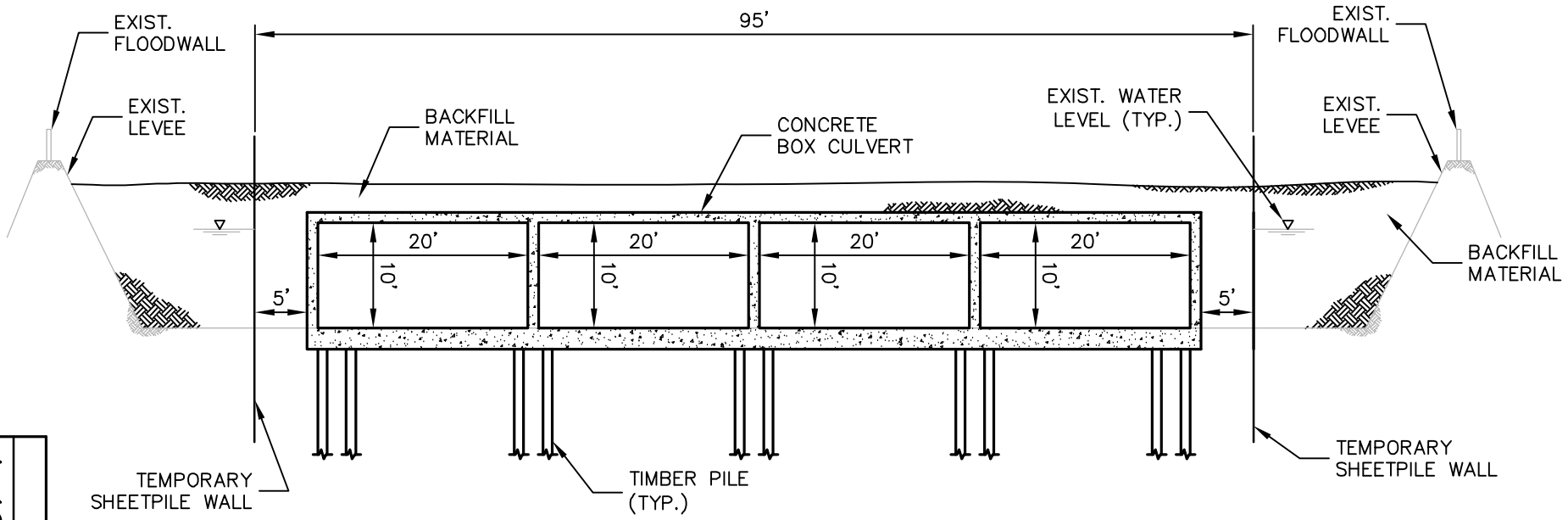
SCALE: 1" = N.T.S.

DATE: 08/04/06

PROJ-07

PLATE 07-2

EXISTING
LONDON AVE
CANAL



4-10'x20' BOX CULVERT SECTION
(FROM DPS 4 TO LAKE PONTCHARTRAIN)
LONDON AVE. CANAL
N.T.S.

IDMO ALTERNATIVES ANALYSIS

4-10'x20' RCB TYP. SECTION

SCALE: 1" = N.T.S.

DATE: 08/04/06

PROJ-07

PLATE 07-3

Discharge tubes at DPS No. 3

London Avenue Canal at DPS No. 3 (Looking North)

London Avenue Canal at Gentilly Blvd. (Looking North)

London Avenue Canal at Lake Pontchartrain

London Avenue Canal at DPS No. 4 (Looking Northeast)

Intake Basin at DPS No. 4

Project No. 8

Use City Park as a Detention Area to Relieve the Orleans Avenue Canal

Objective

The objective of this project is to relieve the capacity demands on the Orleans Avenue Canal by using a large portion of City Park north of Interstate 610 (I-610) as a detention pond for the water that cannot be pumped out of the Orleans Avenue Canal by the temporary pumps.

Existing Conditions

DPS 7 is located at I-610 and the southern terminus of the Orleans Avenue Canal. The station contains six pumps with a combined capacity of 2,690 cfs. The pumps include three horizontal and three centrifugal pumps, which are driven by five 25 Hz electric motors and one 60 Hz electric motor. The Pump Station is fed by a tributary area consisting of 3,960 acres generally bounded by Pontchartrain Blvd., I-10, Lopez St., Orleans Ave., N. Carrollton Ave., Bayou St. John, and Harrison Ave. This includes a large portion of City Park including all the area south of I-610 and about a third of the area north of I-610 that is considered in this alternative as a detention area. The water discharged from DPS 7 flows into the Orleans Canal that discharges north into Lake Pontchartrain.

Gates and temporary pumps are being installed at the north end of the canal to stop a storm surge from Lake Pontchartrain and to continue use of the canal as a component of the drainage system. The temporary pumps are planned to provide a flow of 2,000 cfs into Lake Pontchartrain. Since the current pumps at DPS 7 have a maximum capacity of 2,690 cfs and the temporary pumps allow for 2,000 cfs, there is an apparent need for storage of 690 cfs. Unfortunately, the Orleans Ave. Canal does not receive a discharge of 2,690 cfs from DPS 7 due to conveyance restrictions upstream of the pump station. The canal is capable of holding water up to an elevation of 9 ft NGVD.

City Park is a large municipal park that is bounded on the west by Orleans Ave. south of I-610 and the Orleans Ave. Canal north of I-610. Its other boundaries are City Park Ave. to the south, Robert E. Lee Blvd to the north, and Wisner Dr. along Bayou St. John to the east. City Park is home to numerous cultural and recreational facilities. Those north of I-610 include City Park Riding Stables - Equestrian, the NOPD Horse Stables, the G.

Gernon Brown Center (a gymnasium), Popp's Fountain, Marconi Meadows, Baseball Fields, Pan American Soccer Stadium, a Golf Driving Range, a Golf Club, and two of its three Golf courses. Also located within the park north of I-610 are a public high school and a USDA research facility.

Proposed Work

Assuming that DPS 7 is able to operate near capacity, approximately 690 cfs must be removed from the system. This could be accomplished by modifying a portion of City Park north of I-610 to provide for a detention area.

To create the detention area, a berm would be build around a portion of City Park north of I-610. Because of a gradual slope down to the northern portion of the Park, the berm would require a maximum elevation of 5' to hold approximately 4' of water in the lowest portion, with 1' of freeboard. The storage area created in City Park is estimated to be 1,320 acre-ft. See **Plate 8-1**, Location Layout.

The berm would begin at the Orleans Ave. Canal levee on the north side of I-610 near DPS 7. It would then parallel Zachary Taylor Dr. and I-610 to Wisner Blvd., but would exclude Popp's Fountain and Pan American Stadium. Much of Wisner Blvd. could be used as a berm; however a berm would be required in isolated low areas along that roadway. The berm would turn westward approximately 1,000' south of Filmore Ave. and turn north around the club house, the driving range, John F. Kennedy High School, and the USDA research center to Robert E Lee Blvd. It again turns west parallel to Robert E. Lee Blvd. until reaching the Orleans Ave. Canal levee. All buildings and monuments within the detention area, including the stables, would be surrounded with berms to prevent flooding.

Approximately 500' south of Filmore Ave., an overflow weir / control structure will be constructed to convey water into a discharge basin. Seven 60" diameter concrete culverts would be installed from the discharge basin under Marconi Dr. to discharge water into the City Park detention pond. The culverts will prevent the washout of Marconi Dr. It is estimated that the fastest time to fill the area would be approximately 18.5 hours at 868 cfs. The actual time and discharge into City Park will vary with the gradual rising of the flood stage in the Canal. See **Plate 8-2**, Proposed Outfall Pipes. To ensure water will not exit City Park while it is being held, all drainage leading to existing alternate outfall

structures will be contained with valves and/or flap gates. Flow into the park will be controlled to prevent overtopping of the berm.

The water would be detained until the storm period has past. It would then exit through the existing drainage system located near Zachary Taylor Dr. and Golf Dr., which leads to DPS 7, the Orleans Ave. Canal, and Lake Pontchartrain. The existing drainage structure would be reconstructed to detain water during the storm event and to release it afterward, as conditions allow, into the municipal drainage system. See **Plate 8-3**, Proposed Closure Gate.

Geotechnical Considerations

N/A

Construction Considerations

Prior to the construction of the overflow tubes, the Contractor shall implement a construction procedure that will not impose on the integrity of the existing canal floodwall.

Within City Park, the alignment of the berm should be designed to avoid damage to the oak trees. Where the berm crosses Marconi Dr., Filmore Ave., and Harrison Ave, these roadways would be raised over the berm rather than constructing flood gates.

Environmental Considerations

This project, like all the others, would satisfy the requirements of NEPA through a supplement to EA #433.

For this project, additional consultation with the SHPO is required because there are various sites within City Park that may be eligible for the National Register of Historic Places.

Order of Magnitude Cost Estimate

Cost Estimate - Project 8

Environmental	$5,000
Right-of-Way Acquisition	$0
Design	$337,714
Construction	$3,883,709
Total	**$4,226,423**

Roadmap / Timeline

Design – It should take approximately 4 months to complete the design.

Environmental Clearance – Potential environmental issues could impact the critical path of the project. See Environmental Considerations.

Permits – The permits required concern water quality, and are issued by LDNR, this should be coordinated among the agencies to take no more than one month after final design is completed and be concurrent with the construction bid process.

LERRD – Land required for the detention area is owned by the State of Louisiana and operated by a private non-profit organization. The use of the land would have to go through an extensive public information process as described earlier in this report. This process must be concurrent with Design and could be the critical path of the design.

Construction – The proposed berm would take approximately 12 months to complete.

Further Considerations

- Except for the considerations discussed below, no damage would result from this alternative. To avoid a lengthy community debate, there should be early coordination with the City Park Improvement Association and a pro-active public information program.
- The City Park Riding Stables - Equestrian, the NOPD Horse Stables, and the G. Gernon Brown Center are located within the detention area and would be damaged each time the detention area is used. The Brown Center is adjacent to the Orleans Ave. Canal levee, and it is possible that a sheetpile wall could be added that would protect the site. Protection of the stables with interior berms would be more costly. If this project were advanced, the sponsors should discuss these issues with the New Orleans Police Department and the New Orleans Recreation Department as well as with the City Park Improvement Association.

Conclusion

This project is not recommended for further study. The Orleans Avenue Canal is able to handle the current flow. Without completion of other projects to increase the conveyance capacity between DPS 2 and DPS 7, this project would not be utilized. Therefore, it is eliminated for the following reasons:

1. Conveyance constrictions along Orleans Avenue upstream of DPS 7 prevent enough flow to maximize the capability of DPS 7.

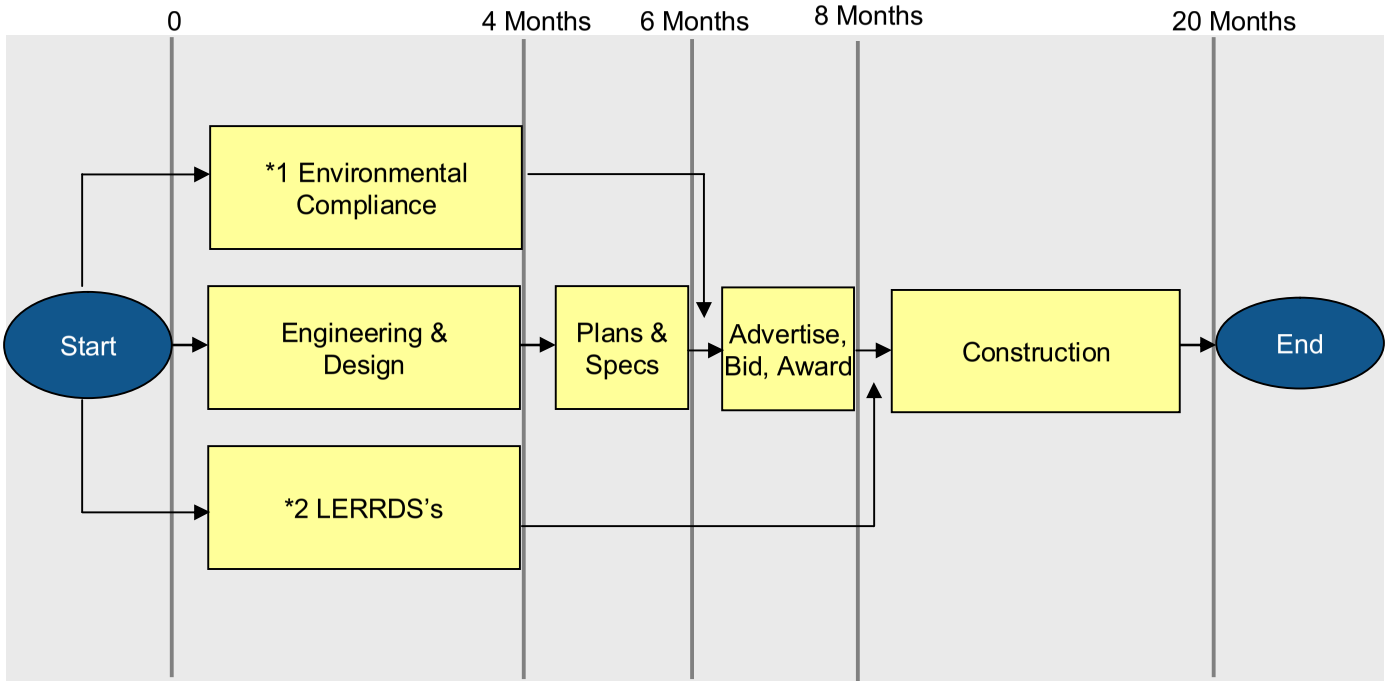
2. The pumps added at the gate structure located at the outfall of the Orleans Avenue Canal have the capacity to discharge the current flow.

3. The maximum flow required to fill the pond within the time necessary to hold the water would only provide a minimal benefit.

4. Mitigation of the park would be necessary after each use.

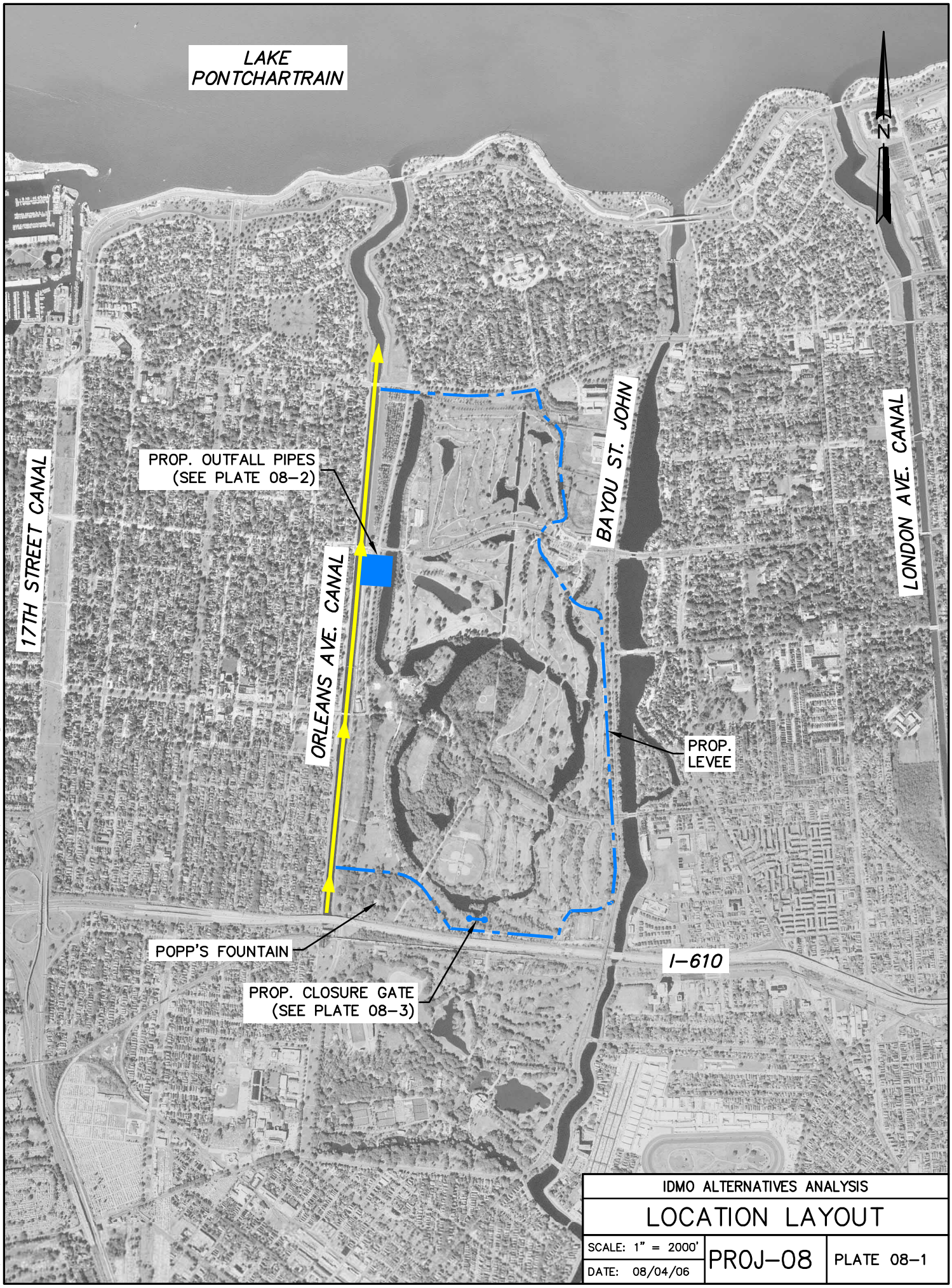
5. Maintenance resources required to place sandbag at the road crossings and around buildings within the pond area could be used more effectively elsewhere.

Project 8



*1 *Environmental Compliance* – Potential environmental issues are discussed in the "Environmental Consideration" section. This scope, combined with the shorter design and plans & specs duration, could put this item on the critical path. Early coordination with the appropriate agencies is essential. Not considered on critical path in flow above.

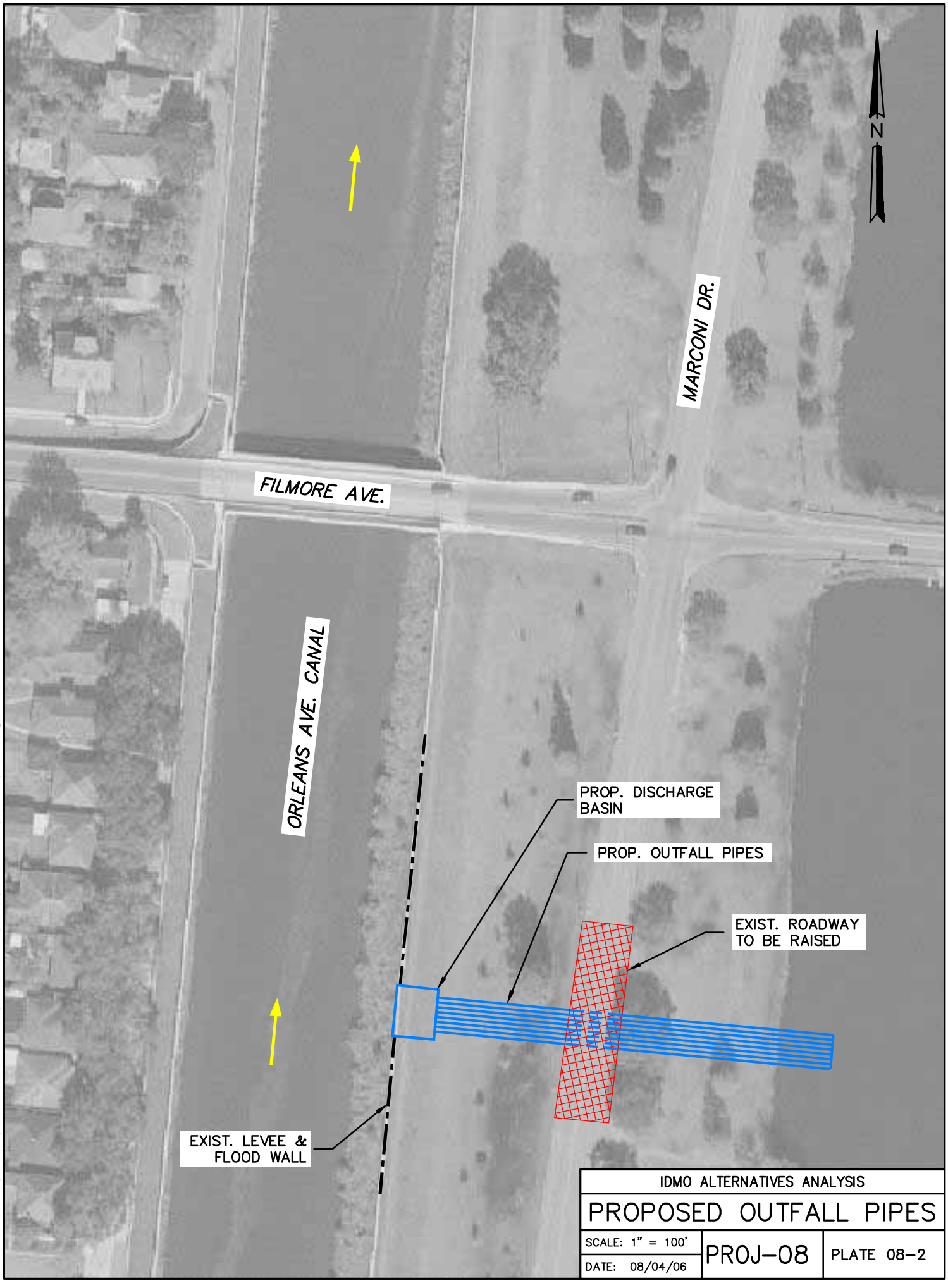
*2 *LERRD's* – Due to the proposed work of this alternative, comprehensive coordination and discussions with the appropriate agencies will be necessary to keep it off the critical path. Not considered on critical path in flow above.



IDMO ALTERNATIVES ANALYSIS

LOCATION LAYOUT

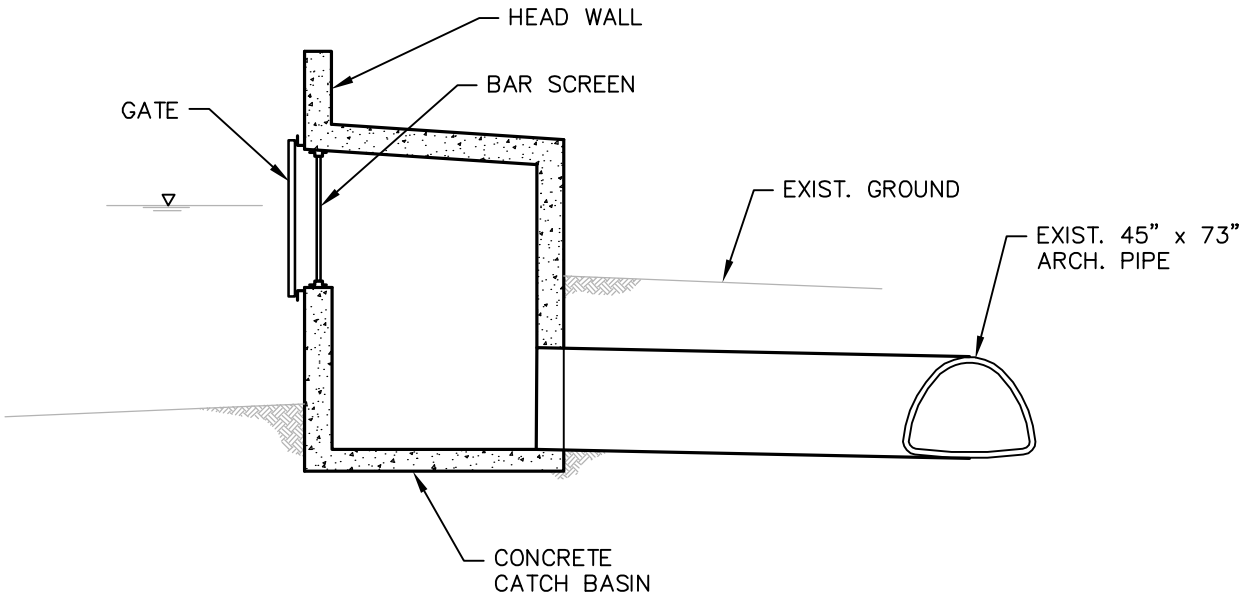
SCALE: 1" = 2000'	PROJ-08	PLATE 08-1
DATE: 08/04/06		



IDMO ALTERNATIVES ANALYSIS

PROPOSED OUTFALL PIPES

SCALE: 1" = 100'	PROJ-08	PLATE 08-2
DATE: 08/04/06		



PROPOSED CLOSURE GATE
N.T.S.

IDMO ALTERNATIVES ANALYSIS		
PROPOSED CLOSURE GATE		
SCALE: 1" = N.T.S.	PROJ-08	PLATE 08-3
DATE: 08/04/06		

Marconi Dr. at Zachary Taylor Dr. (Looking North)

Zachary Taylor Dr. at Marconi Dr. (Looking East)

Existing Outfall Basin near Zachary Taylor and Golf Dr

Wisner Blvd. behind Pan American Stadium

Area behind Bayou Oaks Clubhouse (Looking Southeast)

Filmore Ave. in front of Bayou Oaks Clubhouse (Looking West)

Building Across From Bayou Oaks Golf Clubhouse at Flimore Ave.

Robert E. Lee Blvd on West Side of USDA Research Center (Looking West)

Marconi Dr. & Robert E. Lee Blvd. (Looking East)

Marconi Dr. & Robert E. Lee Blvd. (Looking South)

Marconi Dr. & Robert E. Lee Blvd. (Looking West)

Missing Flood Wall (Zachary Taylor Dr. at Marconi Dr. Looking West)

Missing Flood Wall (Zachary Taylor Dr. at Marconi Dr. Looking West)

Popp's Fountain

Baseball Fields

City Park Riding Stables – Equestrian

NOPD Horse Stables

G. Gernon Brown Gymnasium

Project No. 9

Create Detention Area in New Basin Canal from 17th Street Canal

Objective

The objective of this project is to divert a portion of the water from the 17th Street Canal to the large open median between Pontchartrain Blvd and West End Blvd (formerly the site of the New Basin Canal) for detention. See **Plate 9-1** Location Layout.

Existing Conditions

The 17th Street Canal is located on the west side of the city and straddles the Orleans Parish and Jefferson Parish line. Three pump stations discharge a total of 10,500 cfs into the 17th Street Canal, which discharges north into Lake Pontchartrain.

DPS 6 is located at the southern end of the channel. It contains 15 pumps with a total capacity of 9,480 cfs including nine horizontal pumps and six vertical pumps. The pumps are driven by seven 25 Hz motors and eight 60Hz motors. It is fed by the Palmetto Canal and parts of two tributary areas consisting of 8,100 acres.

The Canal Street Pump Station in Jefferson Parish is located on the west side of the canal at the end of Canal Street. It contains 4 vertical pumps that are driven by four 60 Hz motors with a capacity of 160 cfs. The Canal Street Pump Station is fed by a tributary area consisting of 2,500 acres.

The I-10 Pump Station is located on the east side of the canal on Academy Dr. next to Interstate 10 (I-10). It contains 4 pumps with a capacity of 860 CFS including three vertical pumps and one centrifugal pump that are driven by four 60 Hz motors. Its function is to drain water that accumulates in the low area where I-10 passes under the railroad bridge just north of the City Park Ave interchange.

Between West End Blvd. and Pontchartrain Blvd., there is an approximately 300 ft wide median. It is the site of the former New Basin Canal that was filled in the early 1950's. The median extends from Veterans Blvd. on the south to Robert E. Lee Blvd. on the north. The median splits the Lakeview neighborhood and has been used as a park. There is also an old Civil Defense Bomb Shelter and a monument to Irish Immigrants behind the old Bomb shelter. Just north of the bomb shelter, there is the New Basin Estates, an upper-income gated neighborhood that was built recently.

Much of this neighborhood drains to DPS 12 that is located on Pontchartrain Blvd on the north side of Robert E. Lee Blvd. DPS 12 contains 1 horizontal pump driven by one 25 Hz electric motor. Its capacity is 1,000 cfs. The pump station is fed by the drainage structures along Robert E. Lee Blvd and Fleur de Lis Dr., and discharges into the remaining section of the New Basin Canal (now a marina) and into Lake Pontchartrain.

Proposed Work

A detention area would be built in the median between West End Blvd. and Pontchartrain Blvd. A 5 foot high berm would be built 5 feet off the back of curb of the roadway. The median inside the berm would be excavated 6 feet for total detention pond depth of 11 feet. This would provide a 10 ft water depth with one foot of freeboard to prevent overtopping. At a maximum flow rate of 470 cfs it is estimated that this detention pond would accept 284 acre-feet over 8 hours that would be diverted from the 17th Street Canal.

To convey water to the detention pond, an overflow weir / control structure will be constructed to convey water into a discharge basin on the east side of the 17th Street. Canal just north of I-10. Two 5 foot diameter pipes would be installed from the discharge basin along the I-10 corridor and the Pontchartrain Blvd. / West End Blvd. median to the southern end of the detention pond at Veterans Blvd. See **Plate 9-2**, Proposed Discharge Basin and **Plate 9-4**, Detention Outfall. The proposed pipe to the detention pond will be below ground except where it crosses the existing culvert at Fleur De Lis Dr., See **Plate 9-3**, Culvert Crossing. Roadway Crossings at Harrison Ave, Filmore Ave, and Lane St. would have culverts installed below the roadway to allow for the flow of the water. The openings in the berm at these streets would be closed with sand bags. The monument for the Irish Immigrants would not be moved, the berm would stop approximately 70 ft to the south of the monument. To drain the pond, two 3 foot diameter pipes with control valves would be installed along 40th Street to connect the detention pond with the existing box culvert at Fleur De Lis Dr. The drainage could be routed either to DPS 6 or DPS 12 using this culvert.

Geotechnical Considerations

N/A

Construction Considerations

- Prior to the construction of the pipes, the Contractor shall implement a construction procedure that will not impose on the integrity of the existing canal flood wall and the Fleur De Lis box culvert.
- A concrete barrier may be required along I-610 to protect the pipes from traffic because the pipes will be near the edge of the roadway horizontal clear zone.
- Traffic maintenance will be required along Veterans Blvd. and 40th Street during construction.

Environmental Considerations

This project, like all the others, would satisfy the requirements of NEPA through a supplement to EA #433.

For this project, additional consultation with the SHPO is required because there are sites within the viewshed of the proposed detention area, including the underground fallout shelter, they are NRHP eligible. Also, excavation of this site may uncover archeologically significant remnants of the original canal. Finally, there is a monument to Irish immigrants on the site.

Order of Magnitude Cost Estimate

Cost Estimate - Project 9

Environmental	$5,000
Right-of-Way Acquisition	$0
Design	$912,227
Construction	$10,490,605
Total	**$11,407,832**

Roadmap / Timeline

Design – It should take approximately 5 months to complete the design.

Environmental Clearance – Potential environmental issues could impact the critical path of the project. See Environmental Considerations.

Permits – The permits required concern water quality, and are issued by LDNR, this should be coordinated among the agencies to take no more than one month after final design is completed and be concurrent with the construction bid process.

LERRD – Land required is within the existing right-of-way. The use of the land as a detention area would have to go through an extensive public information process as described earlier in this report. This process must be concurrent with Design and could be the critical path of the design.

Construction – The proposed work would take approximately 12 months to complete.

Further Considerations

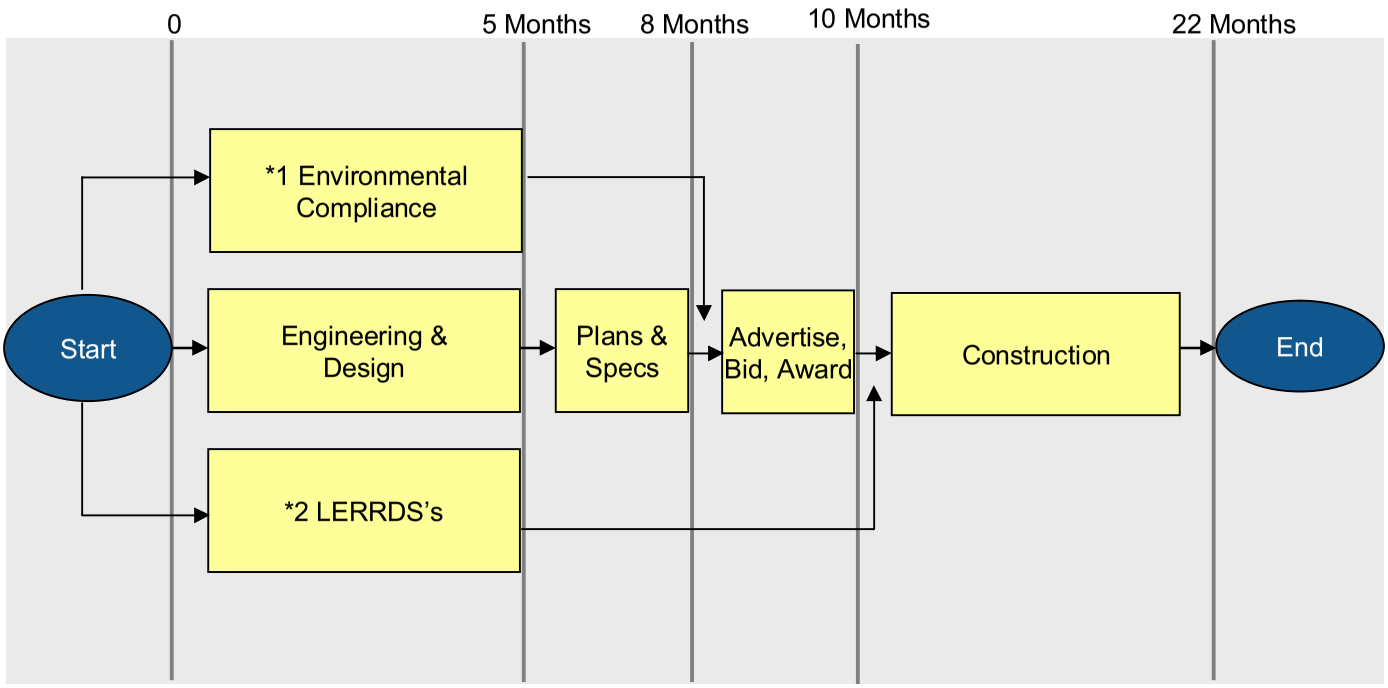
- Public controversy should be anticipated. This alternative does not maintain the site as a park or return it to an open waterway; it is converted to a relatively inaccessible area that would be difficult to patrol.
- If deemed necessary by the SHPO, archaeological data recovery may be required along the canal ROW.

Conclusion

This project is not recommended for further study. It is eliminated for the following reasons:

1. The maximum flow required to fill the pond within the time necessary to hold the water would only provide a minimal benefit.
2. Mitigation of the park would be necessary after each use.
3. Maintenance resources required to place sandbag at the road crossings and around buildings within the pond area could be used more effectively elsewhere.

Project 9



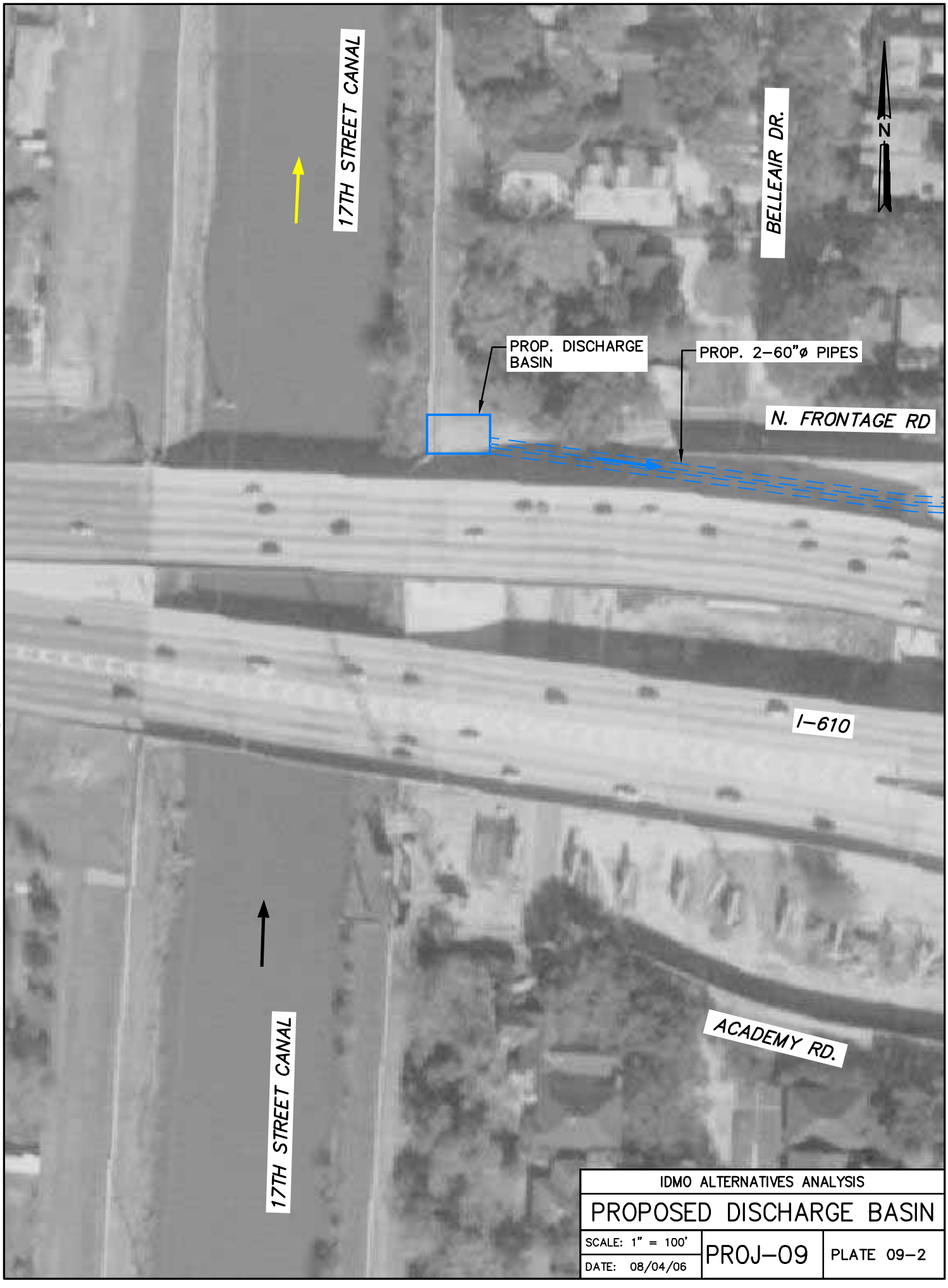
*1 *Environmental Compliance* – Potential environmental issues are discussed in the "Environmental Consideration" section. This scope, combined with the shorter design and plans & specs duration, could put this item on the critical path. Early coordination with the appropriate agencies is essential. Not considered on critical path in flow above.

*2 *LERRD's* – Due to the proposed work of this alternative, comprehensive coordination and discussions with the appropriate agencies will be necessary to keep it off the critical path. Not considered on critical path in flow above.

IDMO ALTERNATIVES ANALYSIS

LOCATION LAYOUT

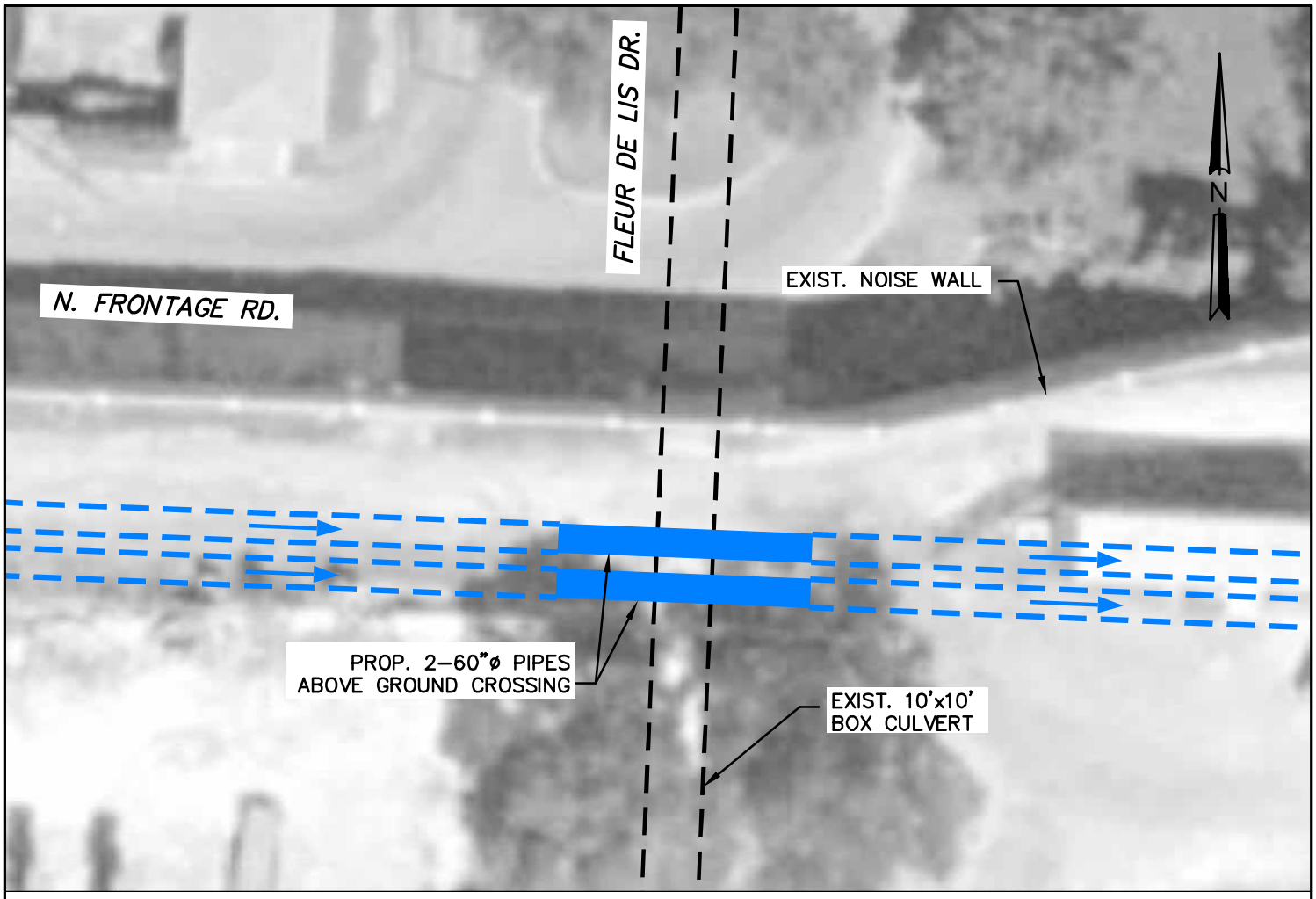
SCALE: 1" = 2000'	PROJ-09	PLATE 09-1
DATE: 08/04/06		

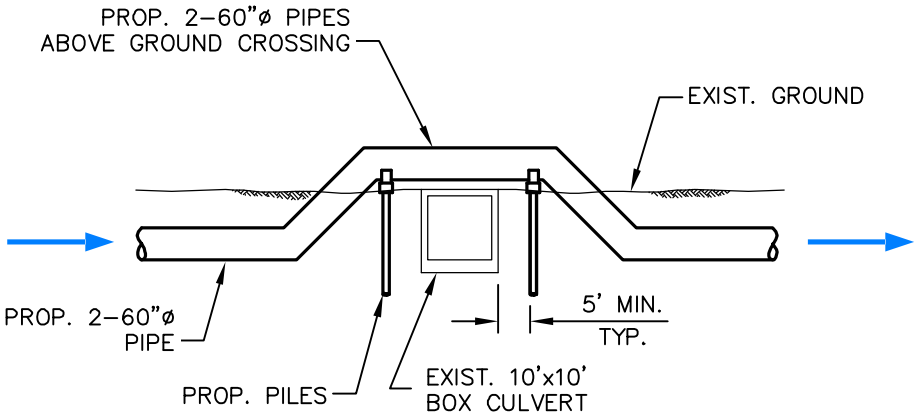


IDMO ALTERNATIVES ANALYSIS

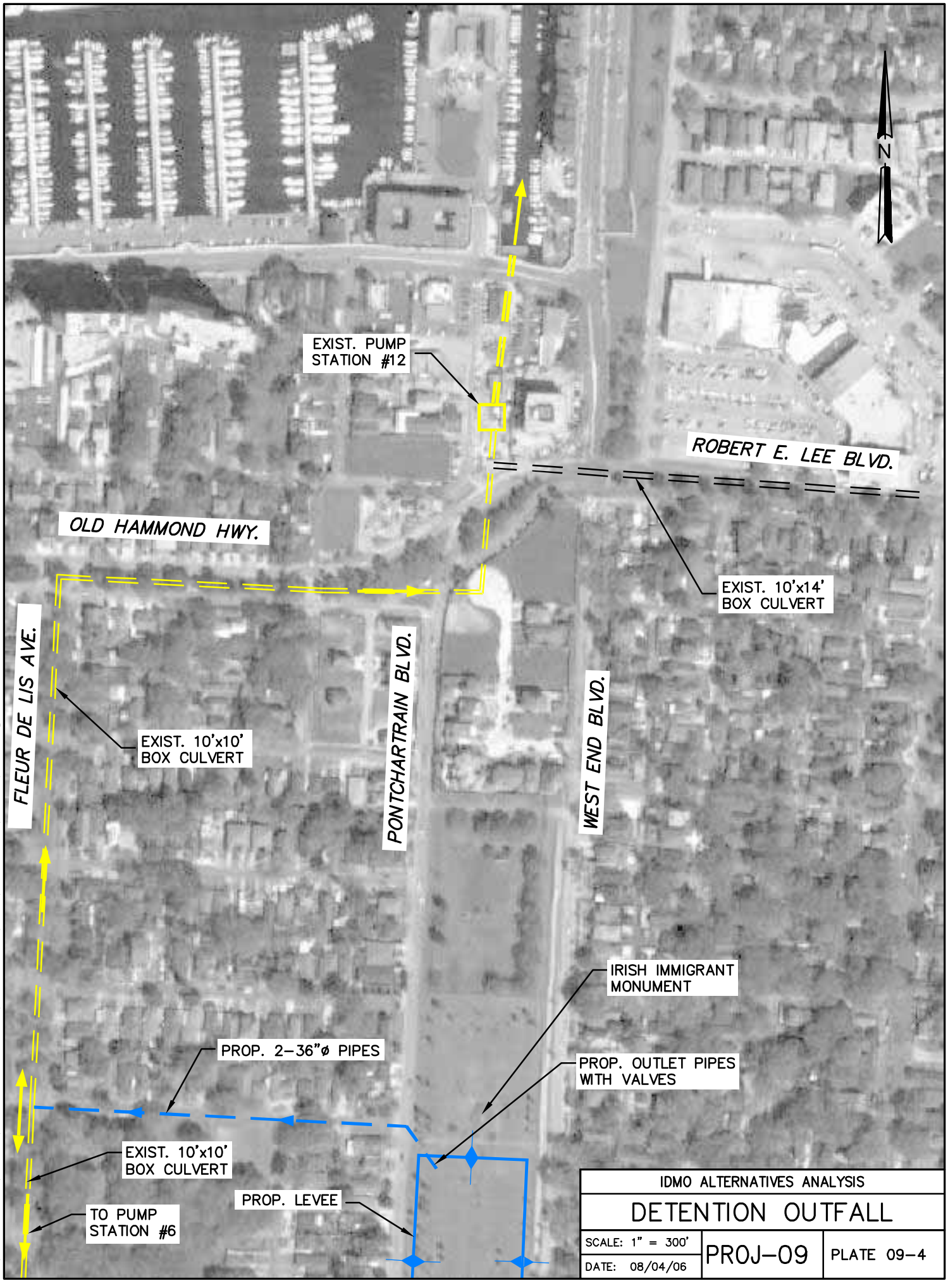
PROPOSED DISCHARGE BASIN

SCALE: 1" = 100'	PROJ-09	PLATE 09-2
DATE: 08/04/06		





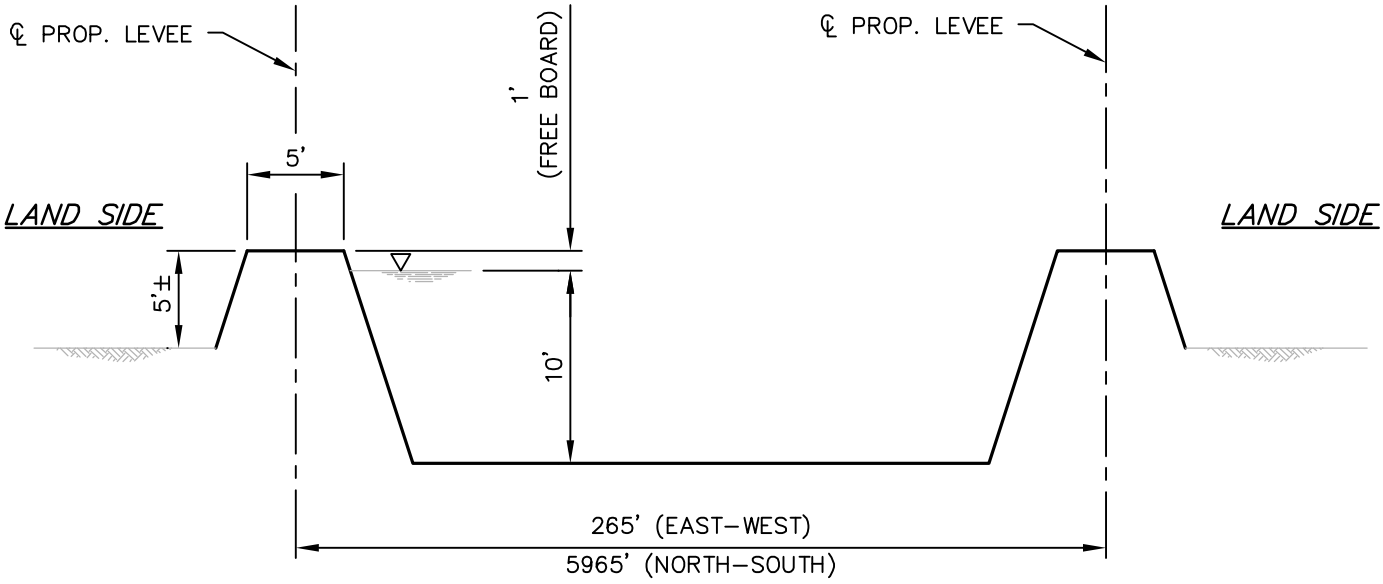
IDMO ALTERNATIVES ANALYSIS		
CULVERT CROSSING		
SCALE: 1" = 30'	PROJ–09	PLATE 09–3
DATE: 08/04/06		



IDMO ALTERNATIVES ANALYSIS

DETENTION OUTFALL

SCALE: 1" = 300'	PROJ-09	PLATE 09-4
DATE: 08/04/06		



TYPICAL PROPOSED DETENTION POND
N.T.S.

