SUBMISSION FOR THE 2012 CANADIAN CONSULTING ENGINEERING AWARDS

Sherbourne Common

TUESDAY, MAY 8, 2012

SUBMITTED TO

Bronwen Parsons, Editor
Canadian Consulting Engineer Magazine
80 Valleybrook Drive
Toronto, Ont. M3B 2S9

SUBMITTED BY

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Project Highlights

The East Bayfront Precinct of Toronto's waterfront is a 22 hectare redevelopment site situated between Lakeshore Boulevard and Lake Ontario from Jarvis Street to Parliament Street. When completely built-out, East Bayfront will contain 6000 residential units, employment for 8000 people, 3,000,000 square feet of commercial space and 5.5 hectares of open spaces and parks.

At the heart of East Bayfront is Sherbourne Common, a park that serves as a public amenity and central gathering area for the new vibrant mixed-use community, as well as a unique visible showcase for the integration of infrastructure into the public realm. The award-winning Pavilion building in Sherbourne Common houses a pumping station and ultra-violet (UV) disinfection system that forms an integral part of the community stormwater management strategy. Currently lake water is treated and discharged through the park via a series of scrim walls and a man-made channel. In the future, during wet weather events, stormwater will also be treated and released through the park features. People can enjoy the beauty of the park features and see an important piece of water infrastructure at work.

Previous studies had suggested that stormwater should be treated in a separate underground chamber and released directly to the lake. However, neither the City of Toronto nor Waterfront Toronto were completely satisfied with the concept due to the challenge of constructing the facility in very poor soils, and the difficulty in maintaining the underground facility. Working for Waterfront Toronto and with West 8 + DTAH and Aquatic Habitat Toronto, The Municipal Infrastructure Group Ltd. (TMIG) proposed an integrated facility that would pre-treat the water to remove grit and sediment prior to UV disinfection and re-use in the park. After acceptance, TMIG worked closely with the park designers, Phillips Farevaag Smallenberg and The Planning Partnership, and visual artist, Jill Anholt, to design an integrated facility to be enjoyed by the public while illustrating engineering and sustainability works. TMIG were the Project Managers, Lead Designers and provided Contract Administration and Inspection services for the Pumping Station, UV system and underground services in the Park. Dillon Consulting Limited provided electrical design. Teeple Architects Inc. designed the Pavilion building, and Alston Associates Inc. provided geotechnical services.

The project fulfilled several goals of Waterfront Toronto for the development of the East Bayfront community. The overall mandate for the revitalization of Toronto's waterfront included the creation of new public spaces, the creation of dynamic and diverse new communities, and the promotion of a clean and green environment. To further emphasize the commitment to environmentally sound principles, Waterfront Toronto's 'Sustainability Framework' mandated the utilization of runoff as a resource, to reduce potable water consumption and optimize the required extent of stormwater management infrastructure.

In addition, the City of Toronto's Wet Weather Flow Management Guidelines stipulate a level of stormwater management control for discharges to Lake Ontario that align with the long term objective of compliance with the international Blue Flag designation for water quality and environmental management, primarily to yield a swimmable waterfront. In particular, the stormwater management objectives for the new development included water quality treatment to remove a minimum of 80% of the total suspended solids, reduction in the concentration of E.coli to a maximum of 100 counts per 100ml, and the utilization of runoff as a resource wherever possible.

Within this context, the stormwater management strategy for East Bayfront was developed to satisfy the water quality treatment requirements, long term operational considerations, all while endeavouring to complement the functional and aesthetic design of the community and its public spaces.

The multi-functional character of the stormwater management infrastructure proposed for the new community, which included the requirement for a UV disinfection facility to achieve the bacteriological treatment objectives, yielded a sustainable source of treated water that significantly influenced the design of Sherbourne Common. The park design capitalized on the availability of the sustainable water source through incorporation of a stunning water channel and dramatic water art sculptures, utilization of the treated water for irrigation of the park's landscaped areas, all with the collective intent of creating a public space that embodied Waterfront Toronto's core principles while providing a visible archetype of water infrastructure at work.

The integration of the pumping station and UV disinfection system into the design of the award-winning Pavilion building further exhibited the sustainability focus for both the park and the overall community.

Extensive stakeholder management was required from the outset of concept development through to commissioning of the system and was at the centre of the success of the project. A collaborative effort was required not only with the various team members but also with the approval agencies involved. The overall stormwater management strategy spanned the jurisdictions of various City departments, along with local, Provincial, and Federal regulatory agencies. A notable example was the extensive consultation with Toronto Public Health necessary to establish the suitability of the treated stormwater and lake water for publically accessible water features. The exercise was ground breaking in that development of a new standard formed part of the effort. The new criteria required a greater level of treatment for E.coli and a range of other pathogens, with corresponding monitoring and verification programs to verify the adequacy of the design.

The solution represented a unique achievement in the accommodation of the City's Wet Weather Flow Management Guidelines. While the City requires bacteriological treatment, there have been few instances where the scale, circumstance, and guiding principles of a project have allowed for the practical fulfillment of this objective. The incorporation of UV treatment in the management of stormwater runoff generated by redevelopment represents a new frontier in this branch of engineering, on par with the global recognition of the value of water and Canada's role in pioneering water treatment technologies.

During the first days of the operation of the system, public commentary revealed an immediate and profound recognition of the significance of the system as a representation of the mechanisms by which our communities and our environment are able to coexist in harmony.

"Waterfront Toronto is leading the development of clean water technology in Ontario by constructing an innovative stormwater management system in East Bayfront that is integrated into the design of the area's public realm. This integrated approach - a first for Ontario and Canada - allows required infrastructure to be beautiful, functional, sustainable and cost-effective. It will serve as a model for city-builders and is setting a new standard for stormwater management processes. Stormwater is conveyed to Sherbourne [Common] where it is treated in a UV Purification Facility in the basement of the Park's pavilion. The water then flows through three dramatic art pieces and a water channel running the length of the park and is returned 99.9% clean into Lake Ontario." (Toronto and Region Conservation Authority, Living City Healthy Rivers and Shorelines Award to Waterfront Toronto for the East Bayfront Integrated Stormwater Management System at Sherbourne Common)

"*It is appropriate that elements such as sewers and water-treatment facilities should be brought to the fore for everyone to see, and this case, enjoy. As a feature on the Toronto waterfront, the Common adds huge presence to a part of town that had none. Sherbourne Common is about as close to that spirit of innovation as we have come in Toronto. The issue here will be that most visitors will be unaware of the park's larger purpose and, therefore, not realize the full extent of its brilliance. Such intelligence is hard to find in this city, except on the waterfront."* (Christopher Hume, Toronto Star, August 5, 2011)

Appendices:

1 Executive Summary

Sherbourne Common is a 1.5 hectare public space in the heart of the East Bayfront precinct on Toronto's waterfront. The park serves as a public amenity and central gathering area for the new vibrant mixed-use community, as well as a unique visible showcase for the integration of infrastructure into the public realm. The award-winning Pavilion building in Sherbourne Common houses a pumping station and ultra-violet (UV) disinfection system that forms an integral part of the community stormwater management strategy. Currently lake water is treated and discharged through the park via a series of scrim walls and a man-made channel. In the future, during wet weather events, stormwater will also be treated and released through the park features.

Originally stormwater was to be treated in an underground chamber and released directly to the lake. Working for Waterfront Toronto and with West 8+DTAH and Aquatic Habitat Toronto, The Municipal Infrastructure Group Ltd. (TMIG) proposed an integrated facility that would pre-treat the water to remove grit and sediment prior to UV disinfection and re-use in the park. After acceptance, TMIG worked closely with the park designers, Phillips Farevaag Smallenberg and The Planning Partnership, and visual artist Jill Anholt to design an integrated facility to be enjoyed by the public while illustrating sustainable engineering. TMIG were the project managers, lead designers, contract administrators and inspectors for the Pumping Station, UV system and underground services. Dillon Consulting Limited provided electrical design. Teeple Architects designed the Pavilion building. Alston Associates provided geotechnical services.

2 Project Details and Explanation

2.1 Context

It has been described as the crown jewel of Toronto's new waterfront developments. The East Bayfront Precinct is a 22 hectare site situated between Lakeshore Boulevard and Lake Ontario from Jarvis Street to Parliament Street. When completely built-out, East Bayfront will contain 6000 residential units, employment for 8000 people, 3,000,000 square feet of commercial space and 5.5 hectares of open spaces and parks.

At the heart of East Bayfront is Sherbourne Common, a 1.5 hectare public space which serves as a public amenity and central gathering space for the new community. The Pavilion building in Sherbourne Common houses a Pumping Station and UV disinfection system that discharges treated water, currently lake water and stormwater in the future, through the park via a series of scrim walls and a man-made channel that flows through the park. People can enjoy the beauty of the park features and see an important piece of water infrastructure at work.

2.2 Project Objectives, Solutions and Achievements

Previous studies had suggested that stormwater should be treated in a separate underground chamber and released directly to the lake. However, neither the City of Toronto nor Waterfront Toronto were completely satisfied with the concept due to the challenge of constructing the facility in very poor soils, and the difficulty in maintaining the underground facility. Working for Waterfront Toronto and with West 8 + DTAH and Aquatic Habitat Toronto, The Municipal Infrastructure Group Ltd. (TMIG) proposed an integrated facility that would pre-treat the water to remove grit and sediment prior to UV disinfection and re-use in the park. After acceptance, TMIG worked closely with the park designers, Phillips Farevaag Smallenberg and The Planning Partnership, and visual artist, Jill Anholt, to design an integrated facility to be enjoyed by the public while illustrating engineering and sustainability works. TMIG were the Project Managers, Lead Designers and provided Contract Administration and Inspection services for the Pumping Station, UV system and underground services in the Park. Dillon Consulting Limited provided electrical design. Teeple Architects Inc. designed the Pavilion building, and Alston Associates Inc. provided geotechnical services.

The project fulfilled several goals of Waterfront Toronto for the development of the East Bayfront community. The overall mandate for the revitalization of Toronto's waterfront included the creation of new public spaces, the creation of dynamic and diverse new communities, and the promotion of a clean and green environment. To further emphasize the commitment to environmentally sound principles, Waterfront Toronto's 'Sustainability Framework' mandated the utilization of runoff as a resource, to reduce potable water consumption and optimize the required extent of stormwater management infrastructure.

In addition, the City of Toronto's Wet Weather Flow Management Guidelines stipulate a level of stormwater management control for discharges to Lake Ontario that align with the long term objective of compliance with the international Blue Flag designation for water quality and environmental management, primarily to yield a swimmable waterfront. In particular, the stormwater management objectives for the new development included water quality treatment to remove a minimum of 80% of the total suspended solids, reduction in the concentration of E.coli to a maximum of 100 counts per 100ml, and the utilization of runoff as a resource wherever possible.

Within this context, the stormwater management strategy for East Bayfront was developed to satisfy the water quality treatment requirements, long term operational considerations, all while endeavouring to complement the functional and aesthetic design of the community and its public spaces.

The multi-functional character of the stormwater management infrastructure proposed for the new community, which included the requirement for a UV disinfection facility to achieve the bacteriological treatment objectives, yielded a sustainable source of treated water that significantly influenced the design of Sherbourne Common. The park design capitalized on the availability of the sustainable water source through incorporation of a stunning water channel and dramatic water art sculptures, utilization of the treated water for irrigation of the park's landscaped areas, all with the collective intent of creating a public space that embodied Waterfront Toronto's core principles while providing a visible archetype of water infrastructure at work. Images of the infrastructure used for the site can be found in **Appendix A** of the attached documents.

The integration of the pumping station and UV disinfection system into the design of the award-winning Pavilion building further exhibited the sustainability focus for both the park and the overall community.

Extensive stakeholder management was required from the outset of concept development through to commissioning of the system and was at the centre of the success of the project. A collaborative effort was required not only with the various team members but also with the approval agencies involved. The overall stormwater management strategy spanned the jurisdictions of various City departments, along with local, Provincial, and Federal regulatory agencies. A notable example was the extensive consultation with Toronto Public Health necessary to establish the suitability of the treated stormwater and lake water for publically accessible water features. The exercise was ground breaking in that development of a new standard formed part of the effort. The new criteria required a greater level E.coli treatment and a range of other pathogens, with corresponding monitoring and verification programs to verify the adequacy of the design.

The solution represented a unique achievement in the accommodation of the City's Wet Weather Flow Management Guidelines. While the City requires bacteriological treatment, there have been few instances where the scale, circumstance, and guiding principles of a project have allowed for the practical fulfillment of this objective. The incorporation of UV treatment in the management of stormwater runoff generated by redevelopment represents a new frontier in this branch of engineering, on par with the global recognition of the value of water and Canada's role in pioneering water treatment technologies.

2.3 Technical Excellence and Innovation

Regarding the design of this innovative system, it is sometimes best to let others speak. On September 24, 2010 a Canada Newswire article said:

"An innovative new park on Toronto's waterfront that will clean stormwater in its Pavilion and public art installations and release the treated water back into Lake Ontario officially opened today. Sherbourne Common is the third and largest new public space opened by Waterfront Toronto and its government partners since August in Toronto's downtown waterfront area. More than just a beautiful public space,

Sherbourne Common is also the first park in Canada to integrate an ultraviolet (UV) treatment facility for neighbourhood-wide stormwater treatment into its design. Collected stormwater is treated in a UV Facility located in the basement of the park's Pavilion and released from three dramatic art features into a 240-metre long water channel — or urban river — and back out to Lake Ontario."

TRCA recognized the facility by awarding Waterfront Toronto the Living City Healthy Rivers and Shorelines Award for the East Bayfront Integrated Stormwater Management System at Sherbourne Common.

