East Hants Servicing Capacity Study

Technical Memorandum #3: Shubenacadie Water Treatment Plant Assessment

Final

Prepared for:
Municipality of East Hants

RVA 226421

March 15, 2023

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March 15, 2023 RVA 226421

Municipality of East Hants
Municipal Office
Lloyd E. Matheson Centre
15 Commerce Court
Elmsdale, NS B2S 3K5

Attention: Derek Normanton, P.Eng.

Dear Mr. Normanton:

Re: Shubenacadie Water Treatment Plant Assessment – Technical Memorandum #3– Final

Please find enclosed Shubenacadie Water Treatment Plant Assessment Technical Memorandum #3 – Final.

This Technical Memorandum is with regard to the capacity assessment for the Shubenacadie Water Treatment Plant.

Please contact the undersigned if you have any questions.

R.V. ANDERSON ASSOCIATES LIMITED

Yours very truly,

Jason Angel, M.Sc., P.Eng., PMP

Senior Project Manager

Encls.

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East Hants Servicing Capacity Study

Technical Memorandum #3: Shubenacadie Water Treatment Plant Assessment

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1.0 INTRODUCTION

The Shubenacadie Water Treatment Plant is situated at 2882 Highway 2 Shubenacadie, Nova Scotia, and services the community of Shubenacadie as part of the water distribution system of the Municipality of East Hants. It was originally constructed in 2011 to replace an existing water treatment system that has since been decommissioned.

The Municipality of East Hants is evaluating the capacity of the Shubenacadie Water Treatment Plant to meet the 2047 projected pumping demand based on the projected population to 2047. Additionally, the Municipality of East Hants is evaluating the life cycle and projected replacement costs in the immediate term (0-5 years) and the future (25 years).

1.1 Objective

R.V. Anderson Associates Limited (RVA) was retained by the Municipality of East Hants to perform an assessment of the Shubenacadie Water Treatment Plant to determine the plant's ability to meet 25-year water demands.

The objectives of this assessment are to:

- Calculate the plant's current capacity.
- Review the 25-year anticipated population.
- Calculate the 25-year anticipated water demand for the Shubenacadie Water Treatment Plant
- Provide estimated asset costs and timelines for replacement in the immediate term (0-5 years) and after 25 years
- Perform a site review assessment of the general condition of the water treatment plant and associated infrastructure
- Provide recommendations for any upgrades required to meet the 25-year water demands

This report provides population and water demand estimates to 2047 to assist the Municipality of East Hants in determining the ability of the Shubenacadie Water Treatment Plant to meet 25-year demands.

1.2 Background

The Shubenacadie Water Treatment Plant was constructed between 2009 and 2011 at a cost of $2,448,140.00 (Infrastructure Canada, 2016). Adjusted for inflation using the Stats Canada Building Construction Price Index (BCPI, Non-Residential, Halifax) this would roughly equate to a present-day cost of about $3.6 M. The record drawings prepared by Horner Associates Limited are provided for reference in **Appendix A**. The plant treatment train includes the following sequence:

1. Water is pumped from one or two well pumps (PW-2 and PW-2019). The following withdrawal rates apply to the wells.
    a. The 30-day maximum withdrawal rate is 740 m^3/day
    b. The 3-day maximum withdrawal rate is 1000 m^3/day.
    c. The monthly withdrawal limit is 22,200 m^3
    d. The annual withdrawal limit is 270,100 m^3
2. Water flows through one or two parallel sand media filters. Each filter has a capacity of 12.6 L/s. There is space available for an additional sand filter in the future.
3. Water flows through one of two ion exchange water softeners. Each softener has a capacity of 9.8 L/s, with the ability to allow an untreated bypass. In addition to the softeners, there is a brine tank and brine pump. There is space in the plant for a future ion exchange water softener.
4. Water flows through a granular activated carbon (GAC) filter for aesthetic polishing. The filter has a capacity of 12.6 L/s and there is only 1 filter. However, there is space for 1 or 2 additional GAC filters in the future.
5. Water is injected with chlorine gas and proceeds through the chlorine contact piping for primary and secondary disinfection.

The system also has a phosphate-based corrosion control system that consists of a 264 L storage tank and dosing pumps.

There is also a backwash equalization tank for backwash water from the sand filters, water softeners, and GAC filter. Duplex pumps discharge the backwash water to a nearby manhole and sanitary sewer.

Additionally, the original facility design considered the addition of UV if alternative disinfection methods were found to be required. This includes both an available footprint in the facility and allocated electrical capacity.

The plant operation is primarily driven by the standpipe water levels. The standpipe high and low limits cause the system to start and stop.

2.0 POPULATION ESTIMATES AND PLANT CAPACITY

2.1 Process Equipment and Capacity

The following sections describe the capacity of each process step involved in the Shubenacadie Water Treatment Plant. Hydrogeological studies, investigations and assessments have been completed by East Hants regarding the Shubenacadie groundwater supply. The assessments to date have had NON-GUDI determinations of their groundwater supply. This includes the assessments completed on the original supply wells during construction and initial operation of the facility, and most recently on the new PW2019 well (Earth-Water Concepts Inc., 2022). East Hants should have the groundwater supply GUDI assessment documentation filed for record keeping purposes and ease of future referencing.

Recent annual reporting has not indicated any long-term adverse parameters in treated water requiring treatment rectification. The sole exception has slight and short-term increased sodium, turbidity, colour and manganese concentrations; however, these were noted as being rectifiable via operational adjustments such as flushing, sampling procedures and laboratory analysis techniques.

Recent raw sampling programs have identified certain parameters such as turbidity, iron, manganese, aluminium, and radionuclides above Maximum Acceptable Concentration (MAC) or Aesthetic Objective Limits (AO) in the raw water; however, finished water remains in compliance. These exceedances are noted to be primarily linked to a well that is no longer in service.

Based on these requirements the overall treatment process is primarily driven by disinfection requirements and the treatment train is primarily for aesthetic parameters.

Should the concentrations of the aforementioned raw water parameters increase to MAC or AO levels, then the requirements of the treatment process would become more stringent to ensure their reduction or removal.

2.1.1 Wells and Well Pumps

The Shubenacadie Water Treatment Plant currently runs off two groundwater wells, PW-2 (installed in 2007) and PW-2019 (installed in 2019). When the plant was first commissioned, it was supplied by wells PW-1 and PW-2; however, PW-1 has since been decommissioned because the internal components of the well failed.

There are currently two (2) ITT Goulds Model 160L15 well pumps, as well as a shelf spare. Each has a rated capacity of 9.5 L/s @ 76 m head (150 USGPM @ 250 ft head). The typical output of the plant is 7.6 L/s @ 58 m head (100 IGPM @ 82 psi)

2.1.2 Sand Media Filters

After water is pumped to the WTP by the well pumps, water flows through one of the two sand media filters, each of which has a capacity of 12.6 L/s (see Figure 2.1 below). The original plant operation manual prepared by Horner and Associates indicates the sand media filters are primarily to protect the downstream ion exchange water softeners by removing solids. The sand filters help to remove particulates, which aids in improving the water quality. However, the system requirements for treatment do not necessitate the sand media filters at this time. Therefore, the sand media filters are not essential; however, they do protect the ion exchange/water softener units.

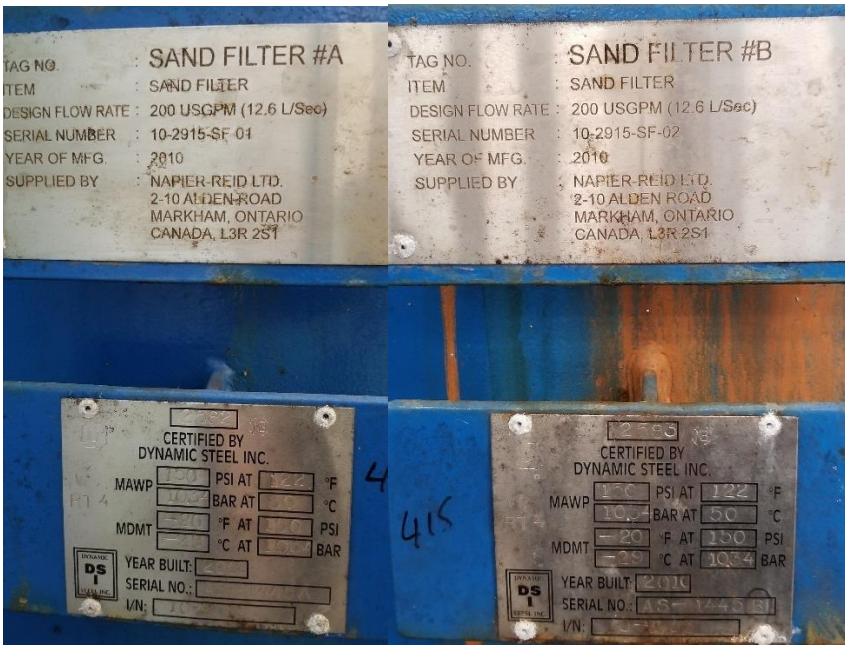


Figure 2.1 – Sand Filter Name Plates

2.1.3 Water Softeners

Following sand filtration, a portion of the water (approximately 60%) proceeds to one of two water softeners, and a portion of the water (approximately 40% in the original design operations manual) bypasses the softeners to reduce the hardness from approximately 261 mg/L to approximately 100 mg/L. The operator has manual control of the bypass and must adjust the bypass to bring the water hardness towards the 100 mg/L target. Each softener has a capacity of 9.8 L/s. In addition to removing hardness, the softeners remove iron and manganese to improve the aesthetic quality of the water.