IDMO ALTERNATIVES ANALYSIS		
TYPICAL SECTION		
SCALE: 1" = N.T.S.	PROJ-09	PLATE 09-5
DATE: 08/04/06		

Levee by 17th Street Canal North Side of I-10 (Looking West)

Area Along I-10 Looking East (Standing By 17th Street Canal Levee)

Area Along I-10 Looking East (Standing By Sound Wall)

Box Culvert at Fleur De Lis and I-10 (Looking North)

I-610 Loop Looking West Towards 17th Street Canal

I-610 Loop Looking Northeast Towards West End Blvd.

West End Blvd. and Veterans Looking South Towards I-10

West End Blvd. and Veterans Looking North Towards the Lake

New Basin Canal At Filmore Ave (Looking South)

Pontchartrain Blvd and 40th St. (Looking North)

Monument to Irish Immigrants (40th St. & Pontchartrain Blvd / Down St. West End Blvd.)

Pump Station No. 12

Pump Station No. 12 Outfall to Lake Pontchartrain

Project No. 10

Divert Flow from DPS 3 to Florida Ave. Canal to DPS 19

Objective

The objective of this project is to reduce pumping requirements on the London Avenue Canal at Lake Pontchartrain by diverting 1,100 cfs that is discharged from DPS 3 into the Florida Ave. Canal, which flows to DPS 19 and discharges into the Industrial Canal.

Existing Conditions

The Industrial Canal is a 5.5 mile waterway located within the limits of the City of New Orleans that connects the Mississippi River and Lake Pontchartrain. Although it is referred to as the "Industrial Canal" both by commercial mariners and by landside residents, its proper name is the Inner Harbor Navigation Canal (IHNC).

DPS 3 is located in the intersection of N. Broad St. and Florida Ave which contains five horizontal pumps; three of these pumps empty into the London Ave. Canal. The other two are capable of pumping 1,100 cfs (two 550 cfs pumps) into the Florida Ave. Canal draining east to DPS 19. The efficiency of these latter two pumps is compromised, however, by a site limitation. The concrete wall between the discharge flume and the intake basin at the Florida Avenue Canal is too short and allows water from the discharge flume of the two 550 cfs pumps to spill back into the intake basin. This causes the water to recycle and reduces the pumping capacity of the station. Modifications to the discharge flume, and possibly other elements of the station, would be required to allow the full 1,100 cfs to enter the Florida Ave Canal.

DPS 19 is located at the end of the Florida Ave Canal and pumps into the Industrial Canal. It consists of five pumps (three horizontal, 1050 cfs each, and two vertical, 250 cfs each) capable of up to 3,650 cfs of flow into the INHC.

The Florida Ave Canal is an open channel concrete structure 25' at the base with vertical walls approximately 7' on either side. From DPS 3 to DPS 19, the canal measures approximately 14,000 linear feet. It has been determined that the canal is capable of handling a flow of approximately 2,100 cfs up to Peoples Avenue Canal, which also contributes to Florida Ave Canal, and approximately 3,200 cfs from that point to the DPS 19. Along the Florida Ave Canal, there are three railroad bridges, a pedestrian bridge, a roadway bridge, and a box culvert. The 10' x 25' box culvert at Louisa St and Piety St is

a major constriction as it only handles 1,700 cfs of flow. This causes the water to overflow the canal banks and flood the adjacent neighborhood.

At this time, a Florida Ave Canal expansion has been designed which rebuilds the entire canal with a base of 43.5' and walls at a height of 13.5'

Proposed Work

Modifications are needed at DPS 3 to prevent the discharge from the two 550 cfs pumps from spilling back into the intake basin and recycling through the pump station. The gate that allows water to be directed to the Florida Ave Canal may also require modification to allow the full 1,100 cfs to flow through. This project includes these modifications to DPS 3 and three options for improvements in the capacity of the Florida Canal:

Option A

Place a 20' x 10' box underneath from Louisa St. to Piety St. adjacent to the existing box. See **Plate 10a-1** Location Layout, **Plate 10a-2**, Proposed Culvert and Plate **10a-3**, Typical Section. This extra culvert would increase the flow by 1,300 cfs at the major point of constriction from Louisa St. to Piety St. This option would require the removal and relocation of a 48" steel water line. It would also require removing the north shoulder of Florida Ave in order to relocate that steel water line.

Option B

Place six 300 cfs pumps at Louisa St. and run pipes on a pipe bridge over Louisa St. and Piety St. The pumps would be located west of Louisa St. in a small intake basin to the north of the existing Florida Ave Canal. Six 60" pipes would tie into two larger pipes and carry the water over both Louisa St. and Piety St. and discharge back into the Florida Ave Canal at the end of the existing box culvert east of Piety St. See Plate **10b-1**, Location Layout, and **Plate 10b-2**, Additional Pumps.

Option C

Fast-track the planned expansion of the Florida Ave. Currently, under the SELA program, there are plans to expand the Florida Avenue Canal from Deer St. to DPS 19. See **Plate 10c-1**, Location Layout, **Plate 10c-2**, Canal Widening & Reconstruction - Layout 1, **Plate 10c-3**, Canal Widening & Reconstruction - Layout 2 and **Plate 10c-4**, Typical Section.

Geotechnical Considerations

- Subsoil Conditions

  Based on borings made with in the general area, subsoil conditions at the proposed construction site along Florida Avenue Canal between Louisiana and Piety Streets would be expected to consist of very soft to soft clay, organic clay or humus to about the 10 ft. depth. The subsoils below this depth consist of very soft to soft clay to about the 55 ft. depth where a stratum of dense to very dense sand would be expected. Based on available data, this sand stratum extends to at least the 100 ft. depth below ground surface.

- Conceptual Foundation System

  Project 10 has several options that include below ground box culverts, new pumps and an above ground pipe bridge. All of these type structures should be supported on piles driven to firm embedment into the dense to very dense sand stratum. For timber piles supporting the pump station and pipe bents, a capacity of about 20 to 25 tons (F.S. = 2.0) in compression should be available. Piles used to support the below ground box culvert would have a capacity of several tons less for the same pile tip depth. Higher capacities on the order of 50 tons would be available if steel "H" or pipe piles or prestressed concrete piles are used for support. These type piles should also be considered if a greater design life than typically provided by timber piles is desired.

- Water Diversion and Cofferdam Arrangement

  The underground box culvert would have to be constructed within a cofferdam, internally braced at least at one location at the top of the cofferdam walls. For cost estimating purposes, a sheet pile penetration of about 50 ft. below ground surface would be expected. Considering the depth to the dense to very dense sand stratum, forced dewatering would probably not be required. The cofferdam should be able to be dewatered with normal sumps and pumps.

- Additional Geotechnical Investigations

  While not known with certainty, there may be sufficient geotechnical data that was prepared for the planned expansion of the Florida Avenue Canal. If this is unavailable, then soil borings on at least about 300 ft. spacings should be

performed with at least one at the proposed Pump Platform. Geotechnical analyses with regard to compression, tension and lateral capacities of piles would be needed for support of the various elements of the pump facility and pipe bents. Analyses were also be needed relative to the temporary retaining structures (structural and dewatering).

Structural Considerations

All box culverts and canals have been sized to accommodate the hydraulic requirements of this report.

Option A

The new box culvert shall be designed in accordance with the Geotechnical Report's recommendations. As for the structural integrity of the box culverts, their foundations shall be supported on timber piles.

Option B

A pipe support structure (bridge) shall be built to facilitate the two 6' diameter (above ground) pipes, which run from the proposed pump to the existing Florida Ave. Canal, See Plate 10b-3, Support Details. In addition, the pump platform foundations shall be supported on composite timber piles (due to water table fluctuations) while the intake basin will be founded on timber piles. All foundations shall be designed in accordance with the Geotechnical Report's recommendations.

Option C

Since this alternate is just the implementation of the proposed Florida Ave. Canal widening all structural consideration has been documented within the contract drawings and specifications.

Mechanical/Electrical Considerations

N/A

Construction Considerations

The Florida Ave Canal is a major utility corridor that includes the Norfolk Southern railroad tracks, a 72" sewer force main, a 54" sewer force main, a 48" water force main, a major power transmission line installation, and several electrical distribution lines that will cause major construction issues.

Options A and C would could have major costs associated with utility relocations.

Option A would only require the relocation of the water force main. Traffic maintenance during construction would need to be addressed since the excavation will extend into the westbound lane of Florida Ave and that shoulder would have to be removed for relocation of utilities.

Prior to the construction of the new box culvert, the Contractor shall implement a construction procedure that will not impose on the structural integrity of the existing adjacent box culvert 15' beyond junction points. Temporary sheet piling be may used as an alternative for providing stability of the existing culvert along Florida Ave. See Plate 10a-3 "Typical Section".

Prior to the construction of the proposed pump platforms, the Contractor shall implement a construction procedure that will not impose on the structural integrity of the existing canal. Temporary sheet piling can may used as an alternative for providing stability of the existing canal at the junction point of the intake basin.

Environmental Considerations

This project, like all the others, would satisfy the requirements of NEPA through a supplement to EA #433.

It appears that that the area along Florida Ave. may be an environmental justice area. A determination must be made and actions taken accordingly.

Order of Magnitude Cost Estimate

Option A

Cost Estimate - Project 10 (A)

Environmental	$5,000
Right-of-Way Acquisition	$0
Design	$285,796
Construction	$3,286,658
Total	**$3,577,454**

Option B

Cost Estimate - Project 10 (B)	
Environmental	$5,000
Right-of-Way Acquisition	$0
Design	$695,931
Construction	$8,003,211
Total	**$8,704,143**

Option C

As of July 2002, the total project cost for the Florida Avenue Canal Expansion from Deers St. to DPS 19 was $60.5 million. The total project consists of four phases. Currently, two of these four phases are to be let within the next few months (August–October 2006). These two phases start at Piety St. and continue through to DPS 19 and have been recently estimated to cost ~$80 million. By using the information on the original cost estimate and comparing w/ the current estimate for two of the four phases, the entire project from Deer St. to DPS 19 is estimated to cost ~$130 million.

Roadmap / Timeline

Option A

Design – It should take approximately 4 months to complete the design.

Environmental Clearance – Potential environmental justice issues could impact the critical path of the project. See Environmental Considerations.

Permits – The permits required concern water quality, and are issued by LDNR, this should be coordinated among the agencies to take no more than one month after final design is completed and be concurrent with the construction bid process.

LERRD – Land required is within the existing right-of-way. There is a water line relocation that could be a critical path item during construction.

Construction – The proposed work would take approximately 4 months to complete.

Option B

This option is not recommended for further study.

Option C

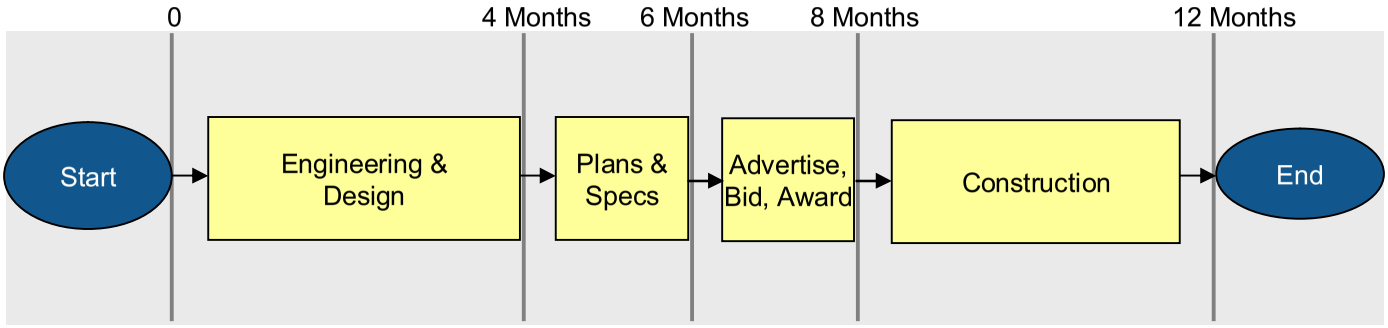
Two phases of the work covered under the SELA program will be advertised in September 2006. Construction of the two phases should be complete in 18 months.

Conclusion

Option A of this project is recommended for further study for the following reasons:

1. The addition of a parallel box culvert at Louisa St. would remove the current constriction of flow that minimizes the capacity of the channel.
2. The cost for the additional box culvert at Louisa St. and the wall and gate improvements at DPS 3 are small compared to other projects.
3. The work would complement the SELA improvements to the Florida Avenue Canal.
4. The improved capacity in the channel restores the flexibility to the municipal drainage system to bypass water around the London Avenue Canal.

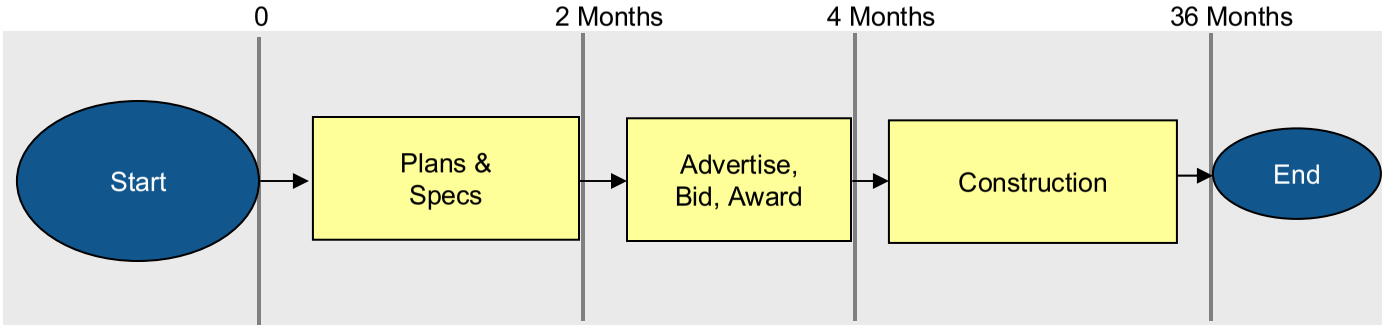
Project 10A



Environmental Compliance – Potential environmental issues, as discussed in the "Environmental Consideration" section, can be addressed during the engineering and design phase in order to keep off the critical path.

LERRD's – Any potential LERRD's , as discussed in the "Proposed Work" section, can be addressed during the engineering and design phase in order to provide for construction without causing delay. Coordination on utility requirements is essential.

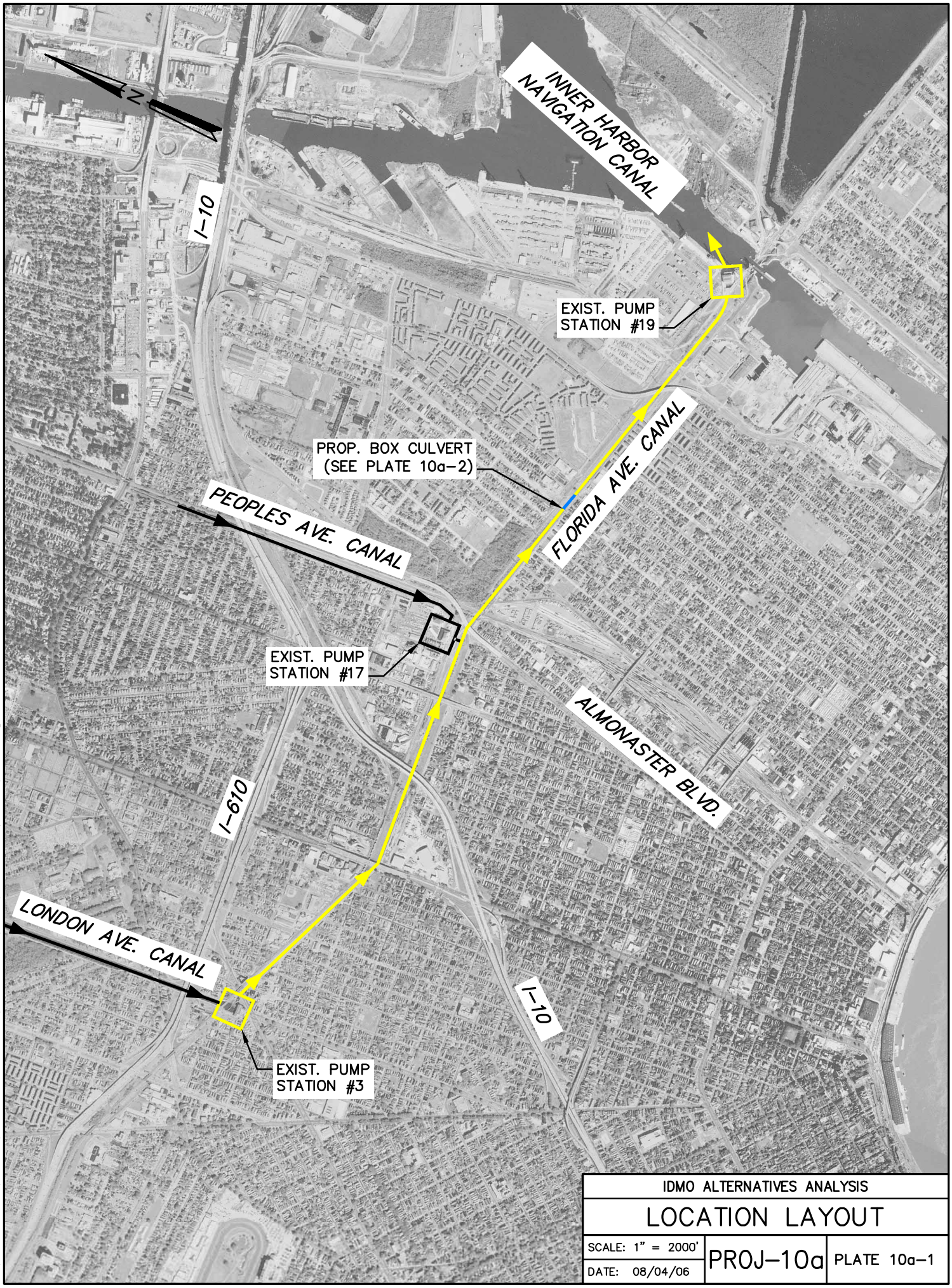
Project 10B



Environmental Compliance – Potential environmental issues, as discussed in the "Environmental Consideration" section, need to be addressed as required. Utilize existing documentation and coordination.

LERRD's – Any potential LERRDS's , as discussed in the "Proposed Work" section, should be addressed as required. Utilize existing documentation and coordination.

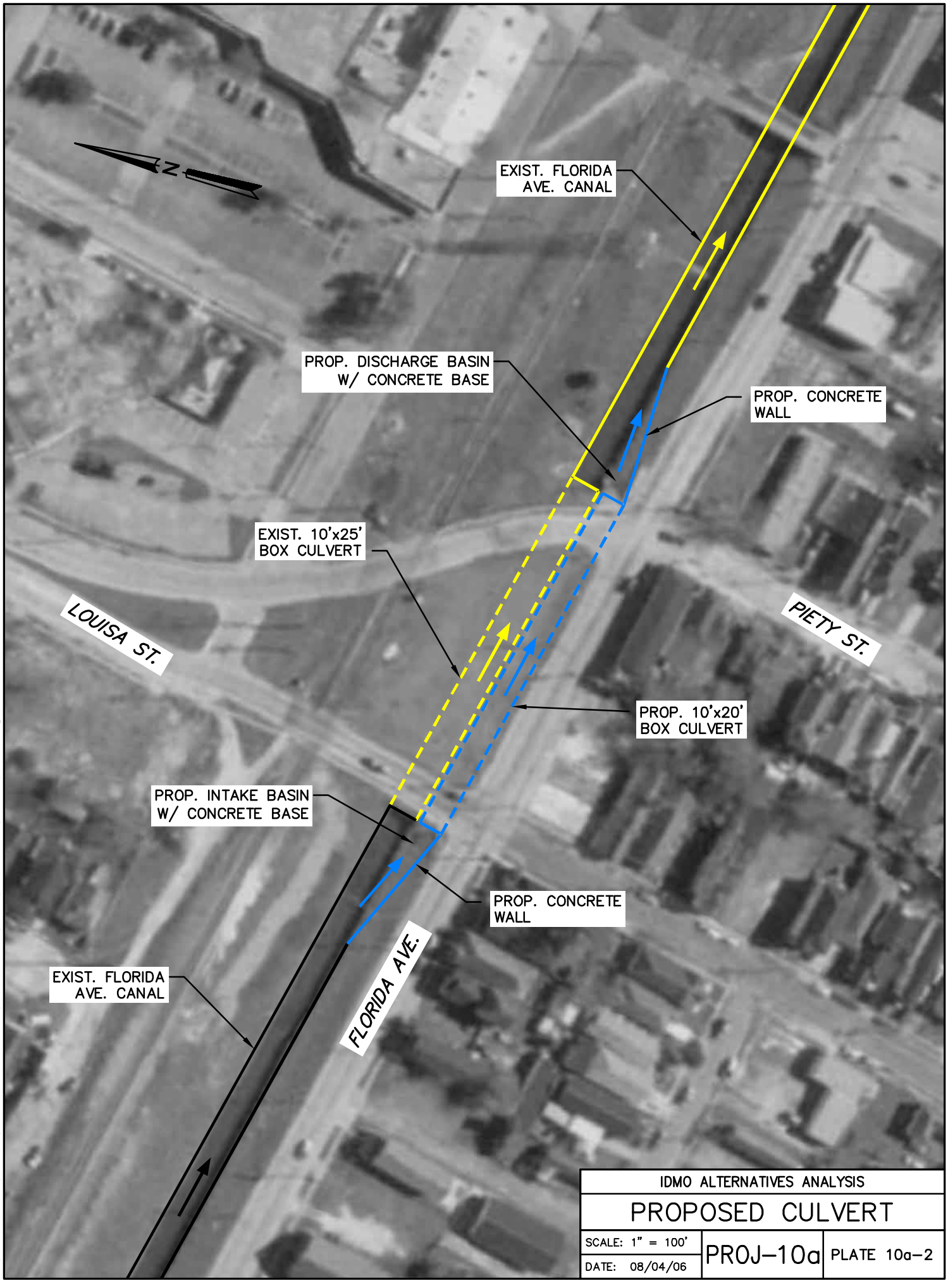
Design/Plans & Specs – Plans & Specs already exist, therefore, not much time is required to prepare this item for advertisement.



IDMO ALTERNATIVES ANALYSIS

LOCATION LAYOUT

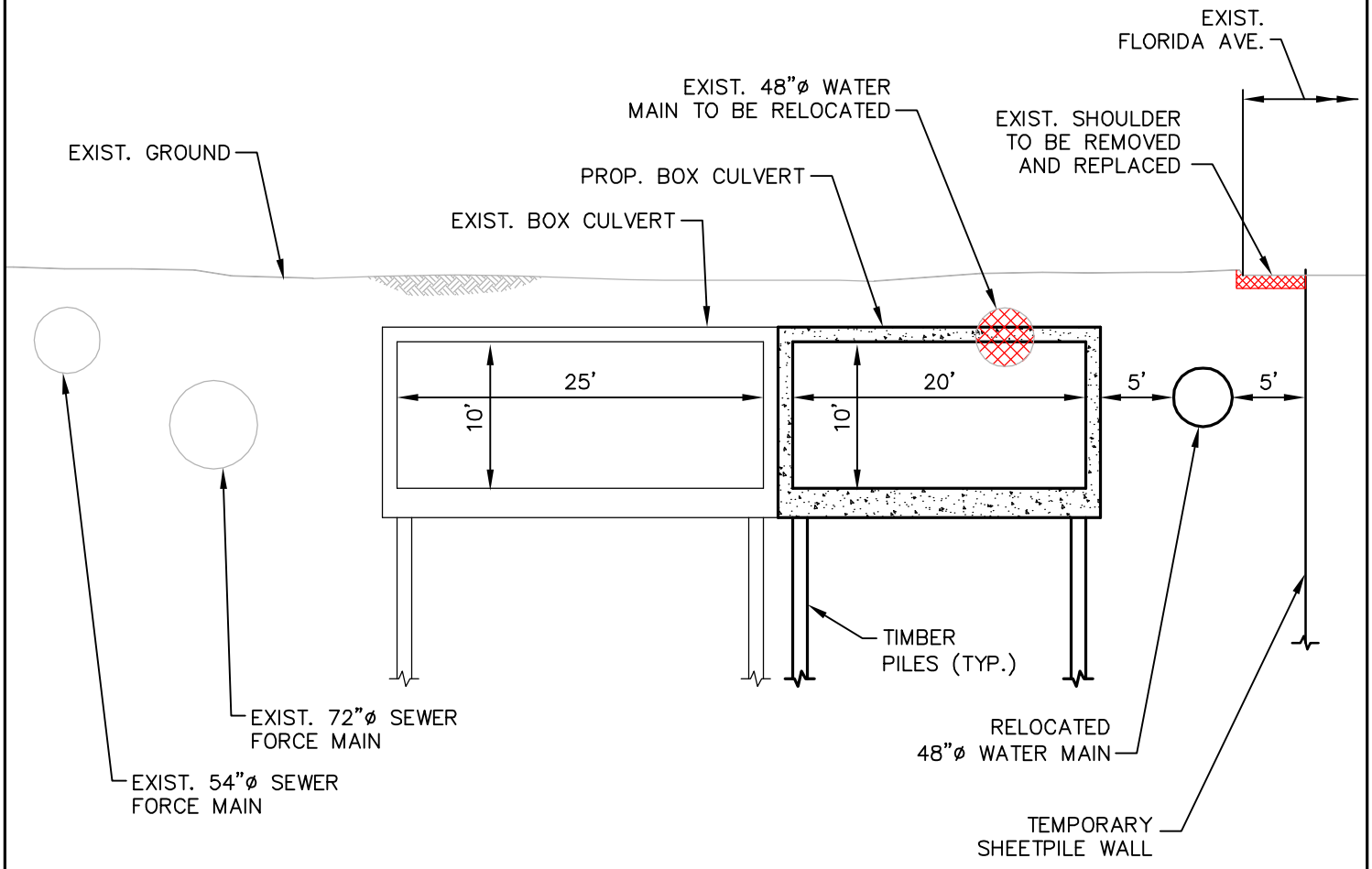
SCALE: 1" = 2000'	PROJ-10a	PLATE 10a-1
DATE: 08/04/06		



IDMO ALTERNATIVES ANALYSIS

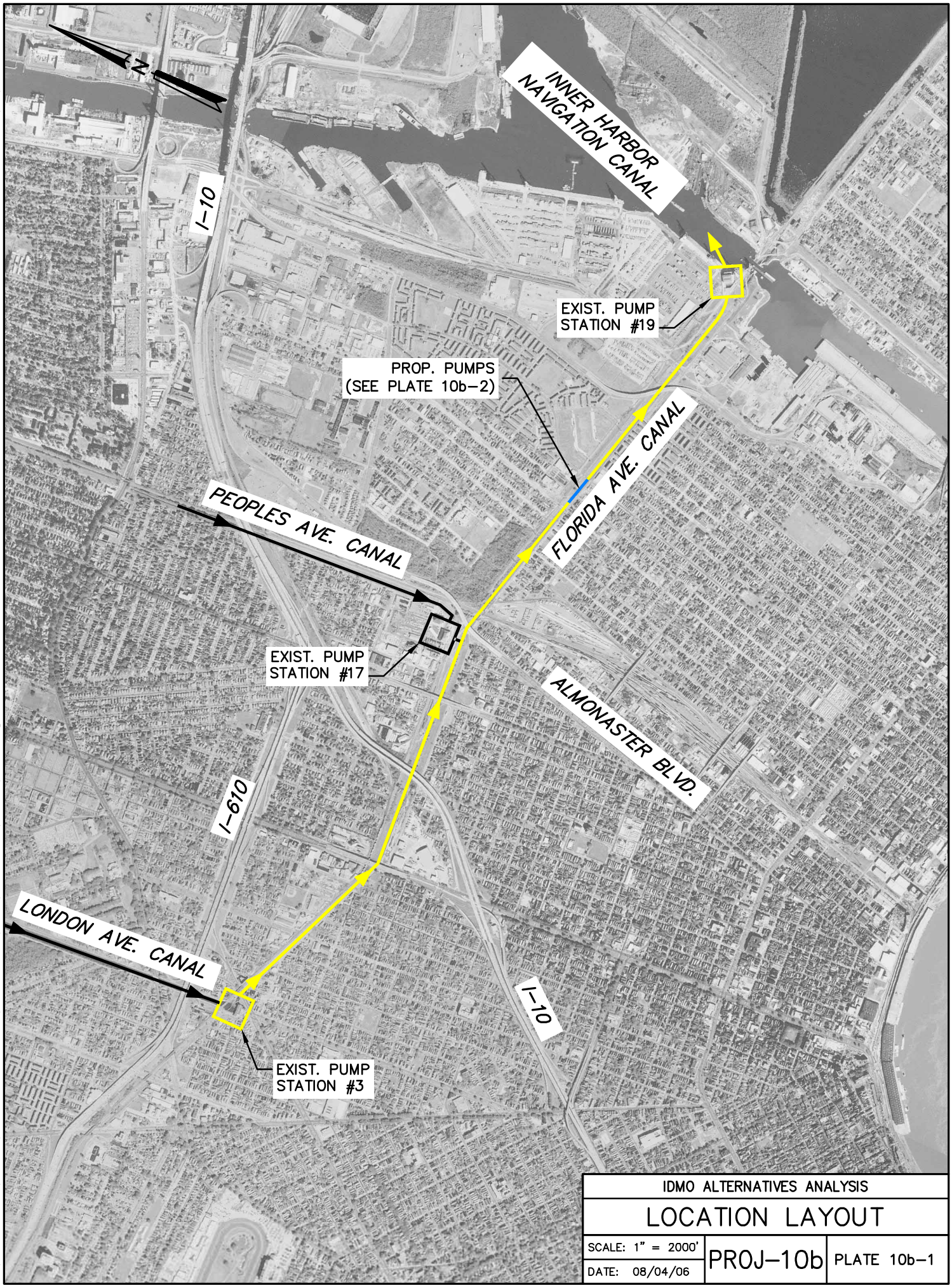
PROPOSED CULVERT

SCALE: 1" = 100'	PROJ-10a	PLATE 10a-2
DATE: 08/04/06		



PROP. 10'x20' BOX CULVERT
TYPICAL SECTION
N.T.S.

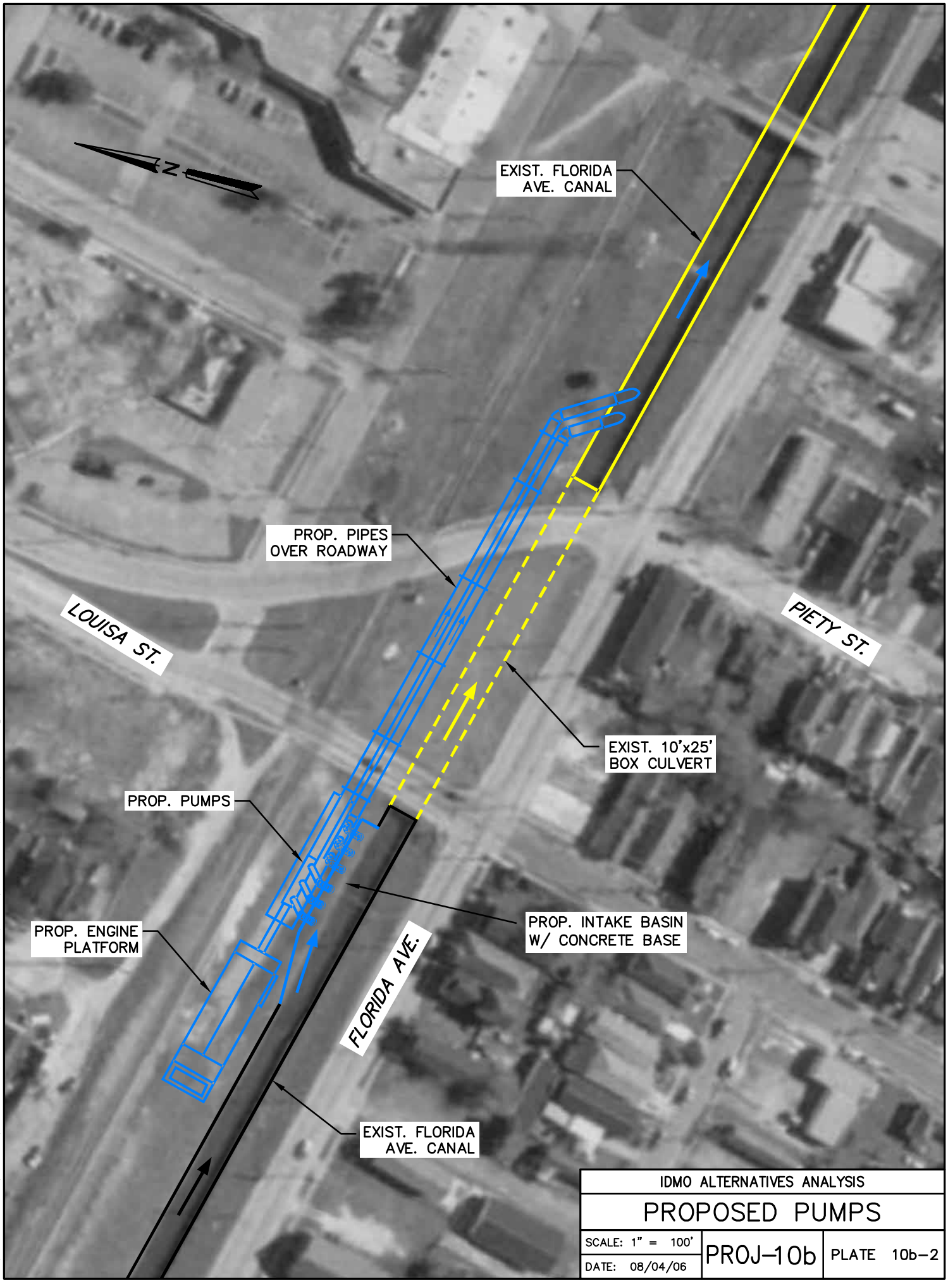
IDMO ALTERNATIVES ANALYSIS		
10'x20' CULVERT SECTION		
SCALE: 1" = N.T.S.	PROJ-10a	PLATE 10a-3
DATE: 08/04/06		



IDMO ALTERNATIVES ANALYSIS

LOCATION LAYOUT

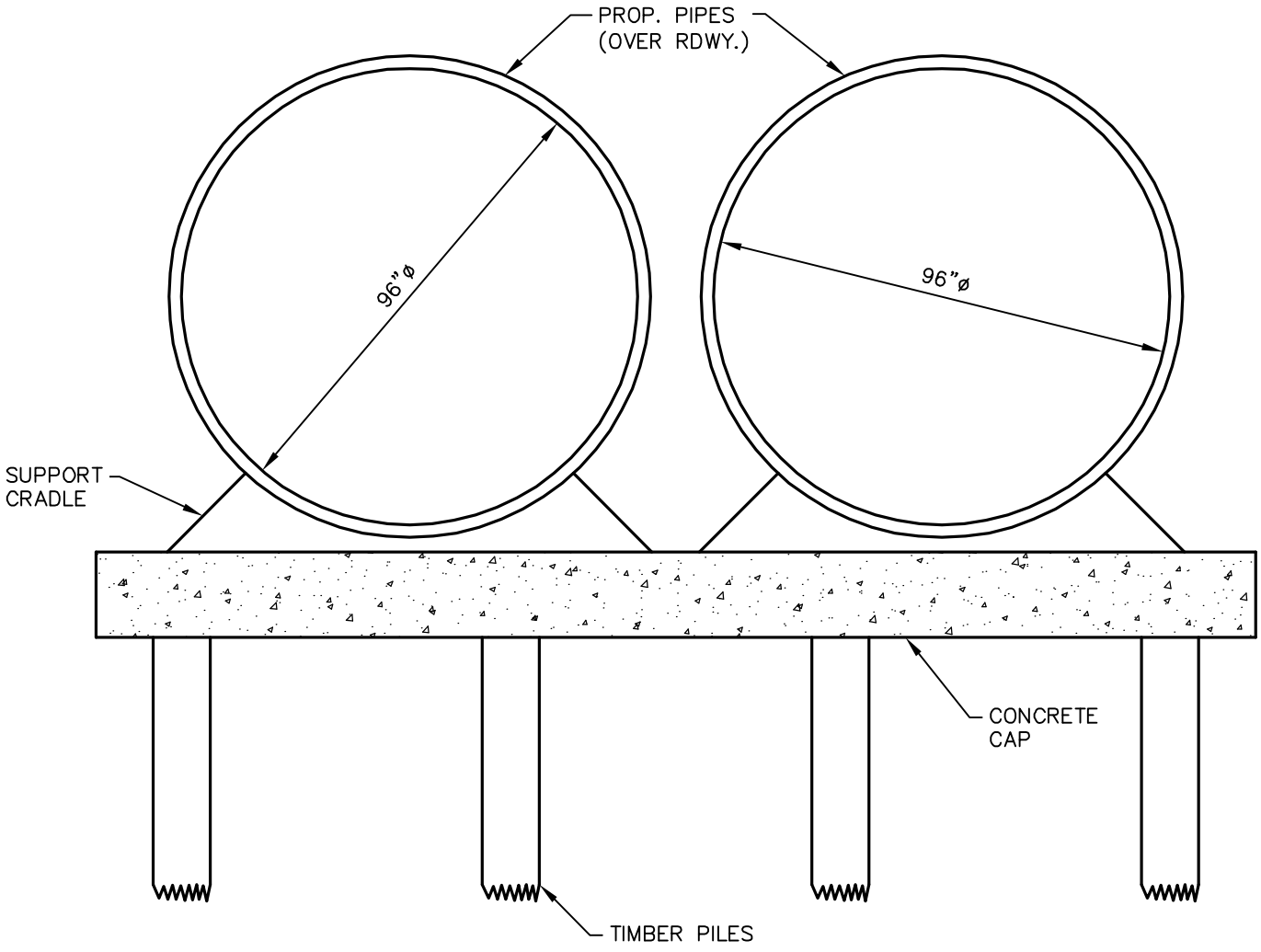
SCALE: 1" = 2000'	PROJ-10b	PLATE 10b-1
DATE: 08/04/06		