TRCA said *"Waterfront Toronto is leading the development of clean water technology in Ontario by constructing an innovative stormwater management system in East Bayfront that is integrated into the design of the area's public realm. This integrated approach - a first for Ontario and Canada - allows required infrastructure to be beautiful, functional, sustainable and cost-effective. It will serve as a model for city-builders and is setting a new standard for stormwater management processes. Stormwater is conveyed to Sherbourne [Common] where it is treated in a UV Purification Facility in the basement of the Park's pavilion. The water then flows through three dramatic art pieces and a water channel running the length of the park and is returned 99.9% clean into Lake Ontario."*

Christopher Hume of the Toronto Star has said in an article on August 5, 2011: **"***It is appropriate that elements such as sewers and water-treatment facilities should be brought to the fore for everyone to see, and this case, enjoy. As a feature on the Toronto waterfront, the Common adds huge presence to a part of town that had none. Sherbourne Common is about as close to that spirit of innovation as we have come in Toronto. The issue here will be that most visitors will be unaware of the park's larger purpose and, therefore, not realize the full extent of its brilliance. Such intelligence is hard to find in this city, except on the waterfront."*

Some of the innovative features include:

- the UV disinfection and treatment of lake water and stormwater for re-use in the park;
- the incorporation and visible display of sustainable engineering to the general public;
- the successful collaborative design process utilized to ensure that the engineering and public realm elements were interwoven and designed in tandem; and,
- the use of a flexible, reinforced bedding design for the sewer pipes and watermains which allowed construction in very poor soils without the use of piles.

2.4 Environmental, Social, and Economic Benefits

The extent of stormwater management treatment that occurs in Sherbourne Common is the next stage in the evolution of stormwater management technology, and showcases the degree to which runoff can be managed to mitigate the environmental impacts of urbanization. Furthermore, the treatment of lake water during dry weather periods represents additional compensation for the impacts of urbanization, insomuch as the developments in East Bayfront are seeking to improve upon rather than maintain the drainage characteristics of the predevelopment condition. With respect to combined environmental and social perspectives, the solution improves the ecological health of the lake, which simultaneously brings the lake closer to the water quality threshold necessary for human contact and the associated recreational uses. Notwithstanding the small scale of lake water treatment relative to the size of the lake, the approach is also a catalyst for the development of similar solutions that, together, can at a broader scale address the impacts of urbanization on our significant water assets.

The concept of utilizing treated lake water and runoff to supply the aesthetic and functional elements of a new public space makes visible the typically hidden processes and infrastructure needed to sustain our communities, and underscores the inherent sustainability of developing engineered solutions that satisfy

more than just technical requirements. During the first days of the operation of the system, public commentary revealed an immediate and profound recognition of the significance of the system as a representation of the mechanisms by which our communities and our environment are able to coexist in harmony.

From an economic standpoint, Sherbourne Common's impact can be attributed to the project's ability to effectively reduce water treatment and distribution costs. The use of non-potable water sources reduced the amount of chemicals needed to treat the water through the city's water supply, while also allowing the water to be used from an on-site source instead of requiring additional pumping and distribution through the city's water supply system. The financial benefits of these distribution and treatment systems can be attributed to their advanced level of resourcefulness and efficiency.

2.5 Level of Complexity

The system accomplishes several distinct but complementary objectives through the treatment and re-use of valuable water resources while minimizing the impacts on the local environment. In fact, the system has a significant net positive benefit to the local biosphere. When fully operational, the system will remove oil, grit and contaminated sediments from the stormwater generated by rainwater falling both on the East Bayfront area and the external contributing drainage areas. The water will then be treated through UV disinfection to remove potentially harmful bacteria and pathogens, yielding sufficient quality for display in art features for the safe enjoyment of the general public prior to discharge into the lake. The discharge point has been co-ordinated with the future location of aquatic habitat improvements, to be constructed as part of the future dockwall rehabilitation works. This clean water will aid in providing a clean protected area for aquatic organisms to thrive and prosper. The pumping station also supplies water to the irrigation system for the park, thereby minimizing the consumption of potable water for park maintenance, and accordingly reducing the amount of chemicals and energy required to treat and use water for the East Bayfront community.

These vibrant scrim walls can be seen lighting up the night sky

3 Project Components

To achieve the various objectives it was necessary to incorporate a number of different components into the engineering solution, increasing complexity of the design. Brief descriptions of the main components are as follows, with detailed drawings provided in **Appendix B**.

3.1 Pumping Station and UV System Overview

The pumping station and UV disinfection facility together provide treated water to the water features within Sherbourne Common. The source water is supplied from natural sources (i.e., clarified stormwater and raw water from Lake Ontario) within the vicinity of the East Bayfront lands. Toronto's Wet Weather

Flow Management Guideline and Toronto Public Health's (TPH) requirements stipulate that the water be disinfected to levels that are safe for human contact. To achieve these targets, two UV disinfection units have been provided in the Sherbourne Common pumping station for disinfecting pre-treated stormwater from the SWM facility, water from Lake Ontario, and the recirculated water from the Sherbourne Common channel.

The pumping system operates based on dry and wet weather conditions, in combination with water quality and is intended to be pumped to the channel 24/7 for the entire operating season (May to October).

3.2 Scrim Wall Pumping System

The water features at Sherbourne Common include three scrim walls, which require a total water supply of 18 - 24L/s continuously between the hours of 7:00 am and 11:00 pm (adjustable) during the operating season (May to October). Two scrim wall pumps (one duty, one standby) rated at 24 L/s each, complete with VFD motors, have been provided in the Pavilion mechanical room and draw water from the downstream (i.e. treated) side of the UV treatment units. These pumps can only operate to provide water to the scrim walls if one of the submersible pumps and UV units is running. A potable water connection with an electrically actuated solenoid ball valve (and appropriate backflow prevention) has been provided on the discharge side of the scrim wall pumps for winter operation. Operations staff can manually press the bypass button on the solenoid to apply 10 second *shots* of water onto the scrim walls as required for the desired effect during the winter months.

3.3 Irrigation Pumping System

Two irrigation pumps rated at 1.9 L/s each have been provided in the Pavilion mechanical room and will draw water from the downstream side of the UV treatment units. The irrigation pumps are intended to operate on a timer. These pumps can only operate to provide water to the irrigation system if a submersible pump is running.

3.4 Submersible Pumps

Three submersible pumps have been provided in the pumping station wet well in order to provide a firm pump capacity of 70 L/s of draw from the future SWM Facility, and a firm supply capacity of 140 L/s to the water features, as well as to accommodate a bypass/recirculation pumping arrangement. The pumps will operate on variable frequency drives (VFD) and are intended to operate automatically through the control panel based on measured levels of the SWM Facility in the wet well while also providing 140 L/s to the water features during wet weather conditions, and 110 L/s in dry weather conditions.

3.5 Level Transmitters

Two level transmitters are provided in the pumping station wet well; one in the sub-cell in Cell 2 and the other in Cell 3. The level transmitter in Cell 2 is used to indirectly monitor the level in the future SWM Facility. The level transmitter in Cell 3 is used to monitor the water level in Cell 3 if it is isolated, or all the Cells if they are hydraulically connected. The PLC monitors the levels in the respective cells and initiates pump and valve operating sequences depending on the condition.

3.6 Motorized Valves

The pumping station wet well has three inlets; one from the channel, one from the SWM Facility and another from Lake Ontario. The inlet from Lake Ontario (Cell 1) and the channel (Cell 3) are fitted with electrically-actuated knife-gate valves within the wet well of the station. The valves are opened or closed

depending on the intended source of water to be used for the water features. The inlet from the SWM Facility (Cell 2) is isolated via an electrically actuated slide gate valve. The wet well and discharge piping are also fitted with valves, some with electric actuators that open or close depending on the intended operation and distribution of flows.

3.7 Turbidity Analyzer (Turbidimeter)

A turbidimeter is provided upstream of the UV treatment units to monitor levels of turbidity in the water supply. The turbidity levels are monitored by the UV control panel. The pumping station PLC also monitors the turbidity level status, and adjusts the operation of the pumps as necessary depending on water quality.

3.8 UVT Transmitter

A UVT transmitter is provided upstream of the UV treatment units to monitor the transmissivity of the water. The UVT is monitored by the UV control panel, which modifies the intensity at which the UV units need to operate for effective treatment. UVT status is also be monitored by the station PLC.

3.9 Treatment Units

The UV treatment units are situated in the Pavilion mechanical room basement. The units are installed in the horizontal position adjacent to one another and operate in parallel. The UV treatment units are intended to treat water from either the future SWM Facility or Lake Ontario to a sufficient level to make the water bacteriologically suitable for human contact. The units come with a dedicated vendor-supplied control panel that controls the intensity of the UV treatment based on water quality and flow rate.

UV Treatment Units used at Sherbourne Common

3.10 Flow Meter

A clamp-on flow meter is installed on the 400mm header on the downstream side of the UV units and is monitored by the UV control panel. The flow meter provides an indication of the flow to the water features and is monitored by the station PLC. It also allows the UV treatment units to adjust their intensity in combination with the UVT reading of the water.

3.11 Scrim Wall and Irrigation Booster Pumps

Two close coupled, end suction, horizontally mounted centrifugal pumps have been provided in the Pavilion basement to supply water to the scrim walls. The pumps will draw treated water from the 400mm header on the downstream (treated) side of the UV treatment units and will operate on VFD's.

Another two close coupled, end suction, horizontally mounted centrifugal pumps have been provided in the Pavilion basement for the irrigation system. The pumps draw treated water from the 400mm header on the downstream (treated) side of the UV treatment units to provide water to the irrigation system.

4 Owner's Needs and Conclusions

As confirmed by the owner in their letter enclosed as **Appendix C**, the project met all of Waterfront Toronto's objectives "within the approved timeframe and within overall budget." Since the project involved the consultation and collaboration of many stakeholders with differing objectives and skill sets, the project was able to achieve a wide range of objectives.

The functional objectives of treating lake water currently and stormwater in the future to levels acceptable for human contact has been achieved thorough implementation of the UV treatment system. The supply of water to the park features was achieved in a manner respecting the waterfront's sustainability framework by utilizing non-potable water sources to wholly supply their requirements. This reduced the amount of chemicals needed to treat the water through the city's water supply and also allowed the water to be used from an on-site source instead of requiring pumping and distribution through the City's water distribution system.

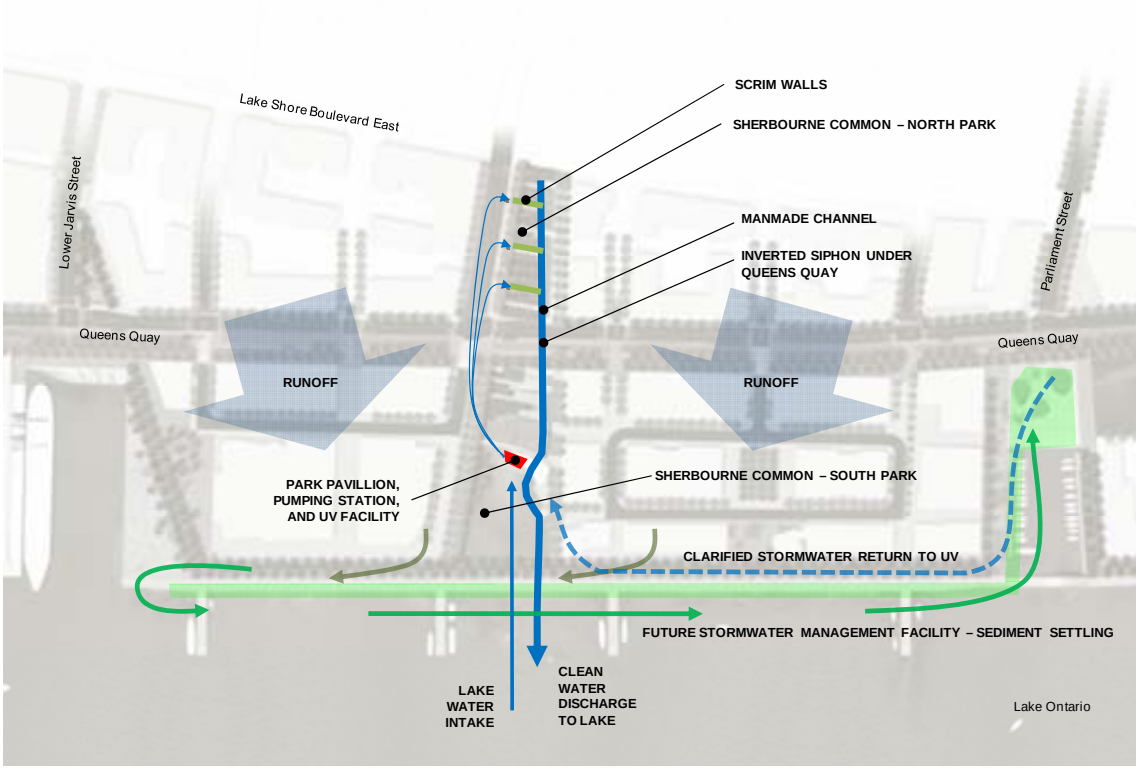
Aesthetically, the park was able to achieve all the goals of Waterfront Toronto and the City by providing an iconic water feature drawing people to the park.

The park itself has become an illustrative example to the media and general public of engineering and its impacts on everyday society.