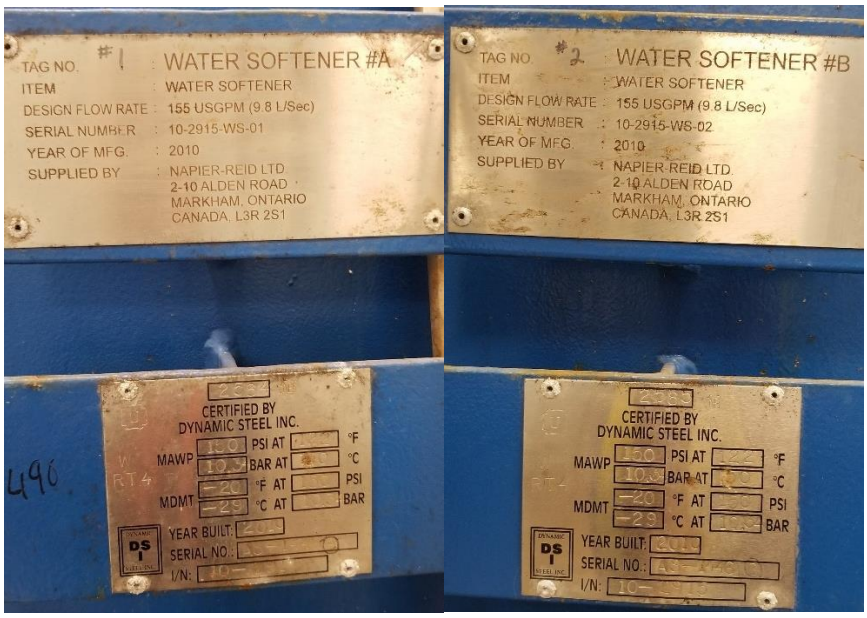


Figure 2.2 – Water Softener Name Plates

2.1.4 Carbon Filter

After softening, the blended water flows through the granular activated carbon (GAC) filter as a polishing step. The GAC filter has a capacity of 12.6 L/s and removes hydrogen sulfide (H_2S) from the water to improve the water aesthetics.

Figure 2.3 – GAC Filter Name Plate

2.1.5 Chlorine Disinfection System

Finally, after GAC filtration, water is disinfected with chlorine gas. The disinfection system consists of two (2) chlorine gas cylinders (one duty, one standby, with a scale and switchover system, each cylinder with a capacity of 68 kg), as well as serpentine piping to provide additional contact time for disinfection. This chlorine injection point is for both primary and secondary disinfection. The drawings indicate that there is space for the storage of ten (10) chlorine cylinders.

2.1.6 Corrosion Control System

In 2013, a Carus phosphate dosing system was installed in the plant. It consists of a 264 L tank and a chemical injection system.

2.1.7 Future UV System

The record drawings by Horner Associates Limited (**Appendix A**) show space for a future UV system within the plant both with respect to plant footprint and spare electrical capacity.

2.1.8 Backwash Storage

The Municipality of East Hants has noted operational challenges with backwashing, as the well production is below the required backwash flowrate. Well water is used to backwash the sand filters, water softeners, and GAC filter. A backwash supply storage tank and pump system could be added to increase the volume and flows of water available for backwashing. Options include adding a tank inside the existing water treatment plant building or buried outside the building. A minimum volume of supply of 8,000 L is recommended; however, a greater volume is likely required to ensure that the entire 8,000 L is available as a functional volume. The system would require duty and standby pumps, as well as modifications to the plant's control and electrical systems. Changes to the piping would also be required to accommodate this new backwash approach. A quotation from Napier Reid for an internal backwash tank has been appended. Additional quotes were also obtained for an external tank option; however, many of the elements from the Napier Reid quotation would also be required for the external tank option. Additional design is required in the future to facilitate a new backwash system. During the future design, there may be potential to find a more economical or value engineered option for this backwash system.

2.1.9 Treatment Requirements

Overall, the current treatment train is adequate to produce potable water in accordance with Nova Scotia Environment requirements. Additionally, the treatment system has the

flexibility to add treatment train redundancy via space for additional media vessels or alternative disinfection methods such as UV.

2.2 Population Estimate

The Municipality of East Hants provided RVA with low, mid, and high-range population estimates from 2022 – 2047 for this assessment. RVA was instructed to use the mid-range population projection for this study. Based on this mid-range projection, the estimated population in 2047 is 1033. See Table 2.1 below. Additionally, to calculate the per capita water usage, RVA used Census data and linear interpolation to determine the approximate population between 2016 – 2021 using the Municipality's data from 2022 – 2047. The Municipality of East Hants provided the following supporting information with their population projections:

> "Population estimates for Shubenacadie are based on 2.5 people/dwelling and the potential development as described in the development table. Very little development has been approved in Shubenacadie over the last number of years due to a lack of service capacity. The current construction of a new sewer treatment plant is expected to trigger some increase in development in the area. Low, medium and high development scenarios have been broken out below based on development estimates."
>
> "*Disclaimer: development and population values are estimates generated by Municipal staff based on a combination factors including, but not limited to: known/proposed future development, development trends, zoning, land vacancy, and the 2021 Census data for average number of people per dwelling in the area. Low, mid, and high estimates for development and population have been calculated to cover a range of possible scenarios. These numbers are to be used as a guide only; the Municipality does not guarantee the accuracy of any data provided herein."

Table 2.1 – Population Estimates Provided by Municipality of East Hants

Year	Population
2016*	**735**
2021**	**775**
2022	**785**
2027	**850**
2032	**920**
2037	958
2042	995
2047	1033

**Statistics Canada, 2016 Census*
***Interpolated between Census and provided 2022 population*

2.3 Historical Water Demands and Maximum Day Factor

The Municipality of East Hants monitors daily raw water flow to the Shubenacadie Water Treatment Plant, as well as total treated flow in L/day. However, the total treated flow was sometimes greater than the raw water flow. Therefore, whichever value was higher between the treated flow and the raw water flow was used in the calculation of maximum demand flow, average demand flow, lowest daily flow, etc.

Historical maximum day demands were determined by looking for the highest daily demand recorded in the Municipality of East Hants's data. Maximum day factors were calculated by dividing the maximum day demand of a certain year divided by the yearly average day demand.

Figure 2.4 presents a summary of key water usage parameters in Shubenacadie between 2017 and 2021. The average day demands in Shubenacadie varied between 244,000 and 327,000 L/d, with an overall average daily demand of 281,000 L/d. The maximum daily demand varied between 480,000 and 625,000 L/d, while the maximum day factor averaged 2.1.

Table 2.2 and Table 2.3 and shows key parameters that can be used to forecast water demands that align with the planned growth of Shubenacadie.