IDMO ALTERNATIVES ANALYSIS

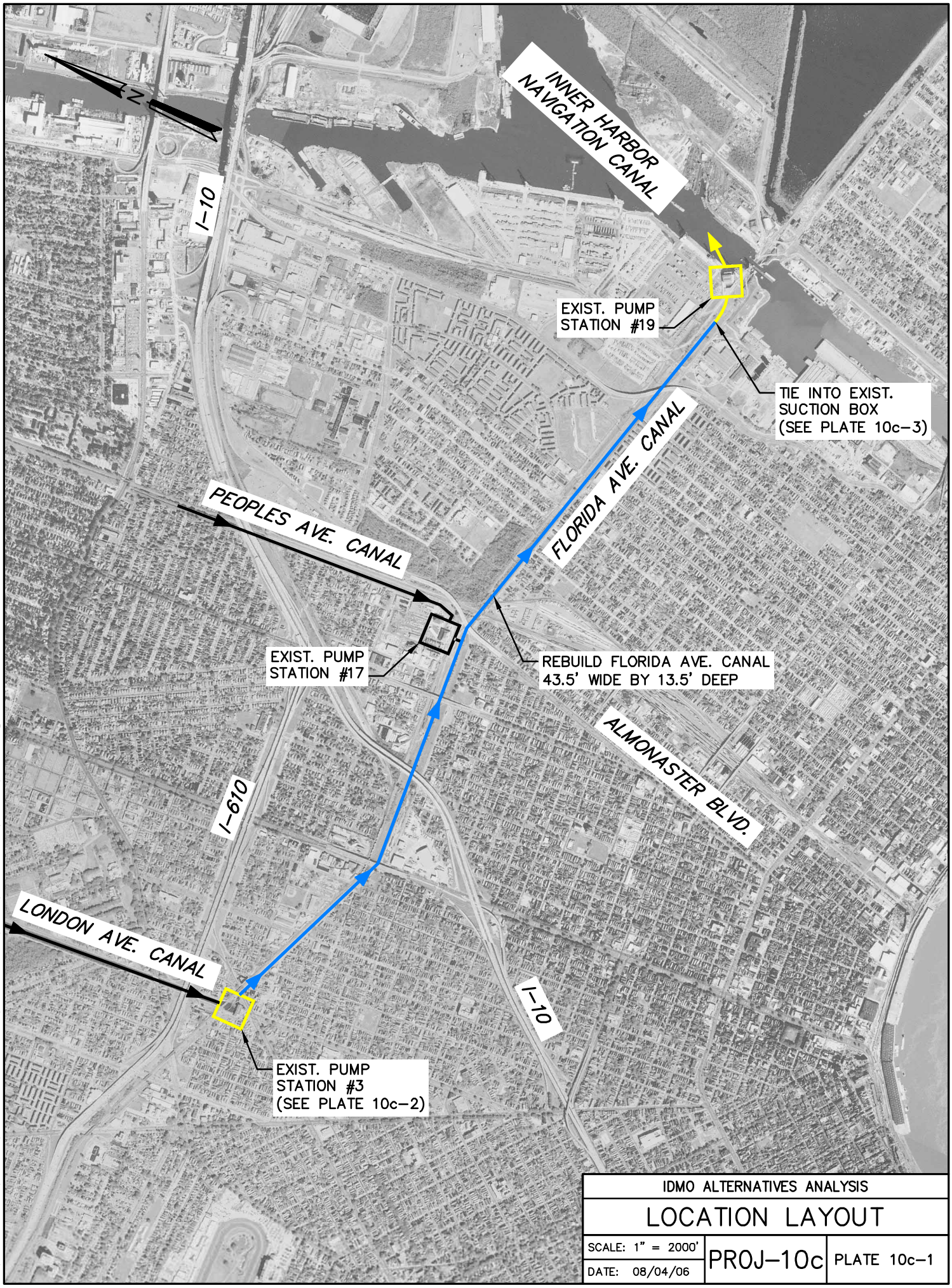
PROPOSED PUMPS

SCALE: 1" = 100'	PROJ-10b	PLATE 10b-2
DATE: 08/04/06		



TYPICAL SUPPORT FOR PROP. PIPES

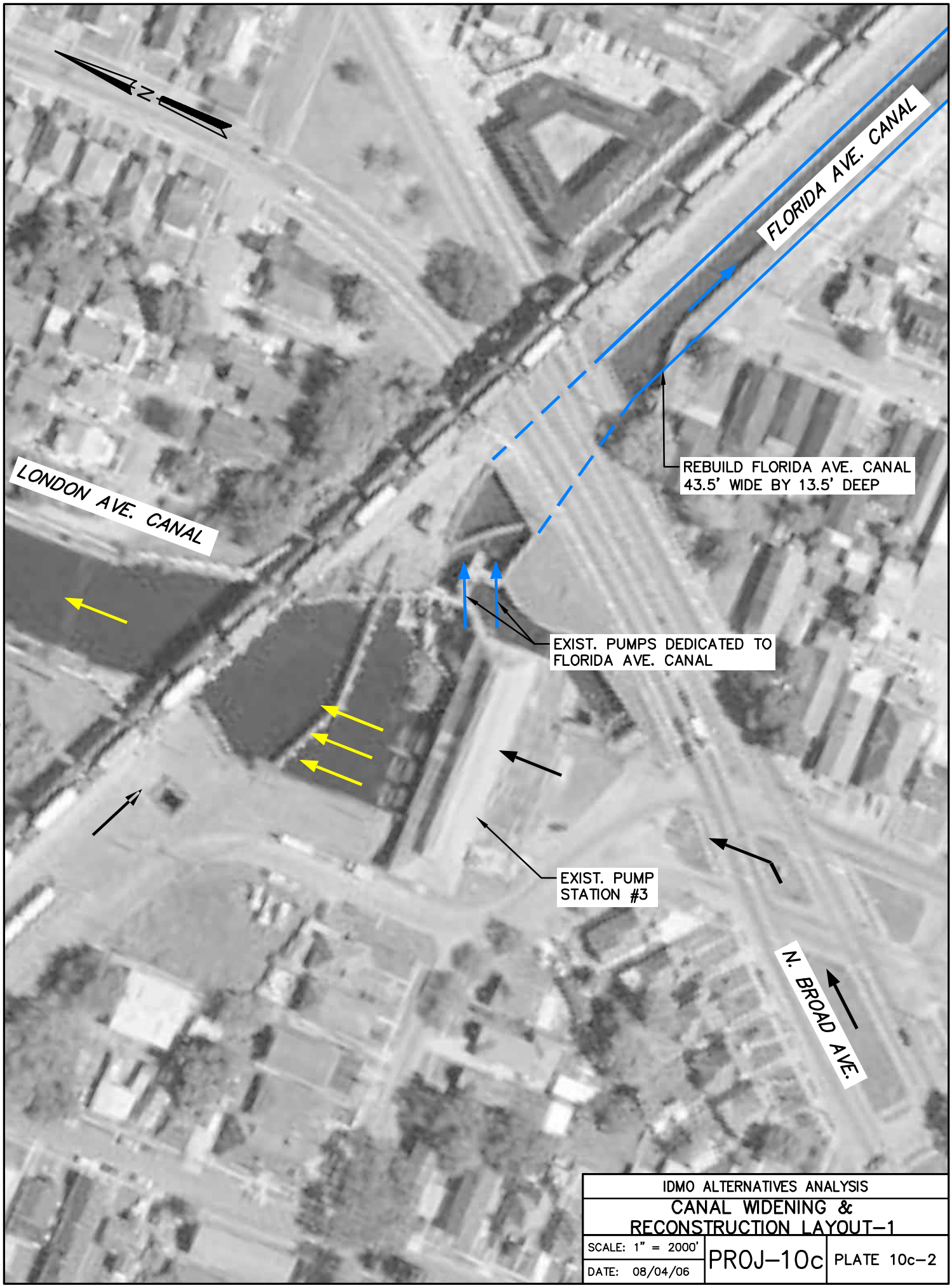
IDMO ALTERNATIVES ANALYSIS		
PIPE SUPPORT DETAIL		
SCALE: 1" = 1'-0"	PROJ-10b	PLATE 10b-3
DATE: 08/04/06		



IDMO ALTERNATIVES ANALYSIS

LOCATION LAYOUT

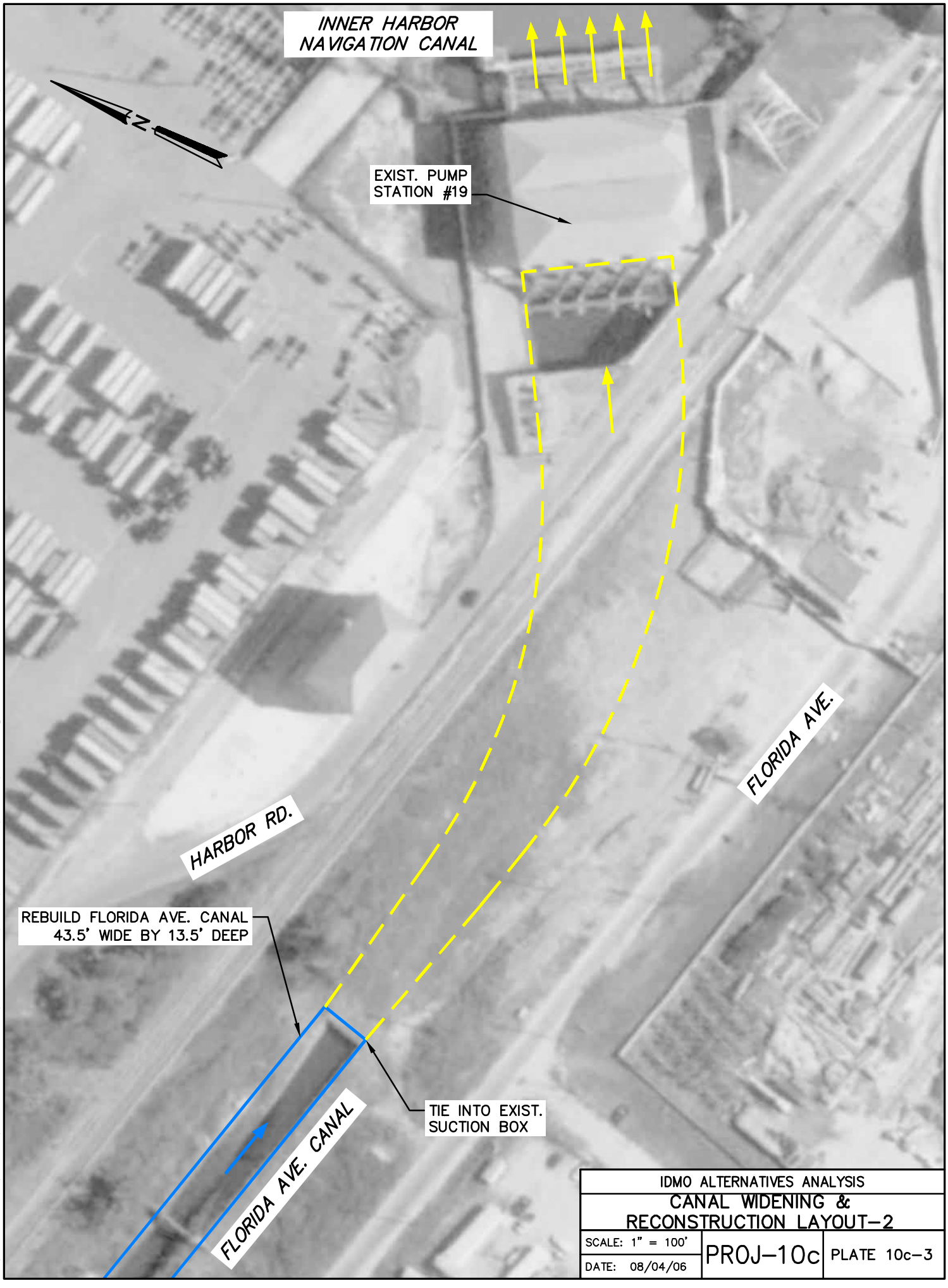
SCALE: 1" = 2000'	PROJ-10c	PLATE 10c-1
DATE: 08/04/06		



IDMO ALTERNATIVES ANALYSIS

CANAL WIDENING & RECONSTRUCTION LAYOUT-1

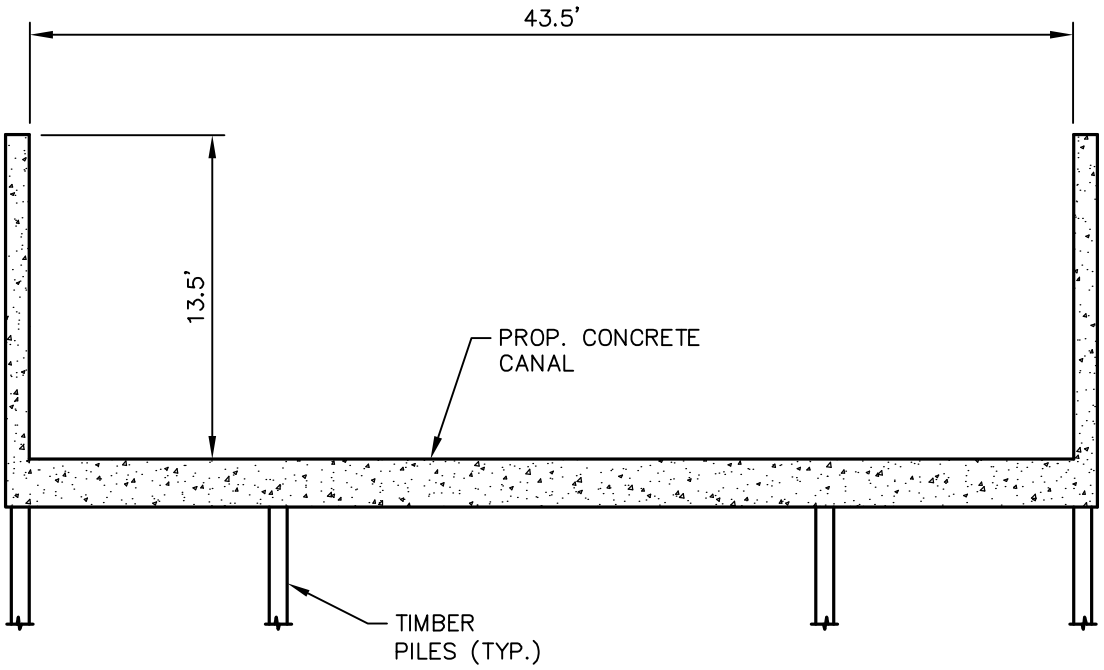
SCALE: 1" = 2000'	PROJ-10c	PLATE 10c-2
DATE: 08/04/06		



IDMO ALTERNATIVES ANALYSIS

CANAL WIDENING & RECONSTRUCTION LAYOUT–2

SCALE: 1" = 100'	PROJ–10c	PLATE 10c–3
DATE: 08/04/06		



FLORIDA AVE. CANAL
TYPICAL SECTION
N.T.S.

IDMO ALTERNATIVES ANALYSIS		
TYPICAL SECTION		
SCALE: 1" = N.T.S.	PROJ-10c	PLATE 10c-4
DATE: 08/04/06		

Pump Station No. 3 - Discharge into London Avenue Canal – 3000 cfs total

Pump Station No. 3 - Discharge into Florida Avenue Canal – 1100 cfs total

Beginning of Florida Avenue Canal from Pump Station No. 3

Florida Avenue Canal towards Pump Station No. 19

Florida Avenue Canal w/ Pump Station No. 19 in the background

Pump Station No. 19 Intake

Project No. 11

Redirect flow at Monticello Canal to the Mississippi River - Orleans Parish

Objective

The objective of this project is to reduce pumping needs by 1600 cfs at the 17th Street Canal at Lake Pontchartrain by pumping water from the Monticello Canal into the Mississippi River.

Existing Conditions

The Monticello Canal is a concrete channel that flows north along the Orleans Parish and Jefferson Parish boundary between S. Claiborne Avenue and the Palmetto Canal.. There is a 10' x 20' box culvert that discharges into the canal at the southern end just north of S. Claiborne Ave. The Monticello Canal flows into the 17th Street Canal and is pumped by DPS 6.

Two small pump stations discharge water into the Monticello Canal. The Pritchard Pump Station, located on Monticello Ave. at Pritchard Pl., contains 3 vertical pumps that are driven by three 60 Hz motors and has a nominal capacity of 250 cfs. The Monticello Pump Station, located on Oleander St., contains 3 vertical pumps that are driven by three 60 Hz motors and has a capacity of 210 cfs.

DPS 6, located on Orpheum Ave. at the beginning on the 17th Street Canal has a capacity of 9,480 cfs. It contains nine horizontal and six vertical pumps that are driven by seven 25 Hz motors and eight 60 Hz motors. DPS 6 discharges into the 17th Street. Canal that flows north and ultimately discharges into Lake Pontchartrain.

DPS 1, located in the intersection of S. Broad St. and Martin Luther King Jr. Blvd. has a capacity of 6,825 cfs. It contains 7 horizontal and 3 centrifugal pumps that are driven by 25 Hz electric motors. The tributary area into DPS 1 is 5,600 acres. The water discharged from DPS 1 can be pumped to the Palmetto Canal or to DPS 2.

Proposed Work

In order to reduce the amount of flow to DPS 6, a pump station would be built across the canal from the Pritchard Pump Station. An intake basin would collect water for the pump station that would consist of three pumps (1-1000 cfs and 2-300 cfs) with a total capacity of 1600 cfs and a total dynamic head of 37 ft. Two 10' diameter pipes, carrying 800 cfs

per pipe, will convey water discharged from the proposed pump station to the Mississippi River via the following route. From the pump station, the pipes will direct the water south towards Jefferson Highway along the west side of the floodwall. The pipes will span over Jefferson Highway by means of a pipe bridge and will proceed towards the River on the east side on the levee along Monticello Avenue. Pipe bridges will then be required to span over Willow Street, the railroad tracks, and River Road / Oak Street. The pipes will go over the levee and discharge into the river down stream of the raw water intake for the city of New Orleans.

Geotechnical Considerations

- Subsoil Conditions

  Based on borings made in the general area, the subsoil conditions at the site of the proposed Pump Station (north side) generally consist of very soft to medium stiff clay that extends to about the 55 ft. depth where Pleistocene age soils were encountered. These Pleistocene age soils generally consist of alternating strata of stiff to very stiff clay and compact sandy silt to at least the 100 ft. depth below ground surface. On the Mississippi River side (south) the subsoils would be expected to consist primarily of soft to medium stiff clay to about the 70 to 80 ft. depth where dense to very dense sand would be expected. This sand should extend to at least the 100 ft. depth below ground surface.

- Conceptual Foundations System

  Based on the subsoil conditions described above, it is believed that the pump station and pipe bents should be supported on driven piles. For timber, or composite, piles, a capacity of about 20 tons (F.S. = 2.0) in compression should be available. This is based on a 60 to 65 ft. long timber, or composite, pile (below existing grade). Timber piles used for support of the pump station intake basin would have a capacity of several tons less for the same pile tip depth. Higher capacities on the order of 30 to 50 tons would be available if steel “H” or pipe piles or prestressed concrete piles are used for support. These type piles should also be considered if greater design life than typically provided by timber piles is desired.

- Water Diversion and Cofferdam Arrangement

  The intake basin for the pump station would have to be constructed within a cofferdam, internally braced at least at one location at the top of the cofferdam walls. For cost estimating purposes, a sheet pile penetrated of about 50 ft. below ground surface would be expected. Based on the subsoil conditions, it is believed that a forced dewatering system would probably not be required and seepage into the cofferdam excavation could be effectively controlled with normal sumps and pumps.

- Additional Geotechnical Investigations

  Soil borings for this Project should be made along the project alignment on about 300 ft. spacings, starting at the proposed Pump Station and ending at the Mississippi River. Geotechnical analyses with regard to compression, tension and lateral capacity of piles would be needed for support of the pump station, intake basin and pipe bents. Analyses would also be needed relative to the temporary retaining structure (structural and dewatering) for the intake basin.

Structural Considerations

Due to the location and orientation of the pump station architectural considerations shall be coordinated with local agencies. As for the structural integrity of the pump station, all components of the structure shall be designed in accordance with the state and local building code requirements and be able to withstand winds in excess of 150 mph. The engine deck for the pump stations would be elevated one foot above the base flood elevation as shown on the FIRM map.

The intake basin shall be sized to accommodate the hydraulic requirements of this report. In addition, pipe support structures / bridges shall be built along the entire project to facilitate the two 10' diameter (above ground) pipes, which run from the proposed pump station at the Monticello Avenue Canal to the Mississippi River, See **Plate 11-1, Location Layout.**

The foundation of the pump station shall be supported on composite timber piles (due to the water table fluctuations) while the intake basin and pipe support structures / bridge foundations shall be supported on concrete piles. All foundations shall be designed in accordance with the recommendation of the Geotechnical Report.

Mechanical/Electrical Considerations

- Mechanical

  The pump station will require one (1) 1000 cfs horizontal pump, diesel driven with the motor rated at 2000 HP. Sufficient fuel storage would need to be provided at the site to operate the pump for up to 36 hours.

- Electric Service

  The local electric service is provided by Entergy. The anticipated electrical load at the pump station is including:

  - Two (2) 300 cfs vertical pump, motor rated at 700HP, medium voltage or approximate 1,040 KW
  - Balance of facility loads including power, lighting and auxiliary systems at approximate 300 KW. The electrical system will be stepped down to 480V and 120/208V with transformers and local distribution panels.

  The peak demand in the pumps station is approximate at 1.5 MW. Two service feeders shall be provided by Entergy for redundancy. In case of loss of one feeder the other feeder shall be capable of providing power for the entire pump station demand. Main Substation will consist of MV vacuum type breakers and metering devices to meet Entergy standards. Service availability will be coordinated with Entergy during the design development.

- Standby Power

  Standby power source will be required in case of total black-out on utility grid occurs coincidence with the flood event. There are two options for providing standby power.

  - Option A: Locally installed 1-1.5 MW diesel generator to meet the peak demand. The generator will be specified for continuous duty with sufficient fuel storage to operate the pumps up to 36 hours.
  - Option B: Central Generation Plant. See description on Project 1.

Construction Considerations

Prior to construction of new drainage structures, the contractor shall implement a construction procedure that will not impose on the structural integrity of existing adjacent concrete structures and channels.

A construction sequencing plan would be required to minimize impacts to traffic during construction.

Prior to the construction of the pump station foundation, the Contractor shall implement a construction procedure that will not impose on the integrity of the existing canal and levee. Temporary sheet piling may be used as an alternative to provide stability of the existing levee at the pump station and intake basin.

Where the proposed two 10' diameter pipes cross the New Orleans Public Belt Railroad, it may be imperative to brace the existing railroad embankment while the pipe support bridge is being constructed. Coordination with the Railroad will be required to locate the pipe bridge structure outside of the railroad right-of-way and to facilitate its horizontal and vertical clearance requirements.

The construction of the pipes across Willow Street, River Road, and Oak Street shall be phased so that traffic can be maintained. Construction shall be coordinated with the railroad so that it does not impede rail service.

Environmental Considerations

This project, like all the others, would satisfy the requirements of NEPA through a supplement to EA #433.

For this project, additional consultation with the SHPO is required because a portion of the project area would be constructed in the Uptown NRHP District.

It appears that that a portion of the project area may be an environmental justice area. A determination must be made and actions taken accordingly.

Order of Magnitude Cost Estimate

Cost Estimate - Project 11

Environmental	$10,000
Right-of-Way Acquisition	$2,000,000
Design	$5,701,953
Construction	$65,572,460
Total	**$73,284,413**

Roadmap/Timeline

Design – This would be divided into two phases that would be initiated concurrently, M&E and Civil. The M&E would include a fast-track specification of pumps and other equipment with long lead time deliveries. M&E fast-track should take 2 months and other design should take 4 months.

Environmental Clearance – Concurrent with design

Permits – The permits required concern water quality, and are issued by LDNR, this should be coordinated among the agencies to take no more than one month after final design is completed and be concurrent with the construction bid process.

LERRD – Pipe ROW or easements will have to be coordinated with the Norfolk-Southern Railroad and any owners of land that the pipe crosses. This must be concurrent with Design and could be the critical path of the Civil design.

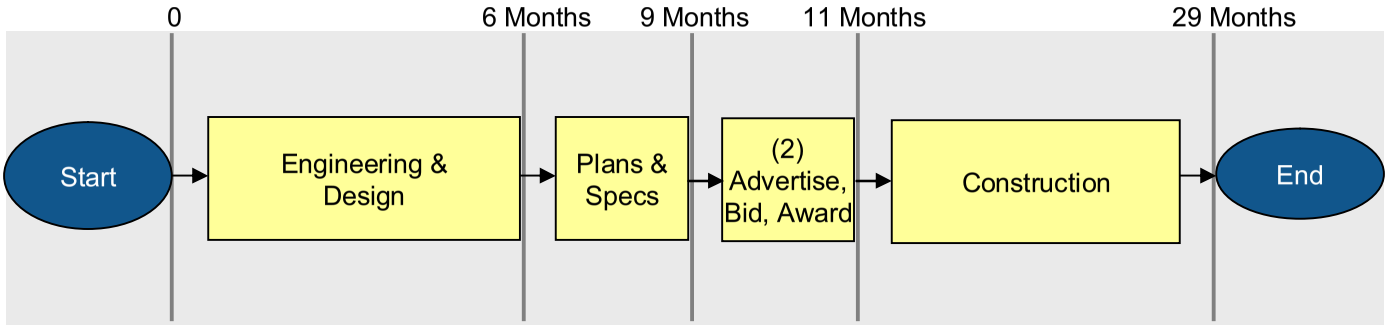
Construction – The pump station proposed would take approximately 18 months to complete.

Conclusion

This project is recommended for further study for the following reasons:

1. It removes 1600 cfs from the 17th Street Canal.
2. It offers another outfall by pumping the water to the Mississippi River.
3. This project implemented in conjunction with Project No. 14 would allow both Orleans and Jefferson Parish to operate separate drainage systems.
4. This project compliments the proposed SELA project, along Claiborne Ave.

Project 11

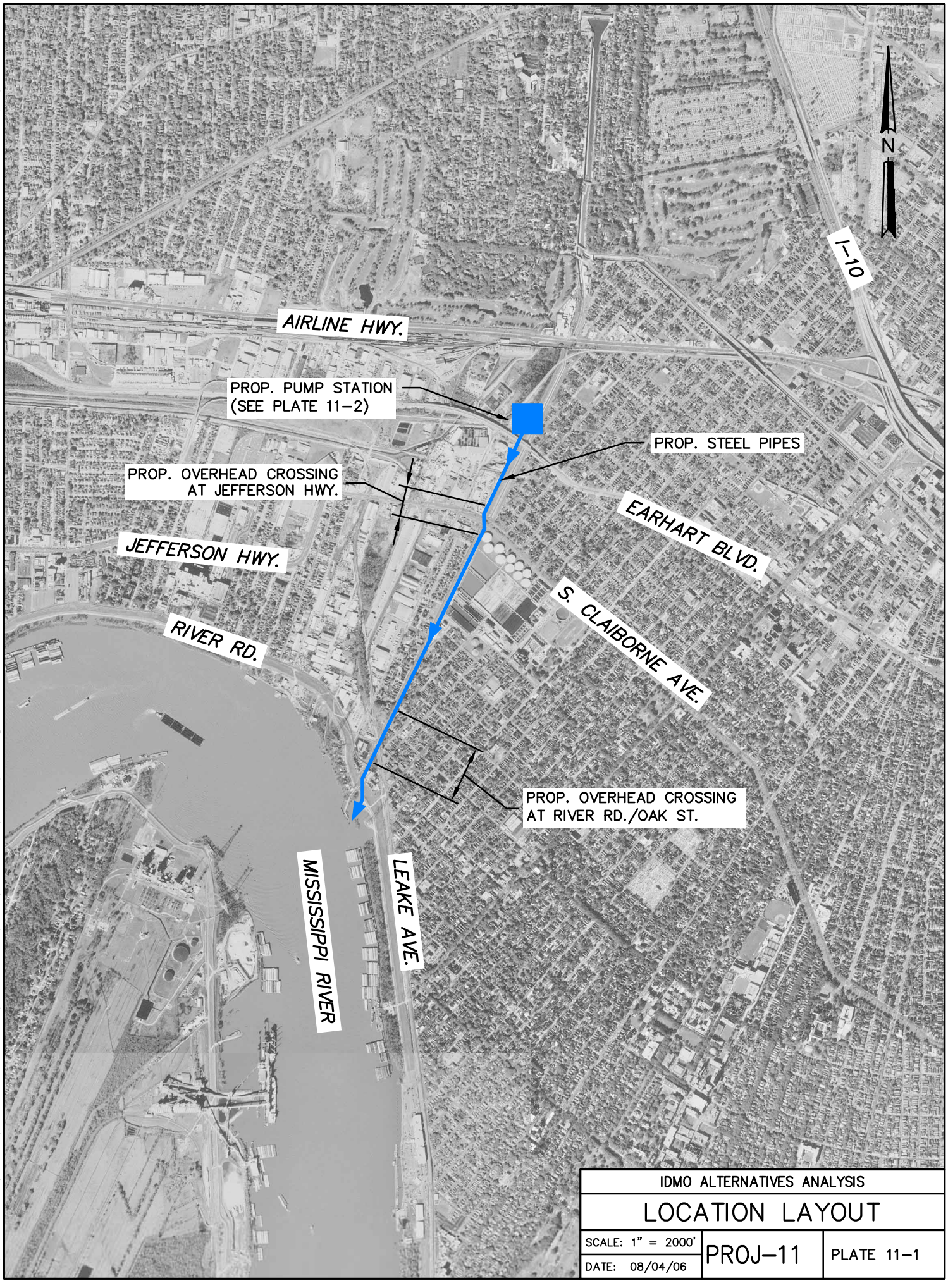


Environmental Compliance – Potential environmental issues, as discussed in the "Environmental Consideration" section, can be addressed during the engineering and design phase in order to keep off the critical path.

LERRD's – Any potential LERRD's , as discussed in the "Proposed Work" section, can be addressed during the engineering and design phase in order to provide for construction without causing delay.

Pump Procurement – Specifics on pumps can be identified early in the engineering and design phase in order to be delivered on-site, when needed, without causing delay. This should be done concurrent with overall schedule. This is not a critical path item in this flow chart. (estimated 12 month lead time required)

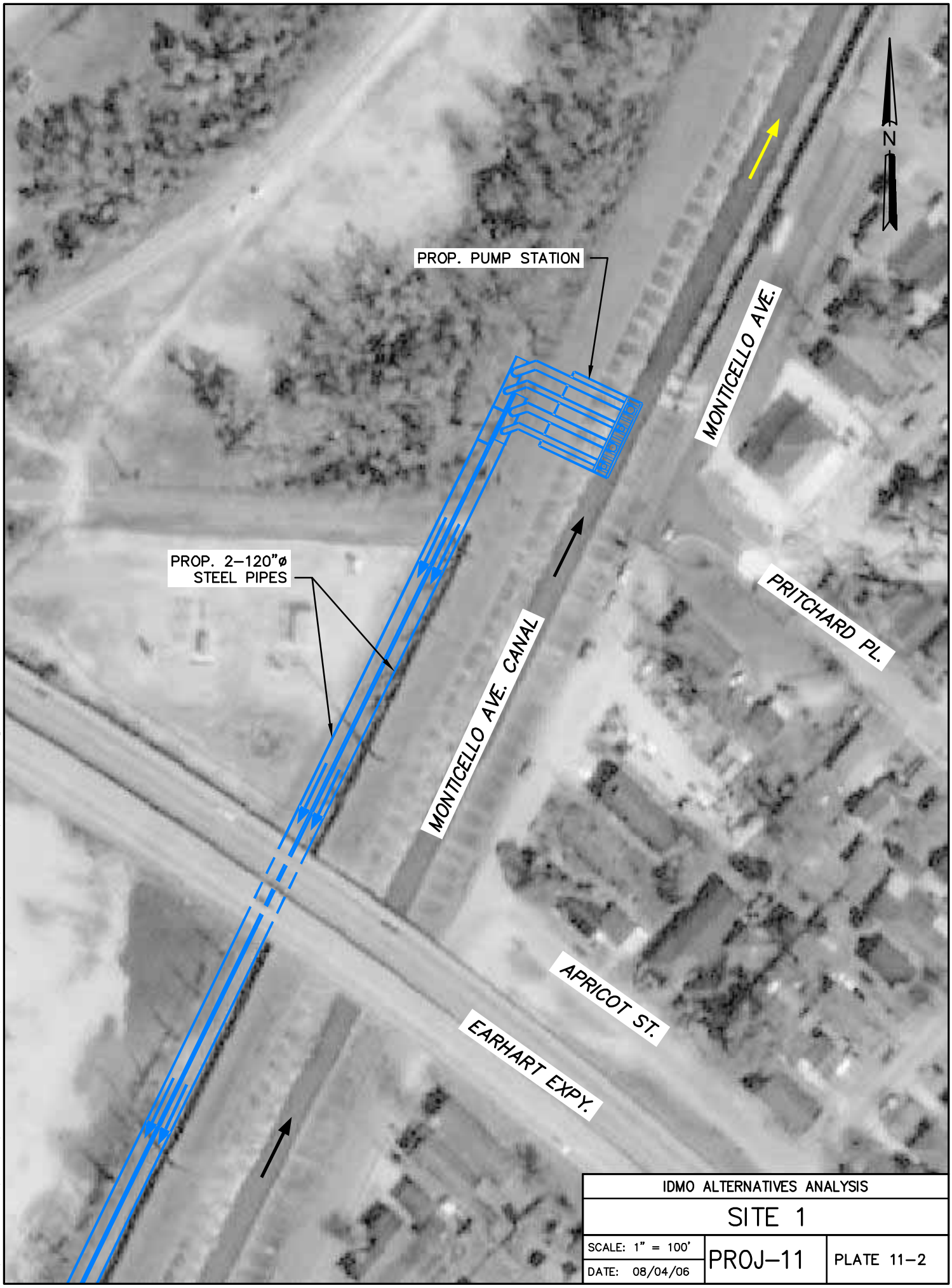
Contract Administration – Construction could be implemented with 2 separate; concurrent contracts for the boxes and pumps in order to expedite the process. Estimated time shown above reflects this approach.



IDMO ALTERNATIVES ANALYSIS

LOCATION LAYOUT

SCALE: 1" = 2000'	PROJ-11	PLATE 11-1
DATE: 08/04/06		



IDMO ALTERNATIVES ANALYSIS		
SITE 1		
SCALE: 1" = 100'	PROJ–11	PLATE 11–2
DATE: 08/04/06		

Monticello Canal (Looking South)

Area along Monticello Canal East Side (Looking South)

Area along Monticello Avenue (Looking North)

Area along Monticello Avenue (Looking South)

Area along Monticello Avenue (Looking South)

Area along Monticello Avenue (Looking South)

Area along Monticello Avenue (Looking North)

Area on the Mississippi River Levee (Looking North)

Area on the Mississippi River Levee Looking North West towards Monticello Avenue

Project No. 12

Redirect DPS 2 discharge to DPS 7, and add pumping capacity to DPS 7 and to the outfall of Orleans Avenue Canal

Objective

The objective of this project is to redirect all discharge from DPS 2 to DPS 7, and to add pumping capacity to both DPS 7 and the outfall of Orleans Avenue Canal.

Existing Conditions

DPS 2 is located in the median of N. Broad St. near the intersection of St. Louis St. It contains 6 pumps with a combined capacity of 3,190 cfs. The pumps include four horizontal and two centrifugal pumps, which are driven by six 25 Hz electric motors. The pump station is fed by the Broad Street and Lafitte Street Canals which collect runoff from the Central Business District and upriver portions of the French Quarter and Treme as well as discharged flow from DPS 1.

The water discharged from DPS 2 flows into two conveyance structures:

- An underground box that runs eastward in the median of Broad St. to DPS 3 where the water is pumped into the London Ave. or Florida Avenue Canals, and
- The Lafitte St. Canal, an 11.65' x 25' concrete flume that runs parallel to Lafitte St. to Jefferson Davis Pkwy.

The latter becomes two closed boxes that are routed on the west side of Bayou St. John to Orleans Ave. One of the boxes traverses along Orleans Ave. to DPS 7 at the southern terminus of the Orleans Ave. Canal. The other box is not completed, but it is planned to be constructed as part of the SELA Drainage Improvements program. Typically, the Sewerage and Water Board only pumps 1,000 cfs towards DPS 7 because any additional flow would flood neighborhoods that have subsided downstream of DPS 2.

DPS 7 is located at the southern terminus of the Orleans Avenue Canal between the Norfolk Southern Railroad ROW and I-610. It contains six pumps with a combined capacity of 2,690 cfs. The pumps include three horizontal and three centrifugal pumps that are driven by (5) 25 Hz and (1) 60 Hz electric motors. The Pump Station drainage basin area consists of 3,960 acres generally bounded by Pontchartrain Blvd., I-10, Lopez St., Orleans Ave., N. Carrollton Ave., Bayou St. John, and Harrison Ave. This includes a large portion of City Park including all the area south of I-610 and about a third of the

area north of I-610. The pumps at DPS 7 are unable to work at its maximum capacity due to conveyance constrictions upstream. The maximum capacity that flows through DPS 7 is 1700 cfs.

The Orleans Avenue Canal conveys water from DPS 7 to Lake Pontchartrain. It is an open earthen channel with concrete floodwalls. The safe water elevation in the canal is 9 ft NGVD 88. A gate structure has been installed near the outfall to protect the canal from intrusion of the lake during a storm surge. Temporary pumps with a total capacity of 2,000 cfs have been placed at the gate to maintain drainage while the gates are closed.

Proposed Work

To redirect the water currently flowing from DPS 2 to DPS 3 so that it would flow from DPS 2 to DPS 7 and the Orleans Avenue Canal, the following three actions are called for:

1. Construct an additional U-shaped flume parallel to the Lafitte Street Canal. See **Plate 12-2**. The flume size could be estimated two ways:
    - Assuming that DPS 2 is allowed to discharge at its full capacity of 3,190 cfs with no restrictions of flow coming in or out, the dimensions would be estimated to be 10' x 22', or
    - Assuming that DPS 2 is discharging with the restraint at the Broad Street Canal, the dimensions would be estimated to be 11' x 11'.

    This proposed box would tie into the existing drainage system at Jefferson Davis Pkwy.;
2. Construct the additional box on Orleans Ave. from Olga St. to DPS 7 planned under the SELA program; and
3. Increase the pumps at DPS 7 by adding three 300 cfs diesel/hydraulic drive pumps to accommodate the extra flow from DPS 2. See **Plate 12-3**. The additional pumps would be located on the south side of the railroad tracks. In order to seat the three pumps, excavation to the south-west side of the intake basin is required. The pumps would be housed on a platform over the excavated section. A discharge tube will connect to the pumps and convey the water north to the Orleans Avenue Canal. The existing driveway to the cellular telephone tower would be re-routed to allow continuous access. The improved pump station would be capable of an additional 900 cfs into Orleans Avenue Canal for a total of 3,590 cfs.

A permanent pump station with three 1,000 cfs pumps and two 300 cfs pumps located just east of the gate structure at the outfall of the Orleans Avenue Canal would be required to remove excess water in the system when the gates are closed. An intake and an outfall basin would be built on either side of the pump station to feed water to the pumps. A 15 ft platform extension would be installed to provide an access road to the existing gate structure installed in the canal. The levee would be relocated to accommodate the pump station. Total added pumping capacity is 3,600 cfs. See **Plate 12-4**.

Construction Considerations

- Prior to construction of new drainage structures, the contractor shall implement a construction procedure that will not impose on the structural integrity of the existing adjacent structures and channels. The contractor will also have to protect all adjacent existing utilities and make accommodations for overhead electric lines.
- A construction sequencing plan would be required to minimize impacts to traffic during construction.
- All excavations will have to be supported with sheet piles.
- The contractor will have to protect the existing levee during construction until the relocated levee is complete.
- In both Options A and B, the engine platform for the existing pumps will have to be relocated to excavate the intake basin.
- In all options, the site preparation could be accomplished while the pumps are on order.

Environmental Considerations

This project, like all the others, would satisfy the requirements of NEPA through a supplement to EA #433. This would include, but not necessarily be limited to, the following:

- Compliance with applicable Federal and state water protection requirements,
- Preparation of a Phase I Site Assessment in any areas for which one has not been completed,
- Continuing coordination with USFWS and LDWF, and

- Consultation with the SHPO regarding potential effects on the New Orleans drainage system.

For this project, additional consultation with the SHPO is required because the project area includes neighborhoods that are eligible for the NRHP.

It appears that that the area between DPS 2 and DPS 7 may be an environmental justice area. A determination must be made and actions taken accordingly.

Order of Magnitude Cost Estimate

Cost Estimate - Project 12

Environmental	$10,000
Right-of-Way Acquisition	$0
Design	$4,538,161
Construction	$52,188,855
Total	**$56,737,016**

Roadmap / Timeline

Design – This would be divided into two phases that would be initiated concurrently, M&E and Civil. The M&E would include a fast-track specification of pumps and other equipment with long lead time deliveries. M&E fast-track should take 2 months and other design should take 4 months. The design for the box culvert along Orleans Avenue is part of the SELA program. The plans are complete, but may need to be updated before advertisement.

Environmental Clearance – Concurrent with design

Permits – The permits required concern water quality, and are issued by LDNR, this should be coordinated among the agencies to take no more than one month after final design is completed and be concurrent with the construction bid process.

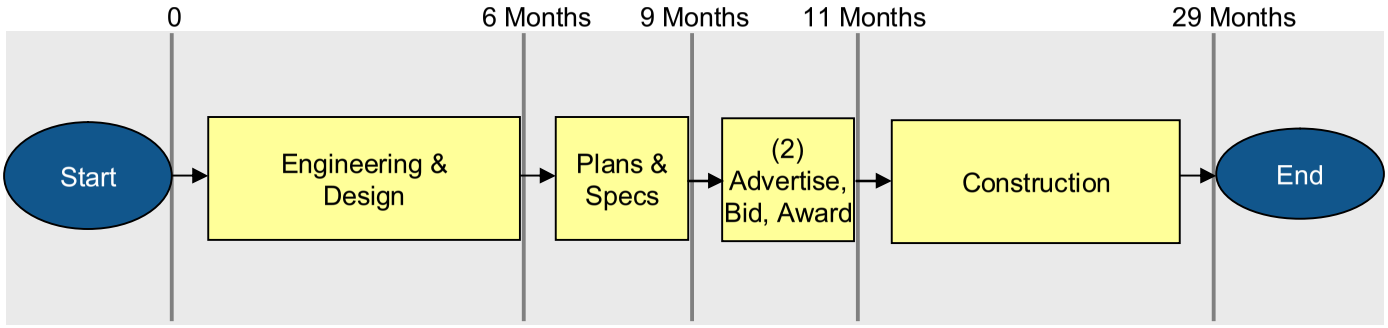
LERRD – Land required for the pump station and relocated levee is within the drainage ROW. There would be no extra ROW acquisition required.

Construction – The pump station proposed at the lake would take approximately 18 months to complete. Lead time for the pumps would be approximately 18 months.

Conclusion

Conveyance restrictions upstream of DPS 7 and DPS 2 severely limit the ability to get extra flow to the Orleans Avenue Canal. Therefore, additional pumps at DPS 7 and the outfall to the lake would not provide a benefit unless the constrictions upstream could be eliminated.

Project 12

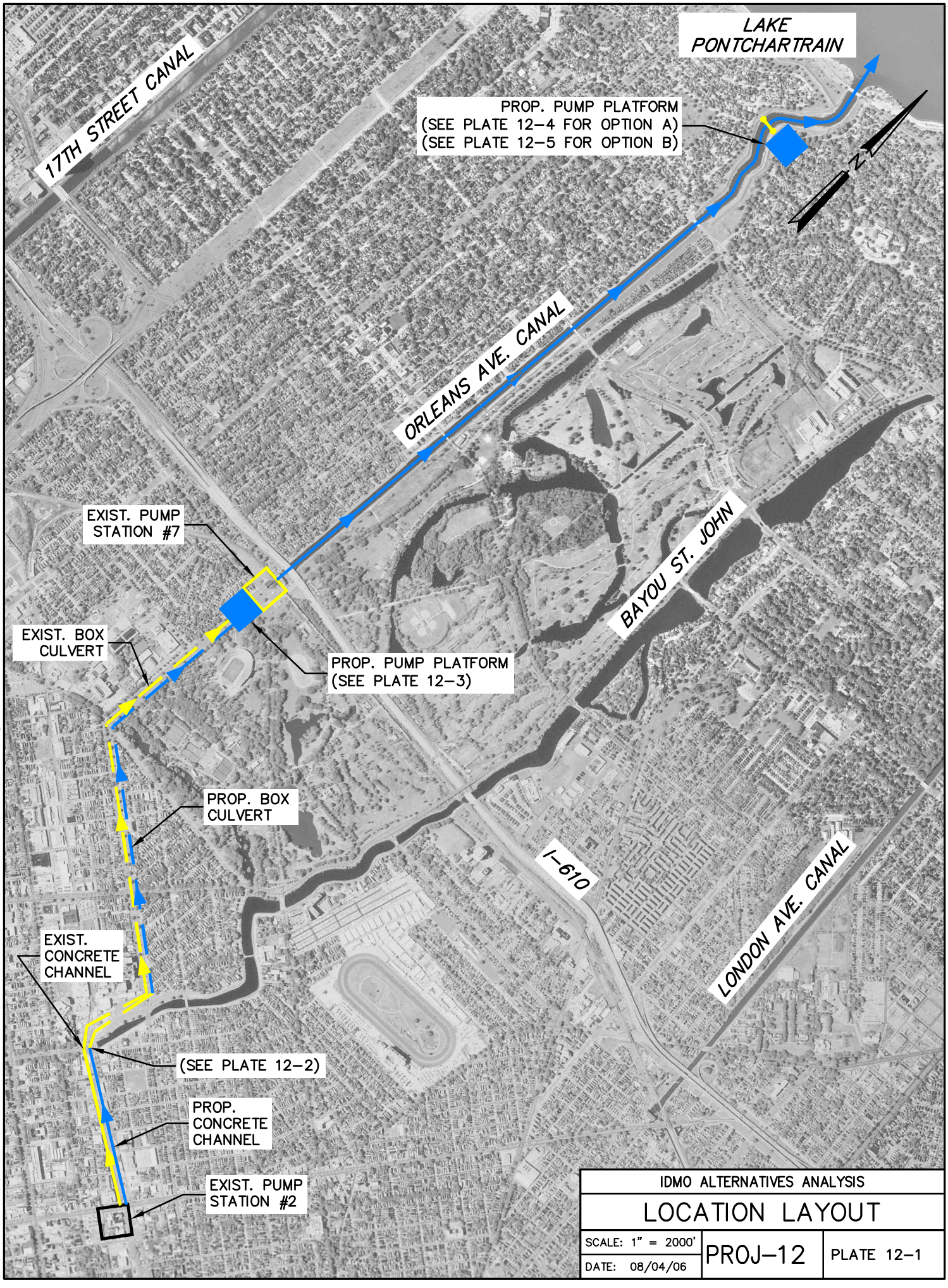


Environmental Compliance – Potential environmental issues, as discussed in the "Environmental Consideration" section, can be addressed during the engineering and design phase in order to keep off the critical path.

LERRD's – Any potential LERRD's , as discussed in the "Proposed Work" section, can be addressed during the engineering and design phase in order to provide for construction without causing delay.