Appendix A

Project Photographs

Photos:



1. Stormwater Management Process Flow Overview

2. Construction of Intake Pipes into Wet Well

3. Construction of Wet Well

4. UV System

5. Scrim Walls, Reed Beds and Channel

6. Channel North of Queen's Quay

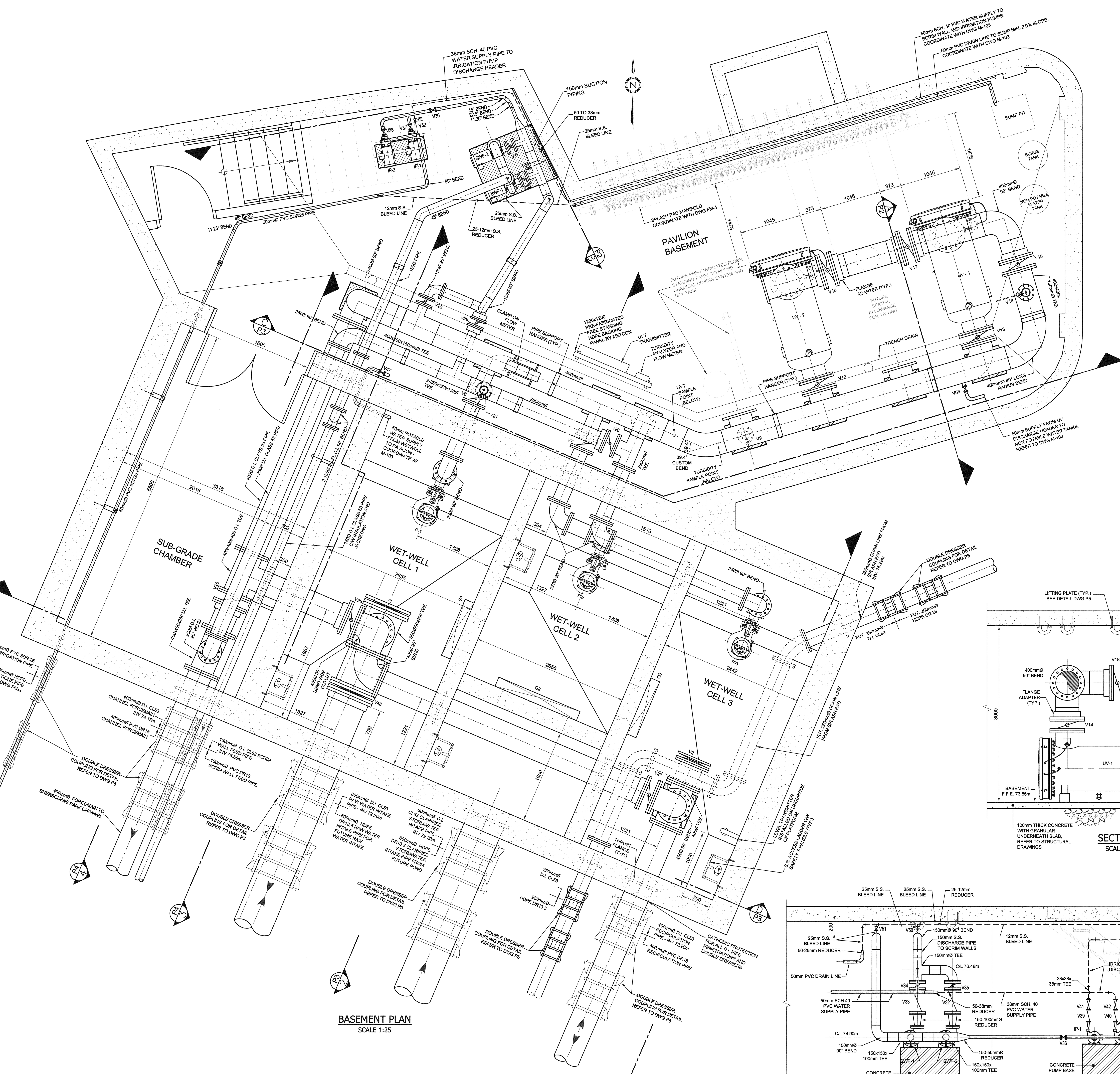
7. Pavilion with Channel , Inverted Siphon Outlet Grate in Foreground

8. Outlet to Lake Ontario, Re-circulation Intake Grate in Foreground

Photo Credit: Cover – Waterfront Toronto, Photos 1-8 – The Municipal Infrastructure Group Ltd. All photos can be used by the Consulting Engineers of Ontario for marketing purposes.

Appendix B

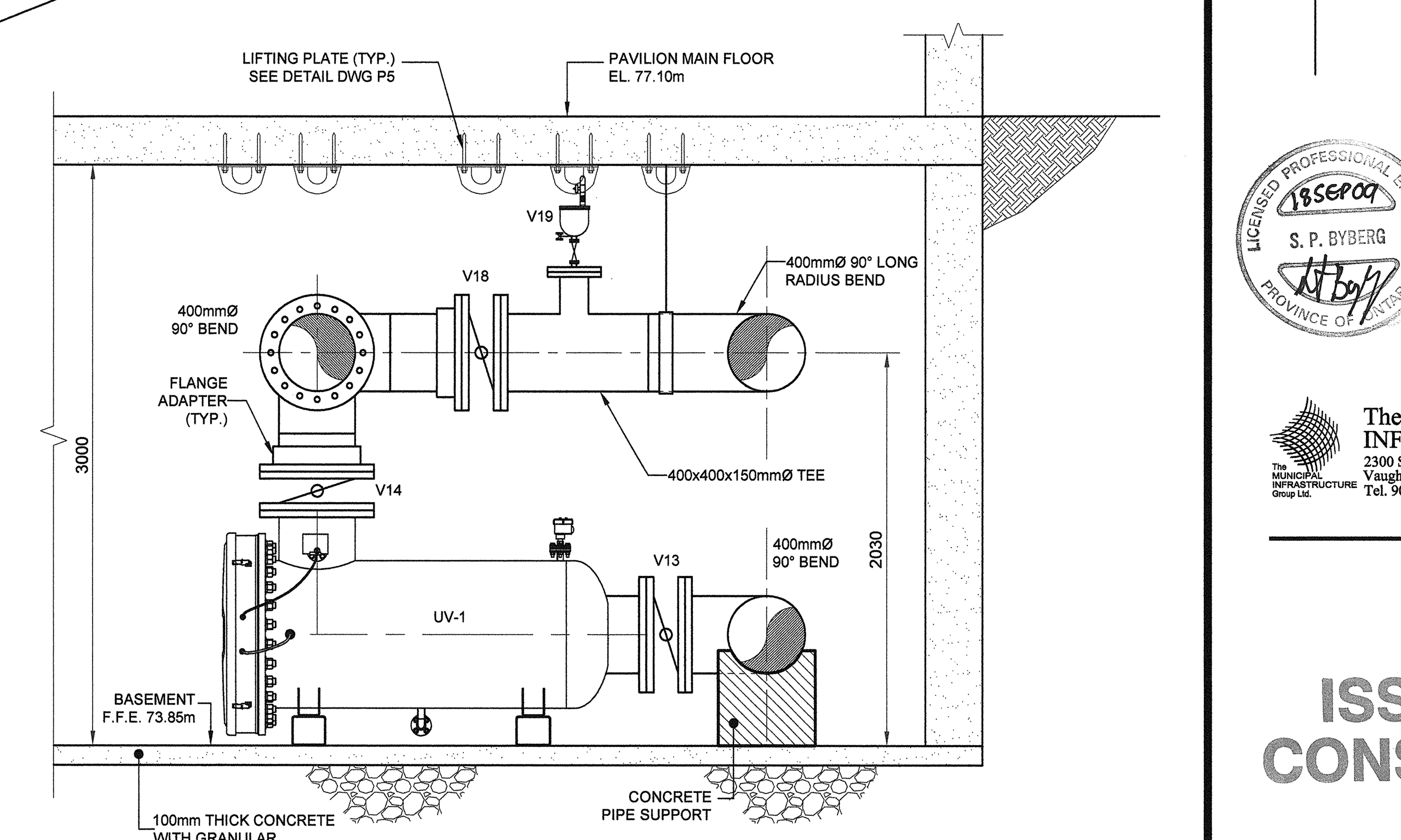
Design Drawings



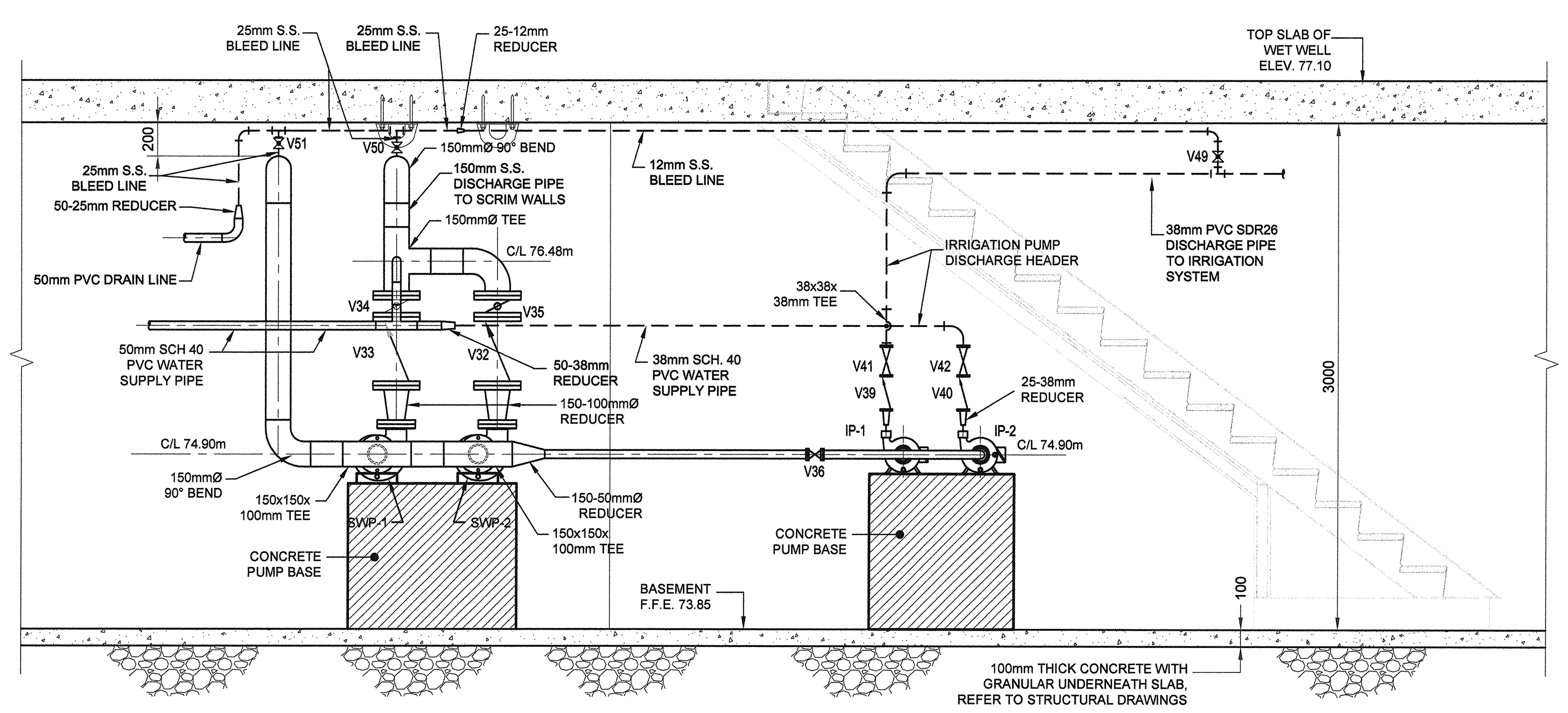
BASEMENT PLAN
SCALE 1:25

NOTE:

1. FOR GENERAL MECHANICAL / PROCESS NOTES REFER TO DWG P1
2. ALL THRUST FLANGES SHALL BE RATED FOR 150 PSI
3. THE 150mm DUCTILE IRON PIPING IN THE SUBGRADE CHAMBER SHALL BE INSULATED WITH 50mm INSULATION AND STAINLESS STEEL METAL JACKETING.
4. THE INTERIOR OF ALL EQUIPMENT PIPING, VALVES AND FITTINGS IN THE PAVILION BASEMENT SHALL BE SUITABLE TO HANDLE SALINE SOLUTION UP TO 5.0%.
5. THE INTERIOR AND EXTERIOR OF ALL EQUIPMENT, PIPING, VALVES AND FITTINGS IN THE WET WELL SHALL BE SUITABLE TO HANDLE SALINE SOLUTION UP TO 5.0%.
6. FLANGE ADAPTERS SHALL BE KLAMFLEX OR APPROVED EQUAL SIZED TO SUIT PIPE OUTSIDE DIAMETER
7. PIPE HANGERS SHALL BE ANVIL, PLASTIC COATED PER FIG 260, COMPLETE WITH GALVANIZED THREADED ROD PER FIG 253 LENGTH TO SUIT, AND GALVANIZED CONCRETE ROD ATTACHMENT PLATE PER FIG 52, OR APPROVED EQUAL SYSTEM.
8. ALL AIR RELEASE VALVES AND INSTRUMENT DRAINAGE SHALL BE PIPED TO THE TRENCH DRAIN
9. PROVIDE CATHODIC PROTECTION ON ALL DOUBLE DRESSER COUPLINGS AND DUCTILE IRON THROUGH-WALL PIPE PENETRATIONS.
10. INSTRUMENTS SAMPLE POINTS SHALL BE SIZED TO SUIT SAMPLE LINE C/W A S.S. ISOLATION BALL VALVE