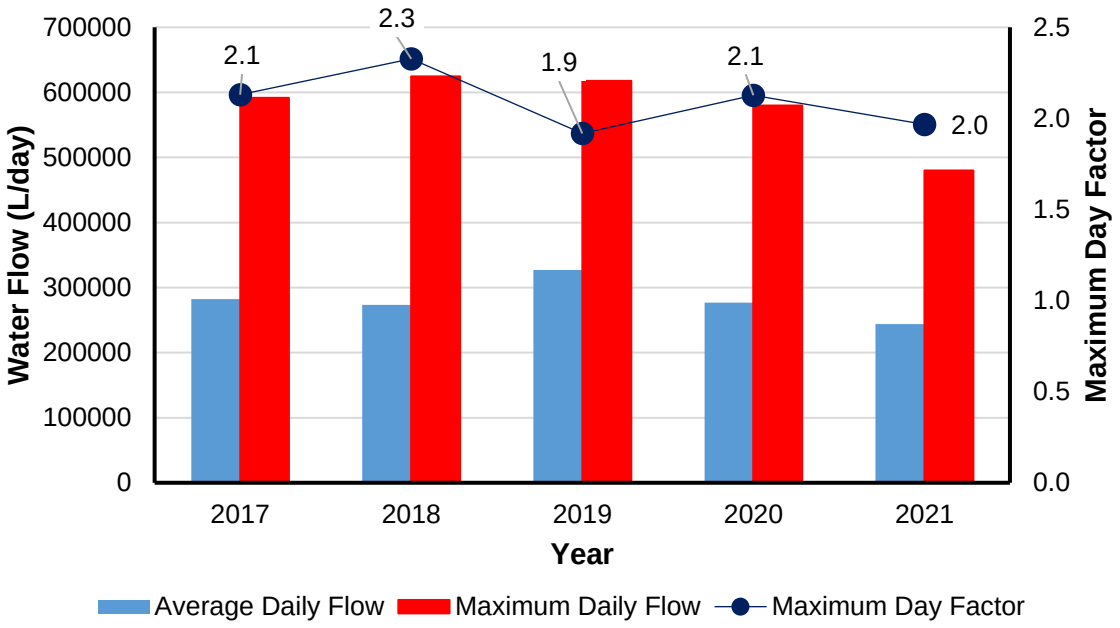


Figure 2.4 – Historical Water Use in Shubenacadie

Table 2.2 – Historical Water Consumption Data in Shubenacadie between 2017 and 2021

Highest Maximum Day Demand Flow	625,000 L/d
Average Day Demand of All Years	281,000 L/d
Lowest Daily Flow	58,000 L/d

Table 2.3 – Average Daily Flow and Maximum Daily Flow from 2017 – 2021

Year	Average Daily Flow (L/d)	Maximum Daily Flow (L/d)
2017	282,000	592,000
2018	273,000	625,000
2019	327,000	618,000
2020	277,000	580,000
2021	244,000	480,000

The Maximum Day Factor was calculated for 2017 – 2021 and ranged from 1.9 – 2.3. The average value for 2017 – 2021 was 2.1; therefore, a maximum day factor of 2.1 will be used for the plant. Refer to Technical Memorandum #4 regarding factors used for the water modelling exercise, which are tied to the distribution system.

2.4 Per Capita Water Usage

The Per Capita Water Usage of the Shubenacadie Water Treatment Plant was calculated using historical water use data, as well as Census data and linear interpolation to determine the approximate population between 2016 – 2021 using the Municipality's data from 2022 – 2047. from 2016 – 2021. Two per capita water usage values were calculated. The Net Per Capita Value is 366 L/Cap/Day, and the Gross Per Capita Value is 384 L/Cap/Day. The Net Per Capita Water Usage Value was calculated using the average flow of treated water in L/day, as well as the population. This value is used for the water model and includes all distribution demands, losses, etc. The Net Per Capita Value is exclusive of the water consumed internally by the water treatment plant processes. The Gross Per Capita Water Usage Value was calculated based on 5% internal water use at the water treatment plant. This value was used to determine the required plant gross capacity, as there were discrepancies between the raw and treated water flow rates, which made it challenging to determine which reading was correct. See Section 3.1 for additional detail regarding the flow meter. Therefore, a 5% internal water use value was utilized, based on standard literature values (MWH's Water Treatment, John C. Crittenden, 2005).

Using the maximum day factor of 2.1, the Gross Per Capita Water Usage Value of 384 L/Cap/Day, and the mid-range population estimates, the anticipated maximum daily flow in 2047 for the Shubenacadie Water Treatment Plant is 9.6 L/s.

2.5 Plant Capacity

The current rate-limiting step for the Shubenacadie water treatment plant is the well pumping limits. The maximum is 1000 m^3/day averaged over 3 days, which is equivalent to 11.6 L/s. In terms of process equipment, the sand filters have a capacity of 12.6 L/s and are noted to primarily reduce turbidity for the softening units. Although the softeners have a capacity of 9.8 L/s, the water softening is considered optional and therefore, this does not limit the overall capacity of the plant. The softeners were also designed with a 40% total plant flow bypass rate of 40% (2.8 L/s). The GAC system has a capacity of 12.6 L/s as well and is not rate-limiting since it is considered a polishing step.

Finally, based on the CT of the disinfection system, the maximum flow to maintain an adequate chlorine residual of 1 mg/L is 23.8 L/s based on 4-log virus removal, based on NSE Requirements. The pipe parameters used to assume the volume for CT calculations should be more explicitly noted in the Municipality's documentation. The volume calculation should note the parameters of the contact pipe and the location where primary disinfection is fully achieved. Figure 2.5 illustrates that it could be interpreted that only the serpentine pipe loop provides contact time; whereas it appears that the entire discharge pipe to the distribution system is used for CT. However, there are washroom and water

taps within the plant that draw water from the end of the serpentine loop, which does not use the additional distribution pipe used in the CT calculation. This could technically deem the water used within the facility as non-potable, as the serpentine loop has about half the available contact time compared to the serpentine loop + distribution pipe.

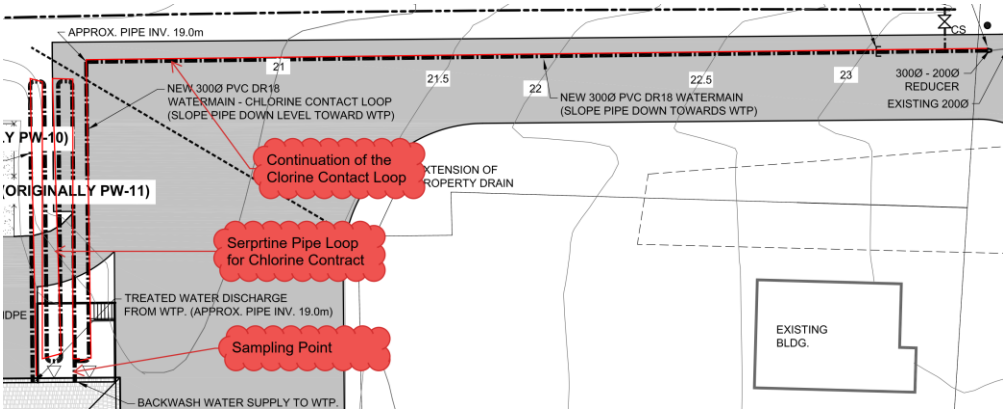


Figure 2.5 – Chlorine Contact Pipe

Since the maximum demand for the servicing area of Shubenacadie is 9.6 L/s in 2047, capacity upgrades to the plant are not required in the immediate term (0-5 years) or the next 25 years. However, it is recommended to plan to drill at least one additional well in the immediate term (0-5 years), since PW-1 failed in recent years. Additionally, to upgrade the plant in the future, at least one (1) additional well will be required, and upgrades to the plant process equipment will be required for flows over 12.6 L/s. In general, due to the arrangement of the system, an expansion would likely entail providing an additional and equivalent tank for the sand media, softeners and GAC media filters that would double the current capacity to 25.2 L/s.

3.0 SITE ASSESSMENT

A site assessment of the Shubenacadie Water Treatment Plant was completed on October 12, 2022, to document the existing conditions and compare the data and operations to record information. The findings of the site assessment are summarized in the following sections.

3.1 Process

The equipment has been in operation for about ten (10) years and is still in overall good condition. Some slight rusting and minor corrosion can be noted on certain steel or iron piping components.

Recent changes to the facility's raw water supply include a new PW 2019 well and the discontinuation of the PW11 well. This included pump replacement and the provision of a shelf spare pump.

A storage rack for salt bags has also been added to the facility since its original construction.

The filtration media has not been replaced since its original installation in 2011. At present, there have not been any noticeable changes in performance. Filtration media can require ongoing replacement to offset for media lost during backwashing and/or full replacement once performance has worsened. There may be value in implementing additional monitoring of the media performance to allow more quantitative assessments to be made. This can also include metrics to aid when backwashing or regeneration is required.

Filtration metrics may include the following:

- Filter run-times
- Pressure drops
- Filtrate quality
- Backwashing parameters (flow, duration)
- Overall recovery rates (Gross vs. net water production)

Plant operations also noted that there can be occasional challenges with sufficient backwash supply tied to insufficient water supply for backwash flow rates. The cause and potential solution(s) for this would require additional investigation.

On review of the raw and treated water flow data, it appears that there may be a minor discrepancy with the flow meters, as treated flows slightly exceed raw flows. This flow discrepancy makes it difficult to track overall treatment system recovery that can provide a simple process performance tracker on overall plant recovery. The discharge flowmeter also appears to be installed in a vertical position with downward flow and this is a non-ideal arrangement that can impact readings. The flowmeter on the backwash supply should consider programming changes to allow for corrections to the total plant discharge flows.