Pump Procurement – Specifics on pumps can be identified early in the engineering and design phase in order to be delivered on-site, when needed, without causing delay. This should be done concurrent with overall schedule. This is not a critical path item in this flow chart. (estimated 12 month lead time required)

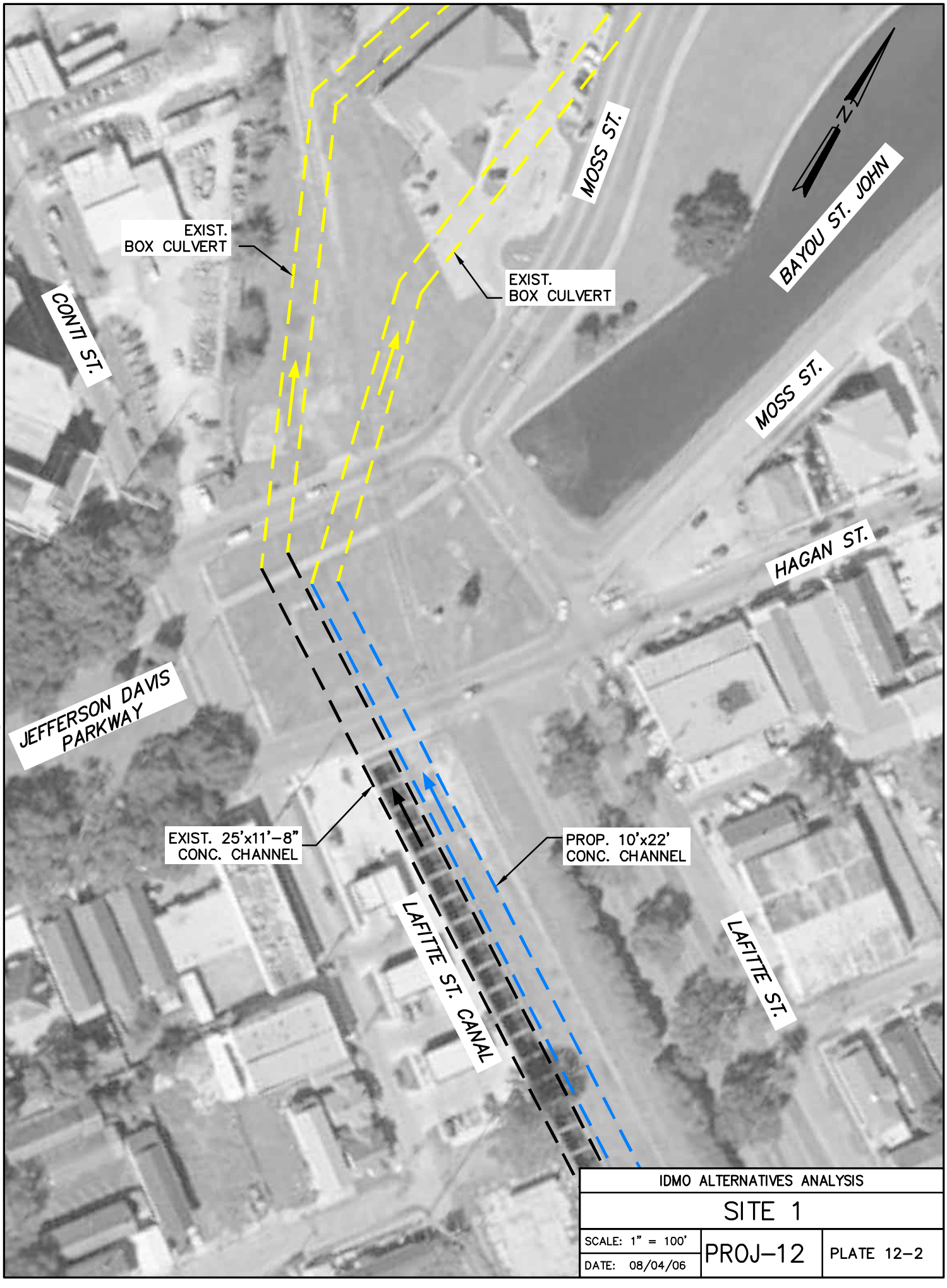
Contract Administration – Construction could be implemented with 2 separate; concurrent contracts for the boxes and pumps in order to expedite the process. Estimated time shown above reflects this approach.



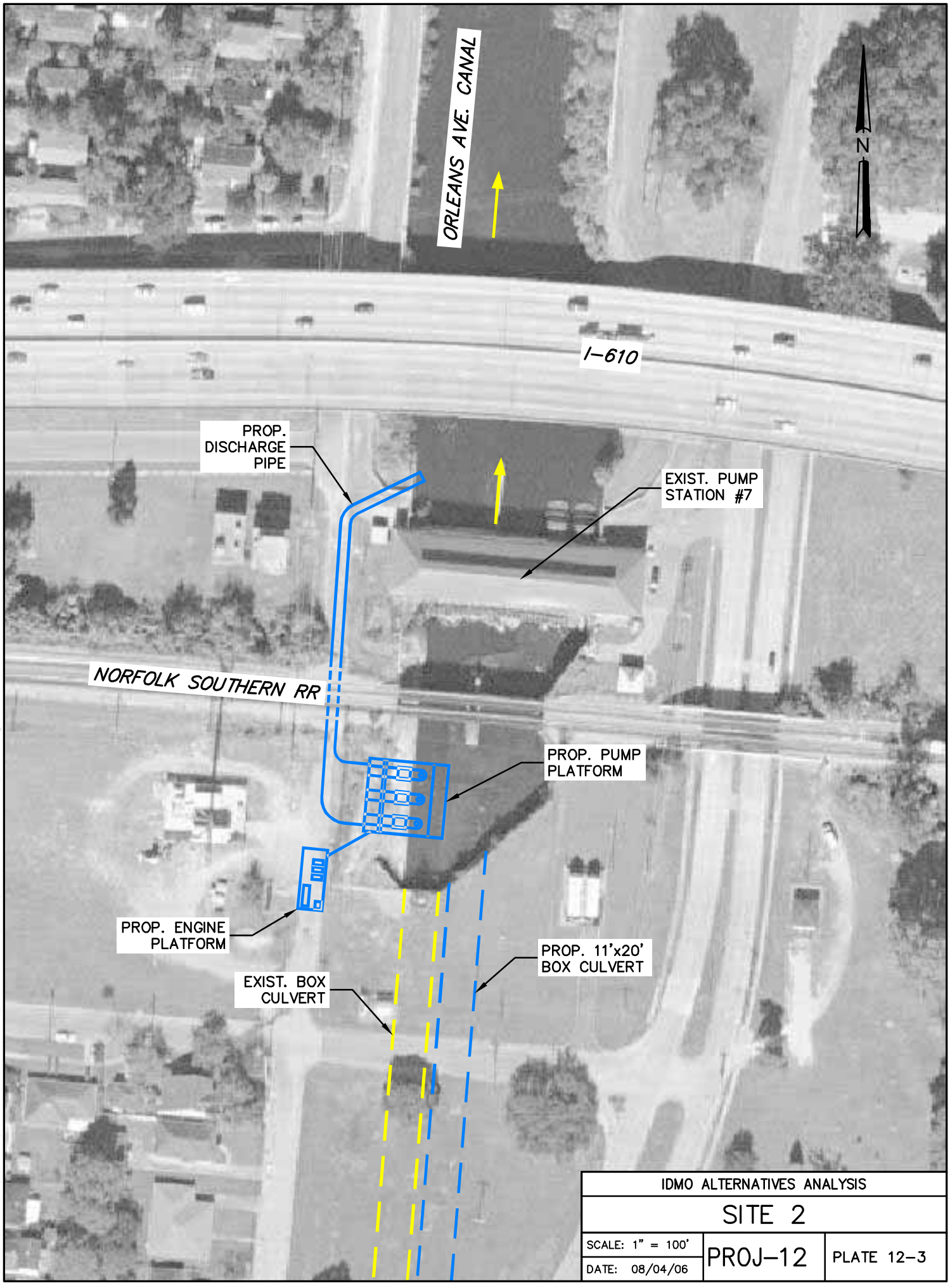
IDMO ALTERNATIVES ANALYSIS

LOCATION LAYOUT

SCALE: 1" = 2000'	PROJ-12	PLATE 12-1
DATE: 08/04/06		



IDMO ALTERNATIVES ANALYSIS		
SITE 1		
SCALE: 1" = 100'	PROJ-12	PLATE 12-2
DATE: 08/04/06		



IDMO ALTERNATIVES ANALYSIS

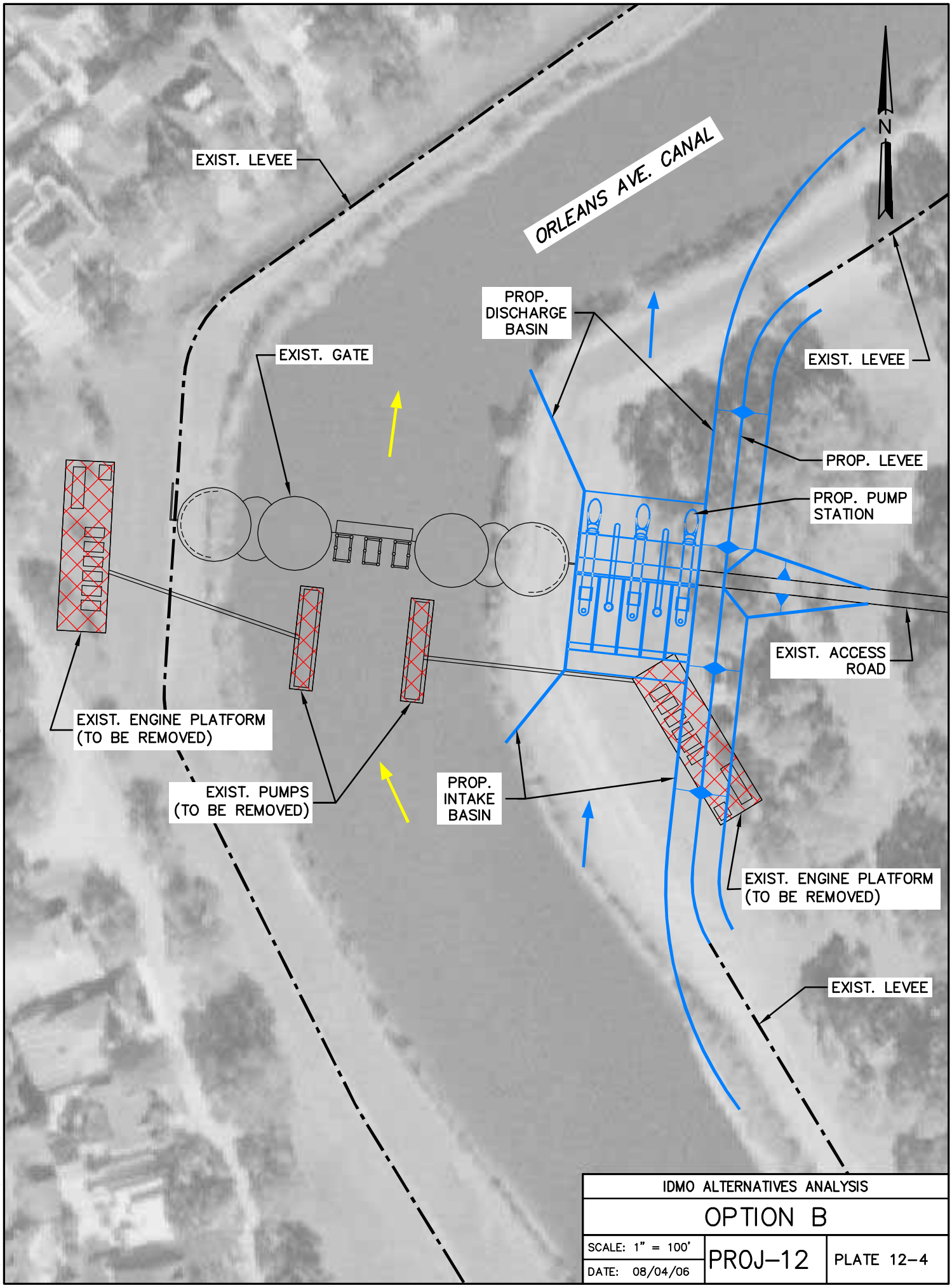
SITE 2

SCALE: 1" = 100'

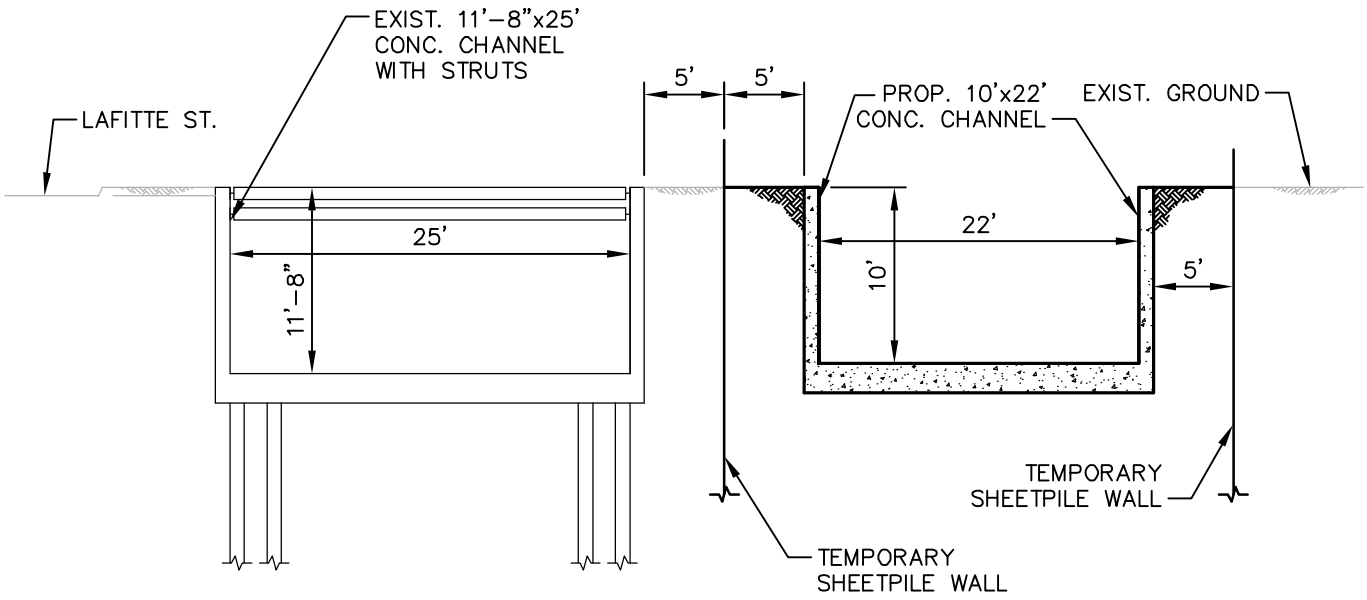
DATE: 08/04/06

PROJ-12

PLATE 12-3



IDMO ALTERNATIVES ANALYSIS		
OPTION B		
SCALE: 1" = 100'	PROJ-12	PLATE 12-4
DATE: 08/04/06		



LAFITTE ST. CANAL TYPICAL SECTION

N.T.S.

IDMO ALTERNATIVES ANALYSIS		
CONC. CHANNEL SECTION		
SCALE: 1" = N.T.S.	PROJ-12	PLATE 12-5
DATE: 08/04/06		

Pump Station No. 7. (Looking South)

Orleans Avenue Canal (Looking North)

Intake basin for Pump Station No. 7 (Looking South)

Intake basin for Pump Station No. 7 (Looking West)

Project No. 13

Redirect DPS 2 discharge to DPS 7 to detention in City Park

Objective

The objective of this project is to redirect discharge from DPS 2 to DPS 7 and overflow the water into a proposed detention pond in City Park.

Existing Conditions

DPS 2 is located in the median of N. Broad St. near the intersection of St. Louis St. It contains 6 pumps with a combined capacity of 3,190 cfs. The pumps include four horizontal and two centrifugal pumps, which are driven by six 25 Hz electric motors. The pump station is fed by the Broad Street and Lafitte Street Canals which collect runoff from the Central Business District and upriver portions of the French Quarter and Treme as well as discharged flow from DPS 1.

The water discharged from DPS 2 flows into two conveyance structures:

- An underground box that runs eastward in the median of Broad St. to DPS 3 where the water is pumped into the London Avenue or Florida Avenue Canals, and
- The Lafitte St. Canal, an 11.65' x 25' concrete flume that runs parallel to Lafitte St. to Jefferson Davis Pkwy.

The latter becomes two closed boxes that are routed on the west side of Bayou St. John to Orleans Ave. One of the boxes traverses along Orleans Ave. to DPS 7 at the southern terminus of the Orleans Avenue Canal. The other box is not completed, but it is planned to be constructed as part of the SELA Drainage Improvements program. Typically, the Sewerage and Water Board only pumps 1000 cfs towards DPS 7 because any additional flow would flood neighborhoods that have subsided downstream of DPS 2.

DPS 7 is located under Interstate 610 at the beginning of Orleans Avenue Canal and contains 6 pumps: three horizontal and three centrifugal pumps. The pumps are driven by five 25 Hz electric motors and one 60 Hz electric motor and has a total maximum capacity is 2690 cfs. The pump station is fed by a tributary area consisting of 3960 acres. This area includes the lower portion of City Park, and area East of Interstate I-10 to Bayou St. John and Lopez St. The pumps at DPS 7 are unable to work at its maximum capacity due to conveyance constrictions upstream. The maximum capacity the flows through DPS 7 is 1700 cfs.

The Orleans Avenue Canal currently flows from DPS 7 to Lake Pontchartrain. It is an open earthen channel with concrete floodwalls. The safe water elevation in the canal is 9 ft NGVD88. A gate structure has been installed near the outfall to protect the canal from intrusion of the lake during a storm surge. Temporary pumps with a total capacity of 2000 cfs have been placed at the gate to maintain drainage while the gates are closed.

City Park is a large municipal park that is bounded on the west by Orleans Ave. south of I-610 and the Orleans Ave. Canal north of I-610. Its other boundaries are City Park Ave. to the south, Robert E. Lee Blvd to the north, and Wisner Dr. along Bayou St. John to the east. City Park is home to numerous cultural and recreational facilities. Those north of I-610 include City Park Riding Stables - Equestrian, the NOPD Horse Stables, the G. Gernon Brown Center (a gymnasium), Popp's Fountain, Marconi Meadows, Baseball Fields, Pan American Soccer Stadium, a Golf Driving Range, a Golf Club, and two of its three Golf courses. Also located within the park north of I-610 are a public high school and a USDA research facility.

Proposed Work

To redirect the water currently flowing from DPS 2 to DPS 3 so that it would flow from DPS 2 to DPS 7 and the Orleans Avenue Canal, the following three actions are called for:

1. Construct an additional U-shaped flume parallel to the Lafitte Street Canal. The flume size could be estimated two ways:
    - Assuming that DPS 2 is allowed to discharge at its full capacity of 3,190 cfs with no restrictions of flow coming in or out, the dimensions would be estimated to be 10' x 22', or
    - Assuming that DPS 2 is discharging with the restraint at the Broad Street Canal, the dimensions would be estimated to be 11' x 11'.

    This proposed box would tie into the existing drainage system at Jefferson Davis Pkwy. See **Plate 13-2**;
2. Construct the additional box on Orleans Ave. from Olga St. to DPS 7 planned under the SELA program; and
3. Increase the pumps at DPS 7 by adding three 300 cfs hydrologic pumps to accommodate the extra flow from DPS 2. The additional pumps would be located on the south side of the railroad tracks. In order to seat the three pumps, excavation to

the south-west side of the intake basin is required. The pumps would be housed on a platform over the excavated section. A discharge tube will connect to the pumps and convey the water north to the Orleans Avenue Canal. The existing driveway to the Telephone tower would be re-routed to allow continuous access. The improved pump station would be capable of an additional 900 cfs into Orleans Avenue Canal for a total of 3,590 cfs. See **Plate 13-3**.

The additional water will be stored in the northern portion of City Park in a detention area constructed by as described below.

A berm will be built around the northern half of City Park to contain the water while the rain event is in progress, after which it will be redirected back into the Orleans Avenue Canal. See **Plate 13-1**. Because of a gradual slope down to the northern portion of the Park, the berm will be built at a maximum of 5' to hold approximately 4' of water in the lowest portion, with 1' of freeboard. The berm will start at the on the north side of Interstate 610, near DPS 7. The berm will follow east and parallel to Zachary Taylor Dr. (I-610) but will exclude Popp's Fountain. It will continue east around Pan American Stadium to Wisner Blvd. Wisner Blvd. could be used as a natural berm. Sections along Wisner Blvd. will be required to be built up to contain the water. The berm will turn approximately 1000' south from Filmore Ave. The berm will continue north around the club house, then continue parallel to the driving range and John F. Kennedy High School; and around the Agricultural Center to Robert E. Lee Blvd. It will continue west parallel to Robert E. Lee Blvd. until the Orleans Ave. Canal. The Orleans Ave. Canal will be used as a natural berm for the western portion of City Park. Marconi Dr. will be required to raise at both the north and south ends of City Park to allow for the berm to continue. All buildings, horse stables, and other monumental structures will be bermed to prevent flooding.

At approximately 500' south of Filmore Ave., an overflow weir / control structure will be constructed to convey water into a discharge basin. Seven 60" diameter concrete culverts would be installed from the discharge basin under Marconi Dr. to discharge water into the City Park detention pond. The culverts will prevent the washout of Marconi Dr. See **Plate 13-4**. It is estimated that the fastest time to fill the area would be approximately

18.5 hours at 868 cfs. The actual time and discharge into City Park will vary with the gradual rising of the flood stage in the Canal.

Construction Considerations

- Prior to construction of new drainage structures, the contractor shall implement a construction procedure that will not impose on the structural integrity of the existing adjacent structures and channels. The contractor will also have to protect all adjacent existing utilities and make accommodations for overhead electric lines.
- A construction sequencing plan would be required to minimize impacts to traffic during construction.
- The existing levee near along the Orleans Avenue Canal will require protection while the relocated levee will be built to accommodate the pump station.
- A construction plan will be required to protect the oak trees in City Park adjacent to the construction.

Environmental Considerations

This project, like all the others, would satisfy the requirements of NEPA through a supplement to EA #433.

For this project, additional consultation with the SHPO is required because the portion of the construction proposed between Olga St. and City Park Ave. is within the Parkview NRHP District, and there are various sites within City Park that may be eligible for the National Register of Historic Places.

It appears that that the area between DPS 2 and DPS 7 may be an environmental justice area. A determination must be made and actions taken accordingly.

Order of Magnitude Cost Estimate

Cost Estimate - Project 13

Environmental	$10,000
Right-of-Way Acquisition	$0
Design	$2,076,609
Construction	$23,881,005
Total	**$25,967,614**

Roadmap / Timeline

Design – It should take approximately 6 months to complete the design for the berm. The design for the box culvert along Orleans Avenue is part of the SELA program. The plans are complete, but may need to be updated before advertisement.

Environmental Clearance – Potential environmental issues could impact the critical path of the project. See Environmental Considerations.

Permits – The permits required concern water quality, and are issued by LDNR, this should be coordinated among the agencies to take no more than one month after final design is completed and be concurrent with the construction bid process.

LERRD – Land required for the detention area is owned by the State of Louisiana and operated by a private non-profit organization. The use of the land would have to go through an extensive public information process as described earlier in this report. This process must be concurrent with Design and could be the critical path of the design.

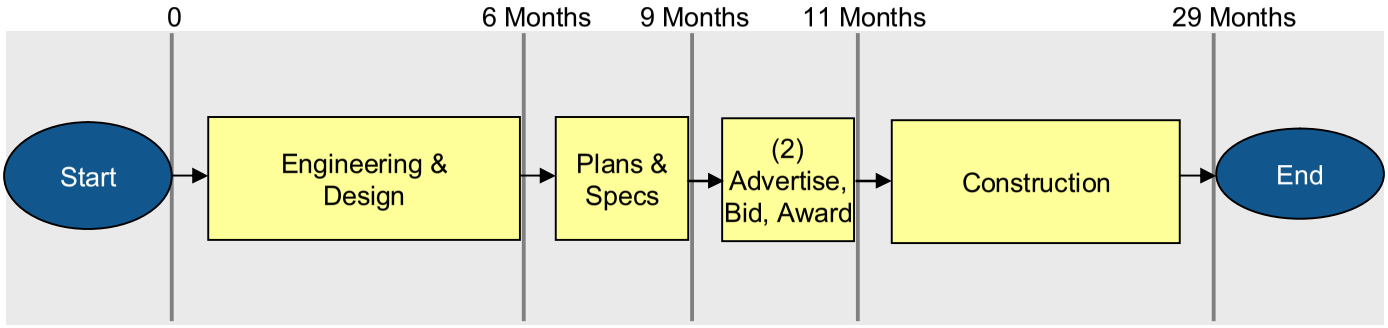
Construction – The proposed berm would take approximately 12 months to complete. The completion of the box culvert from Olga St. to DPS 7 could take 18 months to complete. Lead time for the pumps is approximately 12 months from placement of the order.

Conclusion

This project is not recommended for further study. The Orleans Avenue Canal is capable of conveying the current flow. Without completion of other projects to increase the conveyance capacity between DPS 2 and DPS 7, this project would not be utilized. Therefore, it is eliminated for the following reasons:

1. Conveyance constrictions along Orleans Avenue upstream of DPS 7 prevent enough flow to maximize the capability of DPS 7.
2. The pumps added at the gate structure located at the outfall of the Orleans Avenue Canal have the capacity to discharge the current flow.
3. The storage capacity of the detention pond is not adequate to receive the maximum flow for the duration of the 36-hour storm event.
4. Mitigation of the park would be necessary after each use.
5. Maintenance resources required to place sandbag at the road crossings and around buildings within the pond area could be used more effectively elsewhere.

Project 13

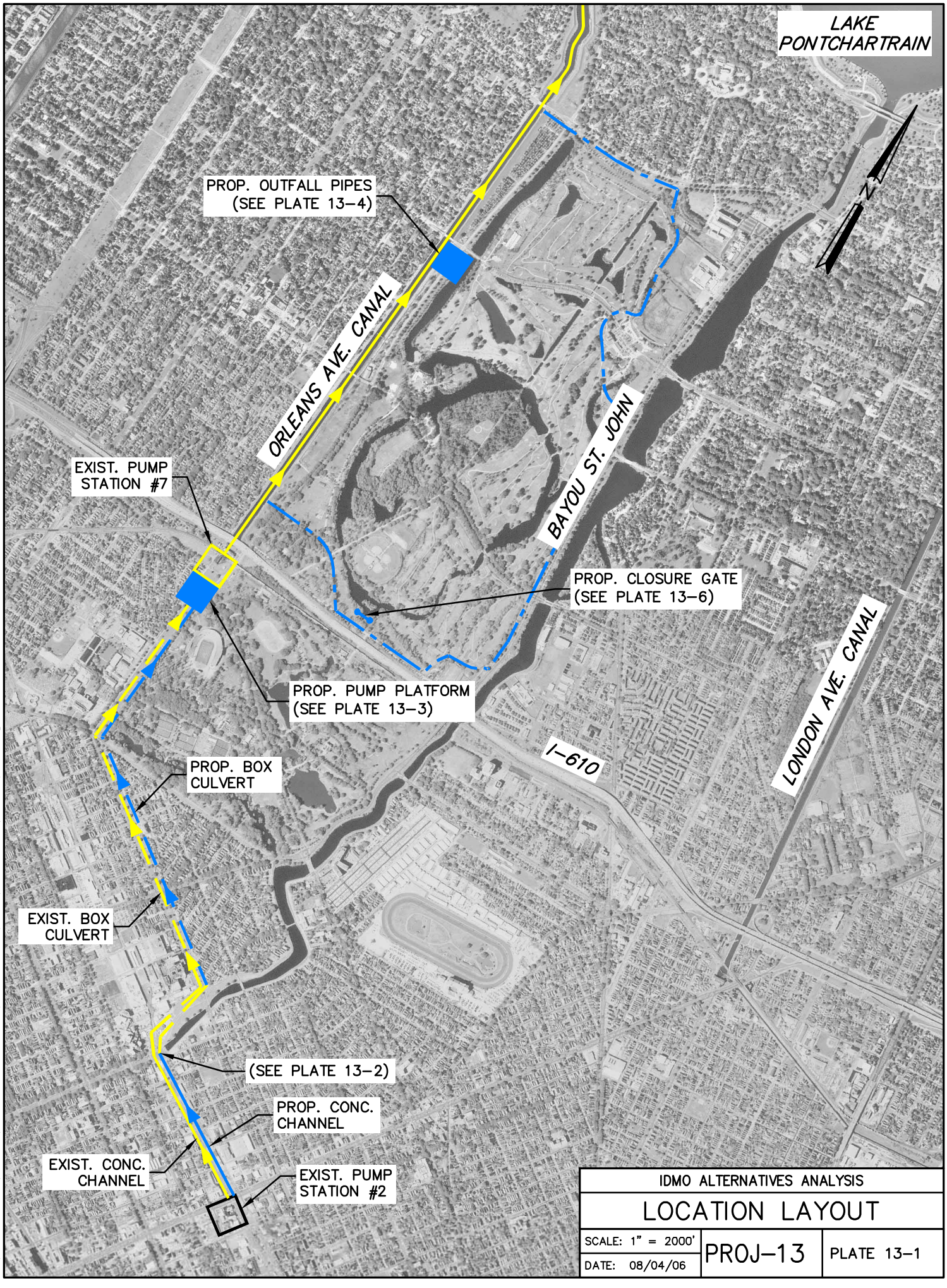


Environmental Compliance – Potential environmental issues, as discussed in the "Environmental Consideration" section, can be addressed during the engineering and design phase in order to keep off the critical path.

LERRD's – Any potential LERRD's , as discussed in the "Proposed Work" section, can be addressed during the engineering and design phase in order to provide for construction without causing delay.

Pump Procurement – Specifics on pumps can be identified early in the engineering and design phase in order to be delivered on-site, when needed, without causing delay. This should be done concurrent with overall schedule. This is not a critical path item in this flow chart. (estimated 12 month lead time required)

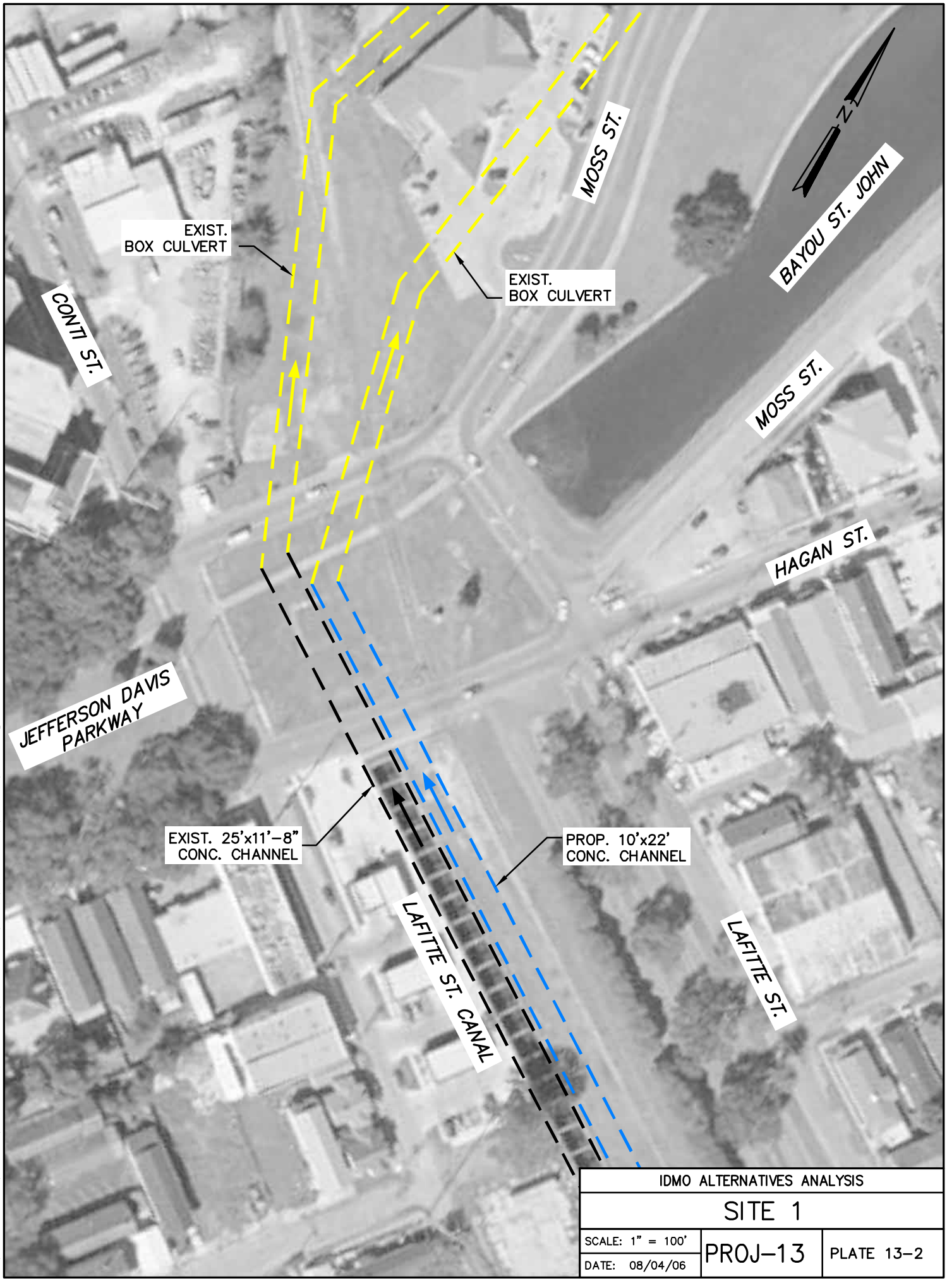
Contract Administration – Construction could be implemented with 2 separate; concurrent contracts for the boxes and pumps in order to expedite the process. Estimated time shown above reflects this approach.



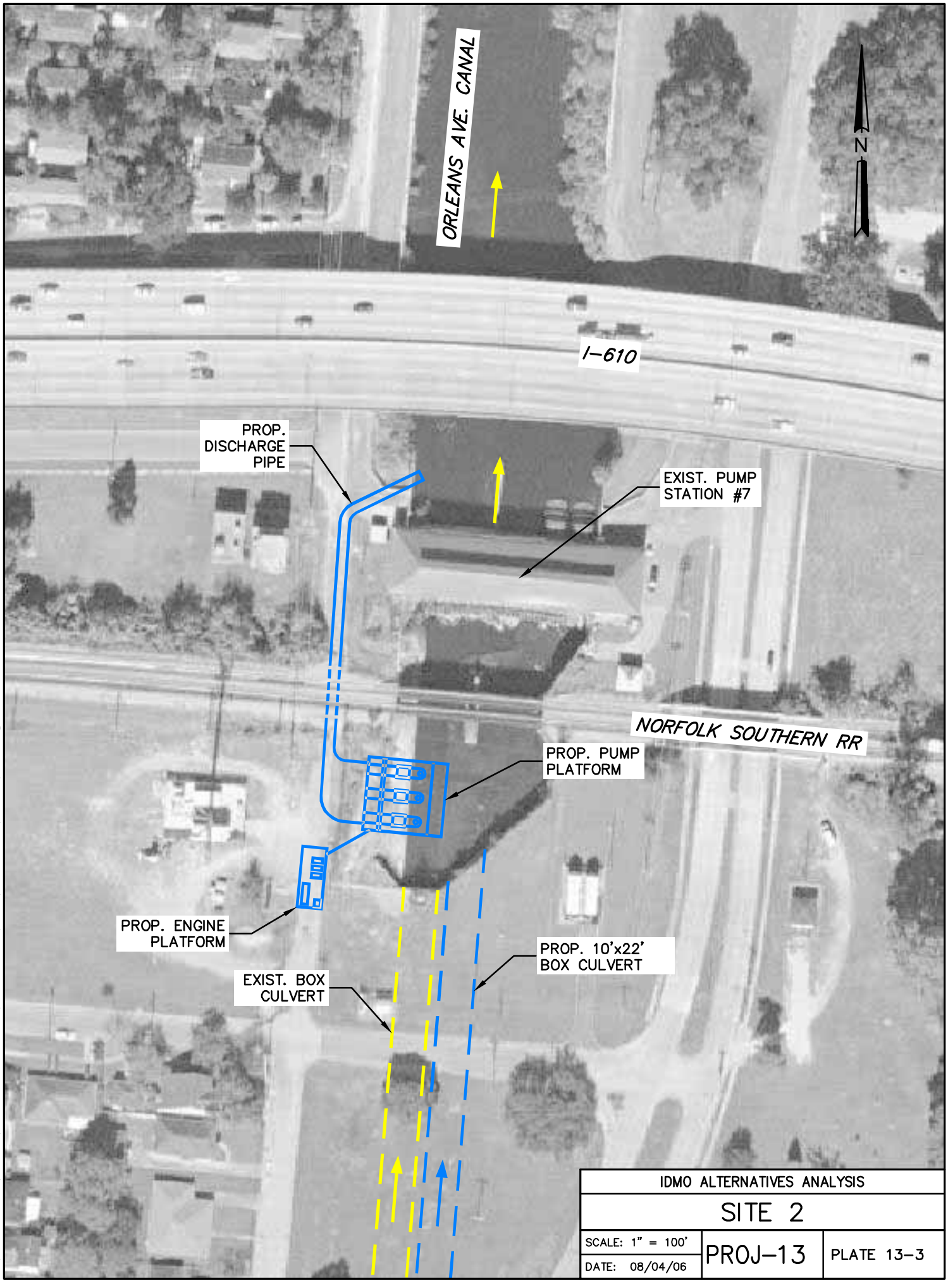
IDMO ALTERNATIVES ANALYSIS

LOCATION LAYOUT

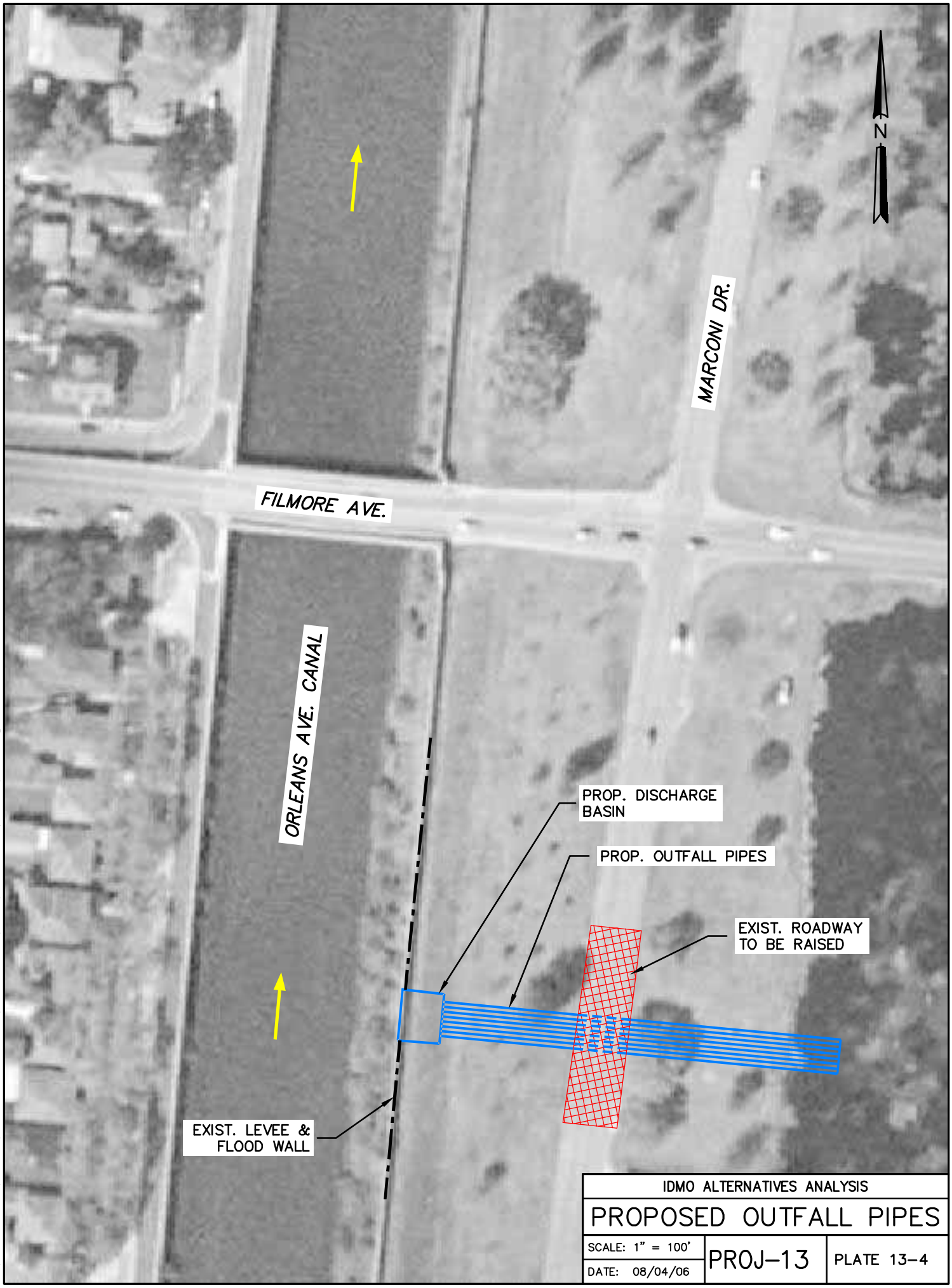
SCALE: 1" = 2000'	PROJ-13	PLATE 13-1
DATE: 08/04/06		



IDMO ALTERNATIVES ANALYSIS		
SITE 1		
SCALE: 1" = 100'	PROJ-13	PLATE 13-2
DATE: 08/04/06		



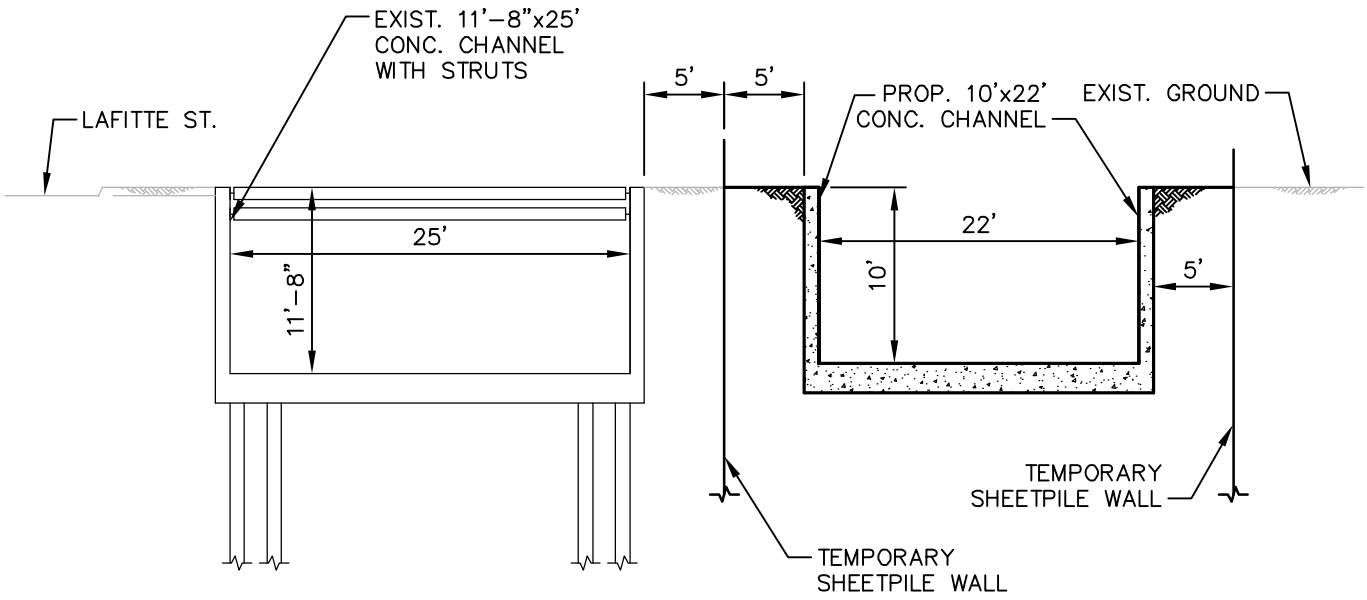
IDMO ALTERNATIVES ANALYSIS		
SITE 2		
SCALE: 1" = 100'	PROJ-13	PLATE 13-3
DATE: 08/04/06		



IDMO ALTERNATIVES ANALYSIS

PROPOSED OUTFALL PIPES

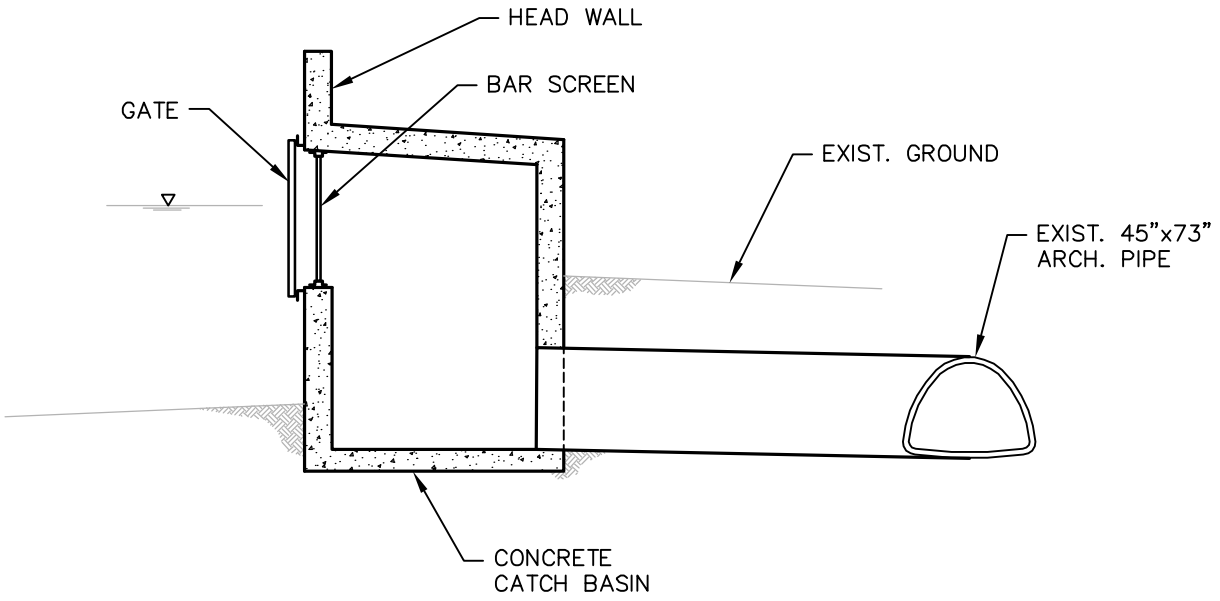
SCALE: 1" = 100'	PROJ-13	PLATE 13-4
DATE: 08/04/06		



LAFITTE ST. CANAL TYPICAL SECTION

N.T.S.

IDMO ALTERNATIVES ANALYSIS		
CONC. CHANNEL SECTION		
SCALE: 1" = N.T.S.	PROJ-13	PLATE 13-5
DATE: 08/04/06		



PROPOSED CLOSURE GATE
N.T.S.

IDMO ALTERNATIVES ANALYSIS		
PROPOSED CLOSURE GATE		
SCALE: 1" = N.T.S.	PROJ-13	PLATE 13-6
DATE: 08/04/06		

Pump Station No. 7. (Looking South)

Orleans Avenue Canal (Looking North)

Intake basin for Pump Station No. 7 (Looking South)

Intake basin for Pump Station No. 7 (Looking West)

Marconi Dr. at Zachary Taylor Dr. (Looking North)

Zachary Taylor Dr. at Marconi Dr. (Looking East)

Existing Outfall Basin near Zachary Taylor and Golf Dr.