SECTION A
SCALE 1:25



SECTION B
SCALE 1:25

THE CLIENT

WATERFRONToronto

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EAST BAYFRONT PROJECT TEAM

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REVISIONS

No.	Date	Details	By
1	SEP 16, 2009	ISSUED FOR CONSTRUCTION	MRE

LICENSED PROFESSIONAL ENGINEER
18SEP09
S. P. BYBERG
PROVINCE OF ONTARIO

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18 Sept 09
M.R. ELLIOTT
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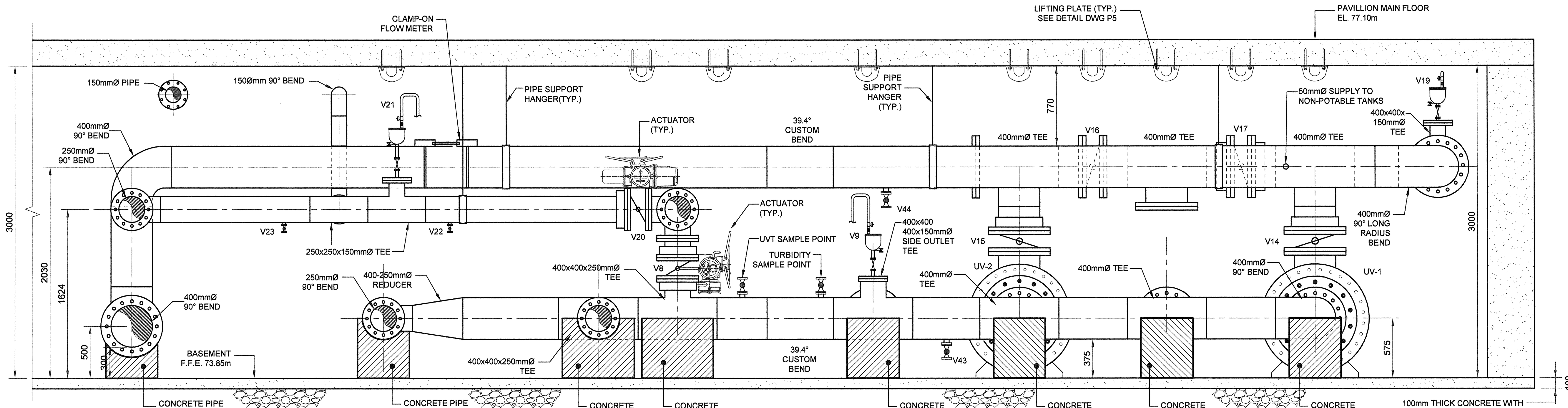
ISSUED FOR CONSTRUCTION

SHERBOURNE PARK

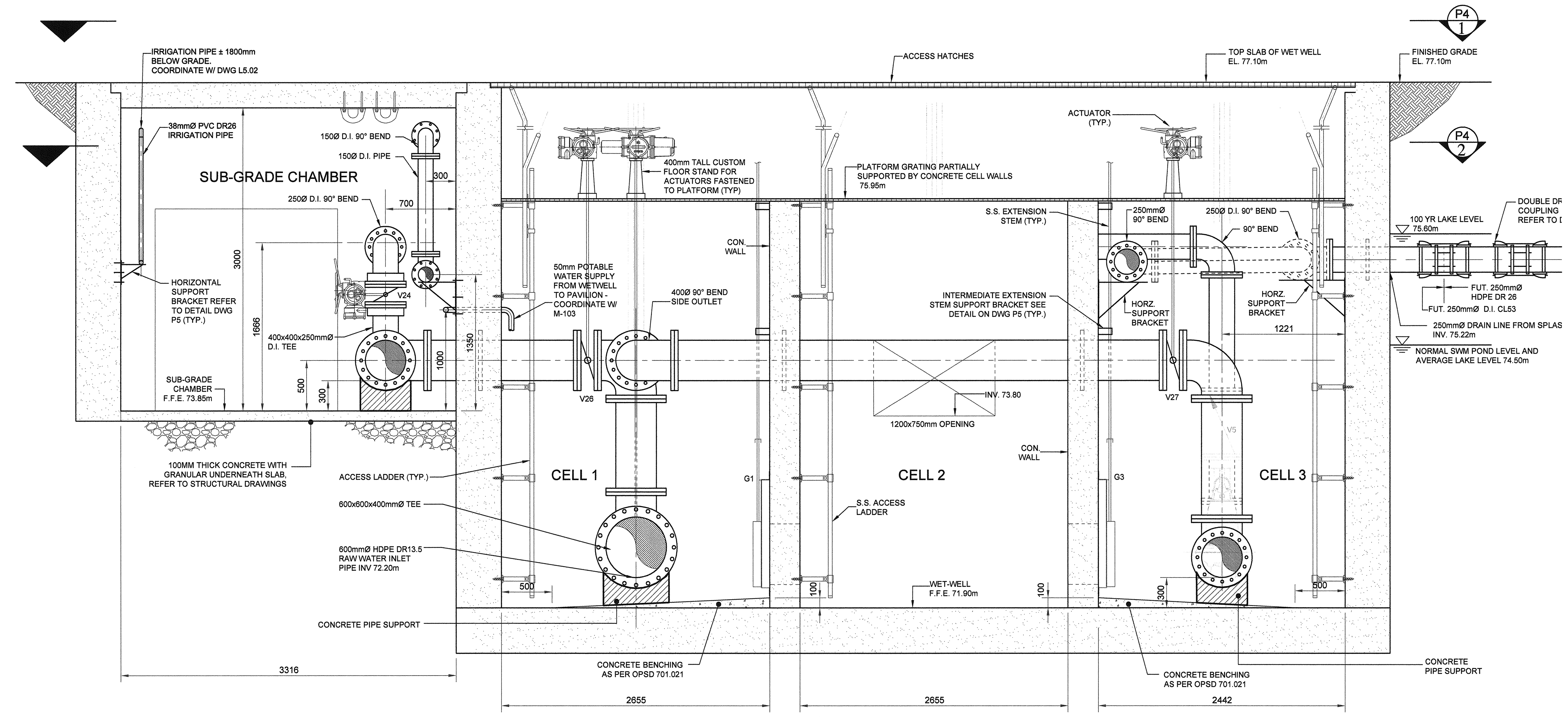
DRAWING TITLE

PAVILION BASEMENT AND WET WELL PLAN & SECTIONS

DATE MARCH, 2009	PFS PROJECT No. 07-021
SCALE AS SHOWN	DRAWING No.
Drawn By: CAD	P2
Checked By: SPB	



SECTION C / P3
SCALE 1:25

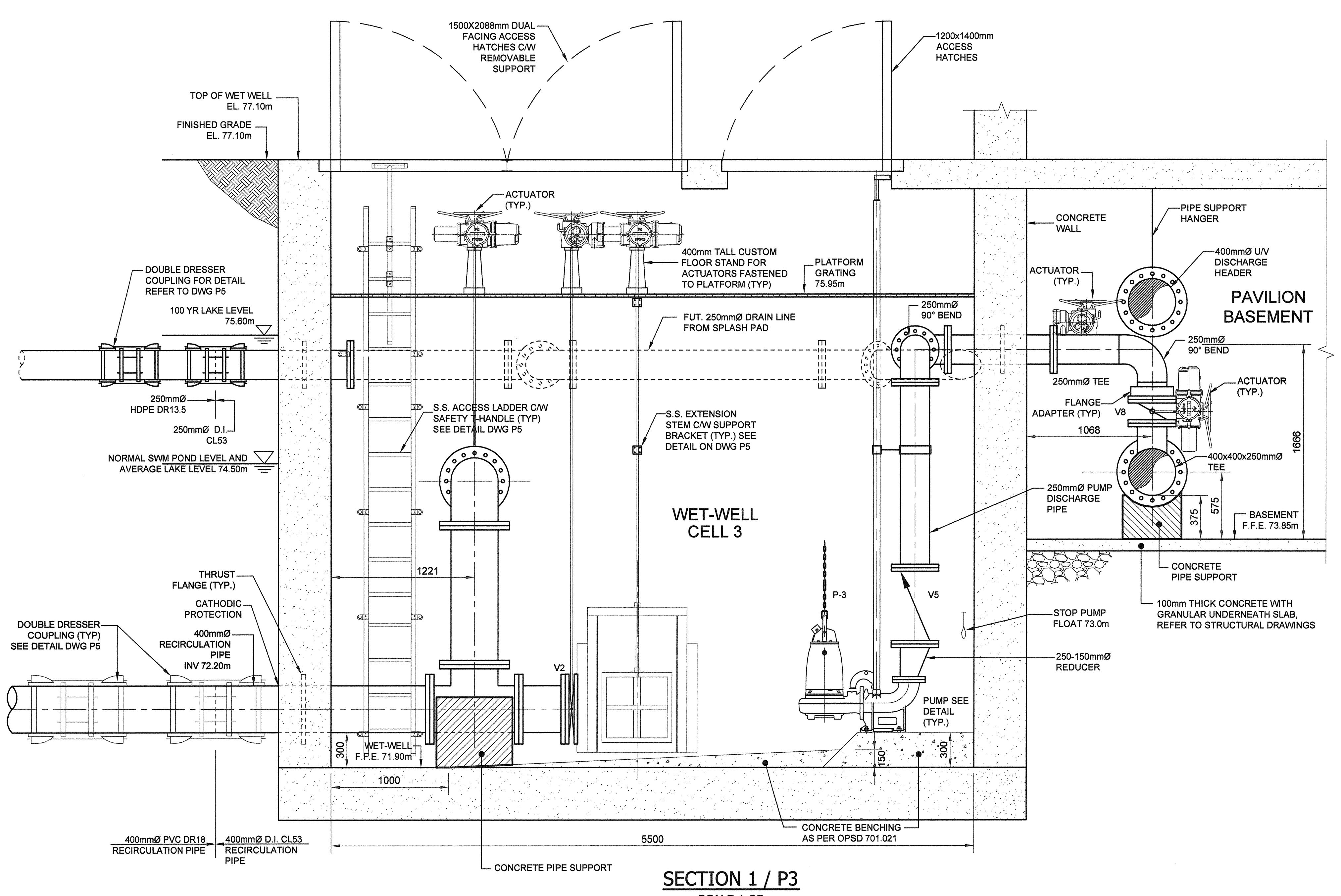


SECTION D / P3
SCALE 1:25

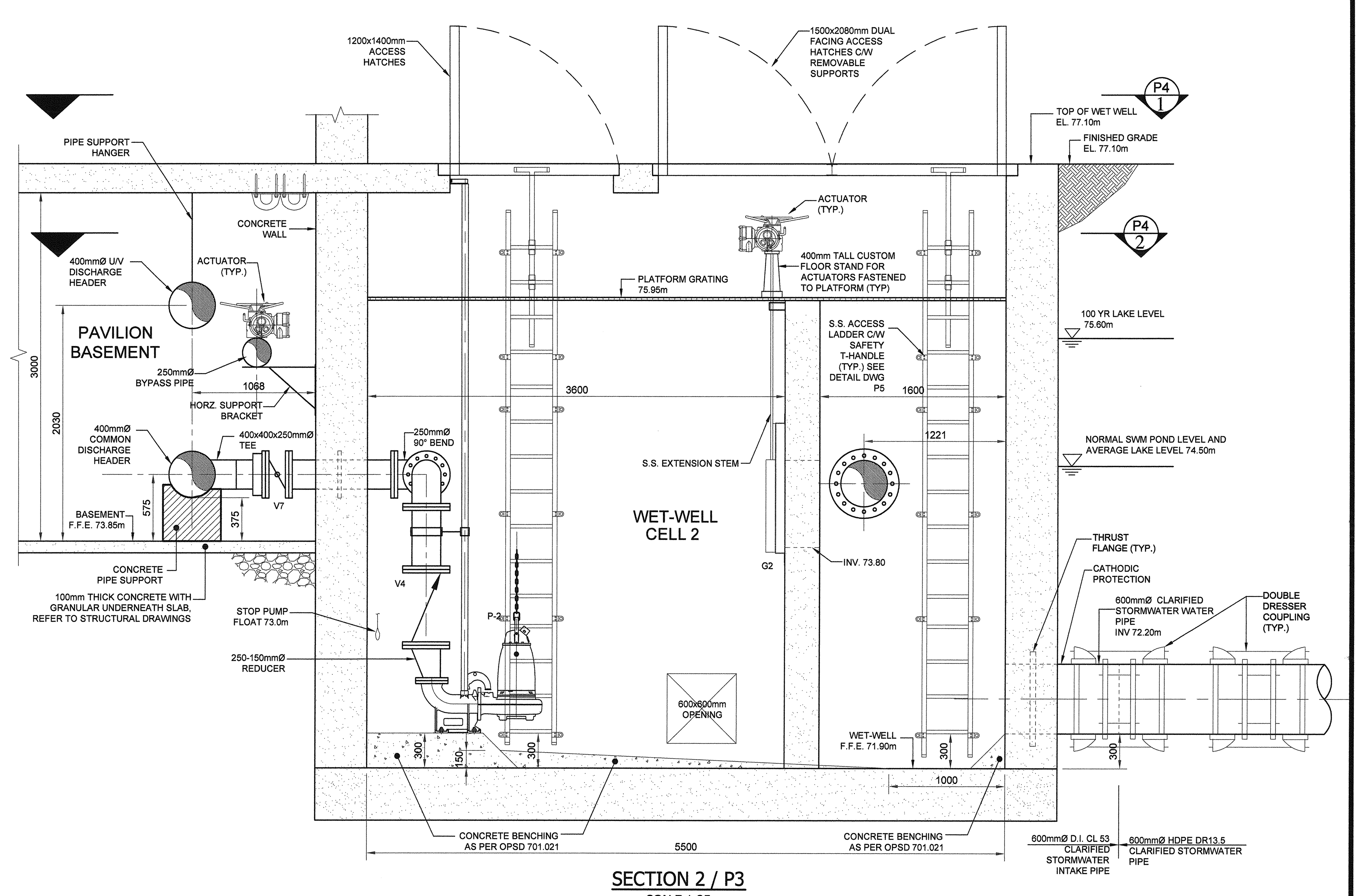
* ALL ELECTRICAL ACTUATORS ARE NOT SHOWN IN THIS SECTION FOR CLARITY PURPOSES.