3.2 Mechanical, Electrical, Communication and General Building

A dehumidifier was added to the building in May 2022 due to address mold issues.

The facility has been in operation for about ten (10) years and is still in overall good condition for these components.

- MCC and associate panels within a separate electrical room
- Ceiling lights
- HMI and SCADA communications systems
- Levels sensors and monitors
- Dehumidification System
- Chemical Feed Pumps
- Interior walls, floor and ceiling
- Exterior walls, roof and loading dock

The rooms within the plant lack proper ventilation systems, there is localized rusting on piping at eye wash and in-line valves within process piping. The interior man access doors show signs of rust and deterioration.

4.0 ASSET COSTS AND TIMELINES FOR REPLACEMENT

Table 4.1 below shows approximate asset costs and timelines for replacement for the Shubenacadie Water Treatment Plant. Rows highlighted in red, yellow, and green represent assets identified for replacement in 0-5 years, 6-25 years, and >25 years, respectively. Approximate costs are provided in 2022 values in CAD, excluding tax. Any relevant quotes or supplier information will be included in an appendix. Napier Reid quoted $1,130,000 for two sand filters and appurtenances, two water softeners and appurtenances, one activated carbon filter and appurtenances, associated PLC, Shop Drawings, O&M Manuals, Field Service, and Inspection. Napier also Reid quoted $870,000 for the following: One sand filter and appurtenances, one water softener and appurtenances, one activated carbon filter and appurtenances, five (5) various 100 mm butterfly valves, and associated PLC for the aforementioned equipment. The estimates for life span are based on RVA's experience with water systems as well as data from the USEPA for asset life spans for small water systems (2003). Life spans are approximate and may vary depending on the state of the assets and how frequently the assets undergo maintenance and the nature of the maintenance.

Table 4.1 – Approximate Asset Costs and Timelines for Replacement

Asset	Cost (2022 values in CAD, excluding tax)	Life Span (years)	Year of Installation
Well PW-2	$110,000	25-35	2007
Well PW-2019	$110,000	25-35	2019
Well Pump PW-2	$18,000	10-15	2011
Well Pump PW-2019	$18,000	10-15	2019
Sand Filters	$400,000	15-25	2011
Softening System	$400,000	15-25	2011
GAC Filter	$400,000	15-25	2011
Chlorine Treatment System	$180,000	15	2011
Corrosion Control	$20,000	15	2013
Future UV System	$170,000	15	2023*
SCADA System	$110,000	15	2011
Emergency Power	$250,000	15	2011
Backwash System	$280,000	30-60	2023**
Building and property	0%-7% of building replacement value per year***	30 to 90, depending on the asset	2011

**Note: will be required if water is ever deemed GUDI. Cost assumes 1 duty plus 1 standby unit and a UVT sensor and analyzer*
***Recommended to install. Requires additional design. Refer to appended quotes received for an internal tank-based system. Quotes have also been received for an external tank. Many of the items required for the internal tank system would also be required for the external tank system (with the exception of the internal tank and piping costs).*
****General building and property are difficult to estimate due to the variety of factors involved. The National Research Council Study "Expenditures for the operation and maintenance of buildings" indicated that a range can be used based on the replacement costs of the building that can vary from 0 – 7% per year, with 0.5% per year as a 6-year average. Deferred maintenance costs would accumulate.*

5.0 CONCLUSIONS

5.1 Recommendations

Since the current rate-limiting step for the Shubenacadie Water Treatment Plant is the well pumps, it is recommended to drill an additional well to increase the capacity of the plant in the future. Provision for a second additional well may be considered to provide additional redundancy to the water supply since well PW-1 failed in recent years.

Additional studies and engineering design would be required for an additional well, as well as capital costs for drilling and piping.

Monitoring programs should be implemented to allow media system performance to be tracked to provide a means to confirm changes in performance.

Ongoing maintenance and replacement costs should be tracked to help confirm ongoing expenditures as the facility ages. The USEPA has several good guides and templates to aid with asset management and can allow it to be simply tracked and undertaken by the Municipality. Any quotes/estimates obtained and actual costs once undertaken for maintaining these assets should be logged.

If one of the wells is ever deemed GUDI, or if a future well is GUDI, the addition of the UV system will be required.

Given the failure of PW-1 in recent years, the following are suggested

- Well inspection every 5 years
- Consideration for investigating a new standby well

Additionally, the following investigations are suggested in the immediate term (0-5 years):

- Investigate the cause of the backwash system deficiencies, evaluate options and design an improved backwash supply system, potentially including a backwash supply tank and pumping system
- Evaluate a means to calculate the treated plant outflow more accurately, considering the orientation of the flow meter and the flows associated with backwashing
- Detailed evaluation of treated water quality, and study to evaluate optimization of the treatment train. For example, consideration as to whether adding a location of chlorine application earlier in the treatment train could optimize iron,manganese and H_2S removal.

Refer to Table 4.1 for upgrades/ replacements recommended based on asset life span in the immediate term (0-5 years) and within the next 6-25 years, as well as their estimated replacement costs.

6.0 REFERENCES

Earth-Water Concepts Inc., “Shubenacadie PW2019 Step 2 GUDI Hydrogeological Assessment,” 2022.

Infrastructure Canada. (2016, January 28). *Infrastructure Canada Projects since 2002 - Nova Scotia.* Available: https://www.infrastructure.gc.ca/investments-2002-investissements/ns-list-eng

J.C. Crittenden, *MWH's Water Treatment: Principles and Design,* 3rd ed., MWH's Water Treatment, John C. Crittenden, 2005.

National Research Council Canada, "Expenditures for the Operation and Maintenance of Buildings," F. Steel, 1985.

United States Environmental Protection Agency, "Asset Management: A Handbook for Small Water Systems," USEPA, 2003.

APPENDIX A

Record Drawings by Horner Associates Limited

MUNICIPALITY OF EAST HANTS

Shubenacadie
Water Treatment Plant

~~July 2010~~

WORK OF THIS CONTRACT WAS PERFORMED BY L & R CONSTRUCTION LTD.