Robert E. Lee Blvd on West Side of USDA Research Center Looking West

Marconi Dr. & Robert E. Lee Blvd. (Looking East)

Marconi Dr. & Robert E. Lee Blvd. (Looking South)

Missing Flood Wall (Zachary Taylor Dr. at Marconi Dr. Looking West)

Popp's Fountain

Project No. 14

Redirect flow from DPS 1 to DPS 2

Objective

The objective of this project is to better utilize the pumping capacity of the system by diverting 1,100 cfs discharged from DPS 1 into DPS 2.

Existing Conditions

DPS 1, located in the intersection of S. Broad St. and Martin Luther King Jr. Blvd., has a capacity of 6,825 cfs. It contains 7 horizontal and 3 centrifugal pumps that are driven by (8) 25 Hz and (2) 60 Hz electric motors. The tributary area into DPS 1 is 5,600 acres. The water discharged from DPS 1 can be pumped to the Palmetto Canal or to DPS 2. The Broad St. Canal consists of a box culvert aligned under Broad St. between DPS 1 and DPS 2. The dimensions of the box increase from (20' x 8') to (20' x 9.5') going toward DPS 2. The subsidence that has occurred since the construction of the drainage system has hindered its performance. The Broad Street Canal was built on piles, therefore it has settled at a slower rate relative to the adjacent neighborhoods. The ariel subsidence of the neighborhoods prevents flowing the box full because that condition could put up to three feet of flooding in those neighborhoods.

DPS 2 is located in the median of N. Broad St. near the intersection of St. Louis St. It contains 6 pumps with a combined capacity of 3,190 cfs. The pumps include four horizontal and two centrifugal pumps, which are driven by six 25 Hz electric motors. The pump station is fed by the Broad Street and Lafitte Street Canals, which collect runoff from the Central Business District and upriver portions of the French Quarter and Treme as well as discharged flow from DPS 1.

The water discharged from DPS 2 flows into two conveyance structures:

- An underground box that runs eastward in the median of Broad St. to DPS 3 where the water is pumped into the London Avenue or Florida Avenue Canals, and
- The Lafitte Street Canal, an 11.65' x 25' concrete flume that runs parallel to Lafitte St. to Jefferson Davis Pkwy.

The latter becomes two closed boxes that are routed on the west side of Bayou St. John to Orleans Ave. One of the boxes traverses along Orleans Ave. to DPS 7 at the southern terminus of the Orleans Avenue Canal. The other box is not completed, but it is planned

to be constructed as part of the SELA Drainage Improvements program. Typically, the Sewerage and Water Board only pumps 1000 cfs towards DPS 7 because any additional flow would flood neighborhoods that have subsided downstream of DPS 2.

Proposed Work

Based on information provided regarding the elevation of the box culvert relative to the adjacent neighborhood, it is assumed that the box culvert between DPS 1 and DPS 2 can only flow half full with possible minor street flooding. With this assumption, it is estimated that the maximum flow in the existing box culvert is 584 cfs. In order to divert a total of 1100 cfs to DPS 2, a new 77.5" x 122" arch pipe would be installed along Broad Avenue to convey the additional 518 cfs of water that exceeds the capabilities of the existing system. See **Plate 14-1**.

Construction Considerations

Prior to construction of new drainage structures, the contractor shall implement a construction procedure that will not impose on the structural integrity of existing adjacent concrete structures and channels. Also, the contractor will have to be aware of all the utilities in the area.

A construction sequencing plan would be required to minimize impacts to traffic along Broad Avenue during construction.

A tunneling procedure would be necessary to install the 8 ft diameter pipe underneath Interstate 10 without impacting traffic.

Environmental Considerations

This project, like all the others, would satisfy the requirements of NEPA through a supplement to EA #433. This would include, but not necessarily be limited to, the following:

- Compliance with applicable Federal and state water protection requirements,
- Preparation of a Phase I Site Assessment in any areas for which one has not been completed,
- Continuing coordination with USFWS and LDWF, and
- Consultation with the SHPO regarding potential effects on the New Orleans drainage system.

For this project, additional consultation with the SHPO is required because most of the construction area is within the Mid-City NRHP District.

It appears that that the entire route of the Broad Avenue Canal may be an environmental justice area. A determination must be made and actions taken accordingly.

Order of Magnitude Cost Estimate

Cost Estimate - Project 14	
Environmental	$10,000
Right-of-Way Acquisition	$0
Design	$2,506,183
Construction	$28,821,108
Total	**$31,337,291**

Roadmap / Timeline

Design – The design for the arch pipe along Broad Avenue would take approximately 6 months to complete.

Environmental Clearance – Concurrent with design

Permits – The permits required concern water quality, and are issued by LDNR, this should be coordinated among the agencies to take no more than one month after final design is completed and be concurrent with the construction bid process.

LERRD – Land required for the arch pipe is within the street ROW. There would be no extra ROW acquisition required.

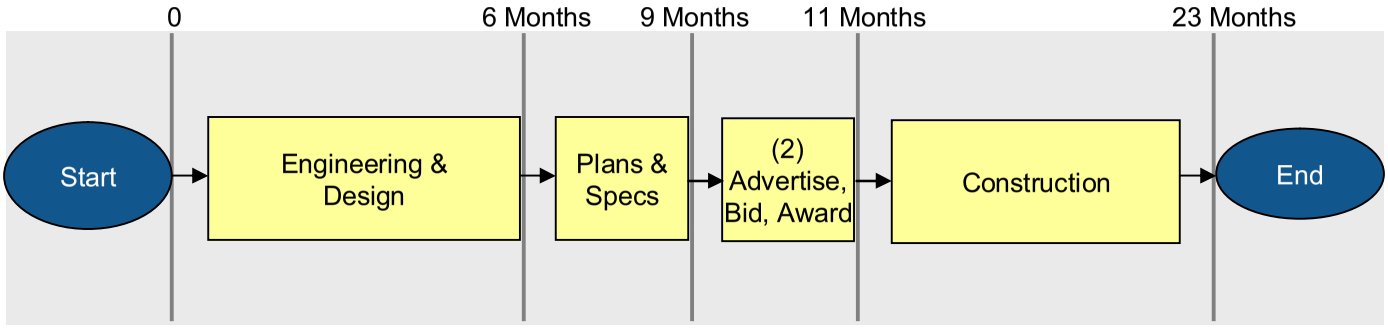
Construction – The installation of the arch pipe along would take approximately 12 months to complete.

Conclusion

This project is not recommended for further study for the following reasons:

1. The disruption to traffic along Broad Avenue would be significant.
2. The cost to install the arch pipe would be expensive.

Project 14

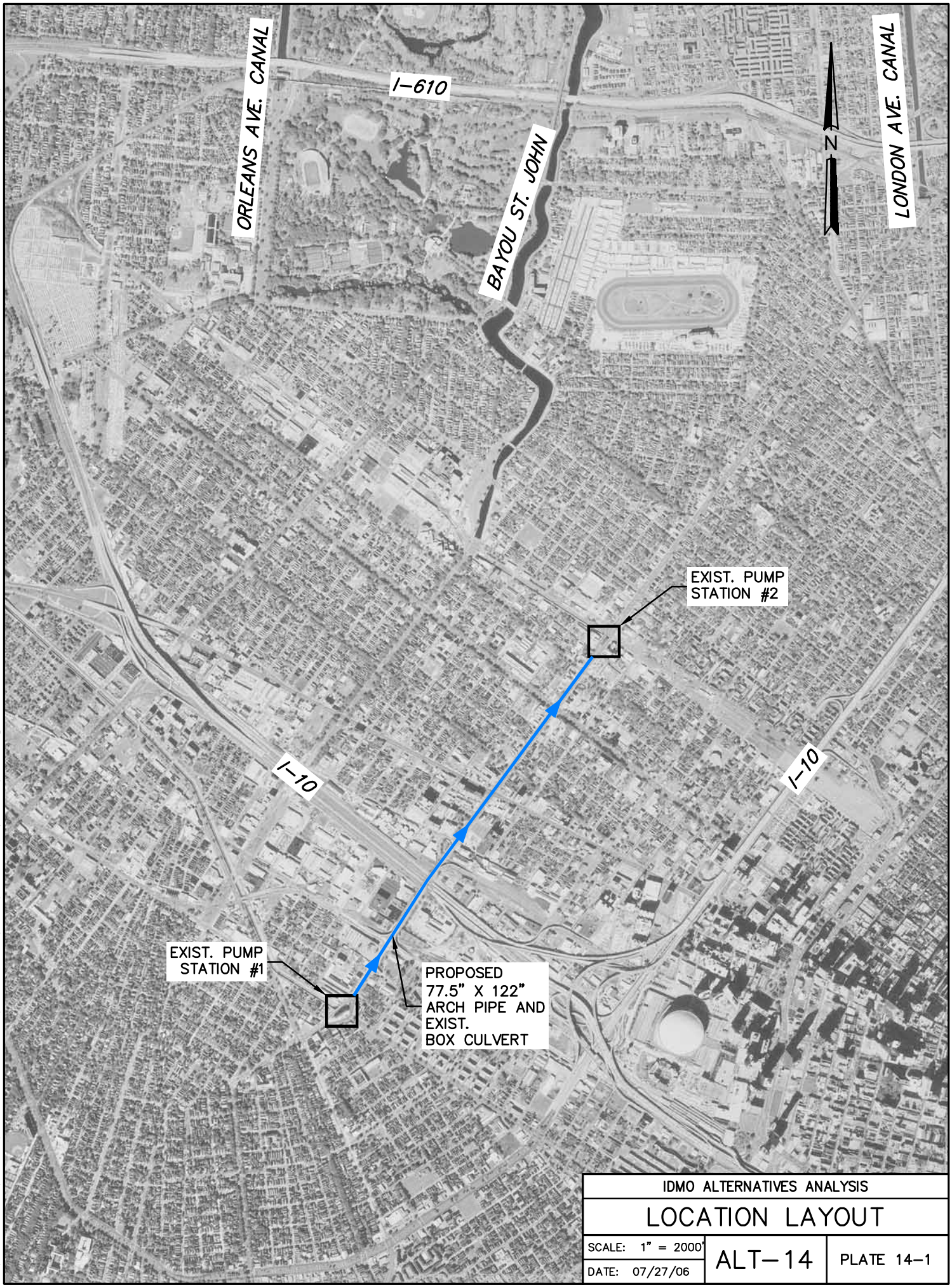


Environmental Compliance – Potential environmental issues, as discussed in the "Environmental Consideration" section, can be addressed during the engineering and design phase in order to keep off the critical path.

LERRD's – Any potential LERRD's , as discussed in the "Proposed Work" section, can be addressed during the engineering and design phase in order to provide for construction without causing delay.

Pump Procurement – Specifics on pumps can be identified early in the engineering and design phase in order to be delivered on-site, when needed, without causing delay. This should be done concurrent with overall schedule. This is not a critical path item in this flow chart. (estimated 12 month lead time required)

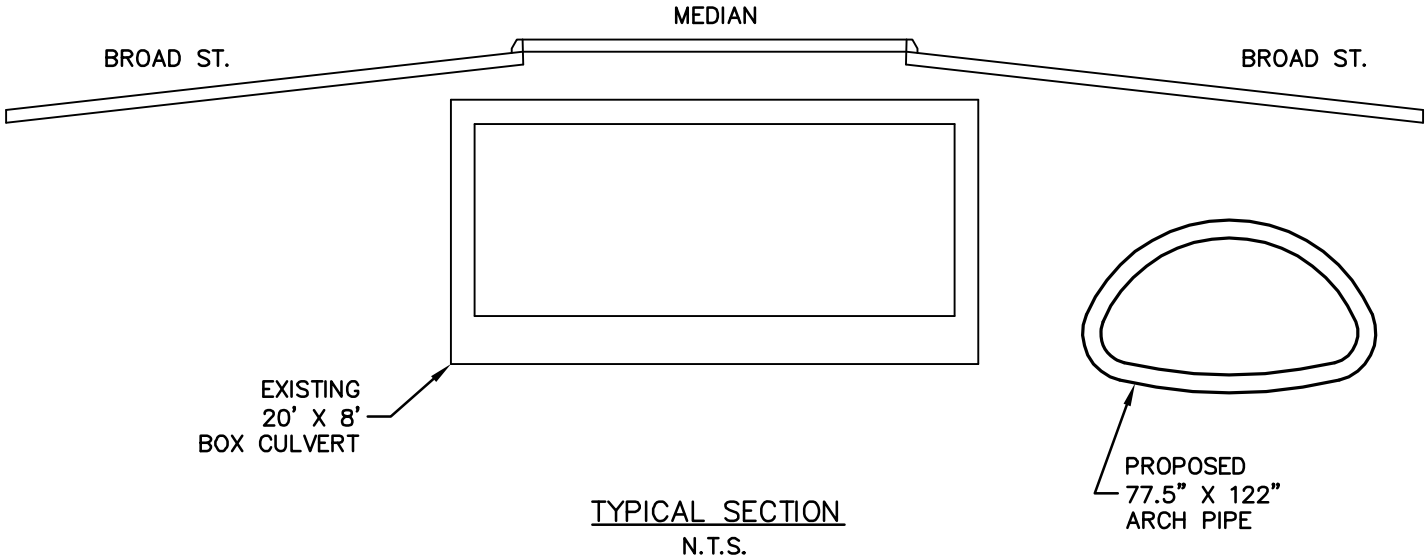
Contract Administration – Construction could be implemented with 2 separate; concurrent contracts for the boxes and pumps in order to expedite the process. Estimated time shown above reflects this approach.



IDMO ALTERNATIVES ANALYSIS

LOCATION LAYOUT

SCALE: 1" = 2000'	ALT-14	PLATE 14-1
DATE: 07/27/06		



TYPICAL SECTION
N.T.S.

IDMO ALTERNATIVES ANALYSIS		
TYPICAL SECTION		
SCALE: 1" = N.T.S.	ALT-14	PLATE 14-2
DATE: 07/27/06		

Pump Station No. 1 (Looking South)

Martin Luther King, Jr. Canal (Looking West)

Box Drain to Pump Station No. 2 (Looking North)

Gate from MLK Jr. Canal to P.S. No. 2 (Looking Northeast)

Back of Gate from MLK Jr. Canal (Looking Southwest)

Gate at P.S. No. 1 from P.S. No. 2 Leading East

Project No. 15

Redirect flow of DPS 4 from London Avenue Canal to the Inner Harbor Navigation Canal (IHNC) via Prentiss, Peoples, & Dwyer Rights-of-way

Objective

The objective of this project is to divert all of the flow discharged by DPS 4 from the London Ave. Canal and Lake Pontchartrain to the IHNC via the Prentiss Ave., Peoples Ave., and Dwyer rights-of-way (ROW). See **Plate 15-1**, Location Layout.

Existing Conditions

The London Ave. Canal runs through Gentilly from DPS 3 northward to the lake. There are two pumping stations that discharge into the London Ave. Canal, DPS 3 at the southern terminus of the canal at Florida Avenue and N. Broad Street and DPS 4 at Prentiss Ave. on the east bank of the canal.

DPS 4 contains six pumps with a combined capacity of 3,720 CFS. The pumps include one vertical, three horizontal and, two centrifugal pumps that are driven by six 25 Hz electric motors. DPS 4 also contains a 10' and 2' steel siphon over the canal to bring water from the west bank of the canal to the pump station.

The IHNC is a 5.5 mile waterway located within the limits of the City of New Orleans that connects the Mississippi River and Lake Pontchartrain. The channel also connects the river to the Intracoastal Waterway and the Mississippi River Gulf Outlet. Both waterways are optional navigation routes to the Gulf of Mexico. The IHNC is subject to tidal surges. A lock placed near the southern end controls the water surface elevations between the canal and the river. Although it is referred to as the "Industrial Canal" both by commercial mariners and by landside residents, its proper name is the Inner Harbor Navigation Canal (IHNC).

The Prentiss Ave. ROW contains two parallel drainage boxes, a large water force main, and other utilities. Peoples Ave. ROW contains a box culvert parallel to the Norfolk Southern railroad ROW, and the Dwyer ROW contains an open canal from Peoples Ave. to the floodwall at the IHNC.

Proposed Work

Water from the drainage basin that flows to DPS 4 will be redirected using the existing drainage system toward a proposed pump station located at the eastern terminus of the

Dwyer ROW as shown on **Plate 15-3,** Proposed Pump Station. It would have the same capacity as DPS 4 (3,720 CFS). The pumps would discharge the water into five discharge tubes, each 9 feet in diameter, which would be routed over the levee and the railroad track into the Industrial Canal. A discharge basin will be cut on the west bank of the Industrial Canal that will accept the water from the siphon into the canal. See **Plate 15-3**.

To direct the water to the proposed pump station, the Dwyer canal would be replaced with a 12' deep rectangular channel with sheet pile walls and an earthen floor, as seen on **Plate 15-4**. Two 10' x 16' box culverts will be added to cross under the railroad track to connect the People's Ave. Canal and Dwyer Canal. A junction box would be built at the intersection of these two proposed culverts with the Peoples Ave. box culvert.

When the gate at London Ave. Canal and Lake Pontchartrain is closed, DPS 4 would be shut down, and the water would be redirected to the proposed pumping station.

Geotechnical Considerations

- Subsoil Conditions

  Based on borings made in the general area, subsoil conditions at the proposed construction site on the west side of IHNC along Dwyer Canal generally consist of a surface layer of very soft to soft clay to about the 10 to 20 ft. This is expected to be underlain by medium dense to dense sand or silty sand to about the 50 ft. depth. This sand stratum is underlain by medium stiff to stiff clay that extends to the Pleistocene age soils which should be encountered at about the 60 to 70 ft. depth. The Pleistocene age soils consist of preconsolidated stiff clay to at least the 100 ft. depth below ground surface. However, strata of medium dense to dense sand could also be encountered within the Pleistocene age soils.

- Conceptual Foundation System

  Based on the subsoil conditions described above, all important structures including the junction box at Peoples Avenue Canal, the box culvert beneath Norfolk Southern Railroad and the discharge basin extending into the IHNC should be supported on driven piles. For timber piles supporting the pump station and pipe bents, a capacity of at least 15 tons (F.S. = 2.0) in compression should be available. This is based on a 60 to 70 ft. long timber pile (below existing grade). Piles used to support the below ground structures would have a capacity of

several tons less for the same pile tip depth. Higher capacities on the order of 30 to 50 tons would be available if steel "H" or pipe piles or prestressed concrete piles are used for support. These piles may also be desirable in view of the thickness and shallow depth of the sands that would be expected in the area. They should also be considered if a greater design life than typically provided by timber piles is desired.

- Water Diversion and Cofferdam Arrangement

  It is believed that all of the below ground structures including the junction box, culverts beneath the Norfolk Southern Railroad, box culvert to the proposed pump station west of France Road and the discharge basin leading to IHNC should be supported on driven piles. Some specialized form of cofferdam system would be required where the junction box connects to the existing box culvert along Peoples Avenue Canal and where the box culverts underlie the railroad tracks. For cost estimating purposes, a sheet pile penetration of about 60 ft. below ground surface would be expected. The cofferdams should be internally braced at least at one location near the top of the cofferdam walls. Forced dewatering (deep wells, well points, etc.) would be required to dewater the sands that would be expected above the 50 ft. depth below ground surface.

- Additional Geotechnical Investigations

  In general, new soil borings should be made on about 300 ft. spacings starting at the proposed junction box at Peoples Avenue Canal and extending to the IHNC. Geotechnical analyses with regard to the compression, tension and lateral capacities of piles would be needed for support of the various elements of the structures. Analyses would also be needed relative to the temporary retaining structures (structural and dewatering). Geotechnical analyses should also be made for the specialize cofferdams where the junction box connects to the existing box culverts along Peoples Avenue Canal and where the below ground culverts underlie the railroad tracks along the alignment. In addition, analyses should be made to evaluate the stability of the existing levee along France Road relative to the proposed new construction.

Structural Considerations

- Regarding the pump station architectural considerations would be coordinated with local agencies. For the structural integrity of the pump station, all components of the structure would be designed in accordance with the state and local building code requirements and be able to withstand winds in excess of 150 mph.
- The foundations for the pump stations shall be supported on composite timber piles due to water table fluctuations while the box culverts, including junction boxes, will be founded on timber piles.
- All foundations shall be designed in accordance with the Geotechnical Report's recommendations.
- The engine deck for the pump station would be elevated one foot above the base flood elevation as shown on the FIRM map.
- All box culverts and junction boxes have been sized to accommodate the hydraulic requirements.

Mechanical/Electrical Considerations

- Mechanical

  The pump station will require three (3) 1000 cfs horizontal pumps, diesel driven with the motors rated at 2000 HP. Sufficient fuel storage would need to be provided at the site to operate the pumps for up to 36 hours.

- Electric Service

  The local electric service is provided by Entergy. The anticipated electrical load at the pump station is including:

  - Two (2) 300 cfs vertical pump, motor rated at 700HP, medium voltage or approximate 1,040 KW
  - One CD Pump 30x63, 80 cfs, motor rated at 1200HP, medium voltage or approximate 900 KW
  - Balance of facility loads including power, lighting and auxiliary systems at approximate 300 KW. The electrical system will be stepped down to 480V and 120/208V with transformers and local distribution panels.

  The peak demand in the pumps station is approximate at 2.25 MW. Two service feeders shall be provided by Entergy for redundancy. In case of loss of one feeder

the other feeder shall be capable of providing power for the entire pump station demand. Main Substation will consist of MV vacuum type breakers and metering devices to meet Entergy standards. Service availability will be coordinated with Entergy during the design development.

- Standby Power

  Standby power source will be required in case of total black-out on utility grid occurs coincidence with the flood event. There are two options for providing standby power.

  - Option A: Locally installed 2-1.25 MW diesel generators to meet the peak demand. The generators switchgear with synchronizing bus will be provided. The generators will be specified for continuous duty with sufficient fuel storage to operate the pumps up to 36 hours.
  - Option B: Central Generation Plant. See description on Project 1.

Construction Considerations

- All box culverts can be installed using sheet pile braced trenches, a typical construction method in this area due to the poor soil strength characteristics in the New Orleans area. Dewatering will be required since the elevation of the water table is near the ground surface. Prior to the construction of the new culverts and junction boxes, the Contractor shall implement a construction procedure that will not impose on the structural integrity of the existing adjacent box culverts.
- Near the intersection of Peoples Ave. and Dwyer Canal where the proposed culvert runs under Norfolk-Southern Railroad, a temporary detour of the track will need to be constructed, to allow the railroad to operate without impedance while the new culvert is constructed.
- Along the Peoples Ave. ROW, work around the railroad tracks will have to be coordinated with the Norfolk-Southern Railroad.
- A dam will be required to hold back the existing flow with portable pumps to pump the water around the construction area.
- The levee wall will have to be rebuilt around the discharge pipe installation. The contractor will have to provide protection for the levees during construction in the event the water level rises in the Industrial Canal.

- Coordination with the Port of New Orleans, its tenant, and the New Orleans Public Belt Railroad will be necessary to route the discharge tubes from the pump station to the discharge area in the Industrial Canal.

Environmental Considerations

- This project, like all the others, would satisfy the requirements of NEPA through a supplement to EA #433.

It appears that substantial portions of the area in which work would be undertaken may be an environmental justice area. A determination must be made and actions taken accordingly.

Order of Magnitude Cost Estimate

Cost Estimate - Project 15

Environmental	$5,000
Right-of-Way Acquisition	$0
Design	$6,538,541
Construction	$75,193,227
Total	**$81,736,768**

Roadmap/Timeline

Design – This would be divided into two phases that would be initiated concurrently, M&E and Civil. The M&E would include a fast-track specification of pumps and other equipment with long lead time deliveries. M&E fast-track should take 2 months and the civil design should take 4 months.

Environmental Clearance – Concurrent with design. Potential environmental justice considerations could be critical path item.

Permits – The permits required concern water quality, and are issued by LDNR, this should be coordinated among the agencies to take no more than one month after final design is completed and be concurrent with the construction bid process.

LERRD – Land required for the pump station and relocated levee is owned by various owners. ROW to install the improvement would have to be purchased from these owners. This must be concurrent with Design and could be the critical path of the civil design.

Construction – The pump station proposed would take approximately 18 months to complete. Lead time for the pump station would take approximately 12 to 18 month upon placing the order.

Further Considerations

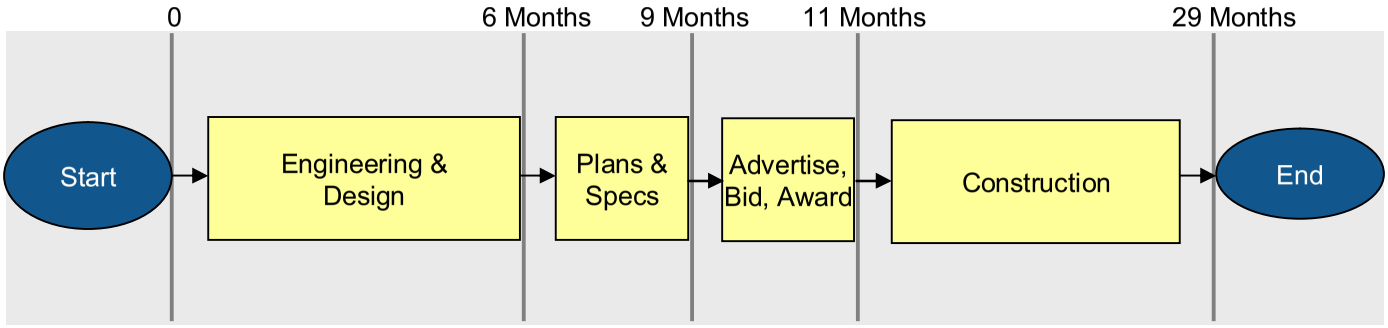
- It is advisable to initiate early coordination with both the Norfolk Southern Railroad and the New Orleans Public Belt Railroad.
- The delivery time for equipment could be the critical path for construction.
- The proposed pump station at the end of the Dwyer Canal and France Rd. could become part of the permanent drainage system. Alternatively, the pumps could be relocated to another location within the system.

Conclusion

This project is recommended for further study for the following reasons:

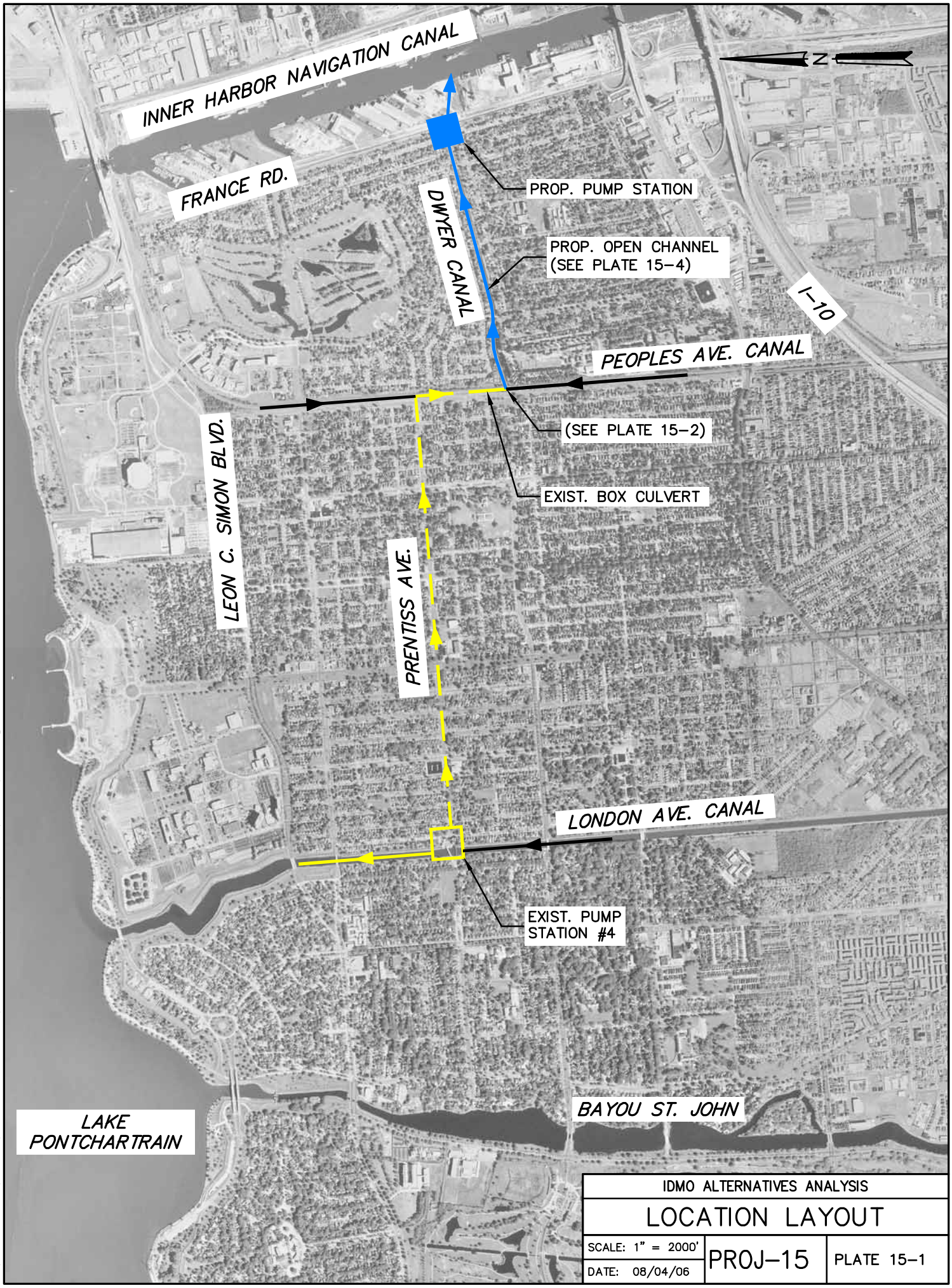
1. The redirection of flow from the London Avenue Canal to the IHNC is significant (3,720 cfs).
2. The proposed pump station would create an alternate outfall for the drainage basin.
3. The pump station could become a permanent part of the drainage system.

Project 15

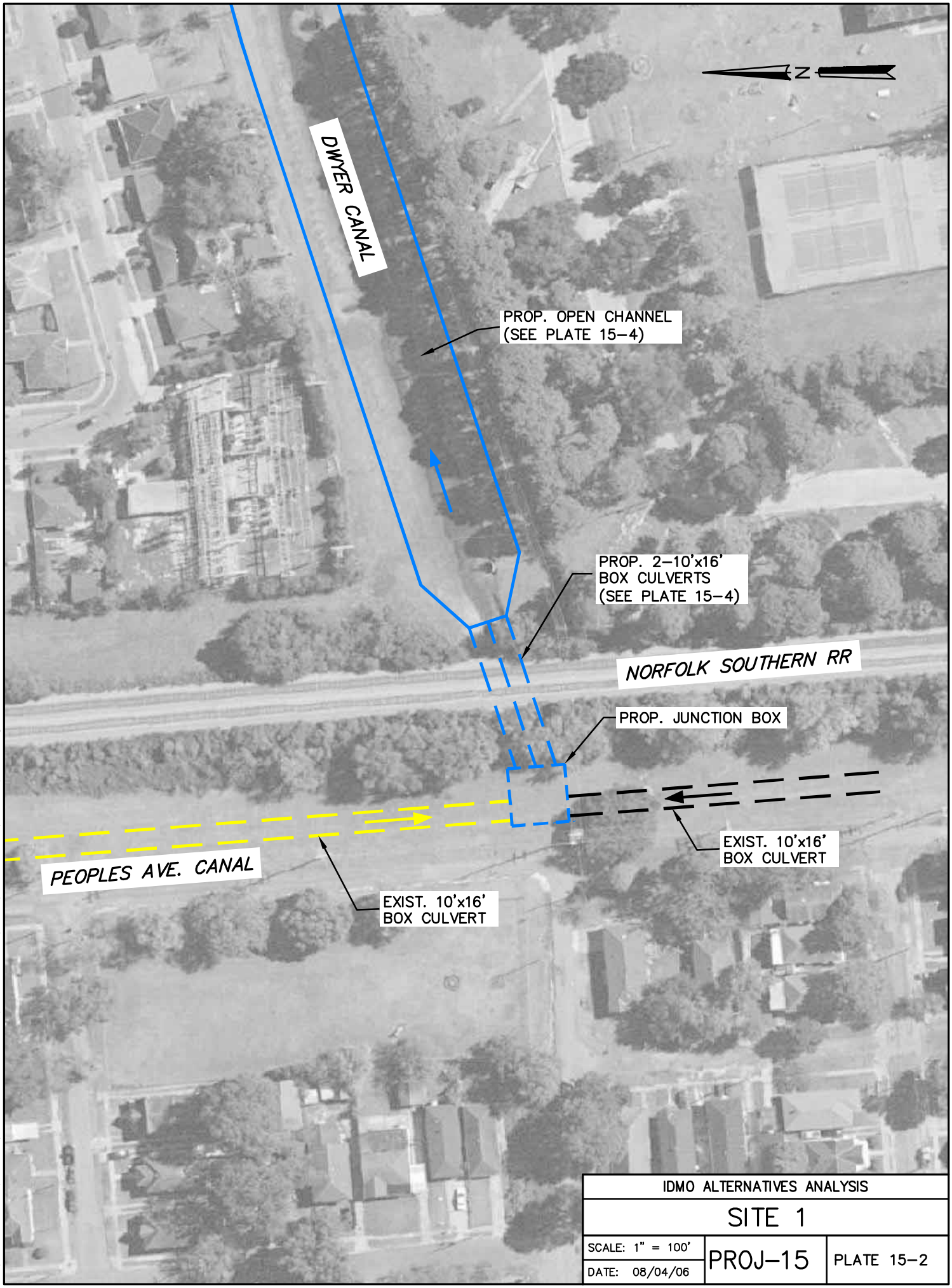


Environmental Compliance – Potential environmental issues, as discussed in the "Environmental Consideration" section, can be addressed during the engineering and design phase in order to keep off the critical path.

LERRD's – Any potential LERRD's , as discussed in the "Proposed Work" section, can be addressed during the engineering and design phase in order to provide for construction without causing delay.



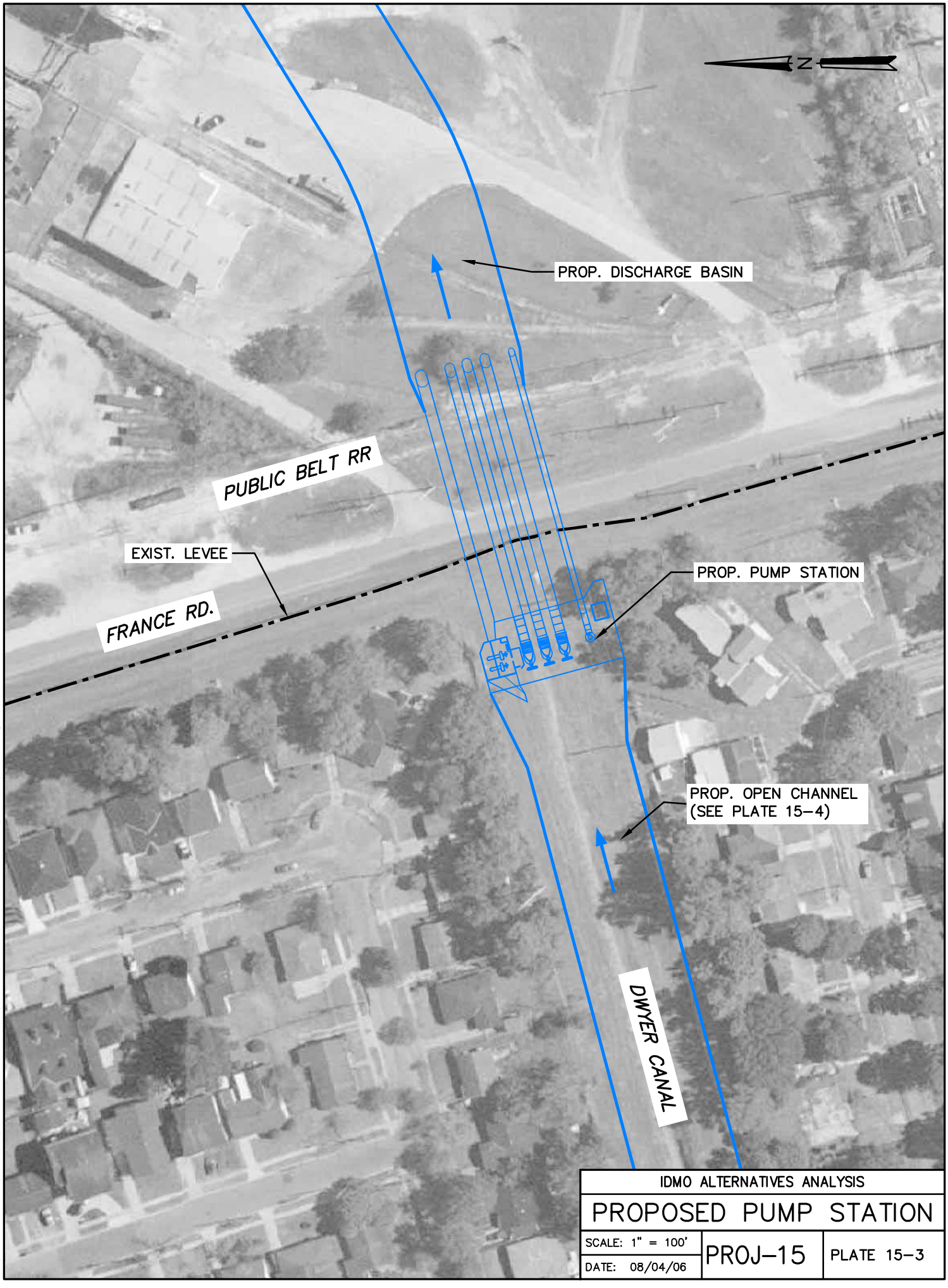
IDMO ALTERNATIVES ANALYSIS		
LOCATION LAYOUT		
SCALE: 1" = 2000'	PROJ-15	PLATE 15-1
DATE: 08/04/06		



IDMO ALTERNATIVES ANALYSIS

SITE 1

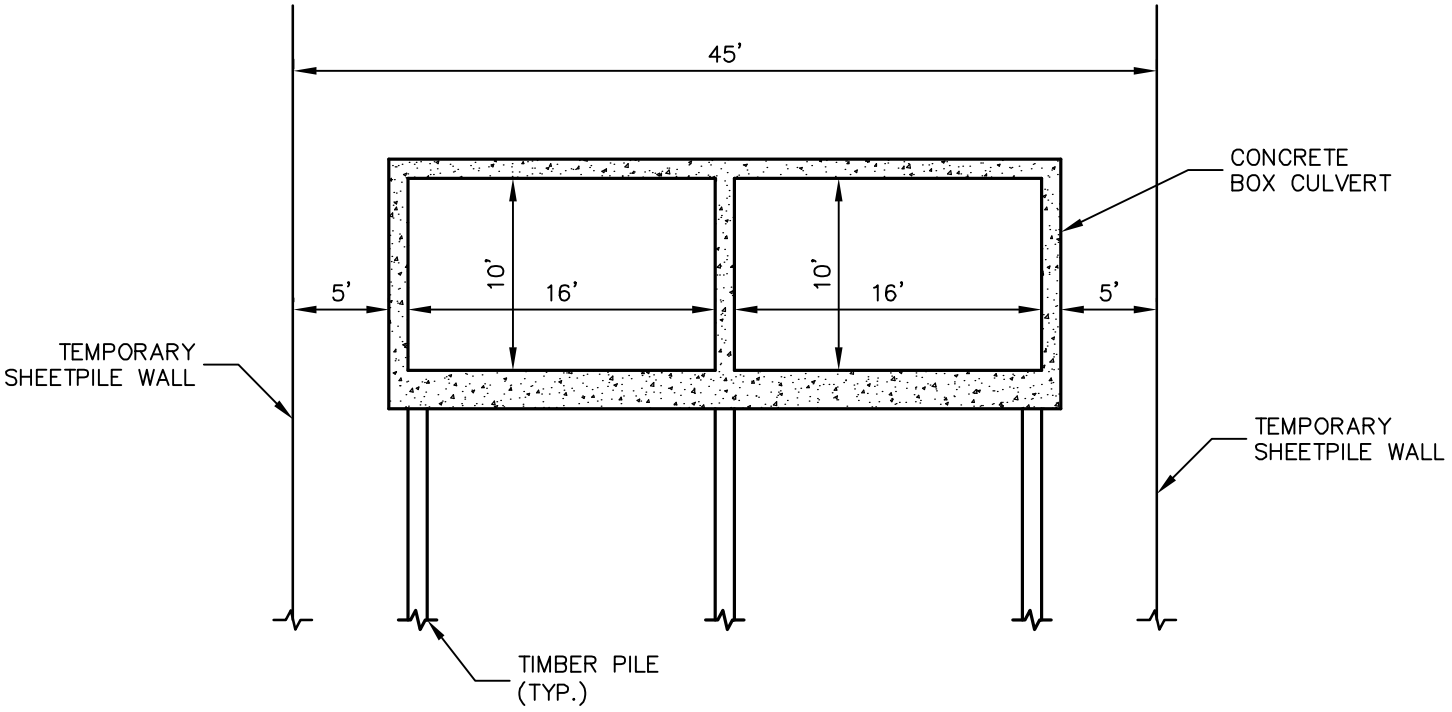
SCALE: 1" = 100'	PROJ–15	PLATE 15–2
DATE: 08/04/06		



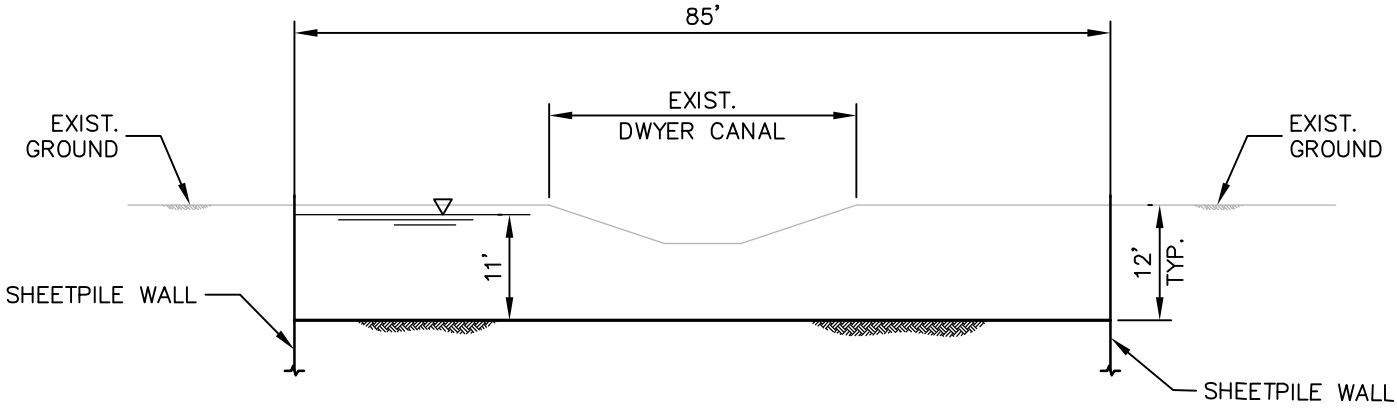
IDMO ALTERNATIVES ANALYSIS

PROPOSED PUMP STATION

SCALE: 1" = 100'	PROJ-15	PLATE 15-3
DATE: 08/04/06		



BOX CULVERT SECTION
N.T.S.



CONCRETE CHANNEL SECTION
N.T.S.

IDMO ALTERNATIVES ANALYSIS		
TYPICAL SECTION		
SCALE: 1" = N.T.S.	PROJ-15	PLATE 15-4
DATE: 08/04/06		

Industrial Canal and Cement Plant (Looking East)

End of Dwyer Canal at west side of the Flood wall (Looking East)

Dwyer Canal (Looking from the railroad on Peoples' Ave to east)

Project No. 16

Redirect Flow from Hoey's Basin to Mississippi River – Jefferson Parish

Objective

The objective of this project is to reduce pumping needs, by 2400cfs, at the 17th Street Canal at the Lake, by redirecting rainwater in the Hoey's Basin to the Hoey's Canal and pumping into the Mississippi.

The concept of this project, and portions of the technical information, are referenced from BCG study report "Rationale for the Hoey's Basin Flood Control Plan For the 2006 Hurricane Season".

Existing Conditions

The 2,500 acres of Hoey's Basin, including the neighborhoods of Oakridge, Metairie Gardens, and South Beverly Knoll, is bounded east and west by the 17th Street Canal and the Severn Avenue-Shrewsbury Road area, and to the north and south by Mississippi River and Metairie Road. And because the River levee and Metairie Road are the highest points in the basin, rain hits the ground and runs to the lowest point, which engineers identified as the Airline-Metairie Country Club golf course area, closely followed by the Pelham, Nassau and the south side of Northline.

Hoey's Canal connects to the 17th St. Canal at Hoey's Cut from up river to help drain the back of the Jefferson Parish communities along the River. Geisenheimer Canal collects water from the entire basin and moves it east from Labarre Road, then north into Hoey's Canal and ultimately into the 17th St. Canal.

The nominal capacity of DPS 6 on the 17th St. Canal is 9,480 CFS. Run off from substantial areas of uptown New Orleans, Metairie, and surrounding neighborhoods drains into the canals and basins on the River side of the pumping station, which pulls the water up into the portion of the 17th St. Canal flowing in to Lake Pontchartrain.

Gates and temporary pumps have been constructed at the lake edge of the 17th St. Canal to facilitate drainage during gate closures associated with the storm. While the floodgate includes some pumps, it is significantly less than the capacity of the canal before Katrina, raising concerns that while the floodgates could protect from Lake Storm surge, heavy

rains could flood portions of the city while the gates are closed because it could not be pumped out.