NOTE:

1. FOR GENERAL MECHANICAL / PROCESS NOTES REFER TO DWG P1
2. ALL THRUST FLANGES SHALL BE RATED FOR 150 PSI
3. THE 150mm DUCTILE IRON PIPING IN THE SUBGRADE CHAMBER SHALL BE INSULATED WITH 50mm INSULATION AND STAINLESS STEEL METAL JACKETING.
4. THE INTERIOR OF ALL EQUIPMENT PIPING, VALVES AND FITTINGS IN THE PAVILION BASEMENT SHALL BE SUITABLE TO HANDLE SALINE SOLUTION UP TO 5.0%.
5. THE INTERIOR AND EXTERIOR OF ALL EQUIPMENT, PIPING, VALVES AND FITTINGS IN THE WET WELL SHALL BE SUITABLE TO HANDLE SALINE SOLUTION UP TO 5.0%.
6. FLANGE ADAPTERS SHALL BE KLAMFLEX OR APPROVED EQUAL SIZED TO SUIT PIPE OUTSIDE DIAMETER
7. PIPE HANGERS SHALL BE ANVIL, PLASTIC COATED PER FIG 260, COMPLETE WITH GALVANIZED THREADED ROD PER FIG 253 LENGTH TO SUIT, AND GALVANIZED CONCRETE ROD ATTACHMENT PLATE PER FIG 52, OR APPROVED EQUAL SYSTEM.
8. ALL AIR RELEASE VALVES AND INSTRUMENT DRAINAGE SHALL BE PIPED TO THE TRENCH DRAIN
9. PROVIDE CATHODIC PROTECTION ON ALL DOUBLE DRESSER COUPLINGS AND DUCTILE IRON THROUGH-WALL PIPE PENETRATIONS.
10. ALL CONCRETE PIPE SUPPORTS SHALL BE INSTALLED TO SPRINGLINE OF PIPE.



SECTION 1 / P3
SCALE 1:25



SECTION 2 / P3
SCALE 1:25

G:\Projects\2007\07136 - Waterfront Toronto - East Bayfront\Drawings\PARKS\SHERBOURNE PARK\DETAILS\P3-P3.dwg Sep18 2009 - 10:07am

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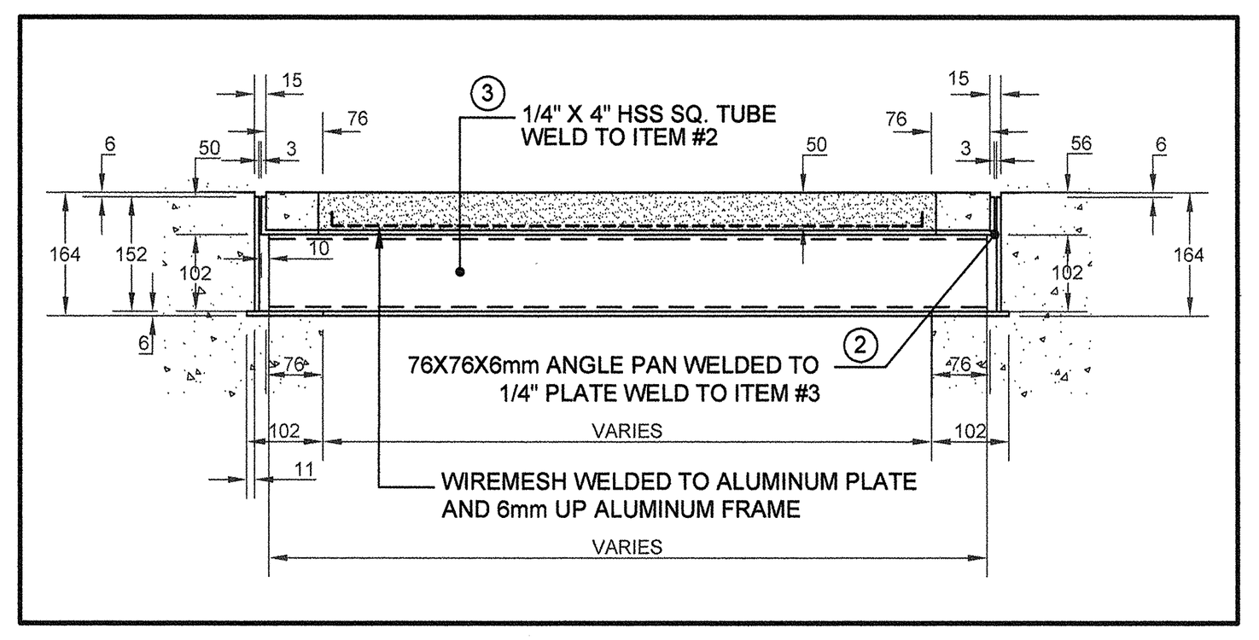
SHERBOURNE PARK

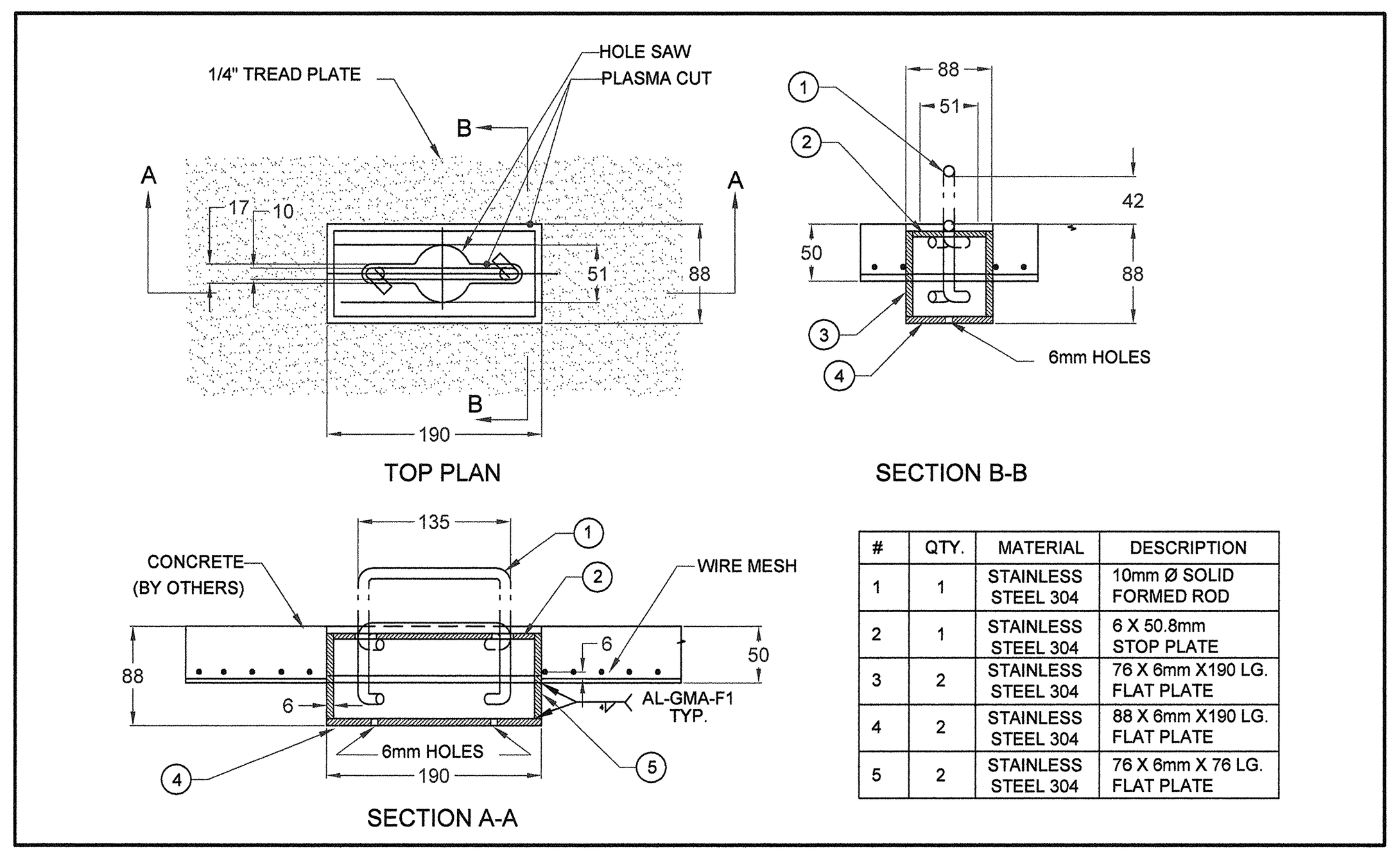
DRAWING TITLE

PAVILION BASEMENT AND WET WELL SECTIONS

DATE	PFS PROJECT No.
MARCH, 2009	07-021
SCALE: AS SHOWN	DRAWING No.
Drawn By: CAD	P3
Checked By: SPB	

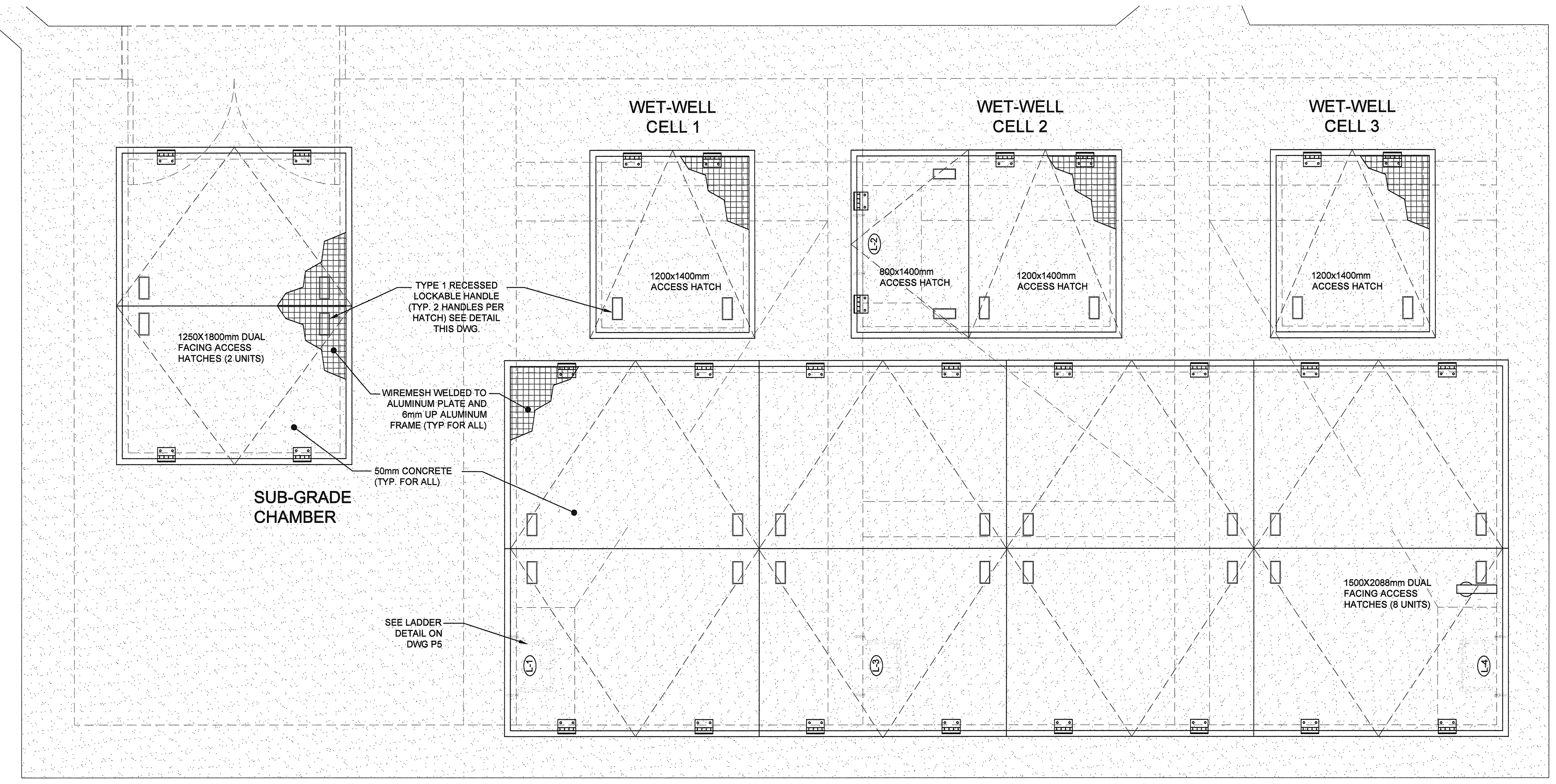


SECTION VIEW - HATCH
NOT TO SCALE

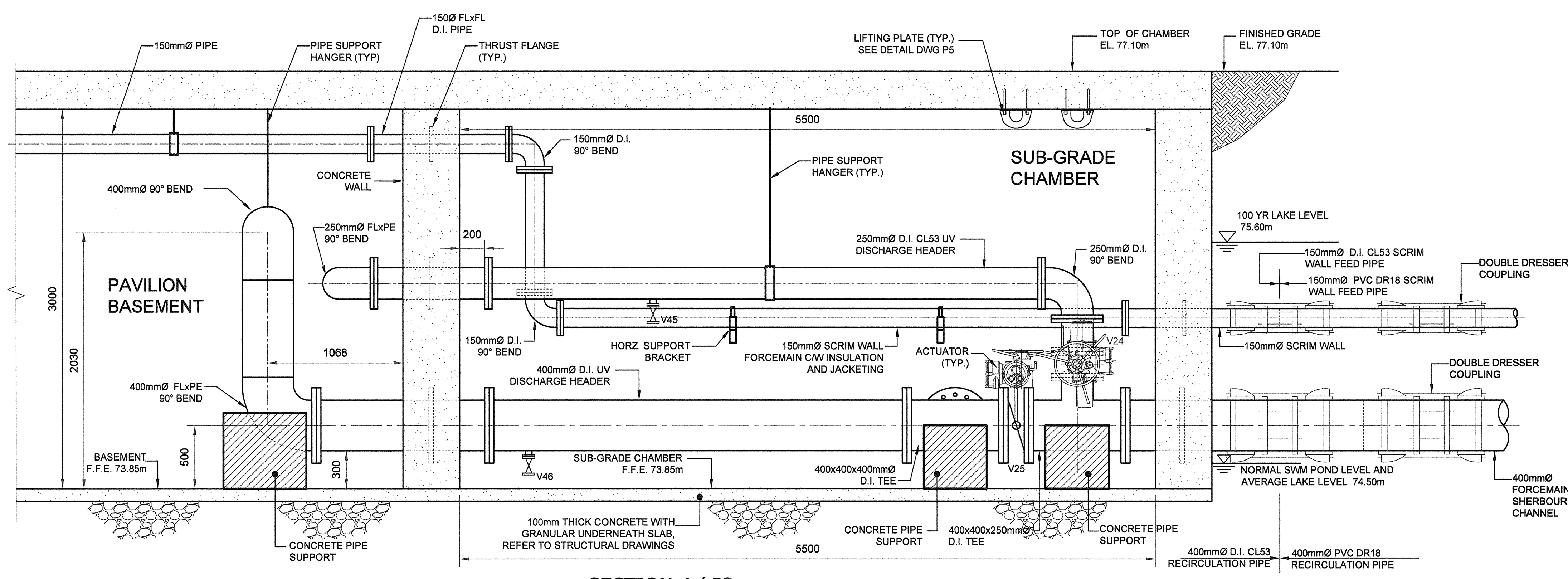


#	QTY	MATERIAL	DESCRIPTION
1	1	STAINLESS STEEL 304	10mm Ø SOLID FORMED ROD
2	1	STAINLESS STEEL 304	6 X 50.8mm STOP PLATE
3	2	STAINLESS STEEL 304	76 X 6mm X190 LG. FLAT PLATE
4	2	STAINLESS STEEL 304	88 X 6mm X190 LG. FLAT PLATE
5	2	STAINLESS STEEL 304	76 X 6mm X 76 LG. FLAT PLATE