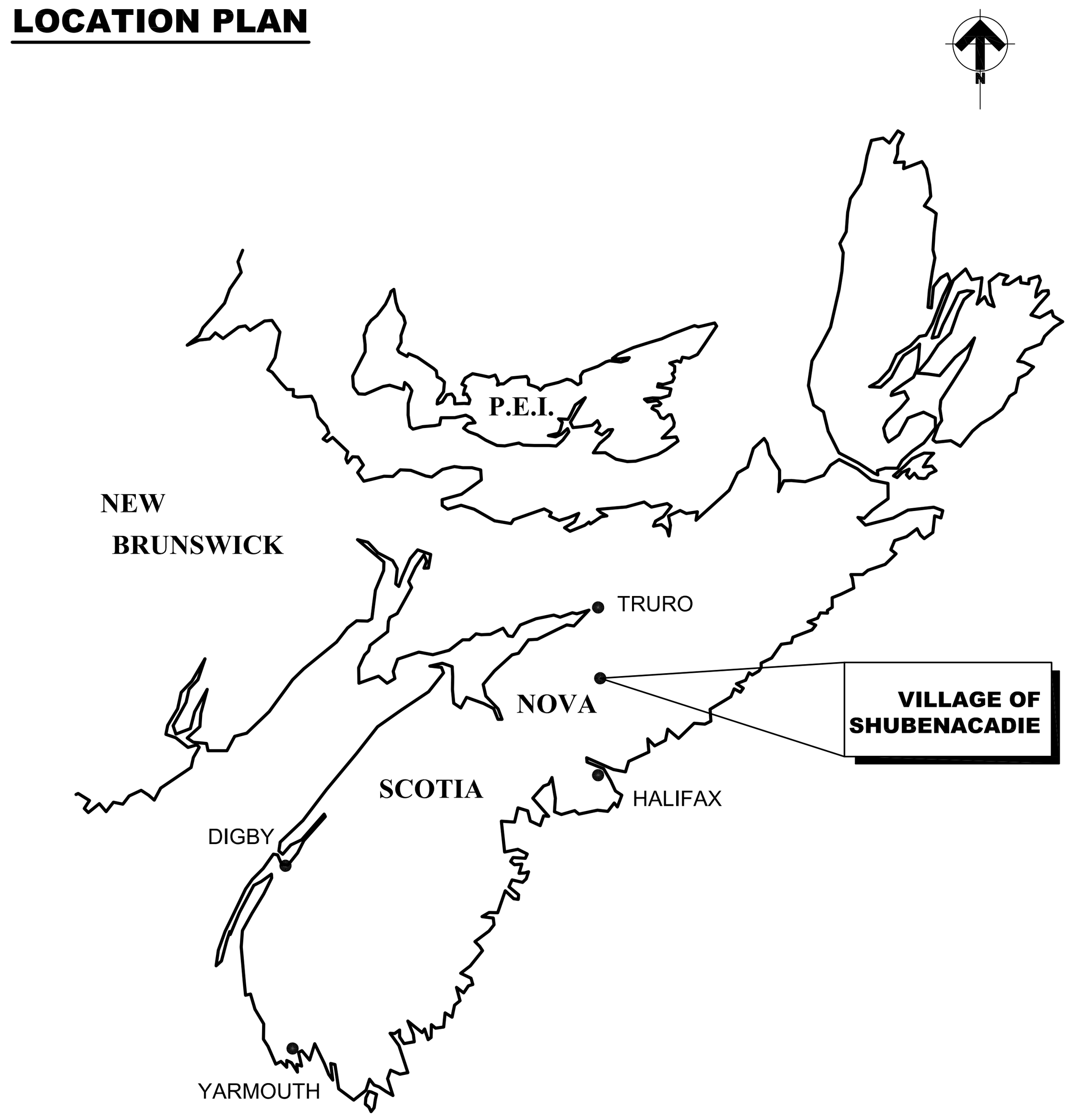
Record Drawings

November 2011

HORNER
ASSOCIATES LIMITED
consulting and design engineers
89 QUEEN ST. TRURO, N.S.

ADI

LOCATION PLAN



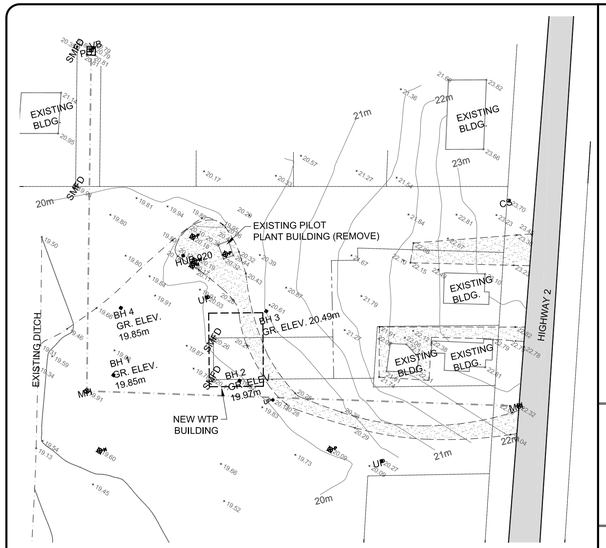
LIST OF DRAWINGS

DWG No.	DRAWING TITLE
101	EXISTING & FINISHED SITE PLAN
102	SITE SERVICES PLAN
201	FOUNDATION PLAN
202	FOUNDATION DETAILS
301	BUILDING ELEVATIONS
302	FLOOR PLAN
303	ROOF PLAN
304	WALL SECTIONS
305	DOOR SCHEDULE, ROOM FINISH SCHEDULE & DETAILS
306	MISCELLANEOUS DETAILS
401	PROCESS SCHEMATIC
402	PROCESS PIPING PLAN & DETAILS
403	PLUMBING & VENTILATION
501	ELECTRICAL SITE PLAN, SPECIFICATIONS & DETAILS
502	LIGHTING & HEATING LAYOUT, LEGEND & PANEL SCHEDULES
503	ELECTRICAL POWER & AUXILIARY SYSTEMS LAYOUT & DETAILS
601	CONTROL DEVICE LOCATION DRAWING
602	CONTROLS CABLE BLOCK DIAGRAM
603	DETAILS

PROJECT No. LH0922160

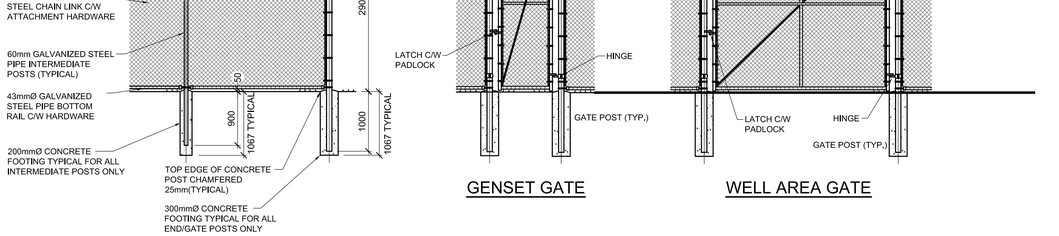
SET No. ____________

ISSUE DATE: ____________



EXISTING SITE PLAN

SCALE: 1:750

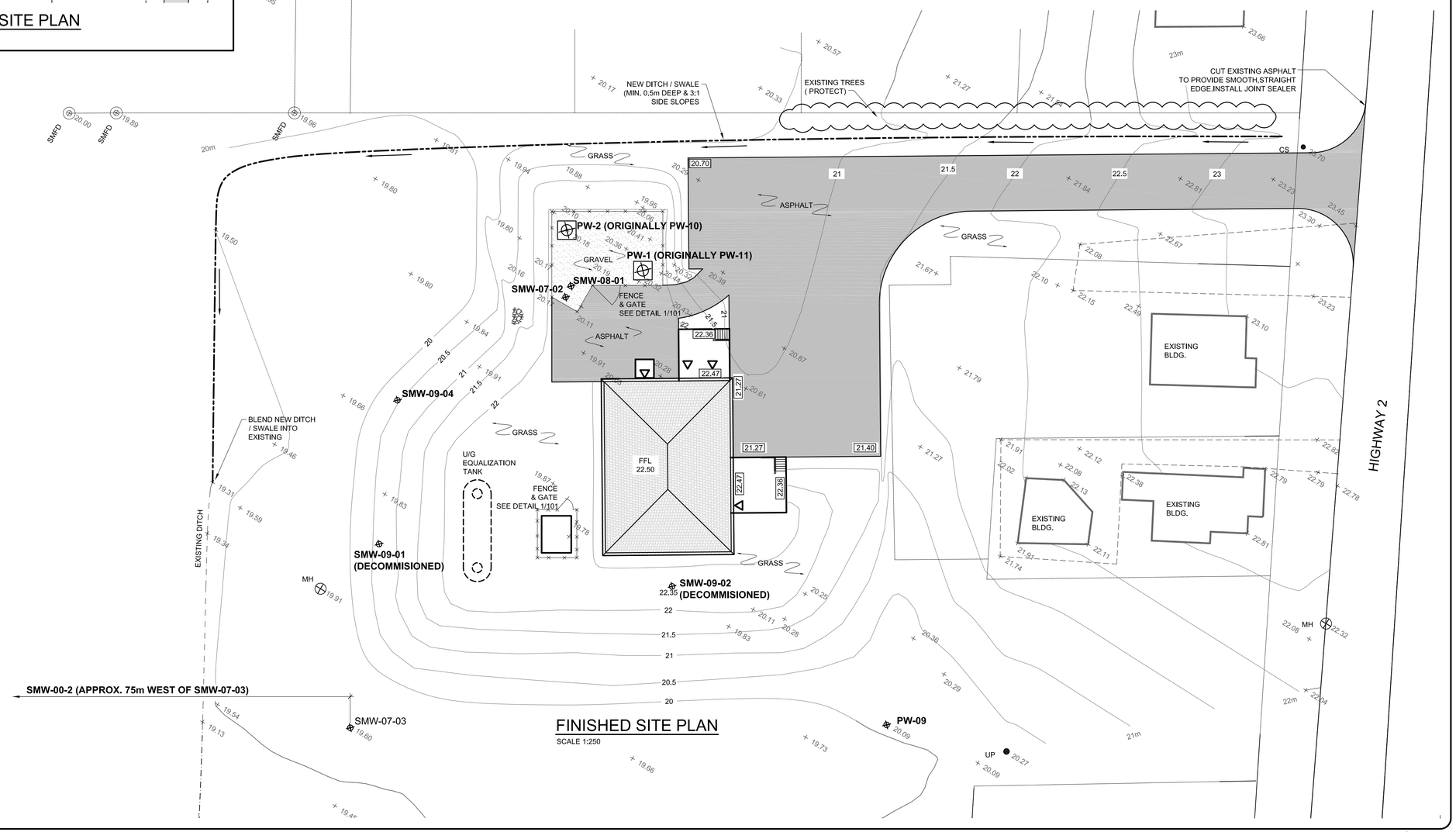


GENSET GATE

WELL AREA GATE

CHAIN LINK FENCE & GATE DETAIL 1/101

SCALE: 1:50



FINISHED SITE PLAN

SCALE 1:250

No.	Issue	Date

NOTES:

1. REMOVE TOPSOIL AND ALLUVIAL SOIL (APPROX. 1.2m TO 1.8m DEPTH) IN THE AREA OF THE BUILDING. REMOVE TOPSOIL AND ORGANICS IN ALL OTHER AREAS OF CONSTRUCTION. PROOF ROLL THE BASE OF ALL EXCAVATION.
2. BACKFILL UNDER THE BUILDING FOOTINGS AND SLAB ON GRADE WITH ENGINEERED FILL IN ACCORDANCE WITH THE STRUCTURAL DRAWINGS AND THE GEOTECHNICAL REPORT.
3. BACKFILL PAVED AND GRAVEL AREAS WITH COMMON BORROW TO 525mm BELOW FINISHED GRADE PLUS 300mm OF TYPE II GRAVEL, 150mm OF TYPE I GRAVEL (AND 75mm OF ASPHALT IN PAVED AREAS). COMPACT ALL BACKFILL TO 98% STANDARD PROCTOR IN 200mm LIFTS.
4. BACKFILL OTHER AREAS OF CONSTRUCTION WITH COMMON BORROW TO 100mm BELOW FINISHED GRADE PLUS 100mm OF TOPSOIL AND HYDROSEED.

LEGEND:

SITE MONITORING WELL

PRODUCTION WELL

No.	Revision	Ckd. By	Date
1	Record Information Added	GAR	Nov. 2011

RECORD DRAWING

Stamp

ORIGINAL DRAWING STAMPED ON 02 July 2010 BY G. A. ROSS P. ENG.

Const. North

Drawn By: STAFF

Dwg. Standards Ckd. By:

Designed By:

Dwg. Design Ckd. By:

Date Printed 2-JULY-2010

Branch Manager:

HORNER ASSOCIATES LIMITED
consulting and design engineers
89 Queen Street
Truro, NS

Client: Municipality of East Hants

Project Title: Shubenacadie Water Treatment Plant

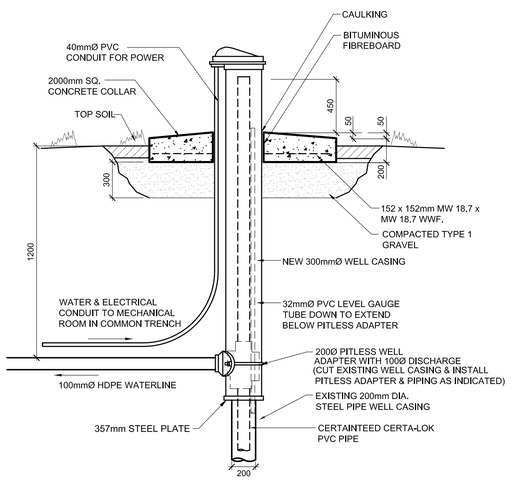
Drawing Title: Existing & Finished Site Plan

Project No.: LH0922160

Dwg. No.: 101

Rev. No.: 1

Scale: 1 : 250
This drawing is not to be scaled

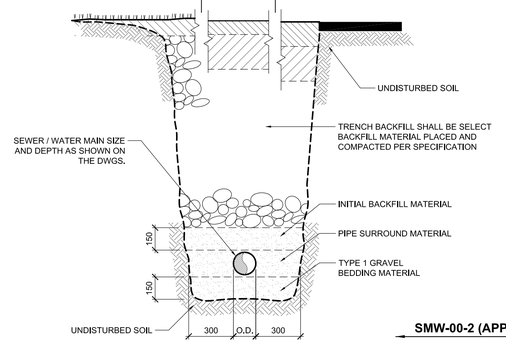


PRODUCTION WELL DETAIL 1/102

NOT TO SCALE

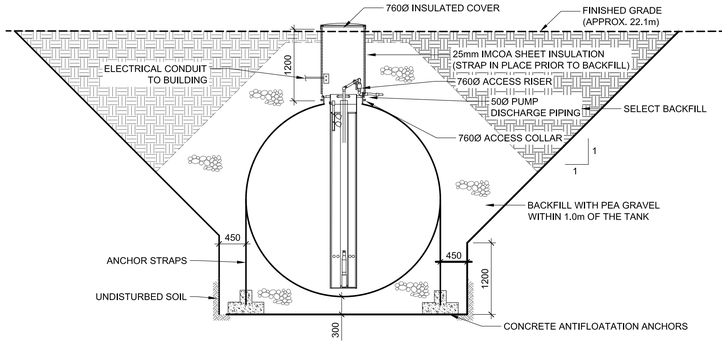
SURFACE FINISH REQUIREMENTS

OTHER AREAS	GRAVELLED AREAS	PAVED AREAS
- SEED - 100mm TOPSOIL	- 100mm TYPE 1 GRAVEL SURFACE COURSE - 200mm TYPE 2 GRAVEL BASE COURSE	- 75mm TYPE B ASPHALT - 175mm TYPE 1 GRAVEL BASE COURSE - 200mm TYPE 2 GRAVEL SUB-BASE COURSE



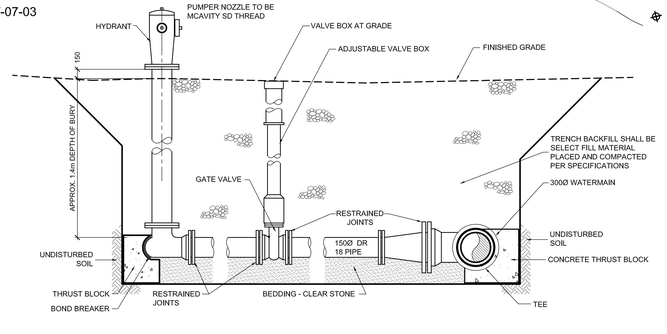
TYPICAL TRENCH DETAIL 2/102

NOT TO SCALE



E.Q. TANK DETAIL 3/102

SCALE: 1:50



HYDRANT DETAIL 4/102

NOT TO SCALE

Well Identification: PW-1	Owner: Municipality of East Hants	Date Drilled 22-Feb-08
Well location: 2682 Hiway No. 2	Top of Casing (m) MSL 22.711	Ground Elev. m 21.88
UTM - N. 4,991,721.2, E. 467,363.6	Casing Stick Up (m) 0.830	Casing Diameter 205 mm
Static Water Elevation (m) MSL 12.26	Water Level From Casing (m) 10.45	< Measured March 4, 2008
Elev. at Bottom of Instal. (m)	Depth of Well (m)	

From Grade

Depth (ft) From	Depth (ft) To	Depth (m) From	Depth (m) To	Elev (MSL m) From	Elev (MSL m) To	Thickness(m)	Summary Unit Descriptions:
0.00	0.82	0.00	0.25	21.88	21.63	0.25	Concrete Well Collar Apron
0.82	1.80	0.25	0.55	21.63	21.33	0.30	Type I Gravel
1.80	4.14	0.55	1.26	21.33	20.62	0.71	Fill
4.14	5.12	1.26	1.56	20.62	20.32	0.30	Concrete Cap over initial Outer Casing
5.12	5.87	1.56	1.79	20.32	20.09	0.23	Crushed Gravel
5.87	6.12	1.79	1.87	20.09	20.02	0.08	Humus - **Original Surface Level**
6.12	39.12	1.87	11.92	20.02	9.96	10.06	Till - Pleistocene
39.12	51.12	11.92	18.63	9.96	3.25	6.71	Grey Clay - Cretaceous
51.12	63.12	18.63	19.24	3.25	2.64	0.61	Fine Sand & Grey Clay - Cretaceous
63.12	71.12	19.24	21.68	2.64	0.20	2.44	Fine Silica Sand 0.2 - 0.5 mm - Cretaceous
71.12	80.12	21.68	24.42	0.20	-2.54	2.74	Coarse Silica Sand 1-2 mm - Cret. - **Upper Water Bearing Horizon**
80.12	88.12	24.42	26.86	-2.54	-4.98	2.44	Brown & Grey Silt & Clay horizons, some sand
88.12	100.12	26.86	30.52	-4.98	-8.64	3.66	Coarse Silica Sand 1-3 mm - Cret. - **Lower Water Bearing Horizon**
100.12	106.12	30.52	32.35	-8.64	-10.46	1.83	Silt & Clay with fine Sand - Cretaceous
106.12		32.35		-10.46	**End of Hole**		

Well Installation Details							
71.72	77.72	21.86	23.69	0.02	-1.81	1.83	**Upper Screen Placement - 30 Slot**
90.72	99.72	27.65	30.40	-5.77	-8.51	2.74	**Lower Screen Placement - 30 Slot**
99.72	104.72	30.40	31.92	-8.51	-10.04	1.52	**"Clean Out Pipe" (below screen)**
104.72		31.92		-10.04			**Bottom of Well installation**

Comment:
A 357 mm steel plate was welded to top of the 205 mm well casing (at 20.) and a 300 mm schedule X steel riser was added bringing the Top of Casing (TOC) to 22.711 m MSL. The gap between the top of the 200 mm steel casing and the initial 300 mm outer casing was enclosed and sealed with pored concrete prior to backfilling to current grade. The pump was installed between the two water bearing horizons at XX.xx m MSL approximately m below current grade.