Proposed Work

The proposed work is to divert 2400 CFS water from Hoey's Canal near Jefferson Highway to the Mississippi River via a pump station, to provide flood reduction levels in the east end of the Geisenheimer Culvert at the Jefferson/Orleans Parish line where the Hoey's Canal joints with the Geisenheimer Culvert to carry rainwater into the 17th St. Canal in Orleans Parish.

A pump station will be located on the south bank of Hoey's Canal. An intake basin would collect water from the pump station that would consist of four pumps (2-1000 cfs and 2-300 cfs) with a total capacity of 2400 cfs. Three 10' diameter pipes, 7000' in length, carrying 800 cfs per pipe, will convey water discharged from the proposed pump station to the Mississippi River. The required total system head is 32 ft. The route of the pipeline would pass under the Kansas City Southern Railroad leads to the river front, be constructed overhead at the crossing of Jefferson Highway and then proceed, above ground, along the east edge of an asphalt parking lot on property leased to Bridgewater Properties. At the south end of this property the force main would be bored under the CN/ICG leads to the river front. The line would come out of the ground and be constructed above ground to Dakin Street where it would turn towards River Road. Dakin Street would be closed. The line would cross River Road on an aerial crossing, cross the Mississippi River levee and discharge into the river. An appropriate discharge basin would be constructed at the river bank and would be designed to achieve siphonic recovery to improve overall efficiency. Total length of this pipe line is approximately 5500 feet.

A box culvert will be added from the east end of Geisenheimer culvert to the north of Hoey's Canal through Airline Dr. From where the box ties into the Hoey's Canal, the canal will be widened toward the proposed pump station to carry 2400 cfs drain water.

Geotechnical Considerations

- Subsoil Conditions

  Based on borings made in the general area, the subsoil conditions at the site of the proposed pump station (north side) generally consist of soft clay or organic clay

to about the 25 ft. depth. The subsoils below this are more granular in character and generally consist of medium dense to dense sand to about the 50 ft. depth. The sands are underlain by medium stiff clay to about the 75 ft. depth where the Pleistocene age soils would be expected to occur. These Pleistocene age soils consist of preconsolidated stiff clay to at least the 100 ft. depth. On the Mississippi River side (south), the subsoils would be expected to consist primarily of soft to medium stiff clay to about the 70 to 80 ft. depth where dense to very dense sand would be expected. This sand should extend to at least the 100 ft. depth below ground surface.

- Conceptual Foundation System

  Based on the subsoil conditions described above, it is believed that the pump station and pipe bents should be supported on driven piles. For timber, or composite, piles, a capacity of about 20 tons (F. S. = 2.0) in compression should be available. This is based on 60 to 65 ft. long timber or composite piles (below existing grade) or piles driven to firm embedment into the medium dense to dense sands. For piles subjected to uplift and lateral loading, a composite timber pile should not be considered. Timber piles used for support of the pump station intake basin would have a capacity of several tons less for the same pile tip depth. Higher capacities on the order of 30 to 50 tons would be available if steel "H" or pipe piles or prestressed concrete piles are used for support. They should also be considered if a greater design life than typically provided by timber piles is desired.

- Water Diversion and Cofferdam Arrangement

  The intake basin for the pump station would have to be constructed within a cofferdam, internally braced at least at one location at the top of the cofferdam walls. For cost estimating purposes, a sheet pile penetration of about 50 ft. below ground surface would be expected. Based on the subsoil conditions, it is believed that some form of forced dewatering (deep wells, well points, etc.) would probably be required to dewater the shallow sands that would be expected between about the 25 and 50 ft. depths below ground surface.

- Additional Geotechnical Investigations

Soil borings for this Project should be made along the project alignment on about 300 ft. spacings, starting at the proposed Pump Station and ending at the Mississippi River. Geotechnical analyses with regard to compression, tension and lateral capacity of piles would be needed for support of the pump station, intake basin and pipe bents. Analyses would also be needed relative to the temporary retaining structure (structural and dewatering) for the intake pump station basin.

Structural Considerations

Due to the location and orientation of the pump station architectural considerations shall be coordinated with local agencies. As for the structural integrity of the pump station, all components of the structure shall be designed in accordance with the state and local building code requirements and be able to withstand winds in excess of 150 mph. The engine deck for the pump stations would be elevated one foot above the base flood elevation as shown on the FIRM map.

The intake basin shall be sized to accommodate the hydraulic requirements of this report. In addition, pipe support structures / bridges shall be built along the entire project to facilitate the two 10' diameter (above ground) pipes, which run from the proposed pump station at the Monticello Avenue Canal to the Mississippi River, See **Plate 11-1, Location Layout.**

The foundation of the pump station shall be supported on composite timber piles (due to the water table fluctuations) while the intake basin and pipe support structures / bridge foundations shall be supported on concrete piles. All foundations shall be designed in accordance with the recommendation of the Geotechnical Report.

Mechanical/Electrical Considerations

- Mechanical

  The pump station will require two (2) 1000 cfs horizontal pumps, diesel driven with the motors rated at 2000 HP. Sufficient fuel storage would need to be provided at the site to operate the pumps for up to 36 hours.

- Electric Service

  The local electric service is provided by Entergy. The anticipated electrical load at pump station is including:

- Two (2) 300 cfs vertical pump, motor rated at 700HP, medium voltage or approximate 1,040 KW
- Balance of facility loads including power, lighting and auxiliary systems at approximate 300 KW. The electrical system will be stepped down to 480V and 120/208V with transformers and local distribution panels.

The peak demand in the pumps station is approximate at 1.5 MW. Two service feeders shall be provided by Entergy for redundancy. In case of loss of one feeder the other feeder shall be capable of providing power for the entire pump station demand. Main Substation will consist of MV vacuum type breakers and metering devices to meet Entergy standards. Service availability will be coordinated with Entergy during the design development.

- Standby Power

Standby power source will be required in case of total black-out on utility grid occurs coincidence with the flood event. There are two options for providing standby power.

- Option A: Locally installed 1-1.5 MW diesel generator to meet the peak demand. The generator will be specified for continuous duty with sufficient fuel storage to operate the pumps up to 36 hours.
- Option B: Central Generation Plant. See description on Project 1.

Construction Considerations

Prior to construction of new drainage structures, the contractor shall implement a construction procedure that will not impose on the structural integrity of existing adjacent concrete structures and channels.

A construction sequencing plan would be required to minimize impacts to traffic during construction.

Prior to the construction of the pump station foundation, the Contractor shall implement a construction procedure that will not impose on the integrity of the existing canal and levee. Temporary sheet piling may be used as an alternative to provide stability of the existing levee at the pump station and intake basin.

Where the proposed two 10’ diameter pipes cross the New Orleans Public Belt Railroad, it may be imperative to brace the existing railroad embankment while the pipe support

bridge is being constructed. Coordination with the Railroad will be required to locate the pipe bridge structure outside of the railroad right-of-way and to facilitate its horizontal and vertical clearance requirements.

The construction of the pipes across Jefferson Highway and River Road shall be phased so that traffic can be maintained. Construction shall be coordinated with the railroad so that it does not impede rail service.

Environmental Considerations

This project, like all the others, would satisfy the requirements of NEPA through a supplement to EA #433.

Order of Magnitude Cost Estimate

Cost Estimate - Project 16

Environmental	$0
Right-of-Way Acquisition	$2,000,000
Design	$8,287,163
Construction	$95,302,371
Total	**$105,589,534**

Road Map/Time line

Design – This would be divided into two phases that would be initiated concurrently, M&E and Civil. The M&E would include a fast-track specification of pumps and other equipment with long lead time deliveries. M&E fast-track should take 2 months and the civil design should take 4 months.

Environmental Clearance – Concurrent with design

Permits – The permits required concern water quality, and are issued by LDNR, this should be coordinated among the agencies to take no more than one month after final design is completed and be concurrent with the construction bid process.

LERRD – Pipe ROW or easements will have to be coordinated with the Norfolk-Southern Railroad and any owners of land that the pipe crosses. This must be concurrent with Design and could be the critical path of the Civil design.

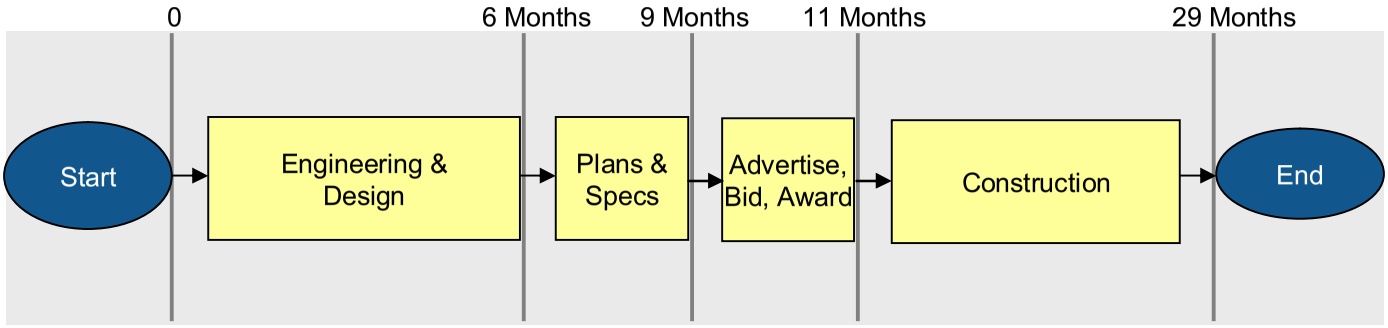
Construction – The pump station proposed would take approximately 18 months to complete.

Conclusion

This project is recommended for further study for the following reasons:

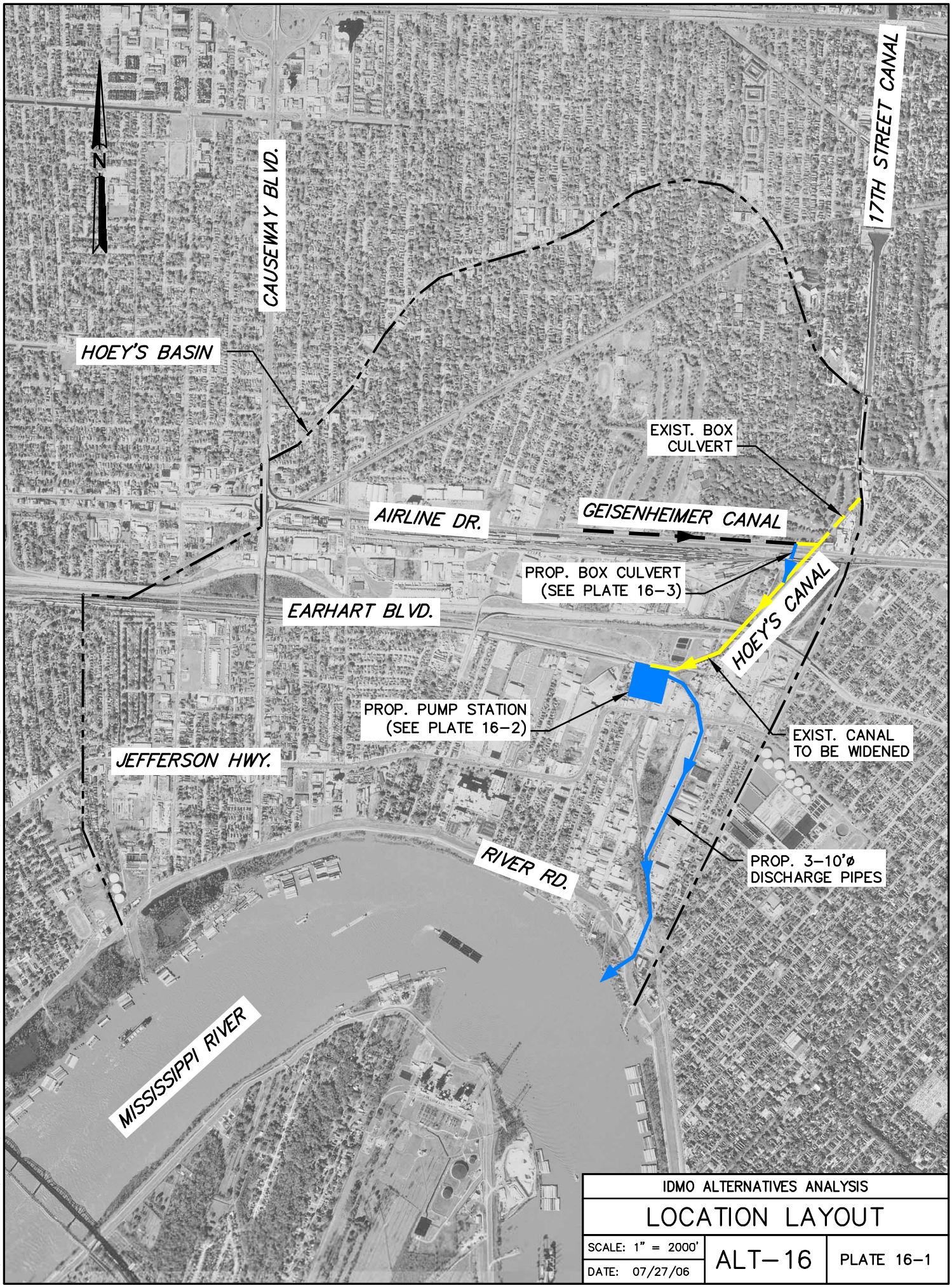
1. It removes 2400 cfs from the 17th Street Canal.
2. It offers another outfall by pumping the water to the Mississippi River.
3. This project implemented in conjunction with Project No. 11 would allow both Orleans and Jefferson Parishes to operate separate drainage systems.

Project 16



Environmental Compliance – Potential environmental issues, as discussed in the "Environmental Consideration" section, can be addressed during the engineering and design phase in order to keep off the critical path.

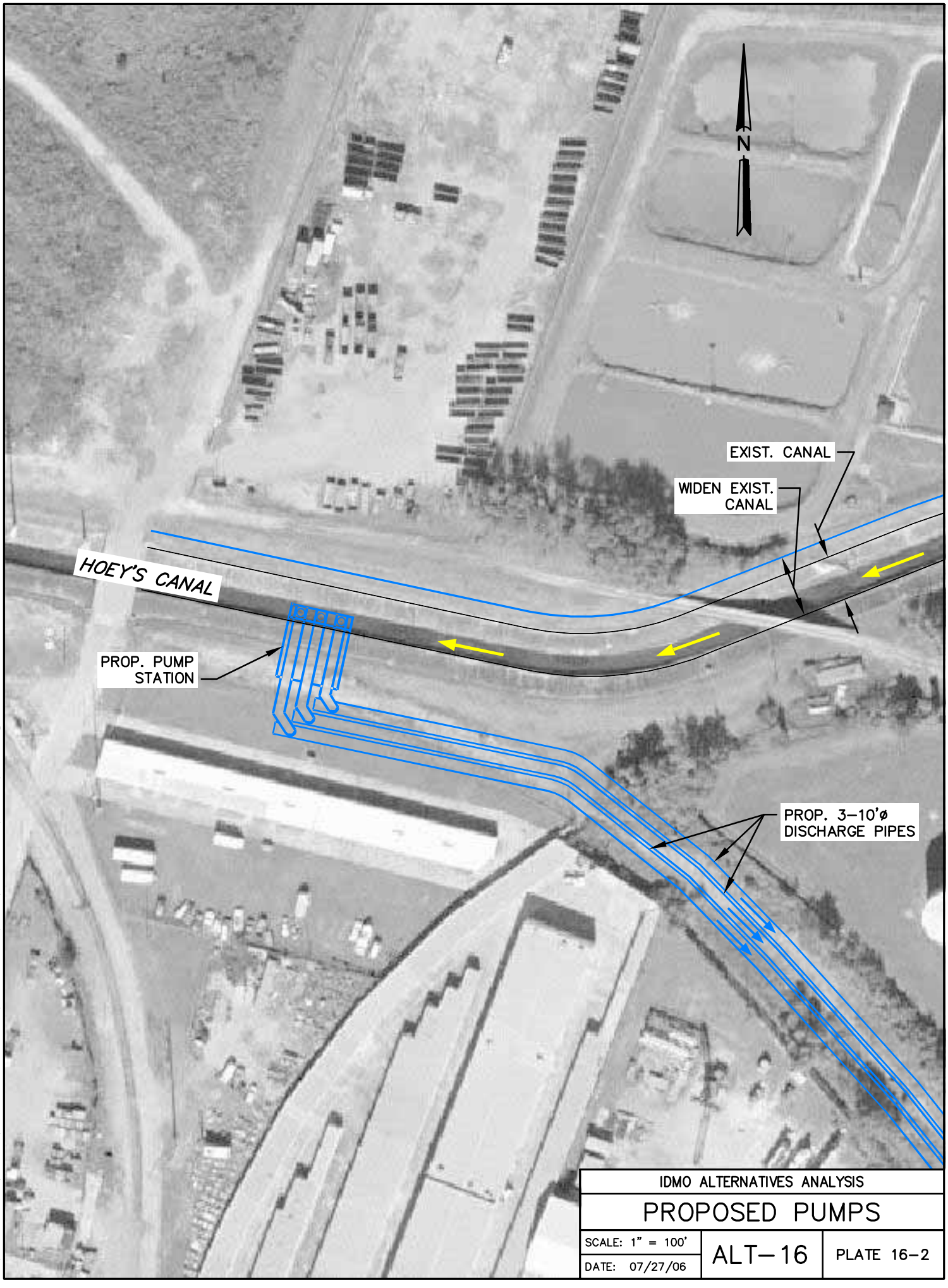
LERRD's – Any potential LERRD's , as discussed in the "Proposed Work" section, can be addressed during the engineering and design phase in order to provide for construction without causing delay.



IDMO ALTERNATIVES ANALYSIS

LOCATION LAYOUT

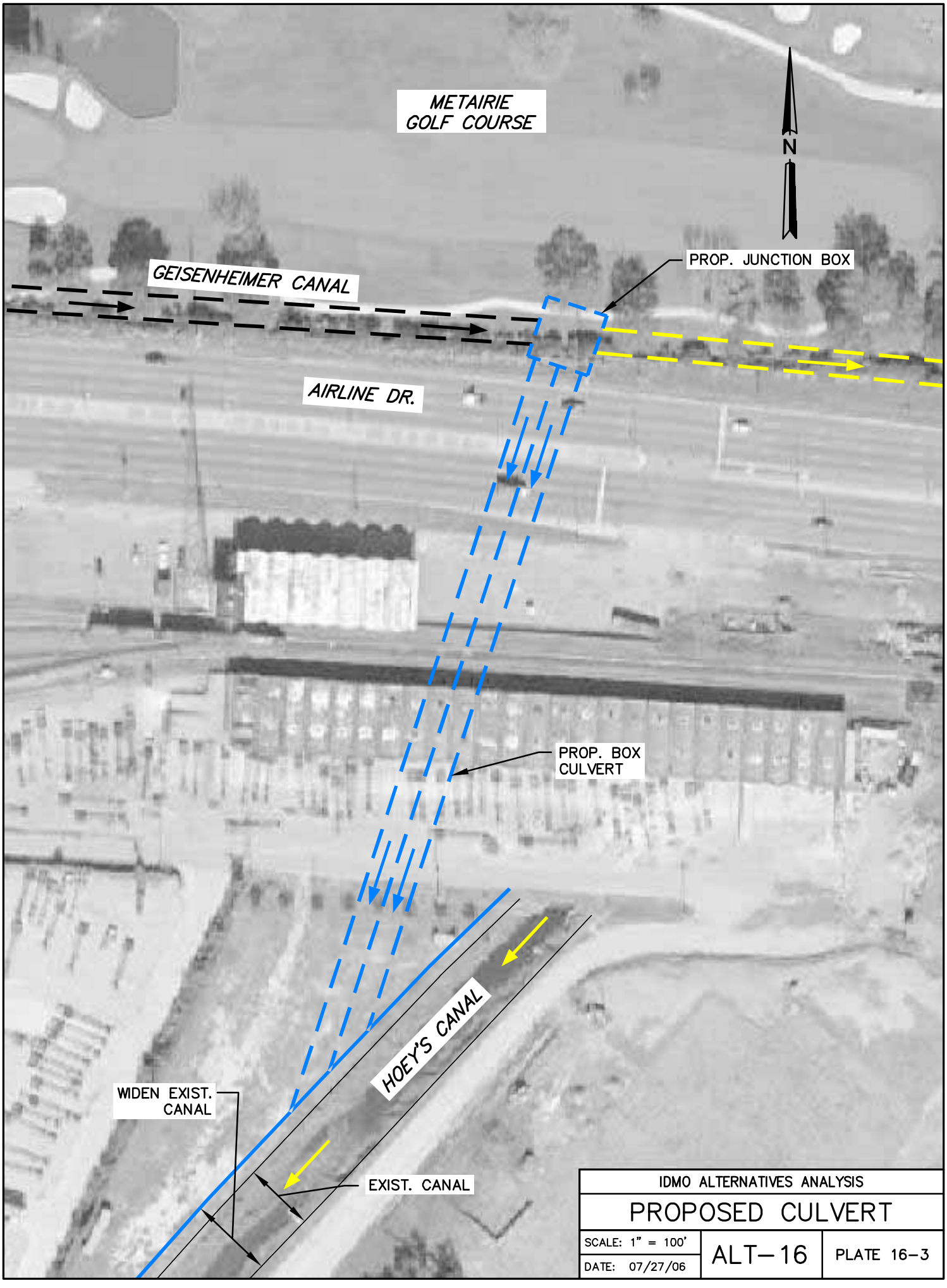
SCALE: 1" = 2000'	ALT-16	PLATE 16-1
DATE: 07/27/06		



IDMO ALTERNATIVES ANALYSIS

PROPOSED PUMPS

SCALE: 1" = 100'	ALT–16	PLATE 16–2
DATE: 07/27/06		



IDMO ALTERNATIVES ANALYSIS

PROPOSED CULVERT

SCALE: 1" = 100'	ALT–16	PLATE 16–3
DATE: 07/27/06		

Building on the south bank of Hoey's Canal (Looking Southeast)

Hoey's Canal and Iris Ave. (Looking Northwest)

Proposed pump station location at Hoey's Canal and railroad track (Looking Southeast)

Railroad track and Jefferson Highway (Looking Northeast)

Railroad track and Jefferson Highway (Looking Southwest)

Railroad track looking southwest toward Dakin Street (Southeast)

Railroad track and Dakin St. (Looking Northwest)

Railroad track and Dakin St. (Looking Southeast)

Dakin St. (Looking Northwest)

Houses Located between the Levee and the River (Looking southeast)

Project No. 17

Redirect flow from DPS 3 to Bayou St. John and pump to the lake

Objective

The objective of this project is to divert 600 cfs of the flow discharged from DPS 3 into Bayou St. John in order to reduce pumping requirements at London Avenue and Orleans Avenue Canal at Lake Pontchartrain. This would result in the converting the bayou to an additional outfall within the drainage system.

Existing Conditions

DPS 3 is located in the intersection of N. Broad St. and Florida Ave. It contains 5 horizontal pumps with a combined capacity of 4,260 cfs that are driven by five 25 Hz electric motors. The principal tributary area of DPS 3 contains of 3,080 acres. It extends from Mirabeau Ave. to the Mississippi River between Bayou St. John, N. Carrollton Ave. and Orleans Ave. on the west and Paris Ave., N. Miro St., and Elysian Fields Ave. on the east. Three of the pumps empty into the London Avenue Canal, which discharges into Lake Pontchartrain. The other two are capable of discharging into the London Avenue Canal or of pumping 1,100 cfs into the Florida Ave. Canal draining east to DPS 19, which discharges into the Industrial Canal.

Bayou St. John is a natural waterway that has been manipulated with concrete paved slopes along the channel. It starts near the intersection of Jefferson Davis Parkway and Lafitte St and continues toward Lake Pontchartrain along the eastern edge of City Park. A water inlet in the channel is controlled at the outlet by two sluice gates located just north of the crossing at Robert E. Lee Blvd. A 24" diameter pipe at the start of the bayou also allows overflow into the municipal drainage system. Other small outfall pipes to the drainage system also serve to control the water elevation in the bayou. Bayou St. John has no drainage function at the present time, and is only for aesthetic purposes.

The only major constriction of flow in the Bayou St. John is the 10'x 28' channel at Robert E. Lee Blvd. just downstream of the sluice gates. A large storm surge protection sector gate has been placed near Lake Pontchartrain to prevent intrusion from the lake. The flood protection extends from the lake to the flood gates north of the sluice gates.

Proposed Work

An estimated maximum flow of 600 cfs from DPS 3 would be diverted through two steel conduits to Bayou St. John. See **Plate 17-1**, Location Layout. Two 300 cfs pumps would be placed on the west side of the discharge basin at DPS 3 to pump water into two 72" diameter steel conduits. These conduits would be located between Florida Ave. and the railroad tracks. The conduits would be supported by concrete pile bents with pipe saddles. Bridge structures would be considered at Gentilly Blvd., St. Bernard Ave., and Paris Ave to cross roadways. See **Plate 17-2**, Proposed Pump Station at DPS 3, **Plate 17-3**, Outfall at Bayou St. John and **Plate 17-5**, Support Detail. The two sluice gates just downstream of Robert E. Lee Blvd. would be removed to allow the extra capacity in the system.

At the existing gate on Bayou St. John, a pump station with two 300 cfs pumps, will be constructed. An intake and outfall basin will be excavated on the east side of Bayou St. John. A total of 600 cfs will be directed from the south side of the gate to the proposed pump station. It will outfall directly to the north side of the gate and into Lake Pontchartrain. See **Plate 17-4**, Pump Station at Existing Gate.

Construction Considerations

The corridor between Florida Ave and the Norfolk Southern has several utilities. Further survey of the area will be required to determine if any utility relocations are necessary. Traffic maintenance will be necessary during construct at St. Bernard Ave., Gentilly Blvd., and Paris Ave.

The Contractor will have to provide protection for the levee during the relocation at the pump station.

Environmental Considerations

This project, like all the others, would satisfy the requirements of NEPA through a supplement to EA #433. This would include, but not necessarily be limited to, the following:

- Compliance with applicable Federal and state water protection requirements,
- Preparation of a Phase I Site Assessment in any areas for which one has not been completed,
- Continuing coordination with USFWS and LDWF, and

- Consultation with the SHPO regarding potential effects on the New Orleans drainage system.

A Scenic River permit must be obtained from LDWF because Bayou St. John is listed as a Scenic River.

It appears that that the area along the proposed ROW of the pipe between DPS 3 and the bayou may be an environmental justice area. A determination must be made and actions taken accordingly.

Order of Magnitude Cost Estimate

Cost Estimate - Project 17	
Environmental	$30,000
Right-of-Way Acquisition	$0
Design	$2,229,143
Construction	$25,635,146
Total	**$27,894,290**

Roadmap / Timeline

Design – This would be divided into two phases that would be initiated concurrently, M&E and Civil. The M&E would include a fast-track specification of pumps and other equipment with long lead time deliveries. M&E fast-track should take 2 months and other design should take 4 months. The design for the box culvert along Orleans Avenue is part of the SELA program. The plans are complete, but may need to be updated before advertisement.

Environmental Clearance – Concurrent with design. Compliance with the Scenic River Permit may be a critical path item.

Permits – The permits required concern water quality, and are issued by LDNR, this should be coordinated among the agencies to take no more than one month after final design is completed and be concurrent with the construction bid process.

LERRD – Land required for the pipe ROW is within existing public ROW, but coordination with the Norfolk-Southern Railroad will be required for structures built adjacent to the railroad.

Construction – The pump station proposed at the lake would take approximately 18 months to complete. Lead time for the pumps would be approximately 18 months.

Further Considerations

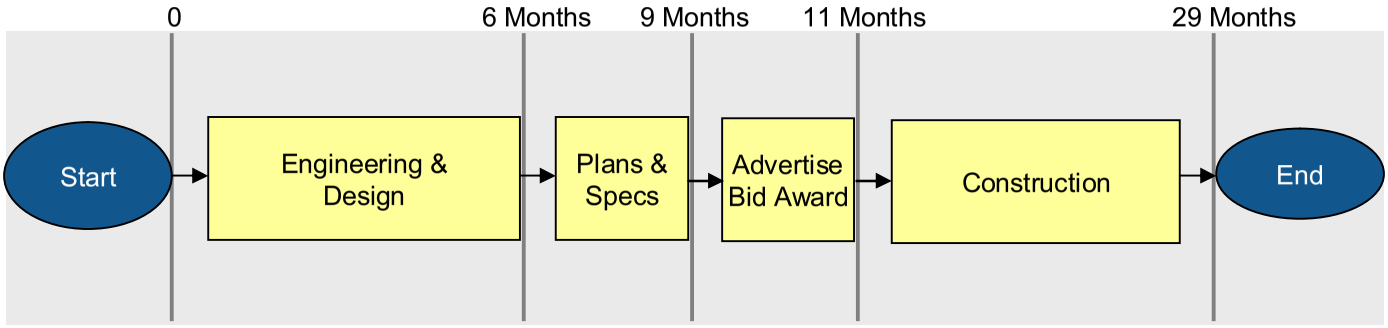
- Bayou St. John can be converted to a new outfall within the drainage system at a cost considerably lower than any other possible alternative.
- Early coordination with the LDWF concerning the Scenic River permit and with the SHPO regarding the Section 106 process is advised because the design elements concerned here overlap, and because these activities are frequently time-consuming.
- The visual concerns relative to both Section 106 and the Scenic River permit could be avoided or mitigated through context sensitive architectural design.
- The delivery time for the pumps and other equipment are probably the critical path of construction.
- There are conveyance limitations between DPS 1 and DPS 2 that may reduce the potential contribution of this alternative to system capacity improvements.
- If an Environmental Justice area is identified, a public involvement process must be undertaken, as appropriate.
- If an Environmental Justice area is identified, a public involvement process must be undertaken, as appropriate.

Conclusion

This project is not recommended for further study. This project has been eliminated for the following reasons:

1. The cost to build the pipe between DPS 3 and Bayou St. John is expensive to convey only 600 cfs of water.
2. There are environmental concerns to convert Bayou St. John into a drainage canal.

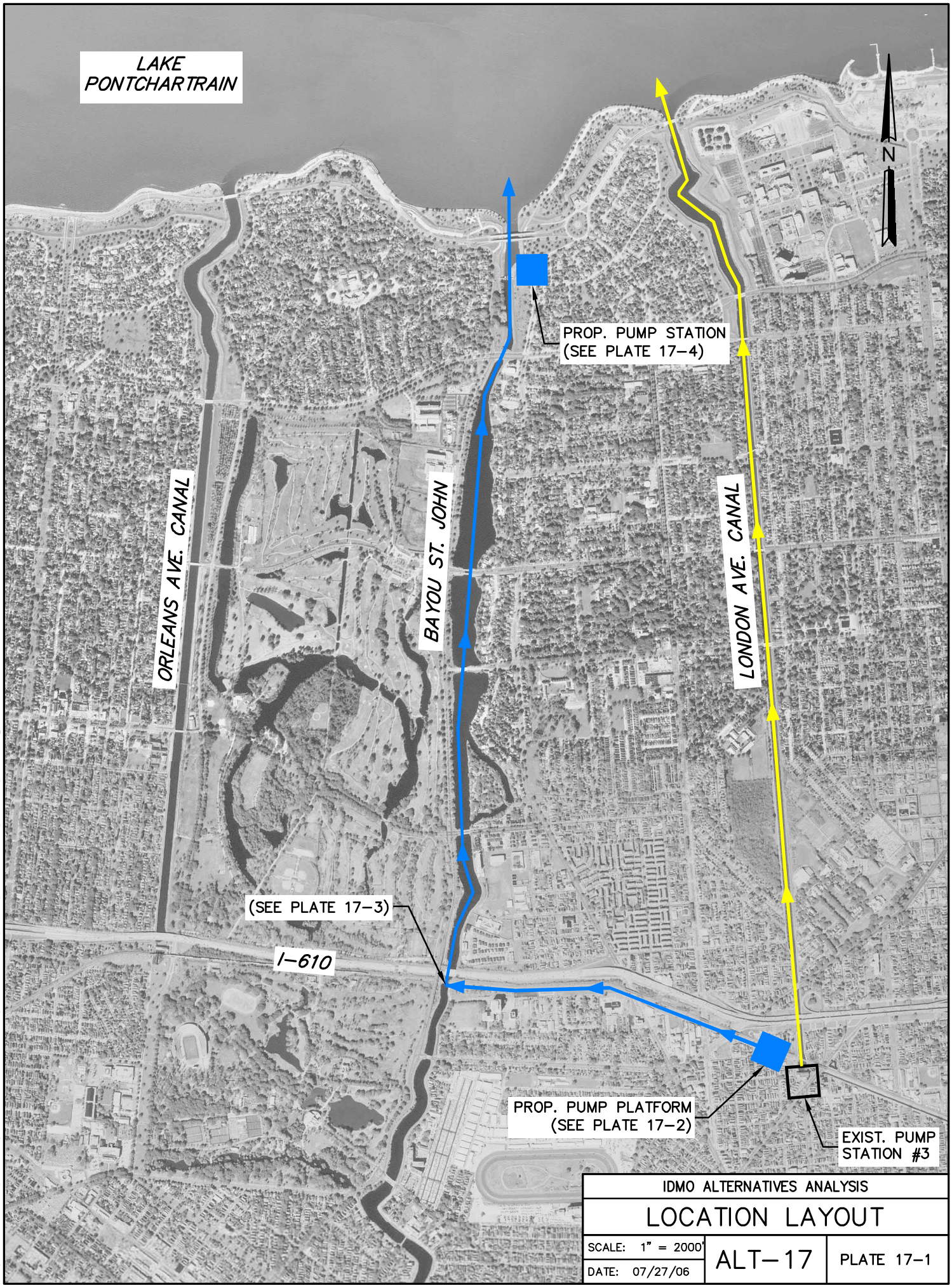
Project 17



Environmental Compliance – Potential environmental issues, as discussed in the "Environmental Consideration" section, can be addressed during the engineering and design phase in order to keep off the critical path.

LERRD's – Any potential LERRD's , as discussed in the "Proposed Work" section, can be addressed during the engineering and design phase in order to provide for construction without causing delay.

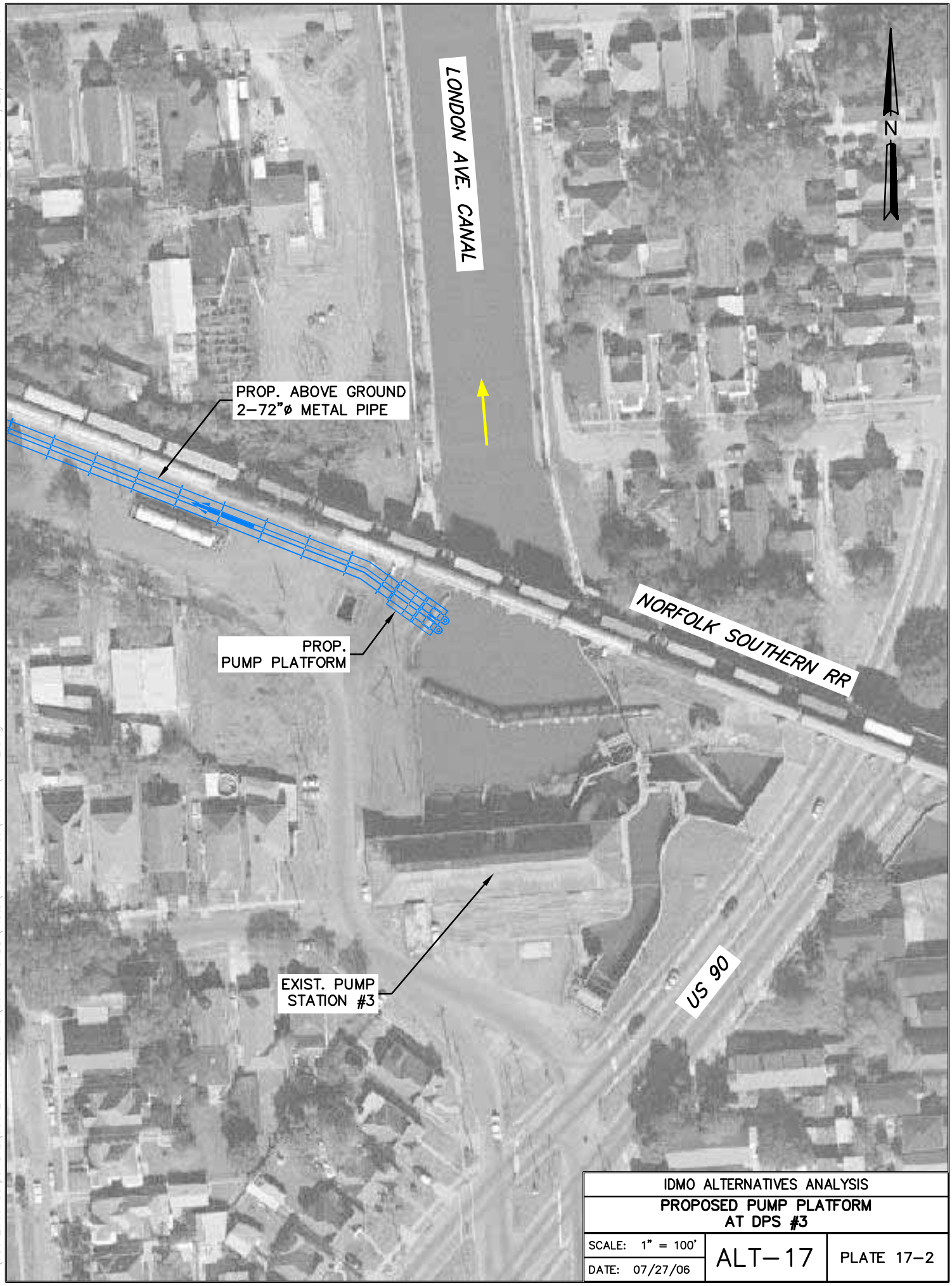
Pump Procurement – Specifics on pumps can be identified early in the engineering and design phase in order to be delivered on-site, when needed, without causing delay. This should be done concurrent with overall schedule. This is not a critical path item in this flow chart. (estimated 12 month lead time required)



IDMO ALTERNATIVES ANALYSIS

LOCATION LAYOUT

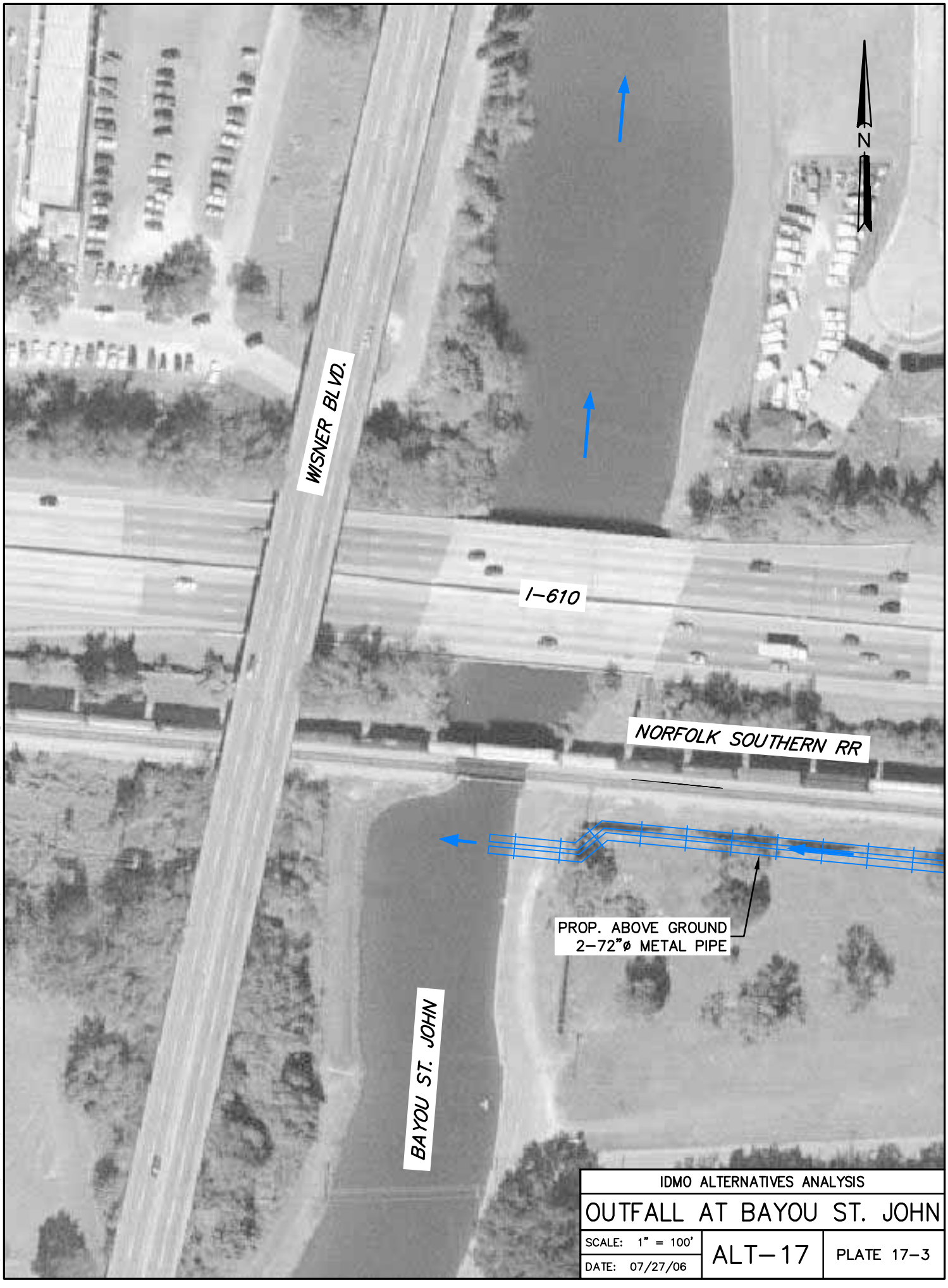
SCALE: 1" = 2000'	ALT-17	PLATE 17-1
DATE: 07/27/06		



IDMO ALTERNATIVES ANALYSIS

PROPOSED PUMP PLATFORM
AT DPS #3

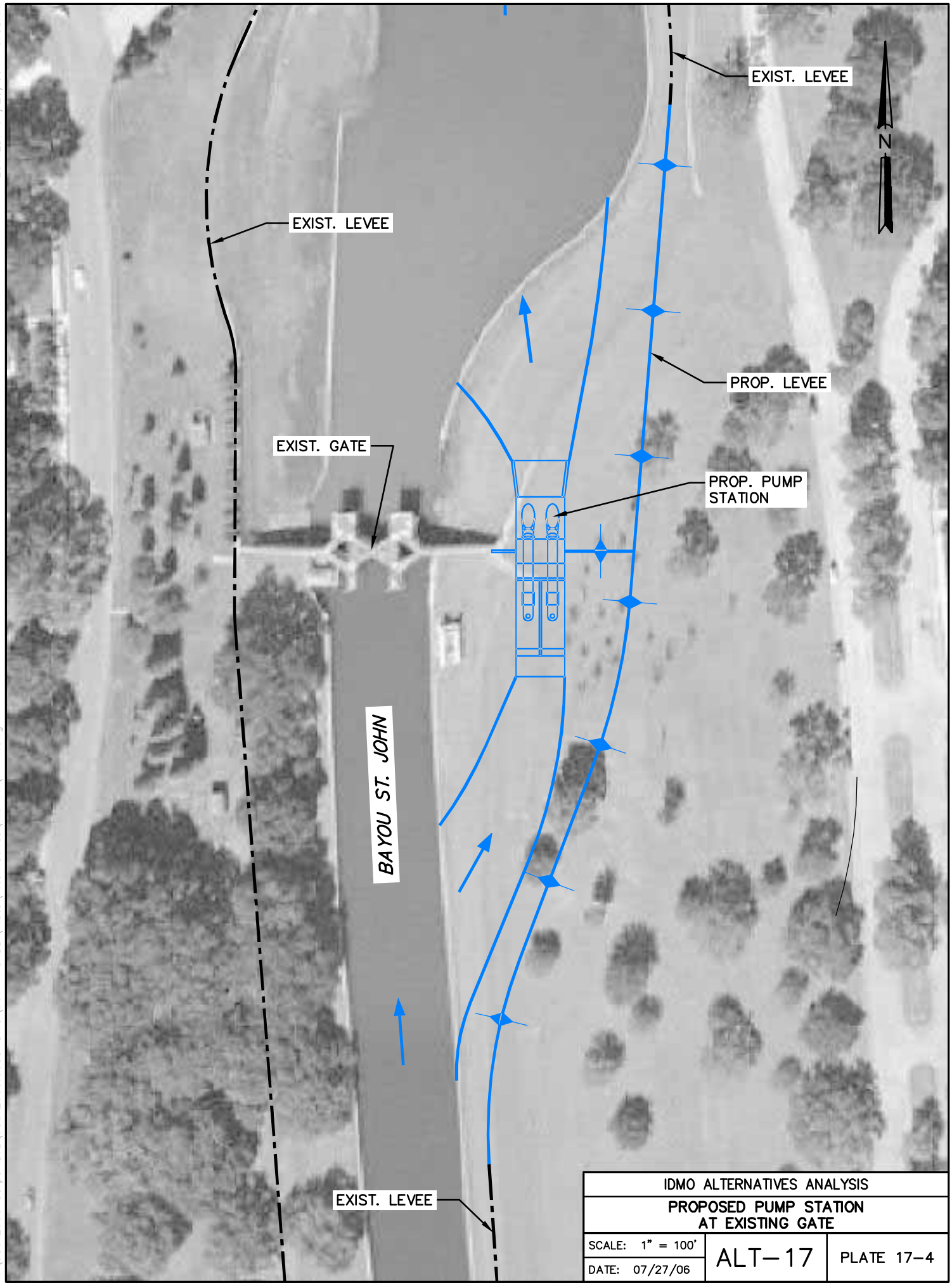
SCALE: 1" = 100'	ALT–17	PLATE 17–2
DATE: 07/27/06		



IDMO ALTERNATIVES ANALYSIS

OUTFALL AT BAYOU ST. JOHN

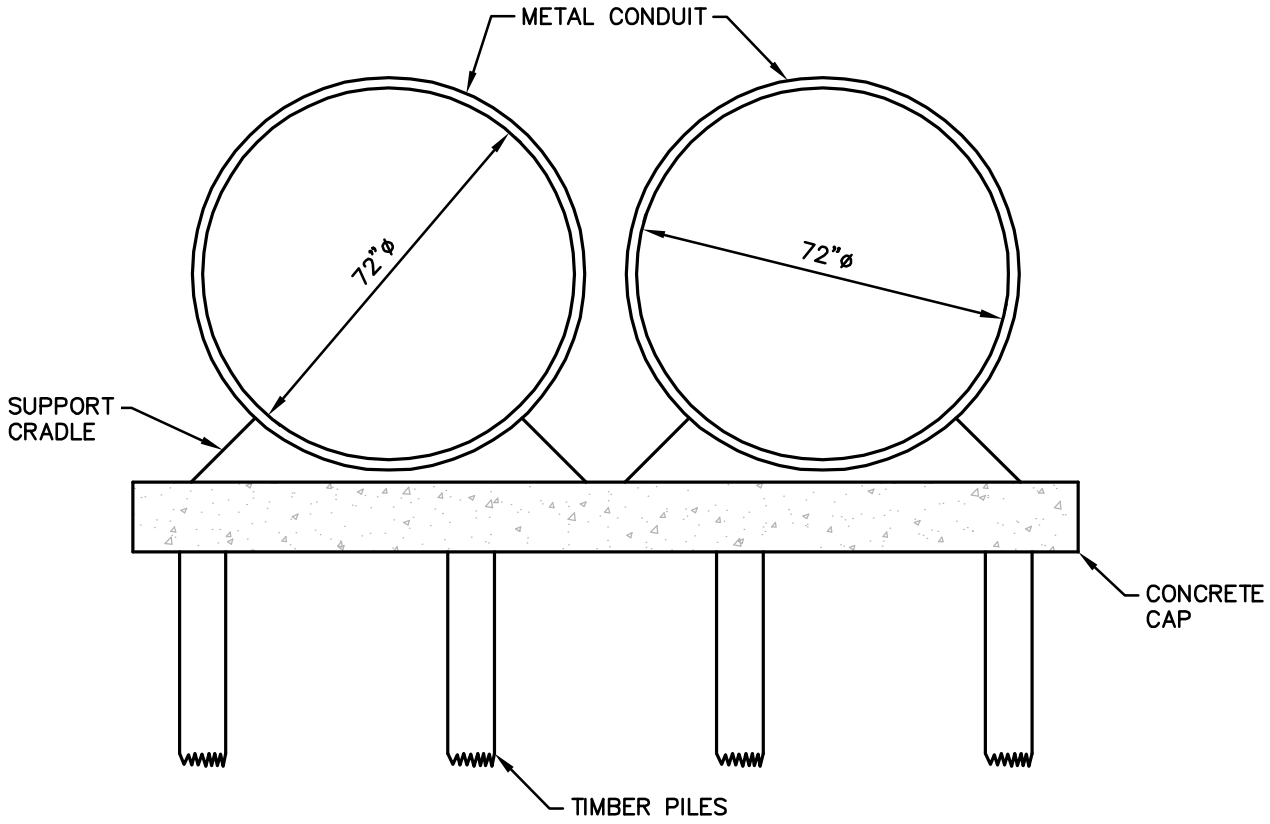
SCALE: 1" = 100'	ALT-17	PLATE 17-3
DATE: 07/27/06		



IDMO ALTERNATIVES ANALYSIS

PROPOSED PUMP STATION AT EXISTING GATE

SCALE: 1" = 100'	ALT–17	PLATE 17–4
DATE: 07/27/06		



TYPICAL SUPPORT FOR METAL CONDUIT

IDMO ALTERNATIVES ANALYSIS		
SUPPORT DETAIL		
SCALE: 1" = 1'-0"	ALT-17	PLATE 17-5
DATE: 07/27/06		

Pump Station No. 3 (Looking at the Southeast corner)

Bayou St. John at proposed outfall location (Looking North)

Railroad Crossing at Gentilly Ave. (Looking North)

Railroad Crossing at Paris Ave (Looking North)

Railroad Crossing at St. Bernard Ave (Looking North)

Project No. 18

Redirect flow from DPS 3 to Bayou St. John and store in City Park

Objective

The objective of this project is to relieve the capacity demands on the drainage system by using a portion of City Park north of I-610 as a detention pond for the water discharged from DPS 3 and diverted to Bayou St. John. See **Plate 18-1**, Location Layout.