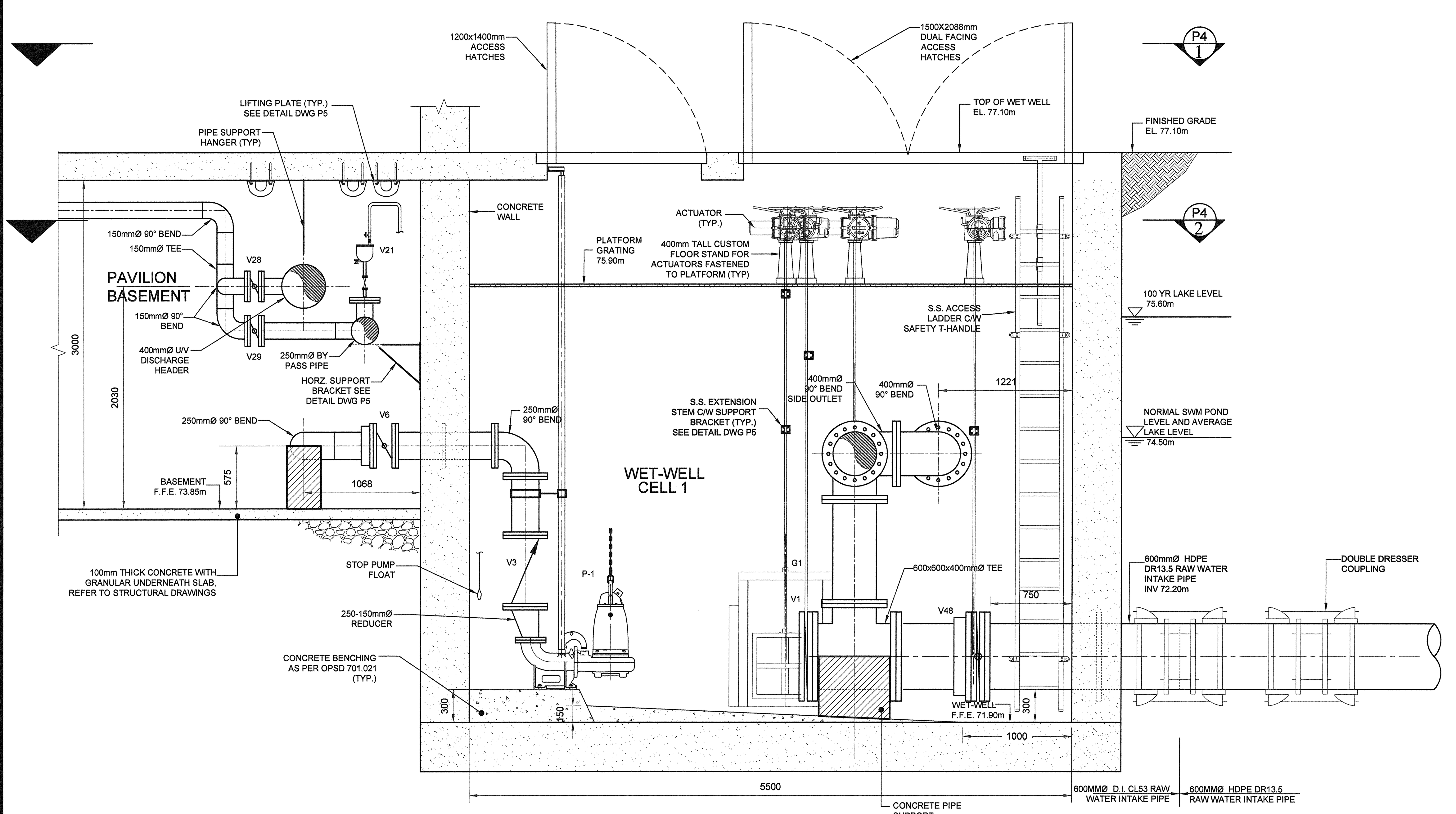
RECESSED HANDLE DETAIL
NOT TO SCALE



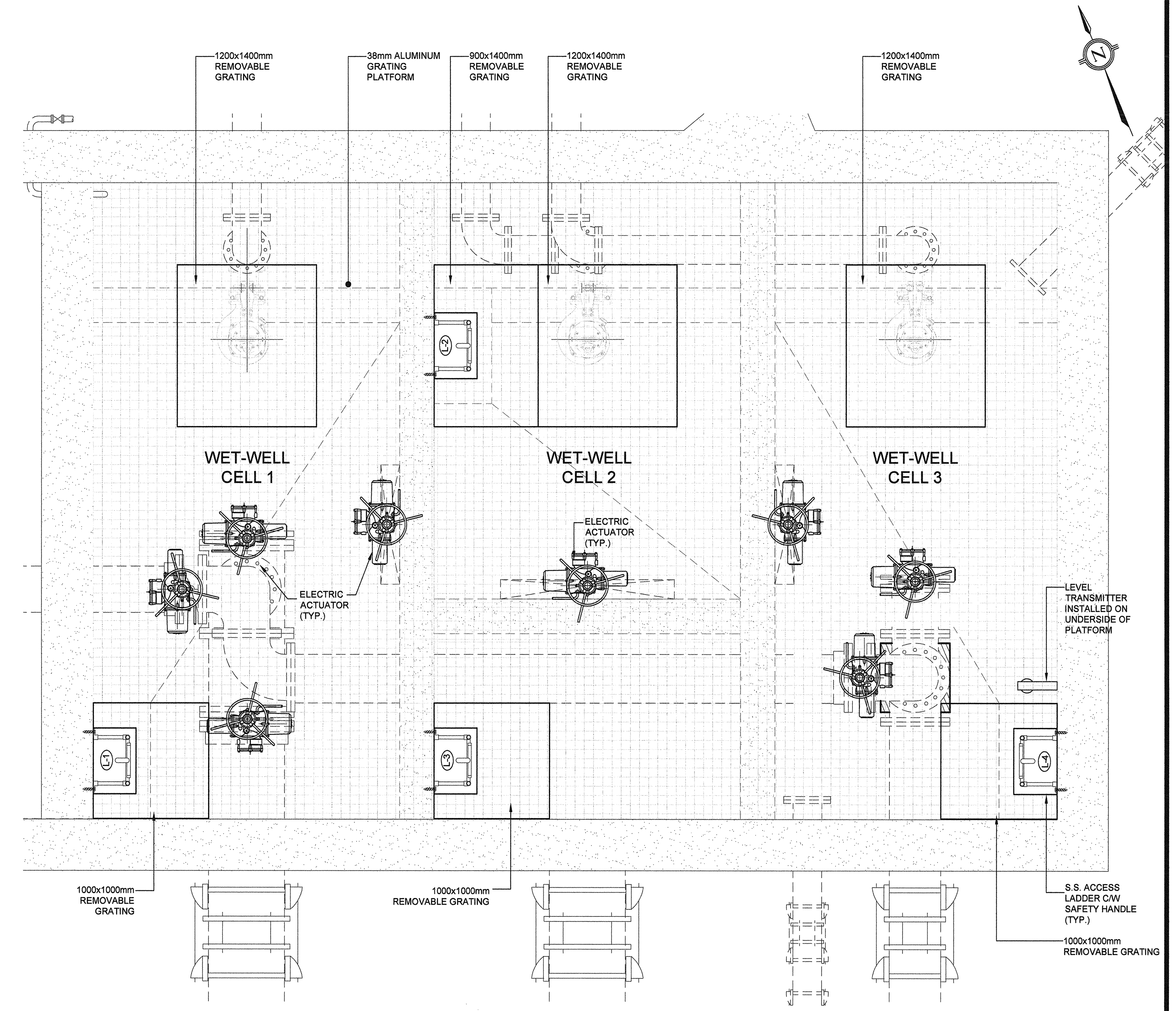
SECTION 1 / P3 - WET WELL HATCH PLAN
SCALE 1:25



SECTION 4 / P2
SCALE 1:25



SECTION 3 / P2
SCALE 1:25



SECTION 2 / P3 - WET WELL PLATFORM
SCALE 1:25

NOTE:

1. ALL HATCHES TO BE ALUMINUM, 50mm DEEP PAN, AND DESIGNED FOR OCCASIONAL WATER TRUCK LOAD.
2. ALL ALUMINUM SURFACES IN CONTACT WITH CONCRETE SHALL RECEIVE TWO (2) COATS OF BITUMINOUS PAINT.
3. ALL WELDING SHALL MEET APPLICABLE CSA STANDARDS. WELDED SURFACES SHALL REMAIN WELDED.
4. ALL HATCHES TO BE SELF SUPPORTING AND BE PROVIDED WITH AT LEAST TWO HYDRAULICALLY ASSISTED LIFTING ARMS. ALL INTERMEDIATE BEAM SUPPORTS FOR THE 1500x2125 HATCHES SHALL BE REMOVABLE AFTER HATCHES ARE OPENED.
5. APPROXIMATE WEIGHT OF 1250 x 1800 HATCH IS 270kg.
6. APPROXIMATE WEIGHT OF 1250 x 1400 HATCH IS 205kg.
7. APPROXIMATE WEIGHT OF 1500 x 2125 HATCH IS 410kg.
8. MINIMUM PLATFORM GRATING LIVE LOAD 4.8 kPa. PLATFORM AND SUPPORTS ALSO TO BE DESIGNED TO HOLD WEIGHT OF ELECTRIC ACTUATORS AND FLOOR STANDS.
9. CONTRACTOR TO SUBMIT SHOP DRAWINGS OF THE PLATFORM GRATING AND SUPPORT SYSTEM. GRATING AND SUPPORTS SHALL BE DESIGNED TO MEET APPLICABLE ONTARIO BUILDING CODE AND CSA STANDARDS.
10. ALL DISSIMILAR METALS SHALL BE SEPARATED BY APPROPRIATE GASKETS OR COATINGS.
11. CONTRACTOR TO SUBMIT SHOP DRAWINGS OF ALL HATCHES, INCLUDING ALL PLAN, SECTIONS, DETAILS AND DESIGN LOADS AND SPECIFICATIONS FOR REVIEW AND APPROVAL.
12. RECESSED HANDLE ON ALL HATCHES SHALL BE LOCKABLE WITH A PAD LOCK.

THE CLIENT

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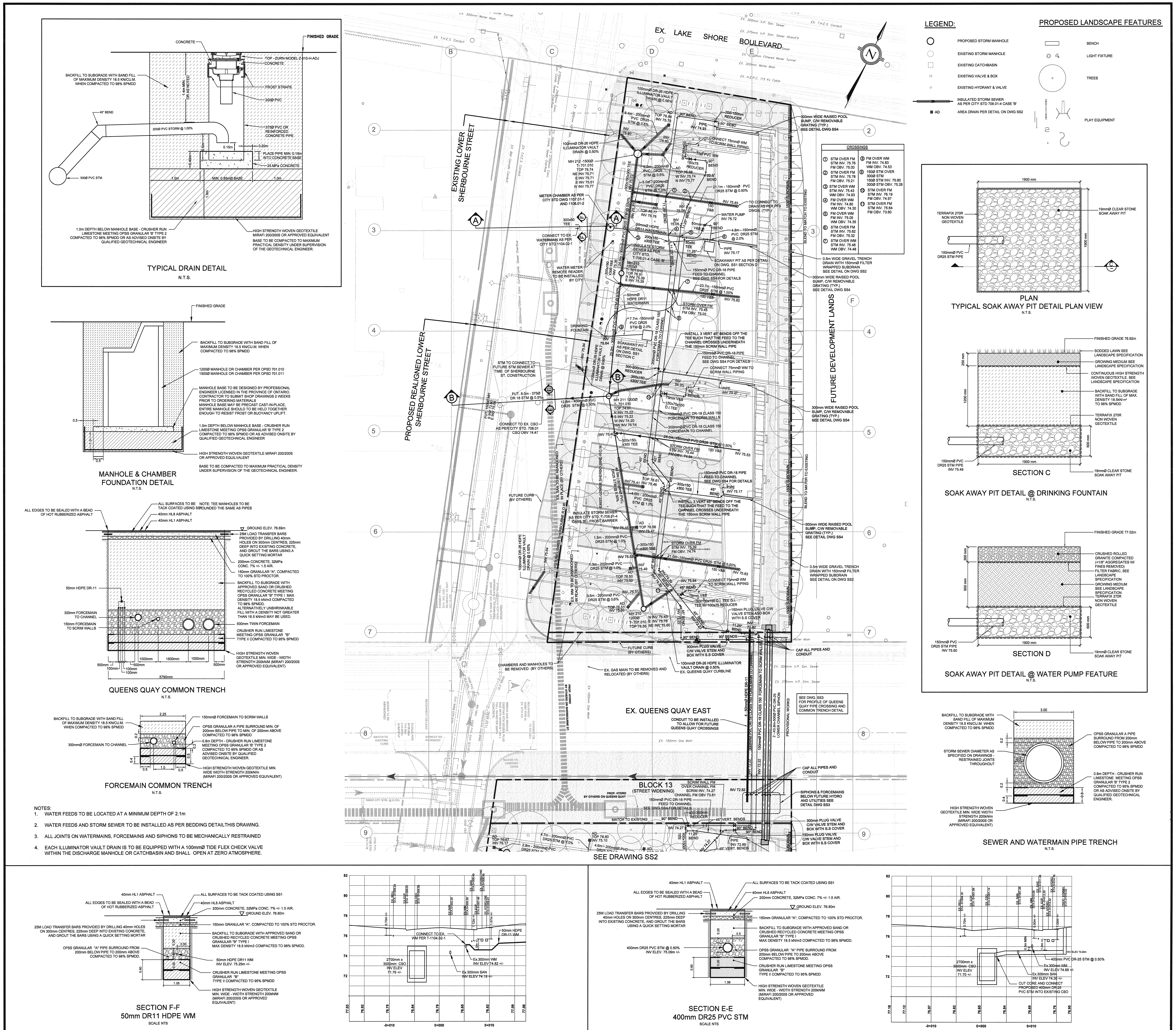
ISSUED FOR CONSTRUCTION