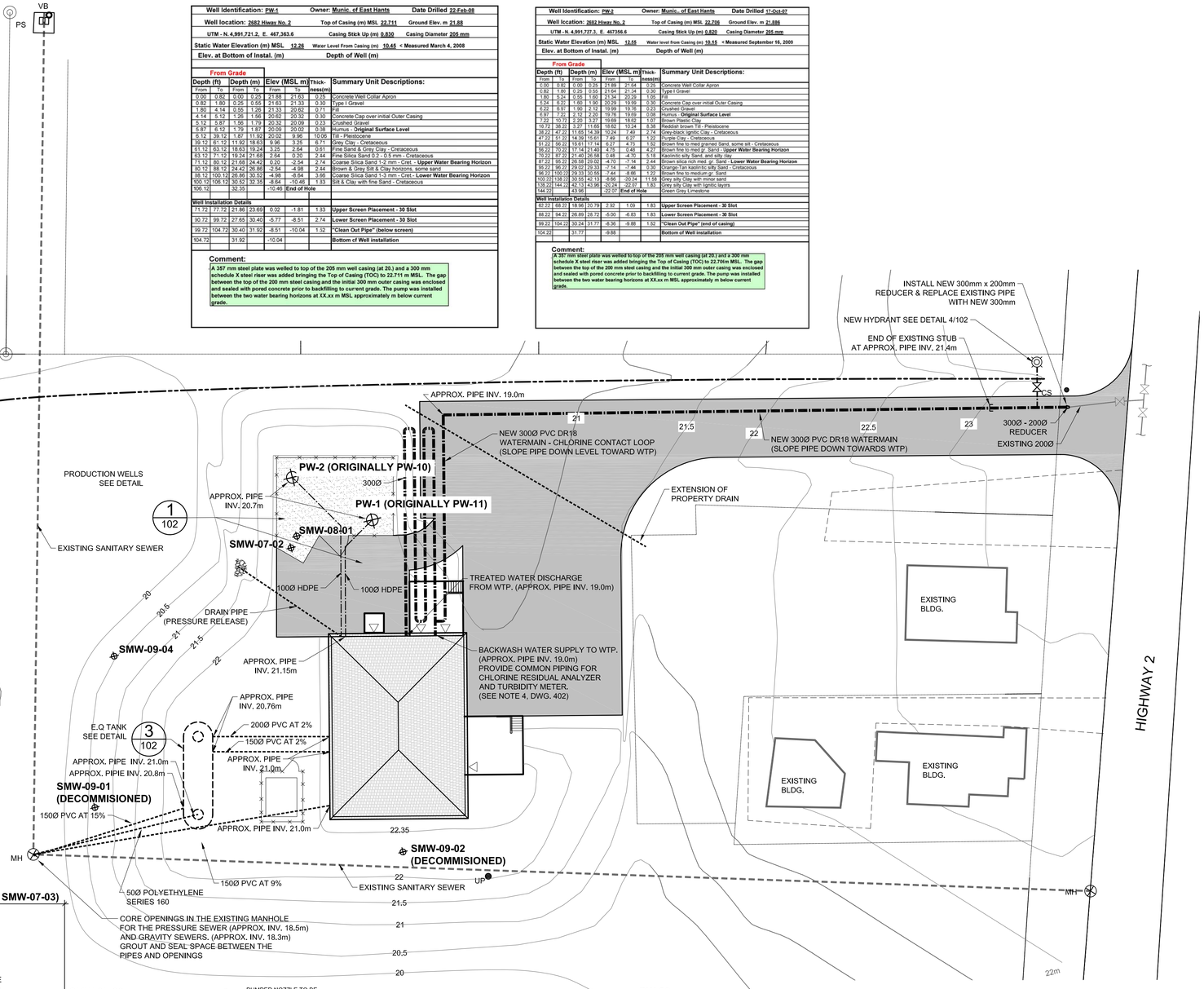
Well Identification: PW-2	Owner: Municipality of East Hants	Date Drilled 17-Oct-07
Well location: 2682 Hiway No. 2	Top of Casing (m) MSL 22.706	Ground Elev. m 21.886
UTM - N. 4,991,727.3, E. 467356.6	Casing Stick Up (m) 0.820	Casing Diameter 205 mm
Static Water Elevation (m) MSL 12.55	Water level From Casing (m) 10.15	< Measured September 16, 2009
Elev. at Bottom of Instal. (m)	Depth of Well (m)	

From Grade

Depth (ft) From	Depth (ft) To	Depth (m) From	Depth (m) To	Elev (MSL m) From	Elev (MSL m) To	Thickness(m)	Summary Unit Descriptions:
0.00	0.82	0.00	0.25	21.89	21.64	0.25	Concrete Well Collar Apron
0.82	1.80	0.25	0.55	21.64	21.34	0.30	Type I Gravel
1.80	5.24	0.55	1.60	21.34	20.29	1.05	Fill
5.24	6.22	1.60	1.90	20.29	19.99	0.30	Concrete Cap over initial Outer Casing
6.22	6.91	1.90	2.12	19.99	19.78	0.23	Crushed Gravel
6.97	7.22	2.12	2.20	19.76	19.69	0.08	Humus - **Original Surface Level**
7.22	10.72	2.20	3.27	19.69	18.62	1.07	Brown Plastic Clay
10.72	38.22	3.27	11.65	18.62	10.24	8.38	Reddish brown Till - Pleistocene
38.22	47.22	11.65	14.39	10.24	7.49	2.74	Grey-black lignitic Clay - Cretaceous
47.22	51.22	14.39	15.61	7.49	6.27	1.22	Purple Clay - Cretaceous
51.22	56.22	15.61	17.14	6.27	4.75	1.52	Brown fine to med grained Sand, some silt - Cretaceous
56.22	70.22	17.14	21.40	4.75	0.48	4.27	Brown fine to med gr. Sand - **Upper Water Bearing Horizon**
70.22	87.22	21.40	26.58	0.48	-4.70	5.18	Kaolinitic silty Sand, and silty Clay
87.22	95.22	26.58	29.02	-4.70	-7.14	2.44	Brown silica rich med. gr. Sand - **Lower Water Bearing Horizon**
95.22	96.22	29.02	29.33	-7.14	-7.44	0.30	Orange-Tan kaolinitic silty Sand - Cretaceous
96.22	100.22	29.33	30.55	-7.44	-8.66	1.22	Brown fine to medium gr. Sand
100.22	138.22	30.55	42.13	-8.66	-20.24	11.58	Grey silty Clay with minor sand
138.22	144.22	42.13	43.96	-20.24	-22.07	1.83	Grey silty Clay with lignitic layers.
144.22		43.96		-22.07	**End of Hole**		Green Grey Limestone

Well Installation Details							
82.22	88.22	18.96	20.79	2.92	1.09	1.83	**Upper Screen Placement - 30 Slot**
88.22	94.22	26.89	28.72	-5.00	-6.83	1.83	**Lower Screen Placement - 30 Slot**
99.22	104.22	30.24	31.77	-8.36	-9.88	1.52	**"Clean Out Pipe" (end of casing)**
104.22		31.77		-9.88			**Bottom of Well installation**

Comment:
A 357 mm steel plate was welded to top of the 205 mm well casing (at 20.) and a 300 mm schedule X steel riser was added bringing the Top of Casing (TOC) to 22.706m MSL. The gap between the top of the 200 mm steel casing and the initial 300 mm outer casing was enclosed and sealed with pored concrete prior to backfilling to current grade. The pump was installed between the two water bearing horizons at XX.xx m MSL approximately m below current grade.



SITE SERVICES PLAN

SCALE 1:250

No.	Issue	Date

No.	Revision	Ckd. By	Date
1	Record Information Added	GAR	Nov. 2011

RECORD DRAWING

Stamp

ORIGINAL DRAWING STAMPED ON 02 July 2010 BY G. A. ROSS P. ENG.