Existing Conditions

DPS 3 is located in the intersection of N. Broad St. and Florida Ave. It contains 5 horizontal pumps with a combined capacity of 4,260 cfs that are driven by five 25 Hz electric motors. The principal tributary area of DPS 3 contains 3,080 acres. It extends from Mirabeau Ave. to the Mississippi River between Bayou St. John, N. Carrollton Ave. and Orleans Ave. on the west and Paris Ave., N. Miro St., and Elysian Fields Ave. on the east. Three of the pumps empty into the London Avenue Canal, which discharges into Lake Pontchartrain. The other two are capable discharging into the London Avenue Canal or of pumping 1,100 cfs into the Florida Ave. Canal draining east to DPS 19, which discharges into the Industrial Canal.

Bayou St. John is a natural waterway that has been manipulated with concrete paved slopes along the channel. It starts near the intersection of Jefferson Davis Parkway and Lafitte St and continues toward Lake Pontchartrain along the eastern edge of City Park. The water surface elevation in the channel is controlled by two sluice gates located just north of the crossing at Robert E. Lee Blvd. A 24" diameter pipe at the start of the bayou also allows overflow into the municipal drainage system. Other small outfall pipes to the drainage system also serve to control the water elevation in the bayou.

City Park is a large municipal park bounded on the west by Orleans Ave. south of I-610 and the Orleans Avenue Canal north of I-610. Its other boundaries are City Park Ave to the south, Robert E. Lee Blvd to the north, and Wisner Dr. along Bayou St. John to the east. City Park is home to numerous cultural and recreational facilities. Those north of I-610 include City Park Riding Stables - Equestrian, the NOPD Horse Stables, the G. Gernon Brown Center (a gymnasium), Popp's Fountain, Marconi Meadows, Baseball Fields, Pan American Soccer Stadium, a Golf Driving Range, a Golf Club, and two of its

three Golf courses. Also located within the park north of I-610 are a public high school and a USDA research facility.

Proposed Work

An estimated maximum flow of 600 cfs from DPS 3 would be diverted through two steel conduits to Bayou St. John and then pumped into a detention area in City Park. Two 300 cfs pumps would be placed on the west side of the discharge basin at DPS 3 to pump water into two 72" diameter steel conduits. These conduits would be located between Florida Ave. and the railroad tracks. The conduits will be supported by pile bents with pipe saddles. Bridge structures would be considered at Gentilly Blvd., St. Bernard Ave., and Paris Ave to cross these roadways. See **Plate 18-2**, Proposed Pump Station at DPS 3, Plate **18-3**, Outfall at Bayou St. John, and Plate **18-5**, Support Detail.

Once the water enters Bayou St. John, it would flow northward to a proposed second pump station that will pump 600 cfs into the detention area through conduits placed under Wisner Blvd. This pump station would be located behind Bayou Oaks Golf Course Clubhouse. See Plate **18-4**, Pump Station into City Park Detention.

To create the detention area, a berm would be build around a portion of City Park north of I-610. Because of a gradual slope down to the northern portion of the Park, the berm would require a maximum elevation of 5' to hold approximately 4' of water in the lowest portion, with 1' of freeboard. The storage area created in City Park is estimated to be 1,320 acre-ft.

The berm would begin at the Orleans Avenue Canal levee on the north side of I-610 near DPS 7. It would then parallel Zachary Taylor Dr. and I-610 to Wisner Blvd., but would exclude Popp's Fountain and Pan American Stadium. Much of Wisner Blvd. could be used as a berm; however a berm would be required in isolated low areas along that roadway. The berm would turn westward approximately 1,000' south of Filmore Ave. and turn north around the club house, the driving range, John F. Kennedy High School, and the USDA research center to Robert E Lee Blvd. It again turns west parallel to Robert E. Lee Blvd. until reaching the Orleans Avenue Canal levee. All buildings and monuments within the detention area, including the stables, would be surrounded with berms to prevent flooding.

The water would be detained until the storm period has past. The calculated estimated time to fill the detention area of City Park is about 27 hours. This calculation is based on the flow into City Park is at 600 cfs during the entire duration, therefore this is the fastest time to fill to capacity. It would then exit through the existing drainage system located near Zachary Taylor and Golf Drive, which leads to DPS 7, the Orleans Avenue Canal, and Lake Pontchartrain. The existing drainage structure would be reconstructed to detain water during the storm event and to release it afterward, as conditions allow, into the municipal drainage system. See **Plate 18-6**, Proposed Closure Gate.

Construction Considerations

- The corridor between Florida Ave and the Norfolk Southern contains several utilities. Further survey of the area would be required to determine if any utility relocations are necessary.
- Traffic maintenance would be necessary during construction of conduit crossings at St. Bernard Ave., Gentilly Blvd., and Paris Ave.
- Within City Park, the alignment of the berm should be designed to protect the oak trees near it from damage. Where the berm crosses Marconi Dr., Filmore Ave., and Harrison Ave, these roadways would be raised over the berm rather than constructing flood gates

Environmental Considerations

This project, like all the others, would satisfy the requirements of NEPA through a supplement to EA #433.

For this project, additional consultation with the SHPO is required because there are various sites within City Park that may be eligible for the National Register of Historic Places.

A Scenic River permit must be obtained from LDWF because Bayou St. John is listed as a Scenic River.

It appears that that the area along the proposed ROW of the pipe between DPS 3 and the bayou may be an environmental justice area. A determination must be made and actions taken accordingly.

Order of Magnitude Cost Estimate

Cost Estimate - Project 18	
Environmental	$30,000
Right-of-Way Acquisition	$0
Design	$2,200,085
Construction	$25,300,978
Total	**$27,531,063**

Roadmap / Timeline

Design – This would be divided into two phases that would be initiated concurrently, M&E and Civil. The M&E would include a fast-track specification of pumps and other equipment with long lead time deliveries. M&E fast-track should take 2 months and other design should take 4 months.

Environmental Clearance – Potential environmental issues could impact the critical path of the project. See Environmental Considerations.

Permits – The permits required concern water quality, and are issued by LDNR, this should be coordinated among the agencies to take no more than one month after final design is completed and be concurrent with the construction bid process.

LERRD – Land required for the detention area is owned by the State of Louisiana and operated by a private non-profit organization. The use of the land would have to go through an extensive public information process as described earlier in this report. Land required for the pipe ROW is within existing public ROW, but coordination with the Norfolk-Southern Railroad will be required for structures built adjacent to the railroad. These issues must be addressed concurrent with Design and could be the critical path items for the project.

Construction – The proposed berm, pipe, and pump stations would take approximately 12 months to complete under 2 concurrent contracts.

Further Considerations

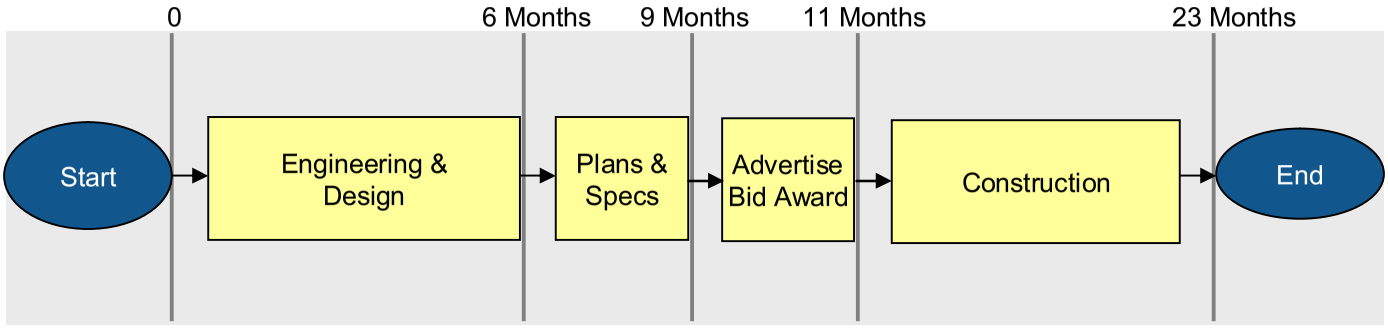
- The visual concerns relative to the Scenic River permit could be avoided or mitigated through context sensitive architectural design.

Conclusion

This project is not recommended for further study for the following reasons:

1. The cost to build the pipe between DPS 3 and Bayou St. John is expensive to convey only 600 cfs of water.
2. There are environmental concerns to convert Bayou St. John into a drainage canal.
3. The storage capacity of the detention pond is not adequate to receive the maximum flow for the duration of the 36-hour storm event.
4. Mitigation of the park would be necessary after each use.
5. Maintenance resources required to place sandbags at the road crossings and around buildings within the pond area could be used more effectively elsewhere.

Project 18



Environmental Compliance – Potential environmental issues, as discussed in the "Environmental Consideration" section, can be addressed during the engineering and design phase in order to keep off the critical path.

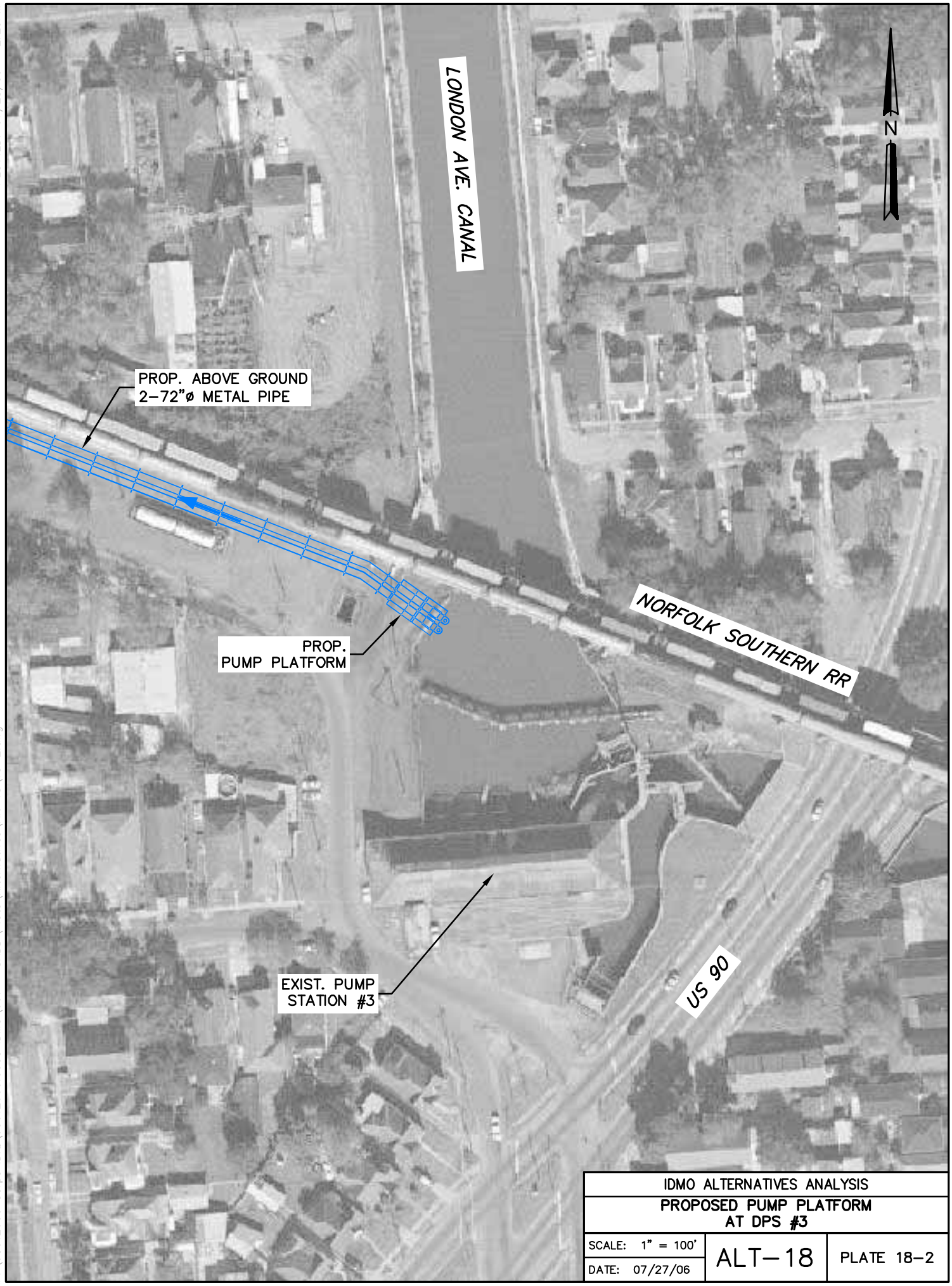
LERRD's – Any potential LERRD's , as discussed in the "Proposed Work" section, can be addressed during the engineering and design phase in order to provide for construction without causing delay.

Pump Procurement – Specifics on pumps can be identified early in the engineering and design phase in order to be delivered on-site, when needed, without causing delay. This should be done concurrent with overall schedule. This is not a critical path item in this flow chart. (estimated 12 month lead time required)

IDMO ALTERNATIVES ANALYSIS

LOCATION LAYOUT

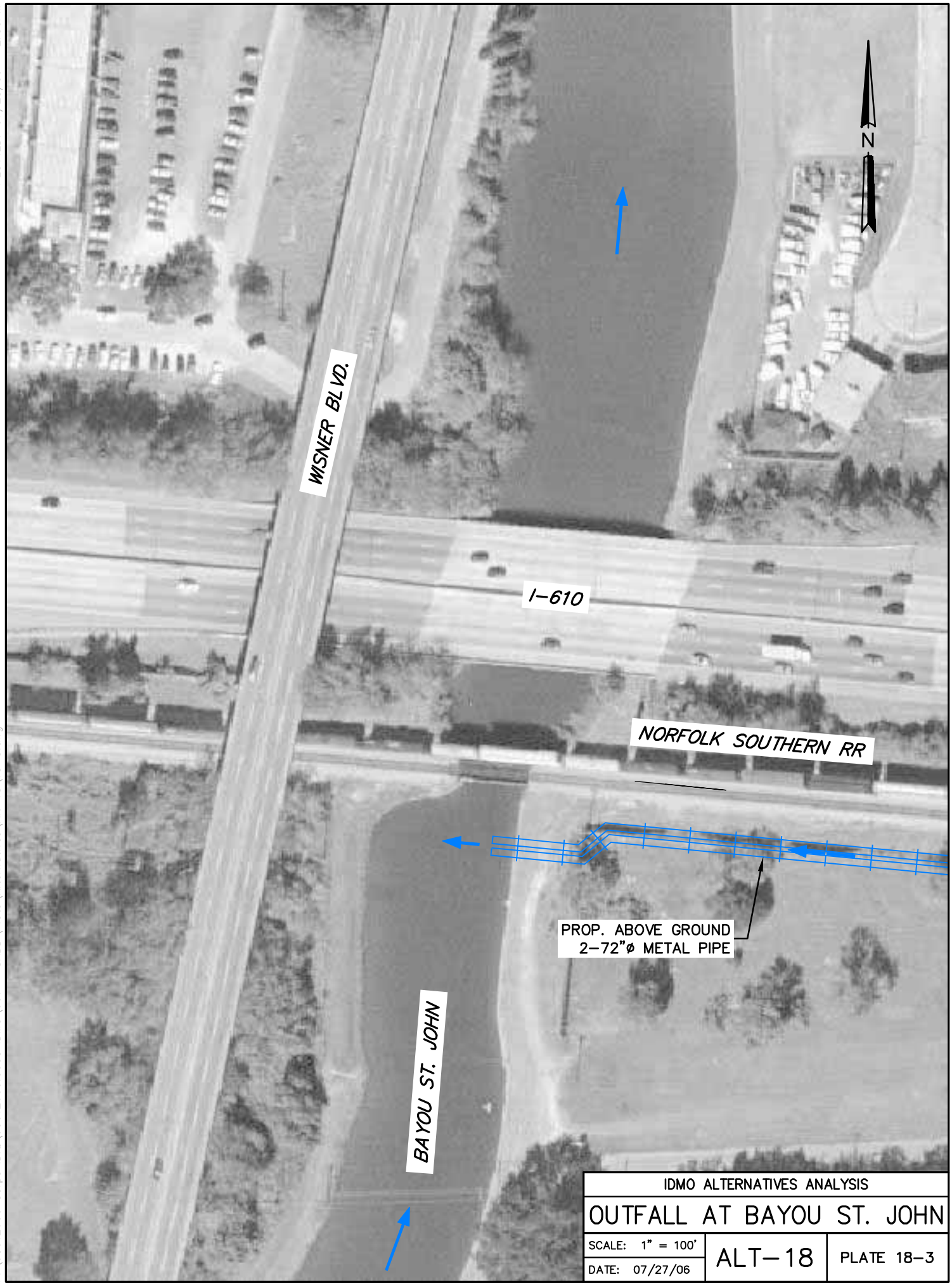
SCALE: 1" = 2000'	ALT-18	PLATE 18-1
DATE: 07/27/06		



IDMO ALTERNATIVES ANALYSIS

PROPOSED PUMP PLATFORM
AT DPS #3

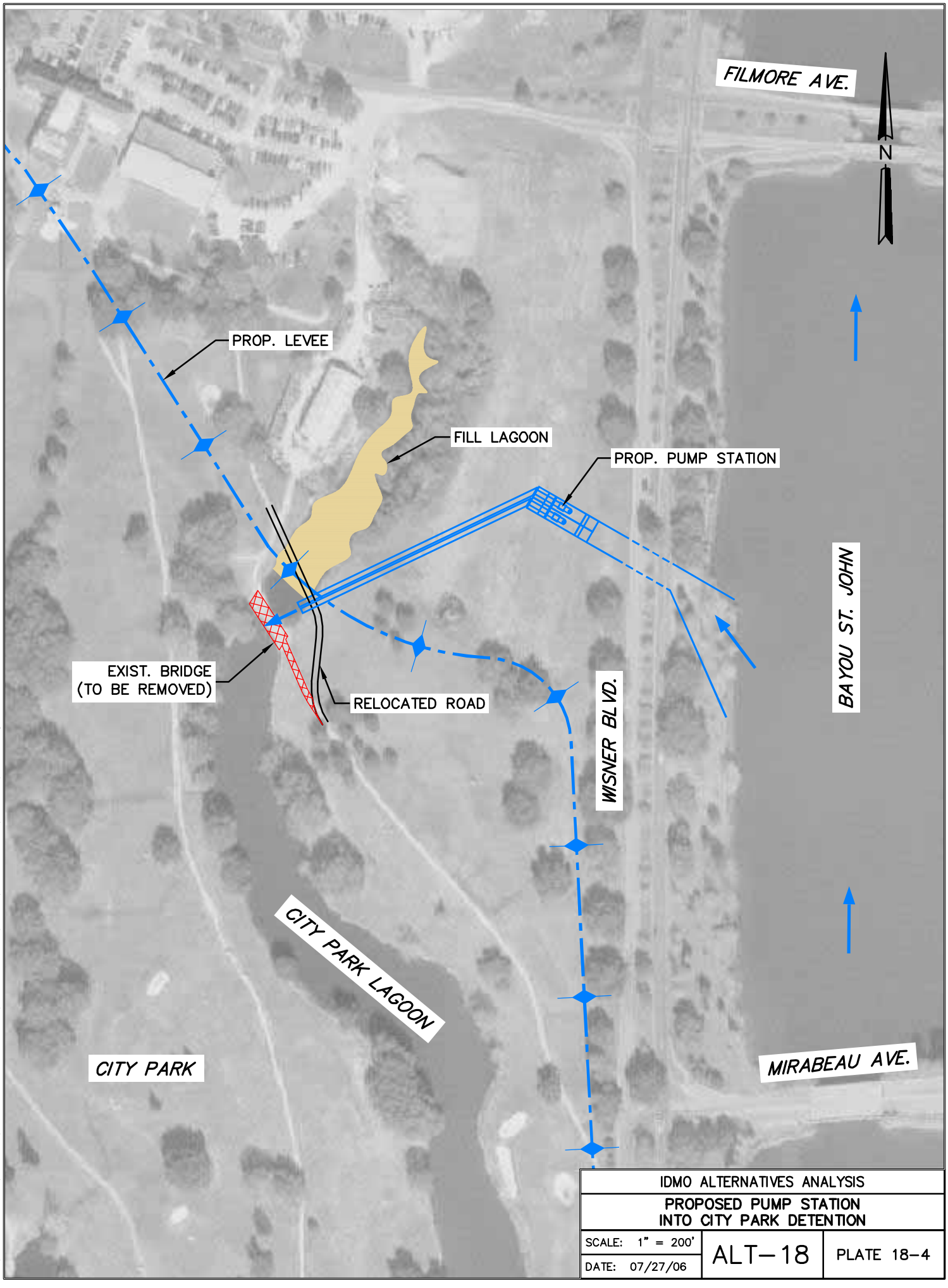
SCALE: 1" = 100'	ALT-18	PLATE 18-2
DATE: 07/27/06		



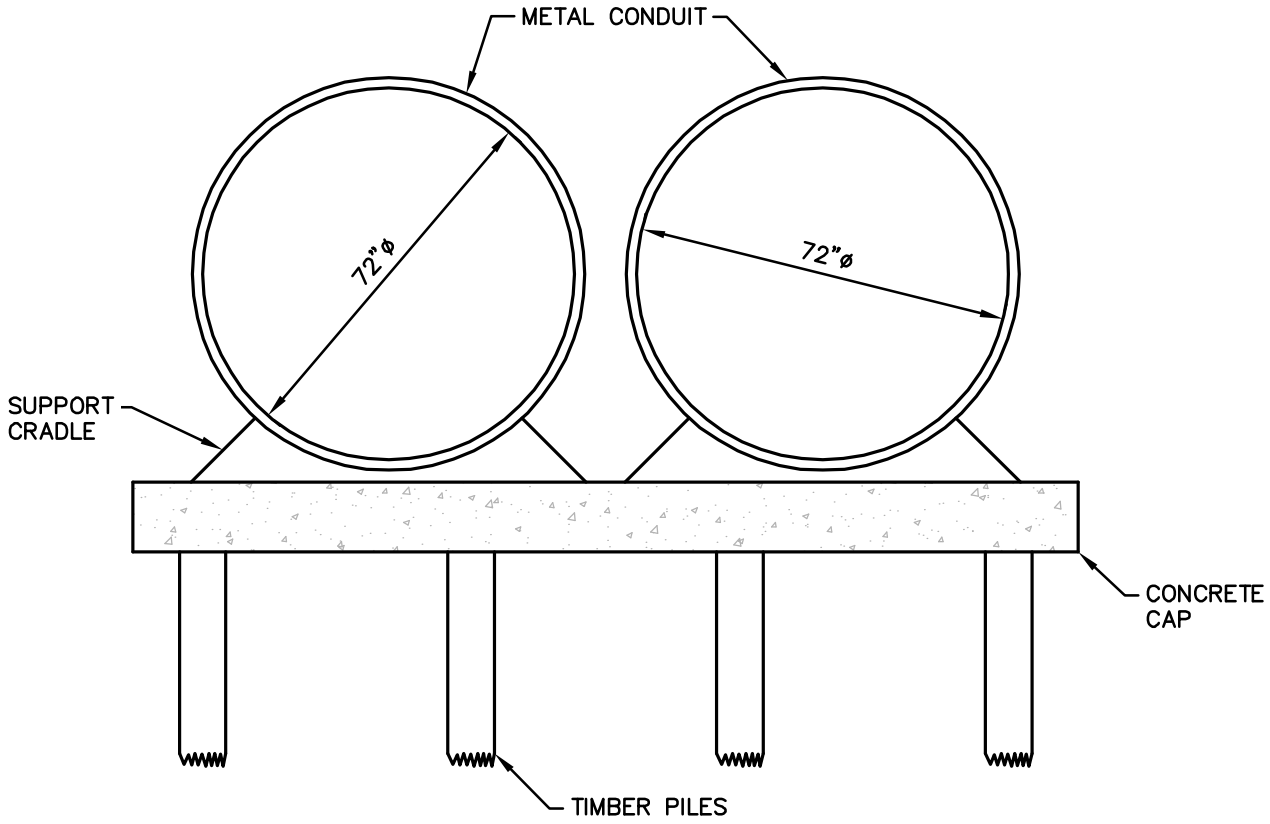
IDMO ALTERNATIVES ANALYSIS

OUTFALL AT BAYOU ST. JOHN

SCALE: 1" = 100'	ALT-18	PLATE 18-3
DATE: 07/27/06		

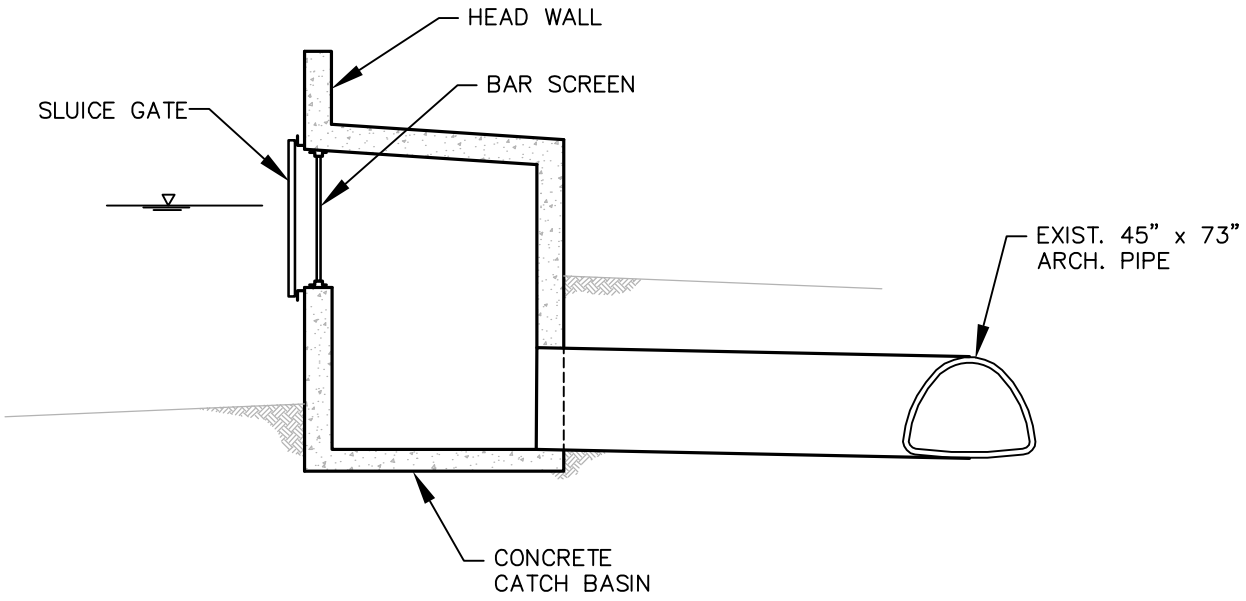


IDMO ALTERNATIVES ANALYSIS		
PROPOSED PUMP STATION INTO CITY PARK DETENTION		
SCALE: 1" = 200'	ALT–18	PLATE 18–4
DATE: 07/27/06		



TYPICAL SUPPORT FOR METAL CONDUIT

IDMO ALTERNATIVES ANALYSIS		
SUPPORT DETAIL		
SCALE: 1" = 1'-0"	ALT-18	PLATE 18-5
DATE: 07/27/06		



PROPOSED CLOSURE GATE
N.T.S.

IDMO ALTERNATIVES ANALYSIS		
PROPOSED CLOSURE GATE		
SCALE: 1" = N.T.S.	ALT-18	PLATE 18-6
DATE: 07/27/06		

Pump Station No. 3 (Looking at the Southeast corner)

Bayou St. John at proposed outfall location (Looking North)

Railroad Crossing at Gentilly Avenue (Looking North)

Railroad Crossing at Paris Avenue (Looking North)

Railroad Crossing at St. Bernard Avenue (Looking North)

Overflow Basin near Zachary Taylor and Golf Dr.

Overflow Basin near Zachary Taylor and Golf Dr. (Looking North)

Project No. 19

Redirect flow from DPS 2 to Bayou St. John and pump to the lake

Objective

The objective of this project is to divert a portion of the flow discharged from DPS 2 into Bayou St. John in order to reduce pumping requirements at London Ave. Canal at Lake Pontchartrain. This project would reduce flows at Orleans Ave and London Ave. Canals by a total of 1,200 cfs by using Bayou St. John as a temporary conveyance channel to Lake Pontchartrain. See **Plate 19-1**, Location Layout.

Existing Conditions

DPS 2 is located in the median of N. Broad St. near the intersection of St. Louis St. It contains 6 pumps with a combined capacity of 3,190 cfs. The pumps include four horizontal and two centrifugal pumps, which are driven by six 25 Hz electric motors. The pump station is fed by the Broad St and Lafitte St Canals which collect runoff from the Central Business District and upriver portions of the French Quarter and Treme as well as discharged flow from Pump Station No. 1.

The water discharged from DPS. 2 flows into two conveyance structures:

- An underground box that runs eastward in the median of Broad St. to DPS 3 that is designed to convey 1150 cfs of water into the London Ave. or Florida Ave. Canals, and
- The Lafitte St. Canal, an 11.65' x 25' concrete flume that runs parallel to Lafitte St. to Jefferson Davis Pkwy is designed to convey 2000 cfs of water..

The latter becomes two closed boxes that are routed on the west side of Bayou St. John to Orleans Ave. One of the boxes traverses along Orleans Ave. to DPS 7 at the southern terminus of the Orleans Ave. Canal. The other box is not completed, but it is planned to be constructed as part of the SELA Drainage Improvements program. Typically, the Sewerage and Water Board only pumps 1000 cfs towards DPS 7 because any additional flow would flood neighborhoods that have subsided downstream of DPS 2.

Bayou St. John is a natural waterway that has been manipulated with concrete paved slopes along the channel. The bayou starts at the intersection of Jefferson Davis Pkwy. and Lafitte St and continues toward Lake Pontchartrain along the eastern edge of City Park. A water inlet in the channel, is controlled by two sluice gates located just north of Robert E. Lee Blvd. The elevation water is controlled at the outlet by a 24" diameter

pipe at the start of the bayou and other small outfall pipes that allow overflow into the municipal drainage system. Bayou St. John has no drainage function at the present time. The only major constriction of flow in the Bayou St. John is the 10'x 28' channel at Robert E. Lee Blvd. just downstream of the sluice gates. A large storm surge protection sector gate has been placed near Lake Pontchartrain to prevent intrusion from the lake. The flood protection extends from the lake to the flood gates north of the sluice gates.

Proposed Work

The 1,200 cfs flow from DPS 2 would be diverted into Bayou St. John via the existing Lafitte St. Canal and a 10' x 22' channel that would be added parallel to the existing canal on the north side. Four 300 cfs pumps would be placed at the foot of Bayou St. John to pump the 1,200 cfs of water into the bayou with an intake basin in the median of Jefferson Davis Pkwy. between Lafitte and Conti Sts. The two sluice gates just downstream of Robert E. Lee Blvd. would be removed, and a new 10' x 20' channel, paralleling the existing channel, would be constructed.

A second new pump station, including intake and discharge basins, would be located just east of the existing gate structure at the outlet of the bayou. Each new pump station would house four 300 cfs pumps.

Geotechnical Considerations

- Subsoil Conditions

  Based on the borings made in the general area, subsoil conditions at the site of the proposed construction to the south would be expected to consist of soft clay and organic clay that extend to about the 60 ft. depth where the geologically identified Pleistocene age soils would be expected to occur. However, medium dense to dense sands are interbedded within this clay stratum between about the 40 and 50 ft. depths. The Pleistocene age soils below about the 60 ft. depth generally consist of stiff to very stiff clay to about the 90 ft. depth where dense silty sand would be expected. This silty sand should extend to at least the 100 ft. depth below ground surface. On the north side of Robert E. Lee Boulevard, the subsoils would be expected to consist of alternating layers of soft to medium stiff clay and loose to medium dense sand to about the 25 ft. depth. The subsoils below this are primarily loose to medium dense sand to about the 50 ft. depth. This is typically

followed by medium stiff clay to about the 65 to 70 ft. depth where the geologically identified Pleistocene age soils would be expected. These Pleistocene age soils would consist of either stiff to very stiff clay or medium dense to dense sand to at least the 100 ft. depth below ground surface.

- Conceptual Foundation System

  Based on the subsoil conditions described above, it is believed that all important structures should be supported on driven piles. For timber, or composite, piles supporting the open channel between Drainage Pump Station No. 2 and Bayou St. John and the pump station at the foot of Bayou St. John, a capacity of about 15 tons (F.S. = 2.0) in compression should be available. This is based on 60 to 70 ft. long timber, or composite, piles (below existing grade) or piles driven to firm embedment into sand. Slightly less capacities would be expected for the pump station on the north side of Robert E. Lee Boulevard. For piles subject to uplift and lateral loading, a composite pile should not be considered. Higher capacities on the order of 30 to 50 tons would be available if steel "H" or pile piles or prestressed concrete piles are used for support. They should also be considered if greater design life than typically provided by timber piles is desired.

- Water Diversion and Cofferdam Arrangement

  Construction cofferdams would be required for the open channel between Drainage Pump Station No. 2 and Bayou St. John and the pump station intake and discharge basins. For cost estimating purposes, a sheet pile penetration of about 60 ft. below ground surface would be expected. The cofferdam should be internally braced at least at one location at the top of the cofferdam walls. Forced dewatering (deep wells, well points, etc.) would probably be required to dewater the shallow sands at both pump station locations.

- Additional Geotechnical Investigations

  Soil borings should be made on about 300 ft. spacing between the existing Pump Station No. 2 and the proposed pump station at the foot of Bayou St. John. Borings should also be made where the existing sluice gate at Robert E. Lee Boulevard will be removed and also at the proposed new pump station to the north. Geotechnical analyses with regard to compression, tension and lateral

capacities of piles would be needed of support of the various elements of the structures. Analyses would also be needed relative to the temporary retaining structures (structural and dewatering). Consideration should also be given to the effect of the cofferdam for the channel between Drainage Pump Station No. 2 and Bayou St. John relative to its effect on the adjacent existing channel. If levees are needed along Bayou St. John to contain the flow during maximum operating conditions, then additional analyses and borings along the length of Bayou St. John would also be needed.

Structural Considerations

The architectural elements of the pump stations shall be coordinated with local agencies.

As for the structural integrity of the pump stations, all components of the structure shall be designed in accordance with the state and local building code requirements and be able to withstand winds in excess of 150 mph.

The foundation shall be supported on composite timber piles (due to water table fluctuations) while the open channel (suction and discharge basins) will be founded on concrete piles.

The engine deck for the pump stations would be elevated one foot above the base flood elevation as shown on the FIRM map.

As for the structural integrity of the box culvert and channel their foundations shall be supported on timber piles

All foundations shall be designed in accordance with the Geotechnical Report's recommendations.

The suction and discharge basins (open concrete channel), box culvert and channel shall be sized to accommodate the hydraulic requirements of this report.

Mechanical/Electrical Considerations

- Electric Service

  The local electric service is provided by Entergy. The anticipated electrical load at pump station is including:

  - Four (4) 300 cfs vertical pump, motor rated at 700HP, medium voltage or approximate 2,080 KW

- Balance of facility loads including power, lighting and auxiliary systems at approximate 300 KW. The electrical system will be stepped down to 480V and 120/208V with transformers and local distribution panels.

The peak demand in the pumps station is approximate at 2.4 MW. Two service feeders shall be provided by Entergy for redundancy. In case of loss of one feeder the other feeder shall be capable of providing power for the entire pump station demand. Main Substation will consist of MV vacuum type breakers and metering devices to meet Entergy standards. Service availability will be coordinated with Entergy during the design development.

- Standby Power

Standby power source will be required in case of total black-out on utility grid occurs coincidence with the flood event. There are two options for providing standby power.

- Option A: Locally installed 2-1.25 MW diesel generators to meet the peak demand. The generators switchgear with synchronizing bus will be provided. The generators will be specified for continuous duty with sufficient fuel storage to operate the pumps up to 36 hours.
- Option B: Central Generation Plant. See description on Project 1.

Construction Considerations

A construction sequencing plan would be required to minimize impacts to traffic during construction of the required box culvert at Robert E. Lee Blvd.

Installation of the pump station, and its intake and discharge basins adjacent to the closure gate, requires relocation of the levee on the east bank of the bayou north of Robert E. Lee.

Prior to the construction of the new drainage structures, the Contractor shall implement a construction procedure that will not impose on the structural integrity of the existing adjacent channels at Lafitte St and Robert E. Lee Blvd.

Temporary sheet piling may be used as an alternative at several locations for providing stability of the existing levee at the junction points:

1) of the existing levee and intake and discharge basins and

2) at the pump station and levee interface.

In addition, sheet piling may be used as an alternative for providing stability of the existing culvert along Lafitte St. See Plates 19-2, Site 1 and 19-5, Conc. Channel Section and the existing channel at Robert E. Lee Blvd. See Plates 19-3, Site 2, and 19-6, Conc. Box Culvert Section.

Remove existing Lafitte St. roadway between Hagen and Moss Sts. and construct new pump station. Also, remove any abandoned railroad tracks in the construction area.

Permanent traffic operation would be addressed by relocating the movements now provided on Lafitte Street to Conti Street, one block away.

Environmental Considerations

This project, like all the others, would satisfy the requirements of NEPA through a supplement to EA #433.

For this project, additional consultation with the SHPO is required because the new pump station in the Jefferson Davis Pkwy. median is within one block of 2 districts and must be reviewed for viewshed concerns, and the new pump station at the lake is in an area that may be eligible for the NRHP.

A Scenic River permit must be obtained from LDWF because Bayou St. John is listed as a Scenic River.

It appears that that the area along Lafitte St. between N. Broad St. and Jefferson Davis Pkwy. may be an environmental justice area. A determination must be made and actions taken accordingly.

Order of Magnitude Cost Estimate

Cost Estimate - Project 19

Environmental	$30,000
Right-of-Way Acquisition	$0
Design	$2,375,745
Construction	$27,321,062
Total	**$29,726,807**

Roadmap / Timeline

Design – This would be divided into two phases that would be initiated concurrently, M&E and Civil. The M&E would include a fast-track specification of pumps and other equipment with long lead time deliveries. M&E fast-track should take 2 months and other design should take 4 months.

Environmental Clearance – Concurrent with design. Compliance with the Scenic River Permit may be a critical path item.

Permits – The permits required concern water quality, and are issued by LDNR, this should be coordinated among the agencies to take no more than one month after final design is completed and be concurrent with the construction bid process.

LERRD – Land required for the concrete flume is within an abandoned railroad ROW. Coordination with the railroad company could be a critical path item.

Construction – The pump station proposed at the lake would take approximately 18 months to complete. Lead time for the pumps would be approximately 12 months from the placement of the order.

Further Considerations

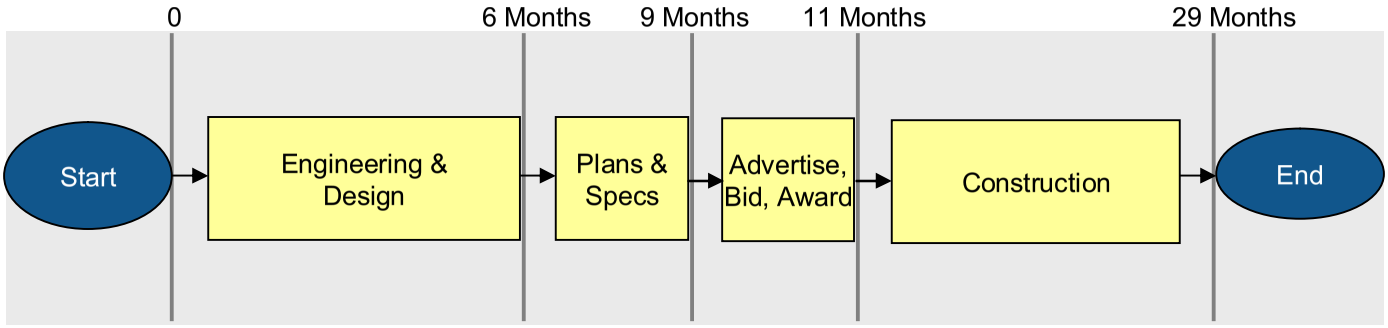
- Bayou St. John can be converted to a new outfall within the drainage system at a cost considerably lower than any other possible project.
- A ROW preservation plan for the additional canal proposed in the Lafitte St. ROW is essential because, although the land is currently vacant, the Norfolk Southern Railroad is actively marketing the property.
- Early coordination with the LDWF concerning the Scenic River permit and with the SHPO regarding the Section 106 process is advised because the design elements concerned here overlap, and because these activities are frequently time-consuming.
- The visual concerns relative to both Section 106 and the Scenic River permit could be avoided or mitigated through context sensitive architectural design.
- The delivery time for the pumps and other equipment are probably the critical path of construction.
- There are conveyance limitations between DPS 1 and DPS 2 that may reduce the potential contribution of this project to system capacity improvements.

- Additional flow can be pumped out of DPS 2 towards the new pump station at the southern end of Bayou St. John without the risk of flooding neighborhoods downstream that have subsided. This condition currently exists pending completion of the SELA project for additional conveyance capacity between the site of the proposed station at Jefferson Davis Pkwy. and DPS 7.
- The additional capacity in the Lafitte St. ROW would be a permanent improvement to the drainage system. Given various proposed improvements in the conveyance network, could provide an option to increase or decrease flow to DPS 7, and, to relieve both DPS 1 and DPS 3.
- Construction of the canal and intake basin in the median of Jefferson Davis can take place in the dry without disturbing the existing system until it is necessary to tie into the system.
- If an Environmental Justice area is identified, a public involvement process must be undertaken, as appropriate.