SHERBOURNE PARK

DRAWING TITLE

PAVILION WET WELL PLANS AND SECTIONS

DATE MARCH, 2009	PFS PROJECT No. 07-021
SCALE AS SHOWN	DRAWING No.
Drawn By: CAD	P4
Checked By: SPB	



NOTES:

1. WATER FEEDS TO BE LOCATED AT A MINIMUM DEPTH OF 2.1m
2. WATER FEEDS AND STORM SEWER TO BE INSTALLED AS PER BEDDING DETAILTHIS DRAWING.
3. ALL JOINTS ON WATERMAINS, FORCEMAINS AND SIPHONS TO BE MECHANICALLY RESTRAINED
4. EACH ILLUMINATOR VAULT DRAIN IS TO BE EQUIPPED WITH A 100mmØ TIDE FLEX CHECK VALVE WITHIN THE DISCHARGE MANHOLE OR CATCHBASIN AND SHALL OPEN AT ZERO ATMOSPHERE.

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ISSUED FOR CONSTRUCTION

SHERBOURNE PARK

DRAWING TITLE

SITE SERVICING PLAN

DATE	PFS PROJECT No.
DECEMBER, 2008	07-021
SCALE 1:250	DRAWING No.
Drawn By: CAD	SS1
CHECKED LMH	

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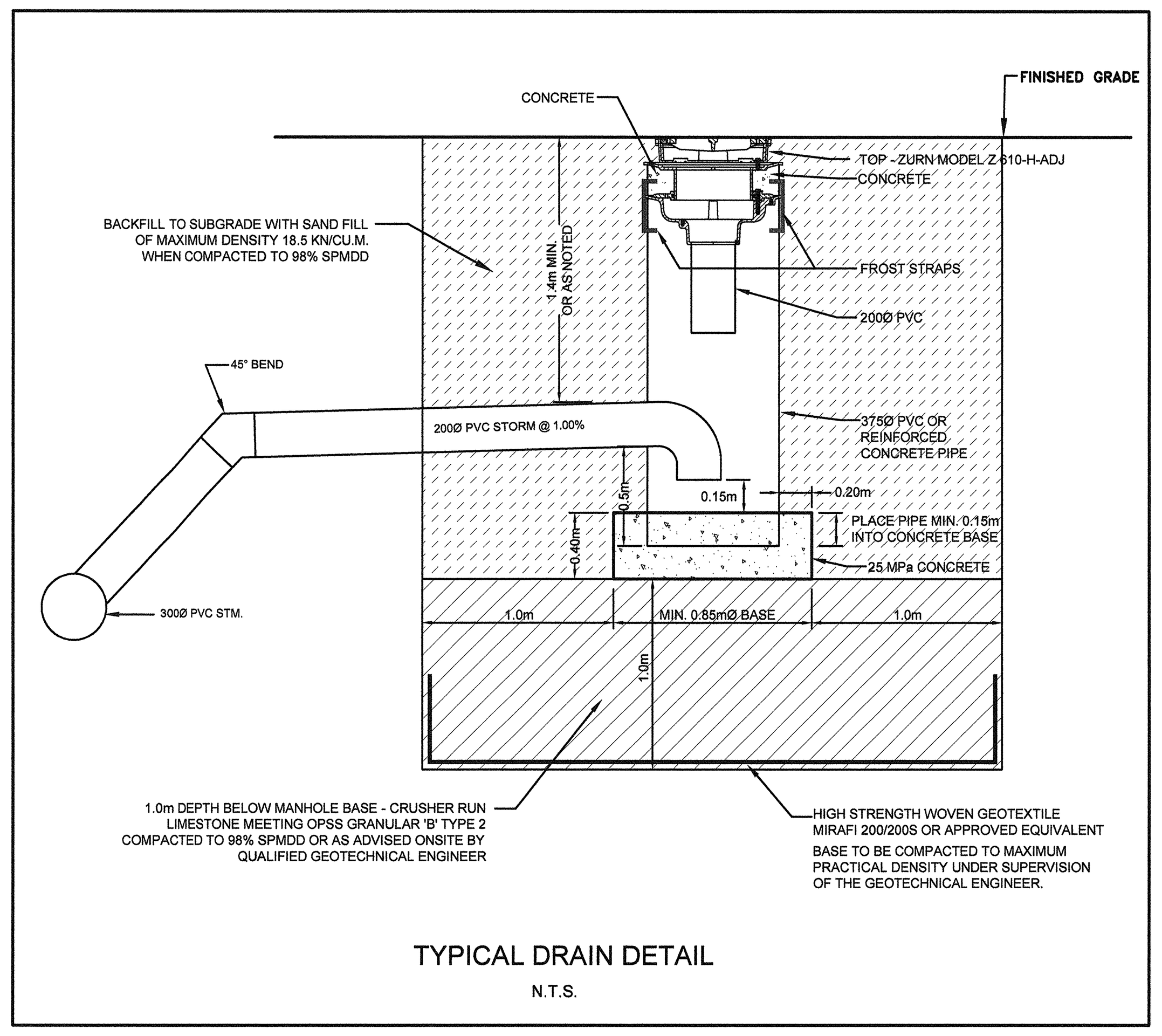
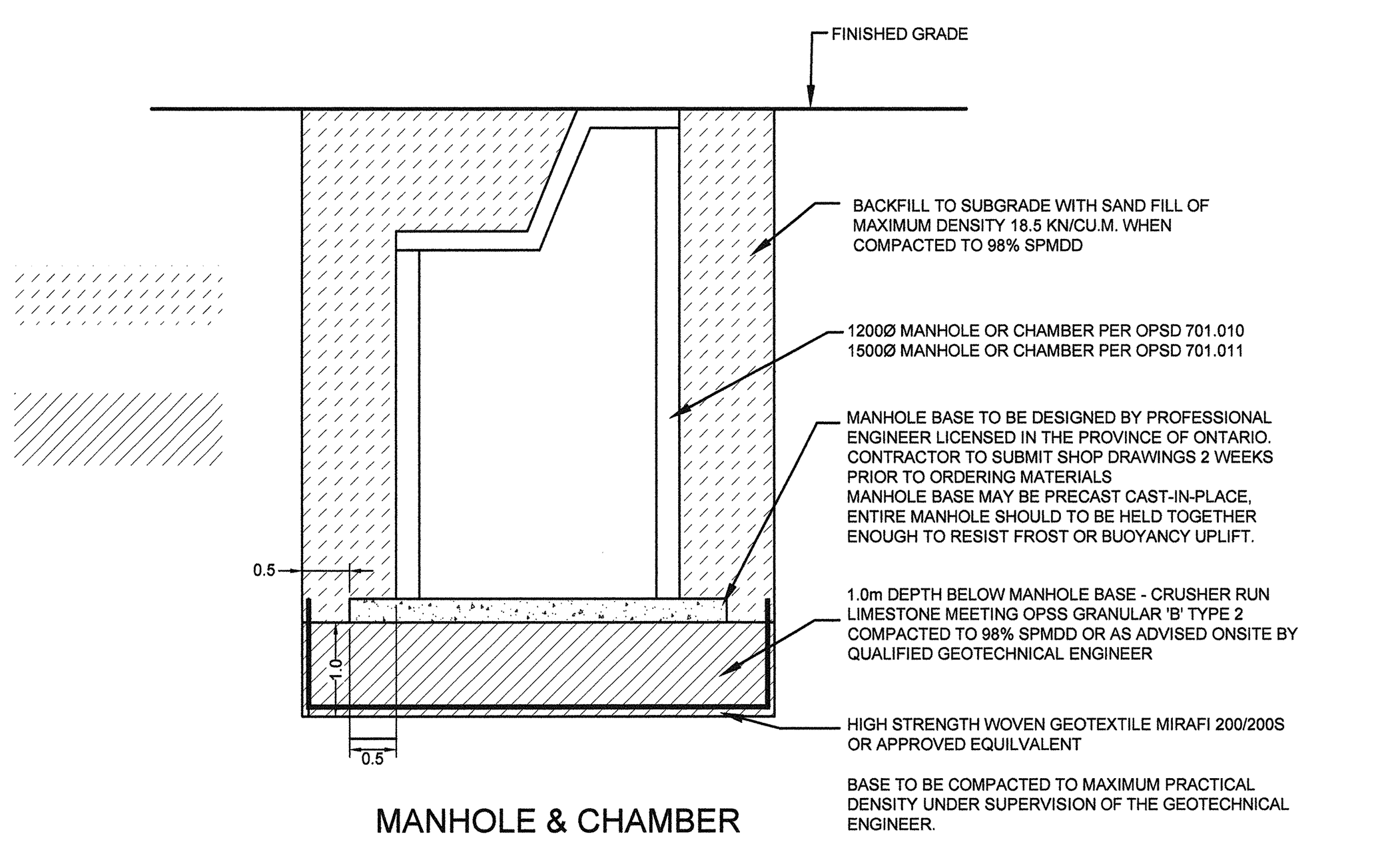
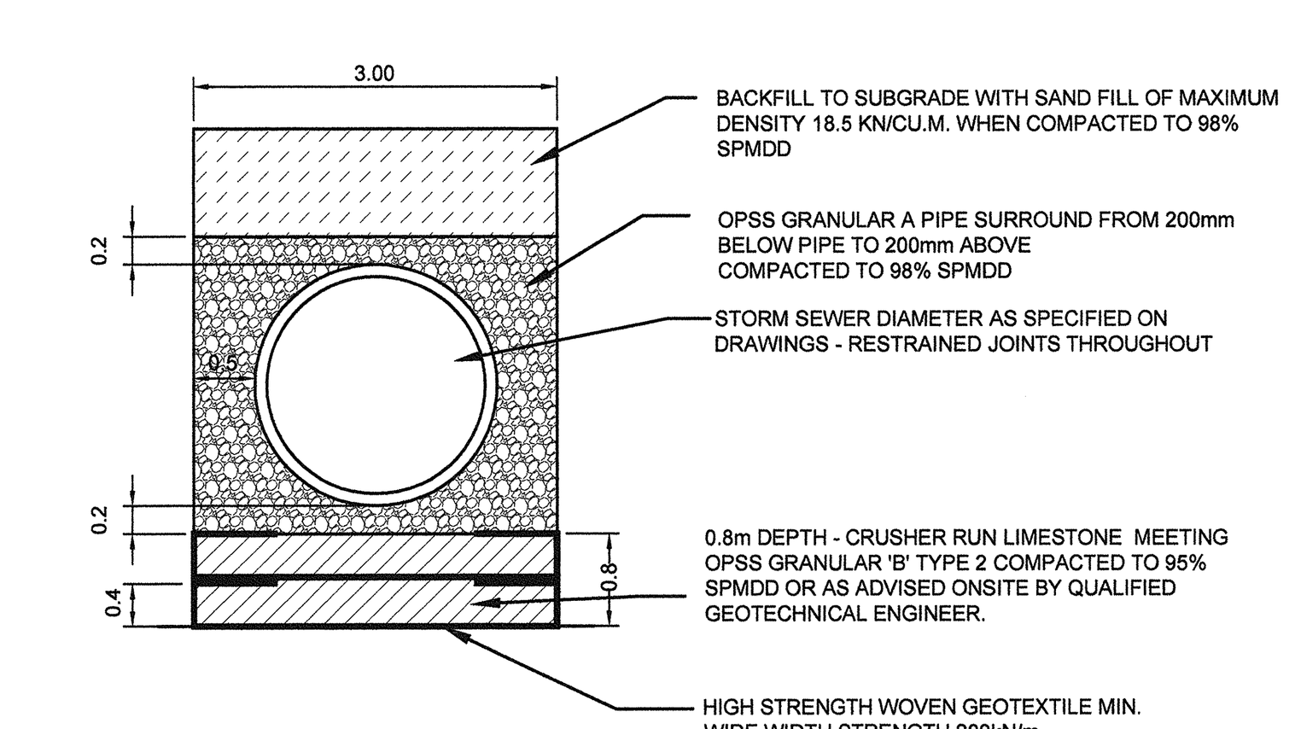


TYPICAL DRAIN DETAIL
N.T.S.