Conclusion

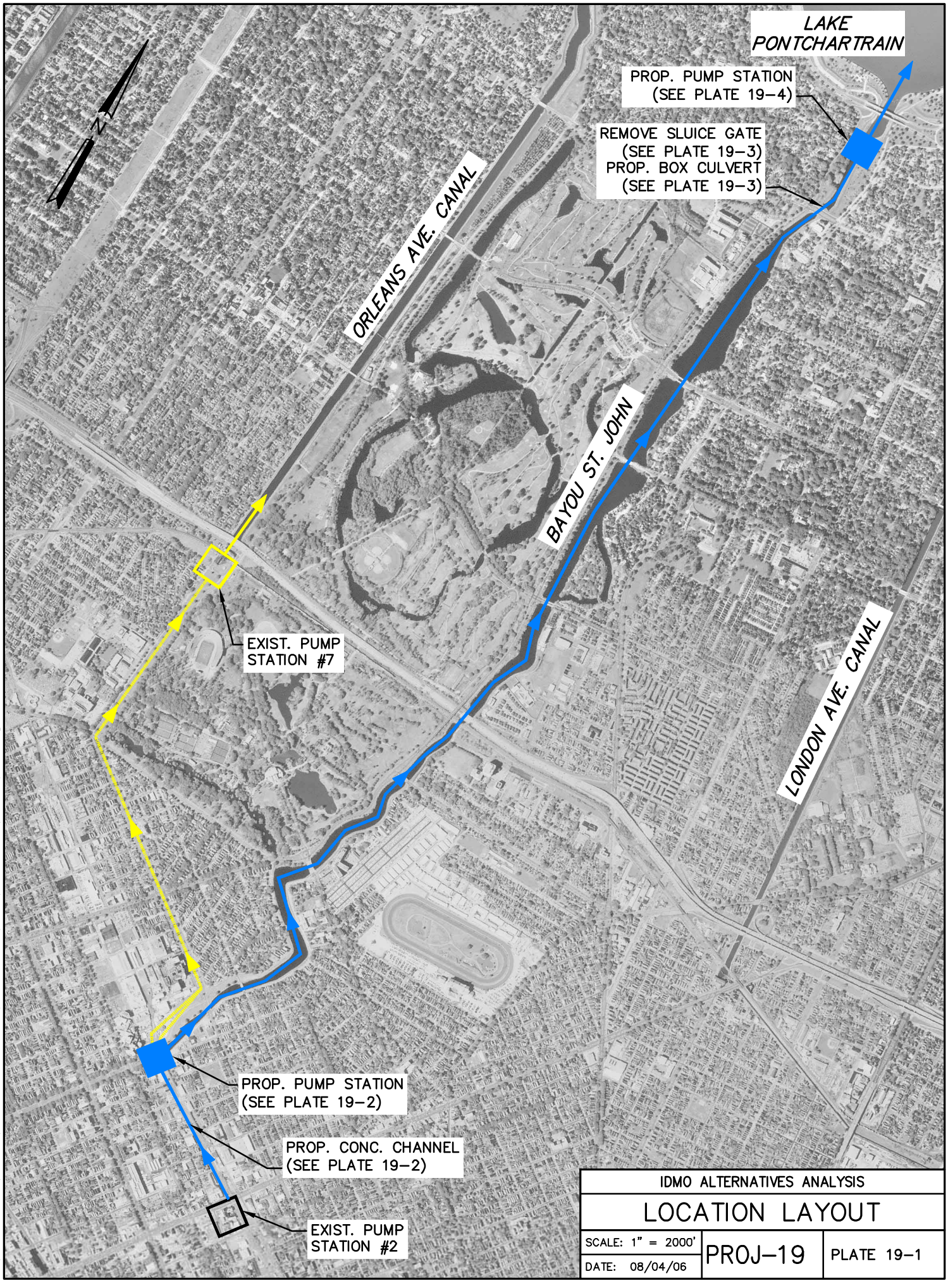
This project has been recommended for further study. The construction of the parallel channel along Lafitte Street from DPS 2 to Bayou St. John and the adjacent pump station can offer significant relief to the London Avenue Canal. This project also can be combined with Project No. 15 to redirect a total of 4800 cfs away from the London Ave, Canal.

Project 19

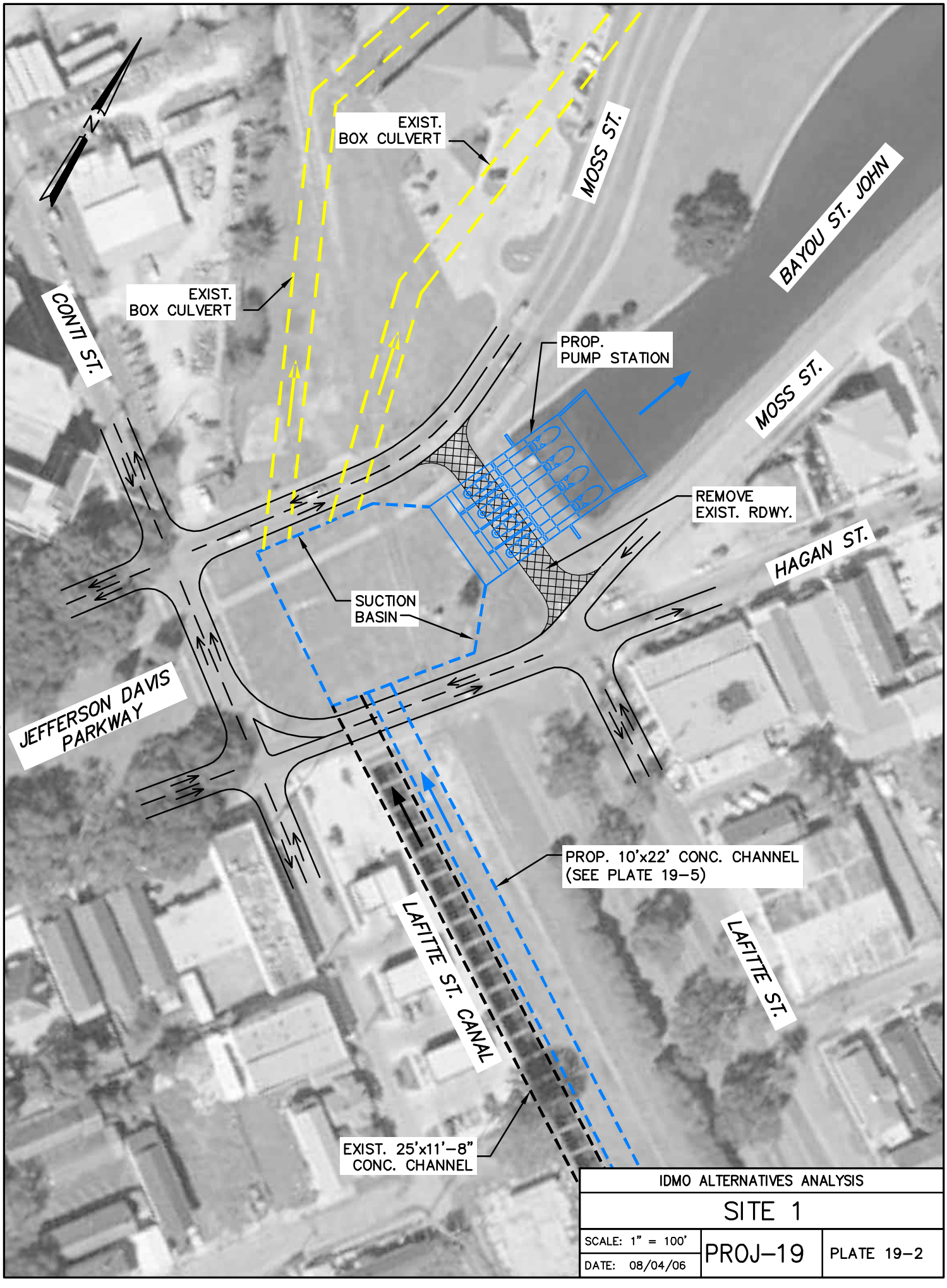


Environmental Compliance – Potential environmental issues, as discussed in the "Environmental Consideration" section, can be addressed during the engineering and design phase in order to keep off the critical path.

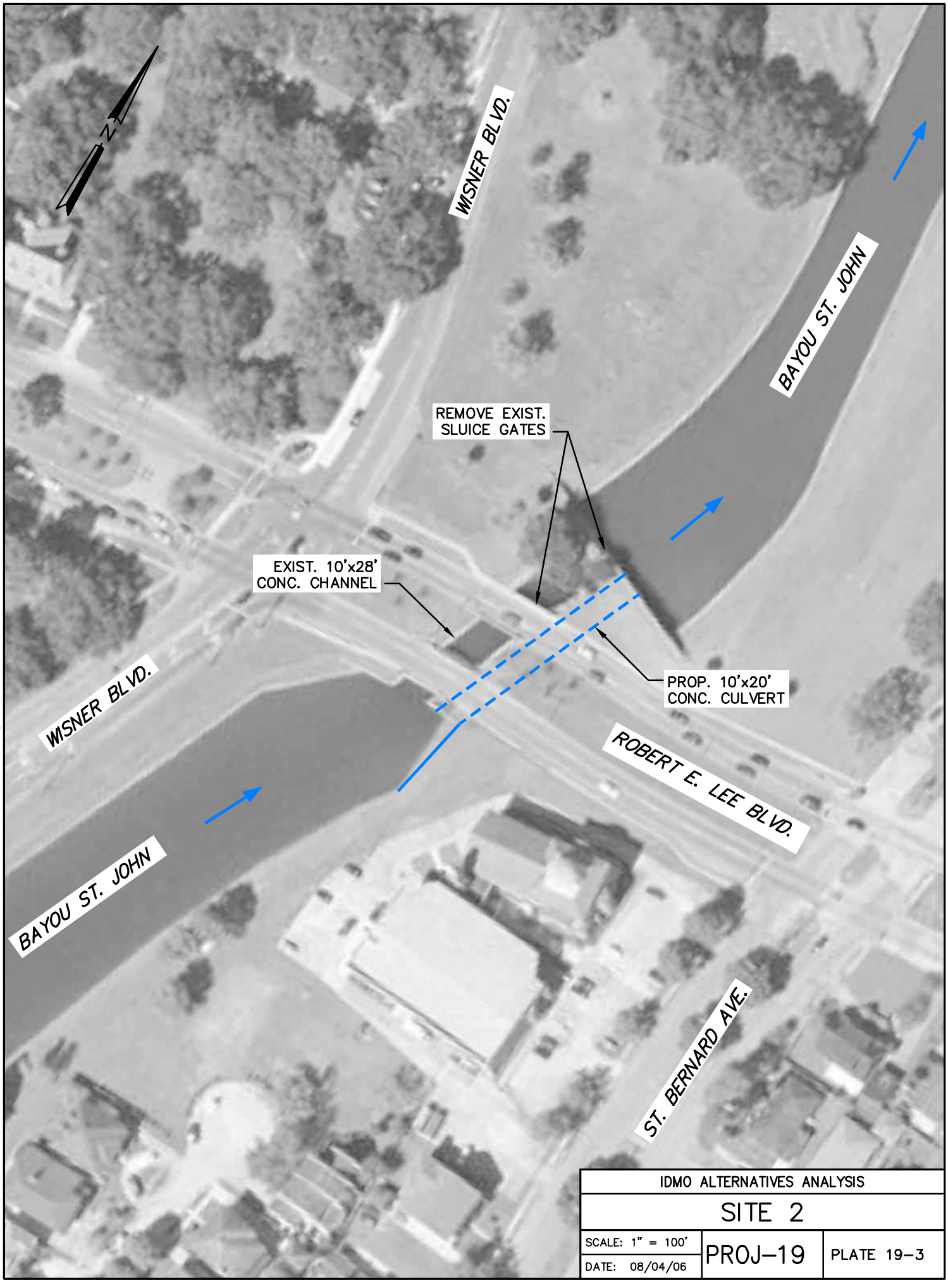
LERRD's – Any potential LERRD's , as discussed in the "Proposed Work" section, can be addressed during the engineering and design phase in order to provide for construction without causing delay.



IDMO ALTERNATIVES ANALYSIS		
LOCATION LAYOUT		
SCALE: 1" = 2000'	PROJ-19	PLATE 19-1
DATE: 08/04/06		



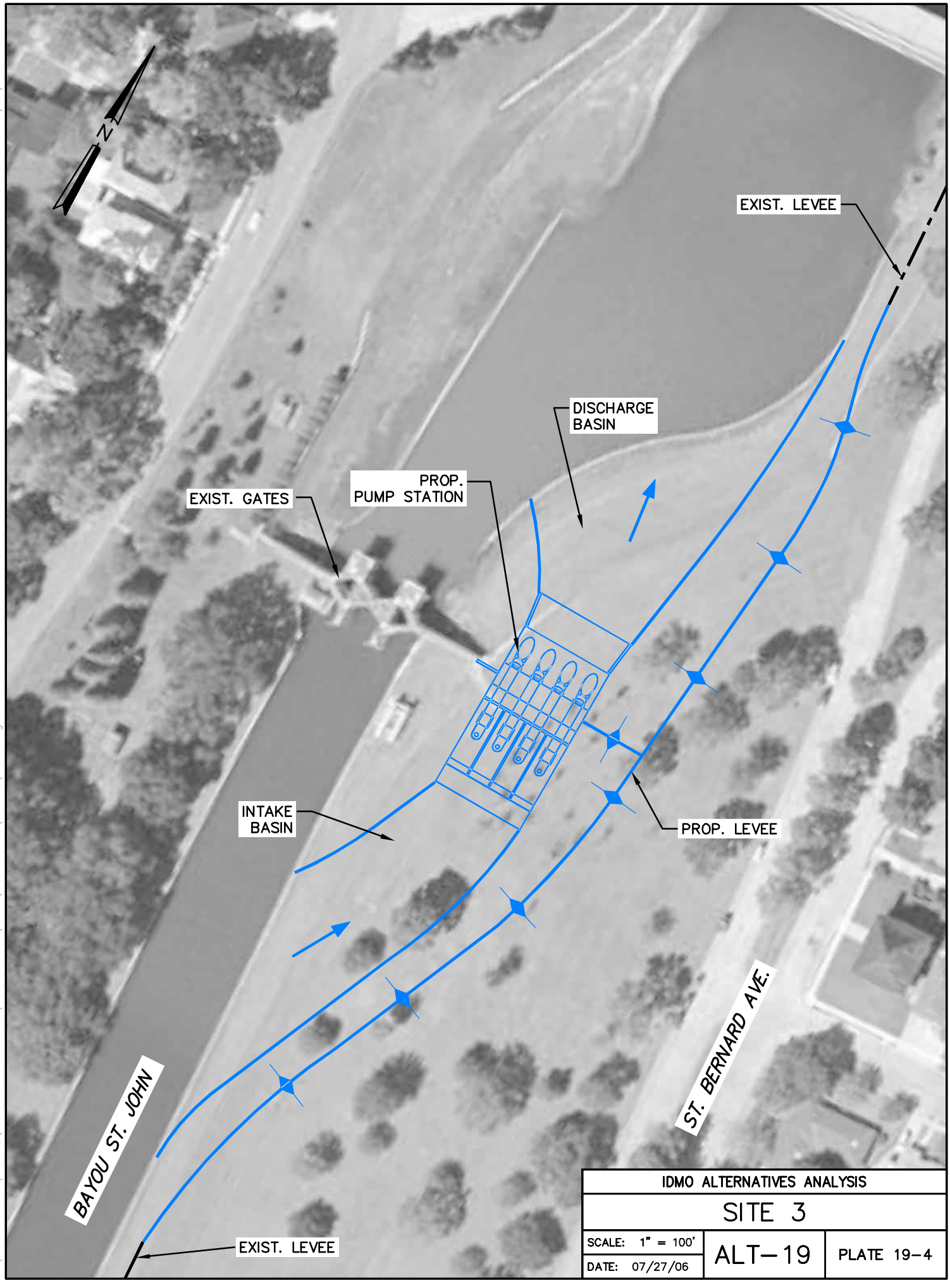
IDMO ALTERNATIVES ANALYSIS		
SITE 1		
SCALE: 1" = 100'	PROJ-19	PLATE 19-2
DATE: 08/04/06		



IDMO ALTERNATIVES ANALYSIS

SITE 2

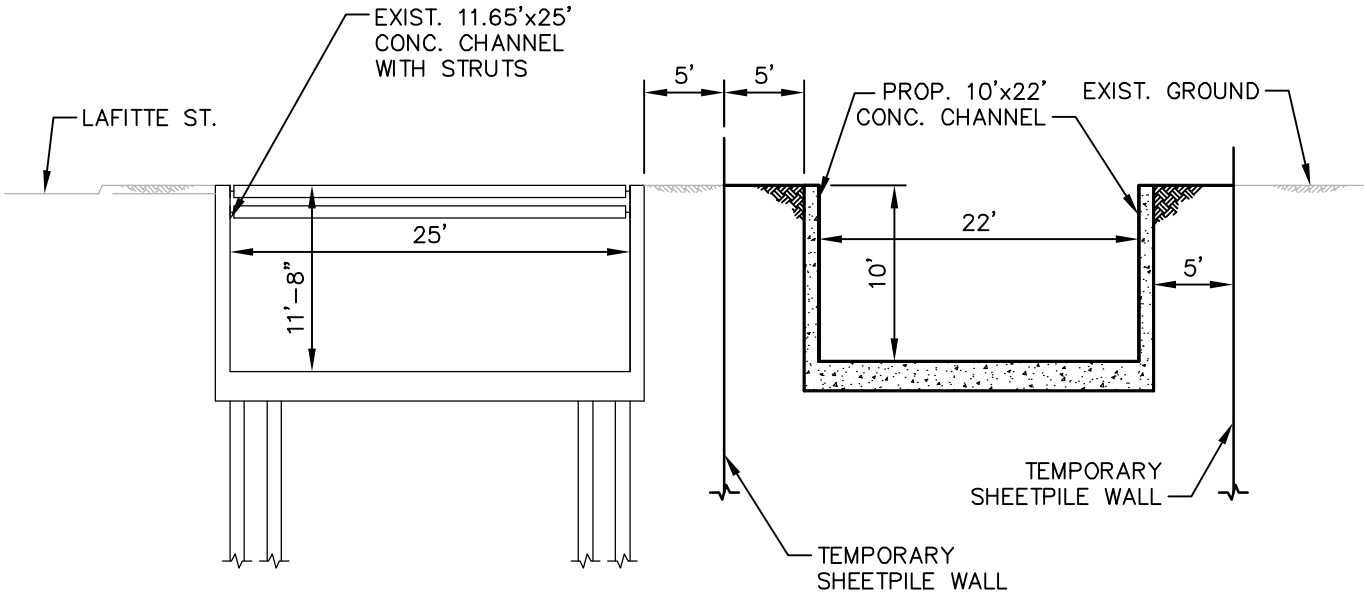
SCALE: 1" = 100'	PROJ-19	PLATE 19-3
DATE: 08/04/06		



IDMO ALTERNATIVES ANALYSIS

SITE 3

SCALE: 1" = 100'	ALT-19	PLATE 19-4
DATE: 07/27/06		



LAFITTE ST. CANAL TYPICAL SECTION

N.T.S.

IDMO ALTERNATIVES ANALYSIS		
TYPICAL SECTION		
SCALE: 1" = N.T.S.	PROJ-19	PLATE 19-5
DATE: 08/04/06		

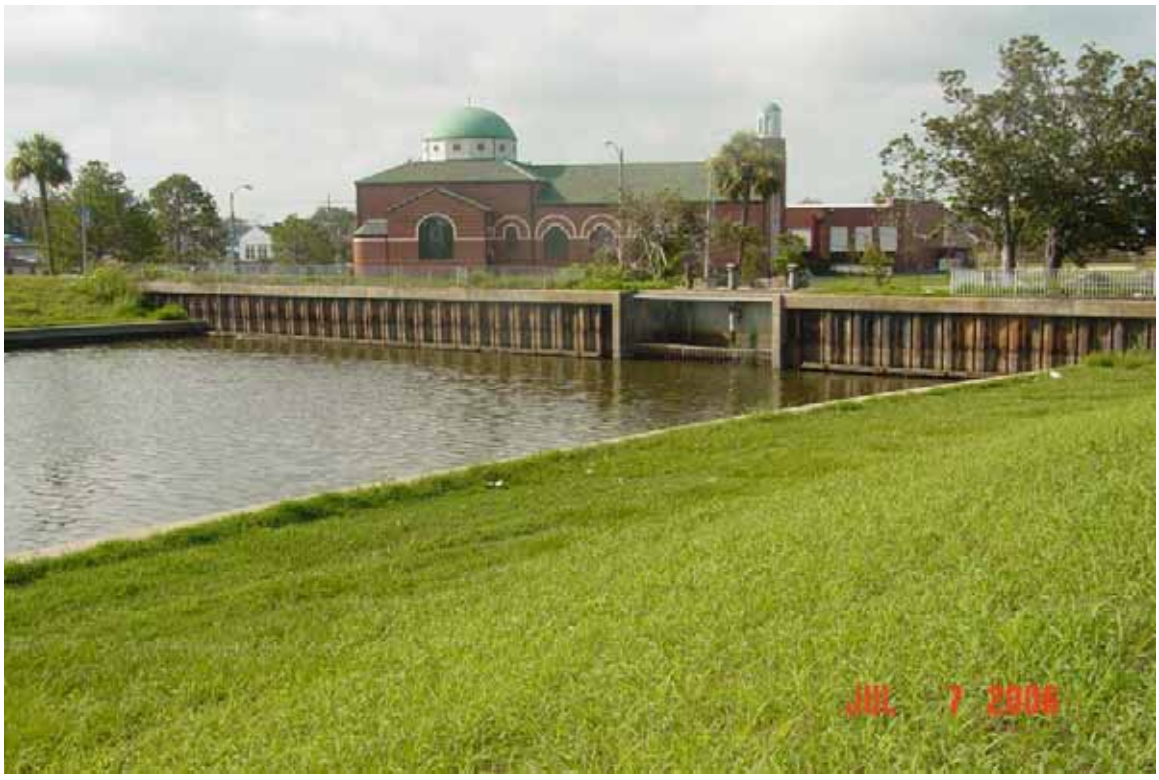
Pump Station No. 2 (Looking at the Northeast corner)

Beginning of Bayou St. John (Looking Southwest)

Beginning of Bayou St. John (Looking Northeast)

Lafitte St. Box (Looking toward DPS No. 2)

Weir on Bayou St. John (Looking North)



Sluice Gates on Bayou St. John (Looking South)

Sector Gate on Bayou St. John (Looking South)

Project No. 20

Redirect flow from DPS 2 to Bayou St. John and store in City Park

Objective

The objective of this project is to relieve the capacity demands on the drainage system by using a portion of City Park north of I-610 as a detention pond for the water discharged from DPS 2 and diverted to Bayou St. John.

Existing Conditions

DPS 2 is located in the median of N. Broad St. near the intersection of St. Louis St. It contains 6 pumps with a combined capacity of 3,190 cfs. The pumps include four horizontal and two centrifugal pumps, which are driven by six 25 Hz electric motors. The pump station is fed by the Broad Street and Lafitte Street canals which collect runoff from the Central Business District and upriver portions of the French Quarter and Treme as well as discharged flow from DPS 1.

The water discharged from DPS 2 flows into two conveyance structures:

- An underground box that runs eastward in the median of N. Broad St. to DPS 3 where the water is pumped into the London Ave. or Florida Ave. Canals, and
- The Lafitte St. Canal, an 11.65' x 25' concrete flume that runs to Jefferson Davis Pkwy. parallel to Lafitte St.

The latter becomes two closed boxes that are routed on the west side of Bayou St. John to Orleans Ave. One of the boxes traverses along Orleans Ave. to DPS 7 at the southern terminus of the Orleans Avenue Canal. The other box is not completed, but it is planned to be constructed as part of the SELA Drainage Improvements program. Typically, the Sewerage and Water Board only pumps 1,000 cfs towards DPS 7 because any additional flow would flood neighborhoods that have subsided downstream of DPS 2.

Bayou St. John is a natural waterway that has been manipulated with concrete paved slopes along the channel. The bayou starts at the intersection of Jefferson Davis Pkwy. and Lafitte St and continues toward Lake Pontchartrain along the eastern edge of City Park. The water surface elevation in the channel is controlled primarily by two sluice gates located just north of Robert E. Lee Blvd. The water elevation also is controlled by a 24" diameter pipe at the start of the bayou and other small outfall pipes that allow overflow into the municipal drainage system.

City Park is a large municipal park that is bounded on the west by Orleans Ave. south of I-610 and by the Orleans Avenue Canal north of I-610. Its other boundaries are City Park Ave. to the south, Robert E. Lee Blvd. to the north, and Wisner Dr. along Bayou St. John to the east. City Park is home to numerous cultural and recreational facilities. Those north of I-610 include City Park Riding Stables - Equestrian, the NOPD Horse Stables, the G. Gernon Brown Center (a gymnasium), Popp's Fountain, Marconi Meadows, Baseball Fields, Pan American Soccer Stadium, a Golf Driving Range, a Golf Club, and three Golf courses. Also located within the park north of I-610 are a public high school and a USDA research facility.

Proposed Work

A total flow of 600 cfs would be diverted into Bayou St. John via the Lafitte St. Canal. A new pump station would be located at the head of Bayou St. John to pump the 600 cfs of water into the bayou with an intake basin in the median of Jefferson Davis Pkwy. between Lafitte and Conti Sts. See **Plate 20-2.**

Once the water enters Bayou St. John, it would flow northward to a proposed second pump station that will pump 600 cfs into the detention area through conduits placed under Wisner Blvd. This pump station would be located behind Bayou Oaks Golf Course Clubhouse. See **Plate 20-3.**

To create the detention area, a berm would be build around a portion of City Park north of I-610. Because of a gradual slope down to the northern portion of the Park, the berm would require a maximum elevation of 5' to hold approximately 4' of water in the lowest portion, with 1' of freeboard. The storage area created in City Park is estimated to be 1,320 acre-ft. See **Plate 20-1**.

The berm would begin at the Orleans Avenue Canal levee on the north side of I-610 near DPS 7. It would then parallel Zachary Taylor Dr. and I-610 to Wisner Blvd., but would exclude Popp's Fountain and Pan American Stadium. Much of Wisner Blvd. could be used as a berm; however a berm would be required in isolated low areas along that roadway. The berm would turn westward approximately 1,000' south of Filmore Ave. and turn north around the club house, the driving range, John F. Kennedy High School, and the USDA research center to Robert E Lee Blvd. It again turns west parallel to Robert E. Lee Blvd. until reaching the Orleans Avenue Canal levee. All buildings and

monuments within the detention area, including the stables, would be surrounded with berms to prevent flooding.

The water would be detained until the storm period has past. The calculated estimated time to fill the detention area of City Park is about 27 hours. This calculation is based on the flow into City Park is at 600 cfs during the entire duration, therefore this is the fastest time to fill to capacity. It would then exit through the existing drainage system located near Zachary Taylor Dr. and Golf Dr., which leads to DPS 7, the Orleans Avenue Canal, and Lake Pontchartrain. The existing drainage structure would be reconstructed to detain water during the storm event and to release it afterward, as conditions allow, into the municipal drainage system.

Construction Considerations

Traffic maintenance would be necessary during construction of the pump station and intake basin in the median of Jefferson Davis Parkway. The abandoned railroad would be removed.

Within City Park, the alignment of the berm should be designed to protect the oak trees near it from damage. Where the berm crosses Marconi Dr., Filmore Ave., and Harrison Ave, these roadways would be raised over the berm rather than constructing flood gates.

Environmental Considerations

This project, like all the others, would satisfy the requirements of NEPA through a supplement to EA #433.

For this project, additional consultation with the SHPO is required because although the new pump station is not within a NRHP district, it is within one block of 2 districts and must be reviewed for viewshed concerns. Also, there are various sites within City Park that may be eligible for the National Register of Historic Places.

A Scenic River permit must be obtained from LDWF because Bayou St. John is listed as a Scenic River.

It appears that that the area along Lafitte St. between N. Broad St. and Jefferson Davis Pkwy. may be an environmental justice area. A determination must be made and actions taken accordingly.

Order of Magnitude Cost Estimate

Cost Estimate - Project 20	
Environmental	$30,000
Right-of-Way Acquisition	$0
Design	$3,006,821
Construction	$34,578,446
Total	**$37,615,268**

Roadmap / Timeline

Design – This would be divided into two phases that would be initiated concurrently, M&E and Civil. The M&E would include a fast-track specification of pumps and other equipment with long lead time deliveries. M&E fast-track should take 2 months and other design should take 4 months.

Environmental Clearance – Potential environmental issues could impact the critical path of the project. See Environmental Considerations.

Permits – The permits required concern water quality, and are issued by LDNR, this should be coordinated among the agencies to take no more than one month after final design is completed and be concurrent with the construction bid process.

LERRD – Land required for the detention area is owned by the State of Louisiana and operated by a private non-profit organization. The use of the land would have to go through an extensive public information process as described earlier in this report. Land required for concrete flume is within an abandoned railroad ROW. These issues could become a critical path item.

Construction – The proposed berm, pump stations, and flume would take approximately 12 months to complete under 2 concurrent contracts. Lead time for the pumps would be approximately 12 months upon ordering.

Further Considerations

- The visual concerns relative to both Section 106 and the Scenic River permit could be avoided or mitigated through context sensitive architectural design.

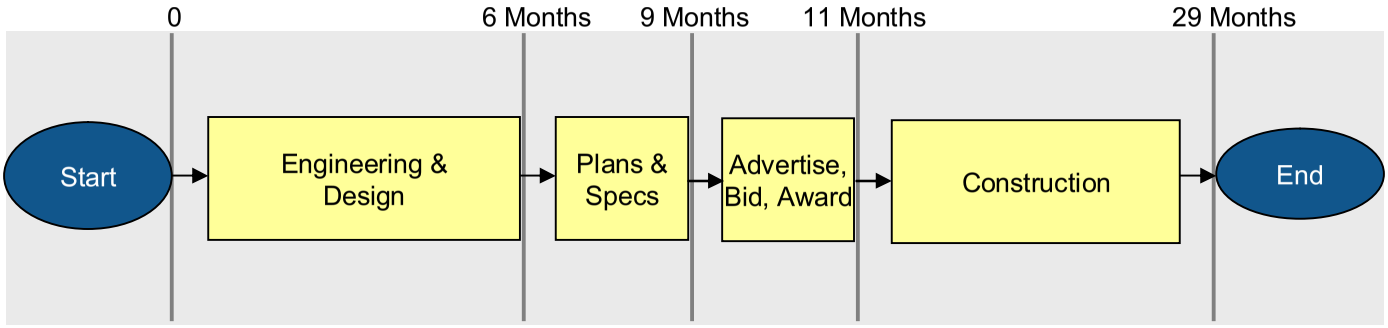
- If an Environmental Justice area is identified, a public involvement process must be undertaken, as appropriate.

Conclusion

This project is not recommended for further study. Therefore, it is eliminated for the following reasons:

1. The storage capacity of the detention pond is not adequate to receive the maximum flow for the duration of the 36-hour storm event.
2. Mitigation of the park would be necessary after each use.
3. Maintenance resources required to place sandbag at the road crossings and around buildings within the pond area could be used more effectively elsewhere.

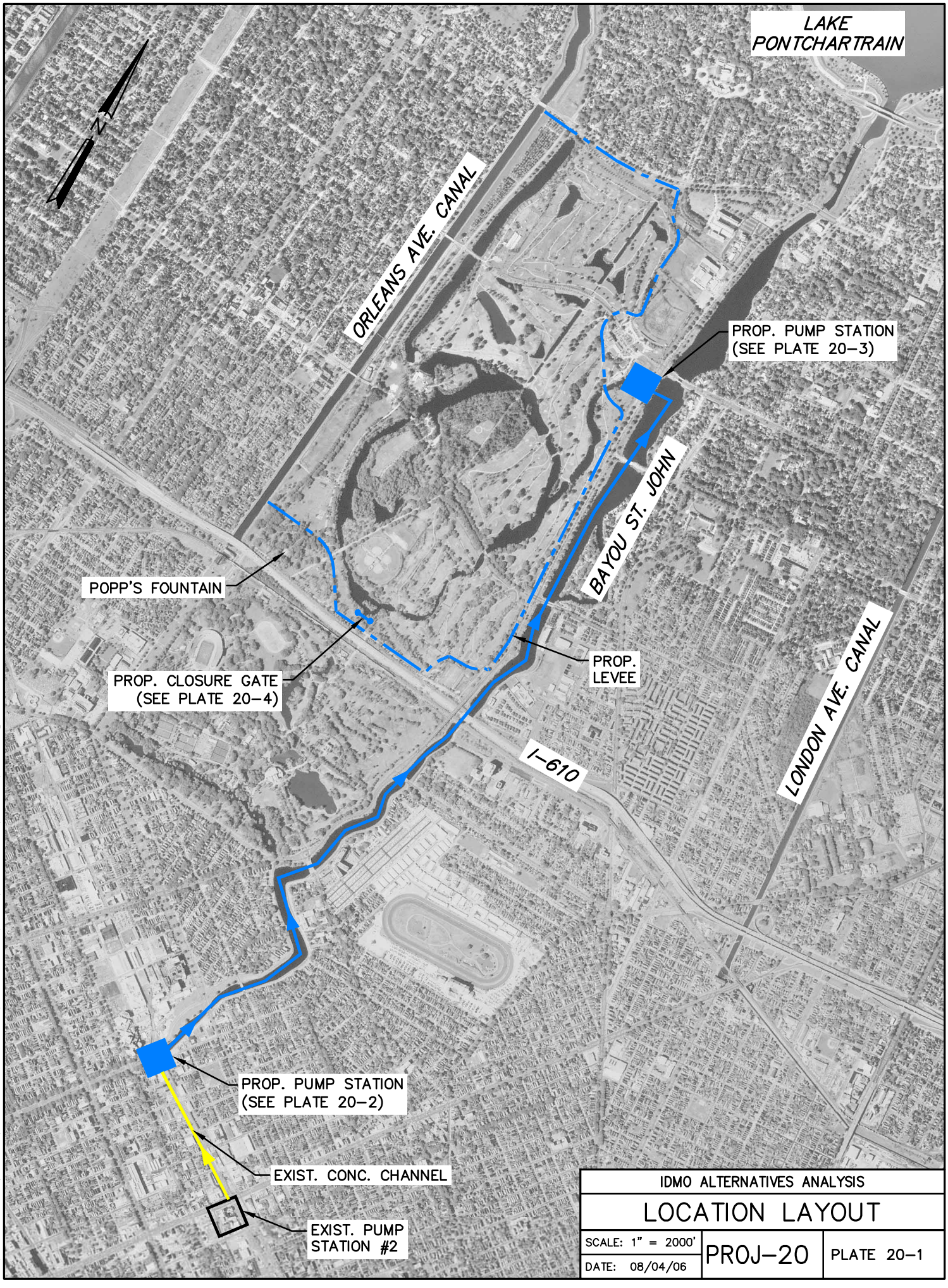
Project 20



Environmental Compliance – Potential environmental issues, as discussed in the "Environmental Consideration" section, can be addressed during the engineering and design phase in order to keep off the critical path.

LERRD's – Any potential LERRD's , as discussed in the "Proposed Work" section, can be addressed during the engineering and design phase in order to provide for construction without causing delay.

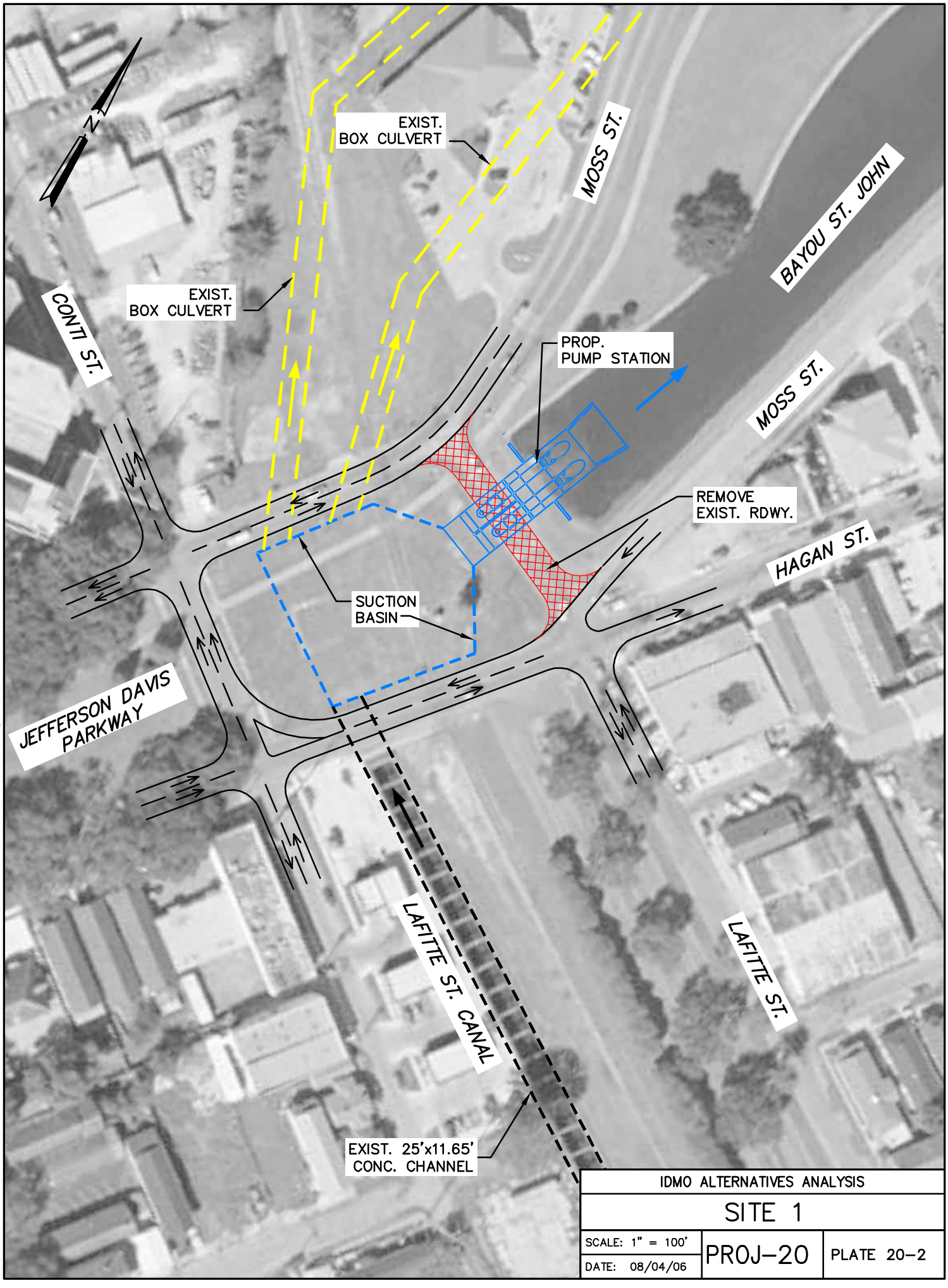
Pump Procurement – Specifics on pumps can be identified early in the engineering and design phase in order to be delivered on-site, when needed, without causing delay. This should be done concurrent with overall schedule. This is not a critical path item in this flow chart. (estimated 12 month lead time required)



IDMO ALTERNATIVES ANALYSIS

LOCATION LAYOUT

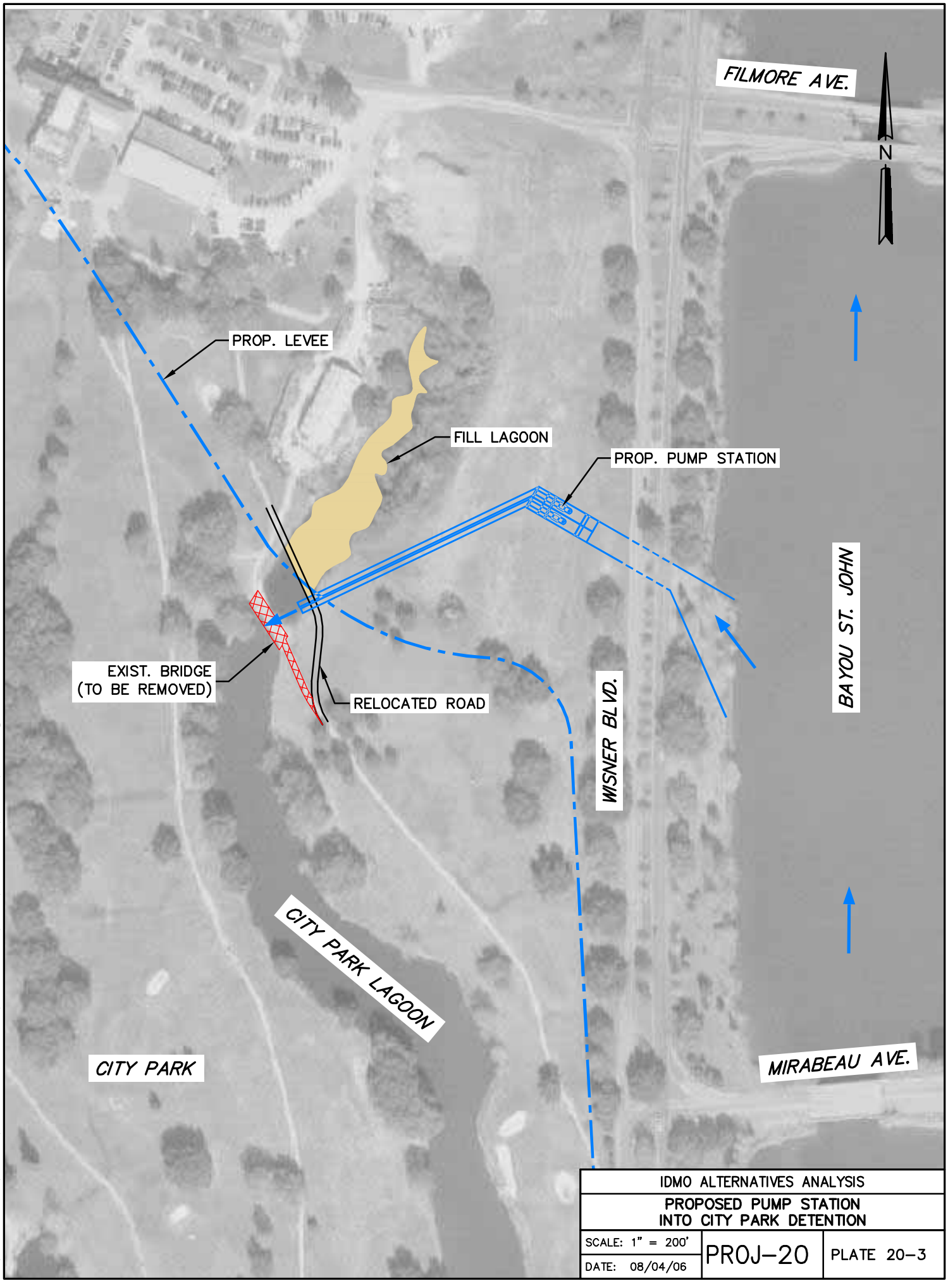
SCALE: 1" = 2000'	PROJ-20	PLATE 20-1
DATE: 08/04/06		



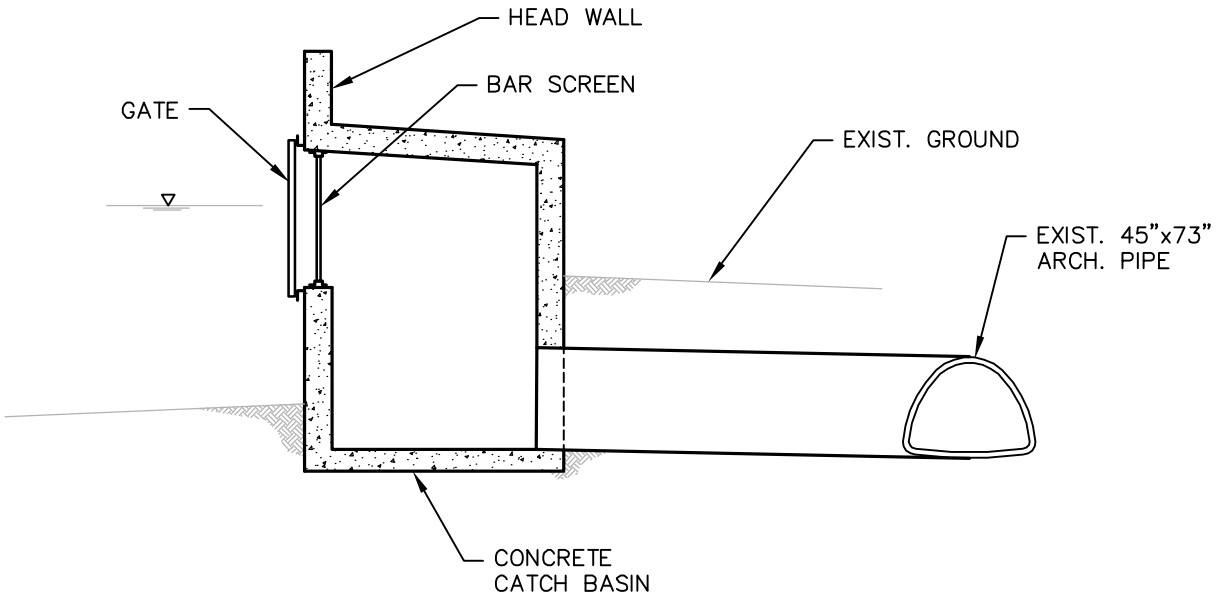
IDMO ALTERNATIVES ANALYSIS

SITE 1

SCALE: 1" = 100'	PROJ-20	PLATE 20-2
DATE: 08/04/06		



IDMO ALTERNATIVES ANALYSIS		
PROPOSED PUMP STATION INTO CITY PARK DETENTION		
SCALE: 1" = 200'	PROJ-20	PLATE 20-3
DATE: 08/04/06		



PROPOSED CLOSURE GATE
N.T.S.

IDMO ALTERNATIVES ANALYSIS		
PROPOSED CLOSURE GATE		
SCALE: 1" = N.T.S.	PROJ-20	PLATE 20-4
DATE: 08/04/06		

Pump Station No. 2 (Looking at the Northeast corner)

Outfall of Pump Station No. 2 (Looking East)

Beginning of Bayou St. John (Looking Southwest)

Beginning of Bayou St. John (Looking Northeast)

Underground Split of Existing Channel (Looking Southwest)

Overflow Basin near Zachary Taylor and Golf Dr.

Overflow Basin near Zachary Taylor and Golf Dr. (Looking North)