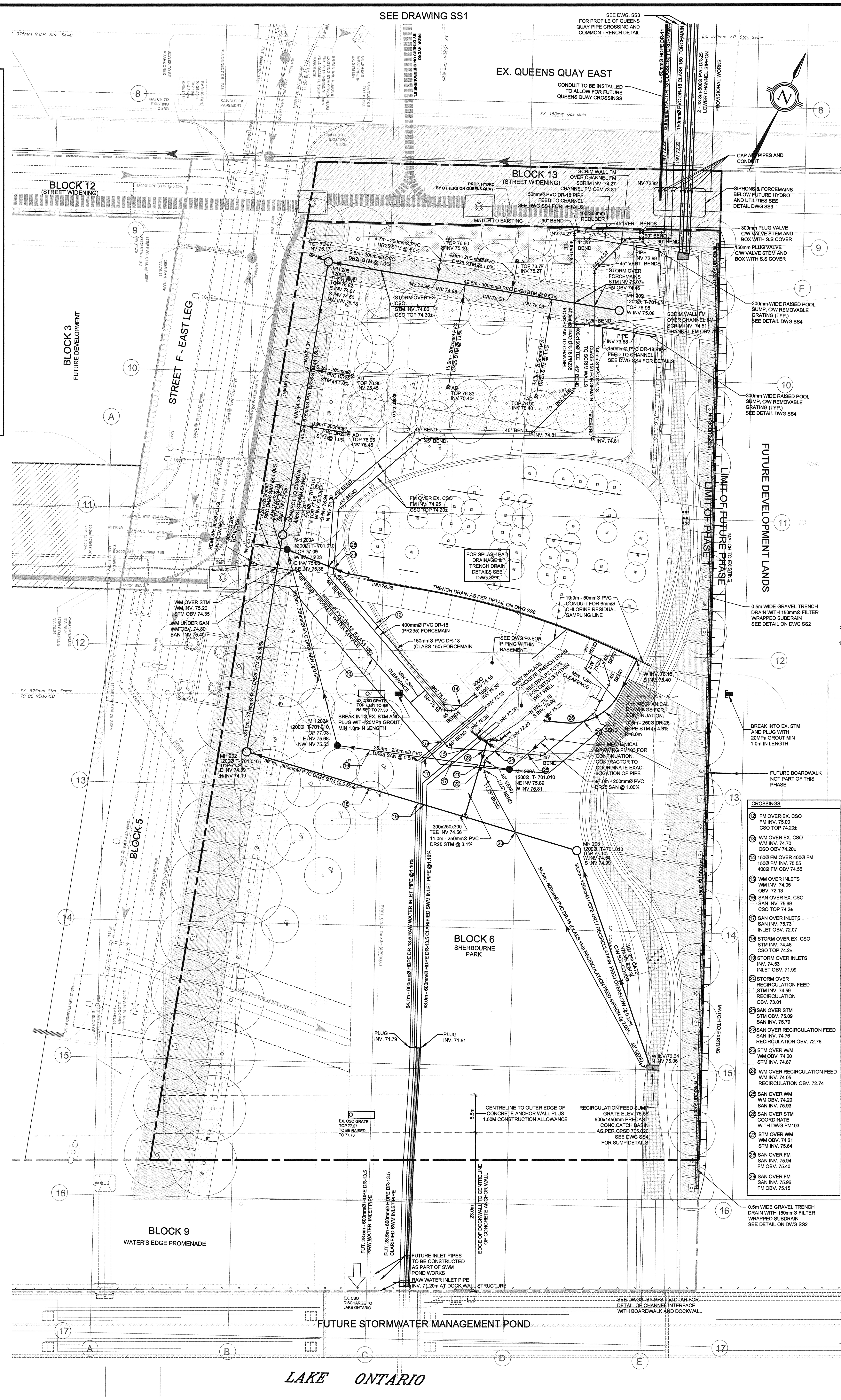
MANHOLE & CHAMBER FOUNDATION DETAIL
N.T.S.



SEWER AND WATERMAIN PIPE TRENCH
N.T.S.

NOTES:

1. WATER FEEDS TO BE LOCATED AT A MINIMUM DEPTH OF 2.1m
2. WATER FEEDS AND STORM SEWER TO BE INSTALLED AS PER BEDDING DETAIL THIS DRAWING.
3. ALL JOINTS ON WATERMAINS, FORCEMAINS AND SIPHONS TO BE MECHANICALLY RESTRAINED



CROSSINGS

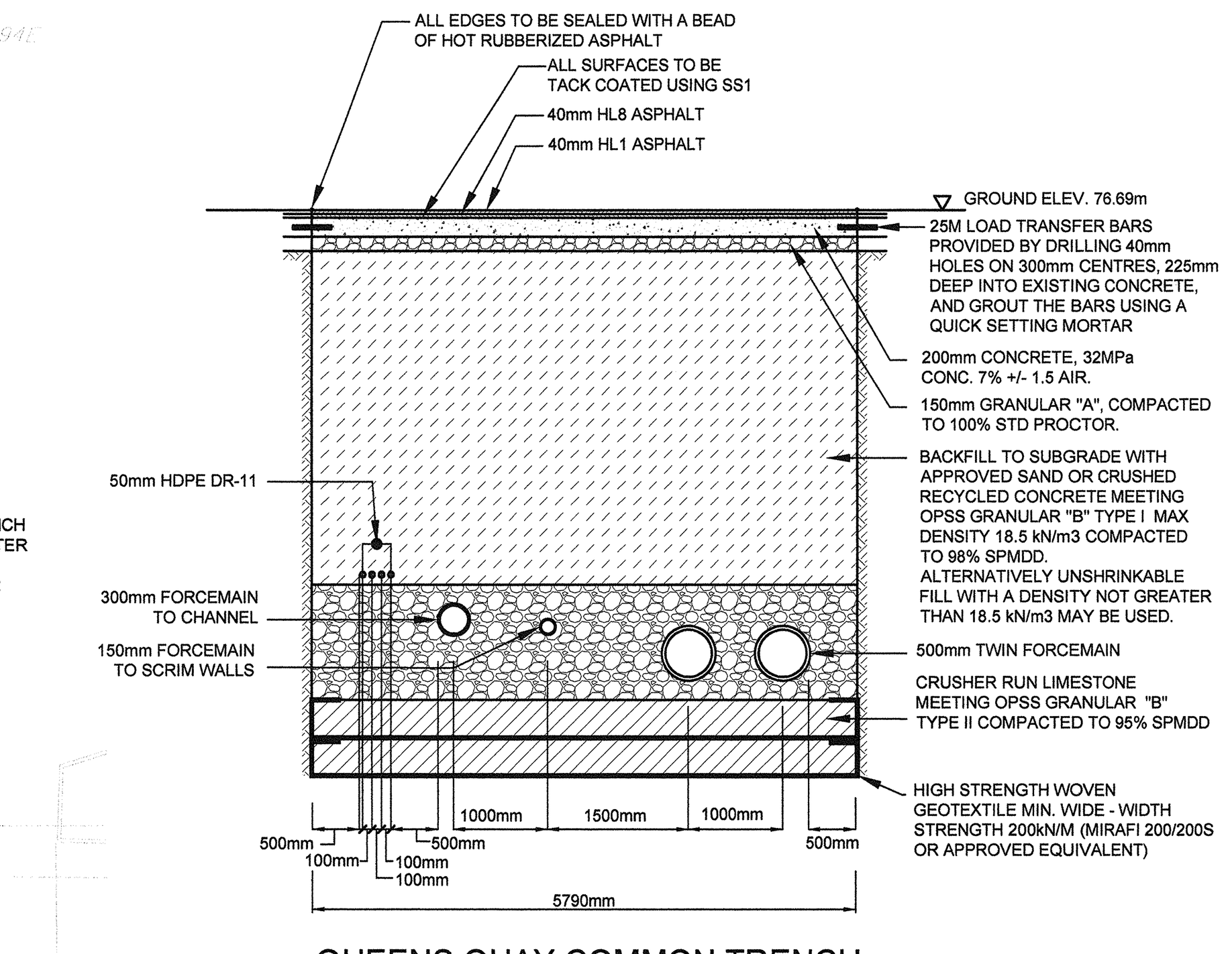
12. FM OVER EX. CSO FM INV. 75.00 CSO TOP 74.20±
13. WM OVER EX. CSO WM INV. 74.70 CSO OBV 74.20±
14. 150Ø FM OVER 400Ø FM 150Ø FM INV. 75.55 400Ø FM OBV 74.55
15. WM OVER INLETS WM INV. 74.05 OBV. 72.13
16. SAN OVER EX. CSO SAN INV. 75.69 CSO TOP 74.2±
17. SAN OVER INLETS SAN INV. 75.73 INLET OBV. 72.07
18. STORM OVER EX. CSO STM INV. 74.48 CSO TOP 74.2±
19. STORM OVER INLETS INV. 74.53 INLET OBV. 71.99
20. STORM OVER RECIRCULATION FEED STM INV. 74.59 RECIRCULATION OBV. 73.01
21. SAN OVER STM STM OBV. 75.09 SAN INV. 75.79
22. SAN OVER RECIRCULATION FEED SAN INV. 74.76 RECIRCULATION OBV. 72.78
23. STM OVER W/M WM OBV. 74.20 STM INV. 74.87
24. WM OVER RECIRCULATION FEED WM INV. 74.05 RECIRCULATION OBV. 72.74
25. SAN OVER WM WM OBV. 74.20 SAN INV. 75.93
26. SAN OVER STM COORDINATE WITH DWG PM103
27. STM OVER WM WM OBV. 74.21 STM INV. 75.64
28. SAN OVER FM SAN INV. 75.94 FM OBV. 75.40
29. SAN OVER FM SAN INV. 75.96 FM OBV. 75.15

LEGEND:

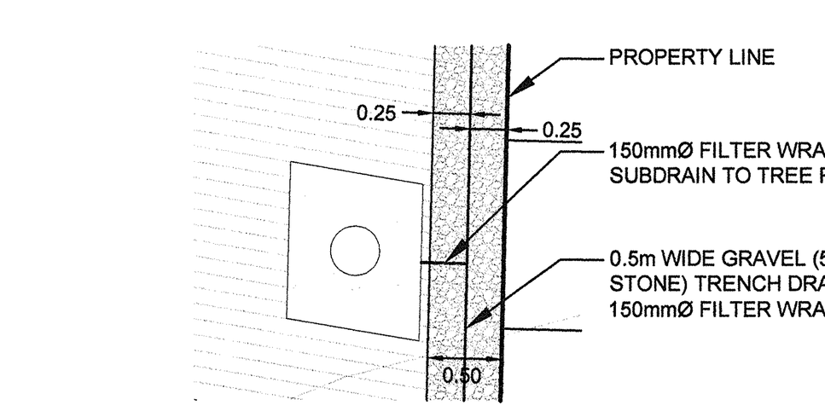
- PROPOSED SANITARY MANHOLE
- PROPOSED STORM MANHOLE
- EXISTING STORM MANHOLE
- EXISTING CATCHBASIN
- EXISTING VALVE & BOX
- EXISTING HYDRANT & VALVE
- INSULATED STORM SEWER
- AD — AREA DRAIN PER DETAIL ON DWG SS2

PROPOSED LANDSCAPE FEATURES

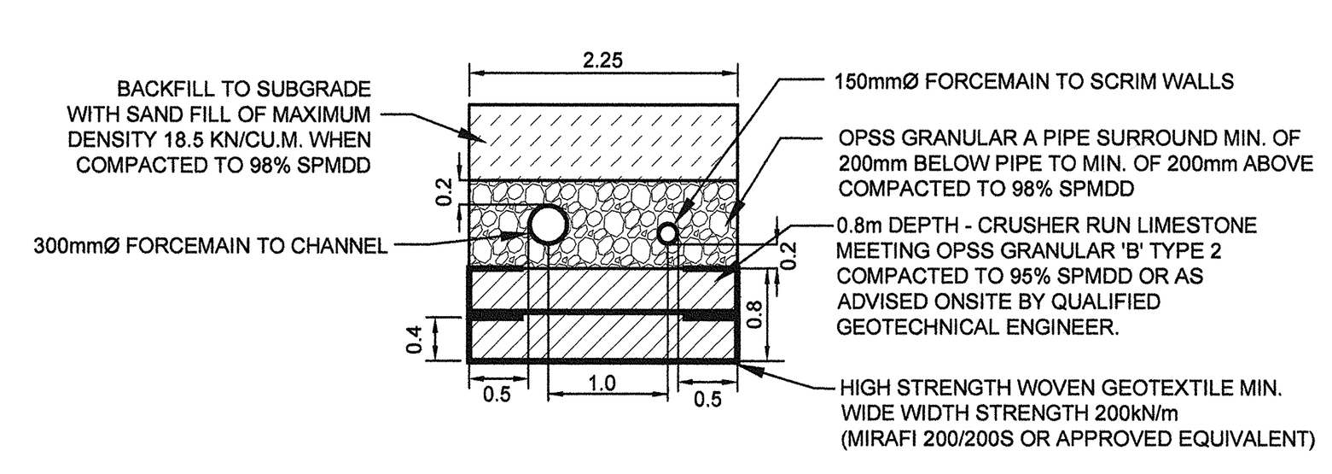
- BENCH
- LIGHT FIXTURE
- TREES
- PLAY EQUIPMENT



QUEENS QUAY COMMON TRENCH
N.T.S.



GRAVEL TRENCH DRAIN WITH 150mmØ SUBDRAIN DETAIL
1:25



FORCEMAIN COMMON TRENCH
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Water Feature Consultant
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EAST BAYFRONT PROJECT TEAM

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2300 Steeles Avenue West, Suite 120, Vaughan, ON L4K 5X6
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REVISIONS

No.	Date	Details	By
1	SEP 16, 2009	ISSUED FOR CONSTRUCTION	-
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LICENSED PROFESSIONAL ENGINEER S. P. BYBERG 18 SEP 09 PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER C. M. EWEN 18/SEP/09 PROVINCE OF ONTARIO

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SHERBOURNE PARK

DRAWING TITLE

SITE SERVICING PLAN

DATE DECEMBER, 2008	PFS PROJECT No. 07-021
SCALE 1:250	DRAWING No.
Drawn By: CAD	SS2
CHECKED LMH	