Const. North

Drawn By: STAFF

Dwg. Standards Ckd. By:

Designed By:

Dwg. Design Ckd. By:

Date Printed 2-JULY-2010

Branch Manager:

HORNER ASSOCIATES LIMITED
consulting and design engineers
89 Queen Street
Truro, NS

Client: Municipality of East Hants

Project Title: Shubenacadie Water Treatment Plant

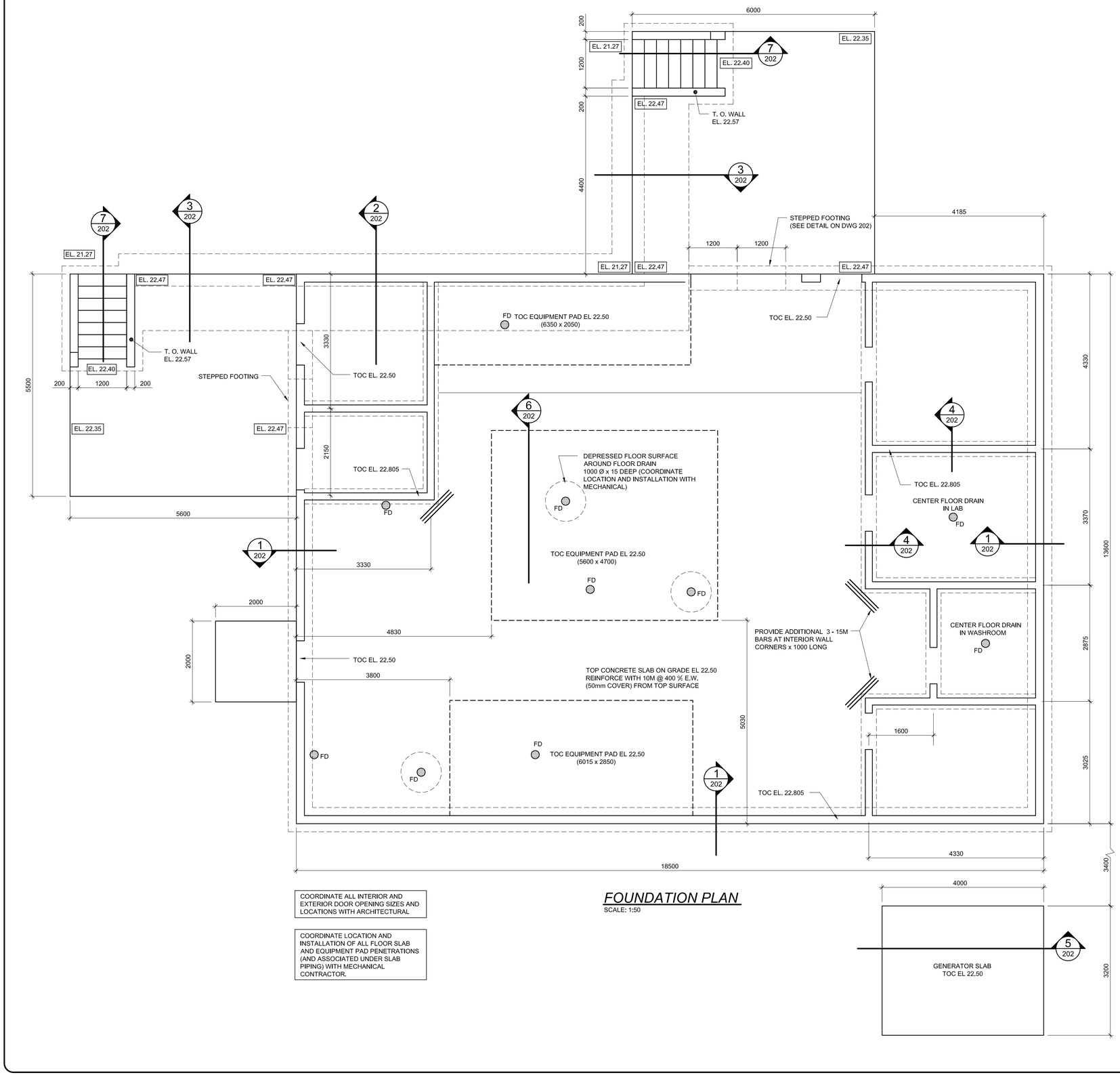
Drawing Title: Site Services Plan

Project No. LH0922160

Dwg. No. 102

Rev. No. 1

Scale: AS NOTED
This drawing is not to be scaled



COORDINATE ALL INTERIOR AND EXTERIOR DOOR OPENING SIZES AND LOCATIONS WITH ARCHITECTURAL

COORDINATE LOCATION AND INSTALLATION OF ALL FLOOR SLAB AND EQUIPMENT PAD PENETRATIONS (AND ASSOCIATED UNDER SLAB PIPING) WITH MECHANICAL CONTRACTOR.

FOUNDATION PLAN

SCALE: 1:50

REINFORCED CONCRETE NOTES

1. CONCRETE DESIGN STRENGTHS
   - f'c = 25 MPa (AT 28 DAYS) FOR ALL FOOTINGS
   - f'c = 30 MPa (AT 28 DAYS) FOR ALL FOUNDATION WALLS AND INTERIOR SLAB ON GRADE.
   - f'c = 32 MPa (AT 28 DAYS) FOR EXTERIOR SIDEWALKS, EQUIPMENT PADS, ETC
2. REFER TO SPECIFICATIONS FOR CONCRETE EXPOSURE AND CONCRETE MIX DESIGN DETAILS.

   CONCRETE COVER REQUIREMENTS
   - 60mm - WALLS AND FOOTING
   - 75mm - CONCRETE CAST AGAINST EARTH
3. CONCRETE REINFORCING LAP SPLICES AND DETAILS PER RSIC MANUAL LATEST EDITION UNLESS OTHERWISE NOTED.
4. LOCATIONS OF ALL VERTICAL CONSTRUCTION JOINTS MUST BE APPROVED, IN WRITING, BY THE ENGINEER PRIOR TO CONSTRUCTION.
5. COORDINATE LOCATION OF ALL EMBEDDED PARTS WITH APPROPRIATE TRADE.
6. ALL ELEVATIONS ARE SHOWN IN METERS. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS.

No.	Issue	Date
1	Record Information Added	GAR	Nov. 2011
No.	Revision	Ckd. By	Date

RECORD DRAWING

Stamp

ORIGINAL DRAWING
STAMPED ON
02 July 2010
BY
D. G. BACH P. ENG.

Const. North

Drawn By: STAFF

Dwg. Standards Ckd. By:

Designed By:

Dwg. Design Ckd. By:

Date Printed 2-JULY-2010

Branch Manager:

HORNER ASSOCIATES LIMITED
consulting and design engineers
89 Queen Street
Truro, NS

Client: Municipality of East Hants

Project Title: Shubenacadie Water Treatment Plant

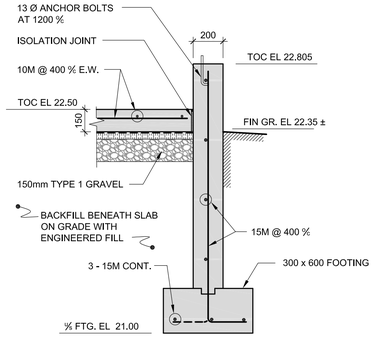
Drawing Title: Foundation Plan

Project No. LH0922160

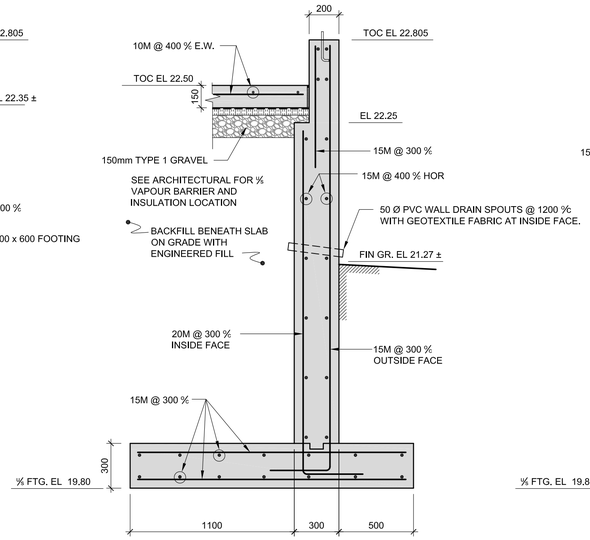
Dwg. No. 201

Rev. No. 1

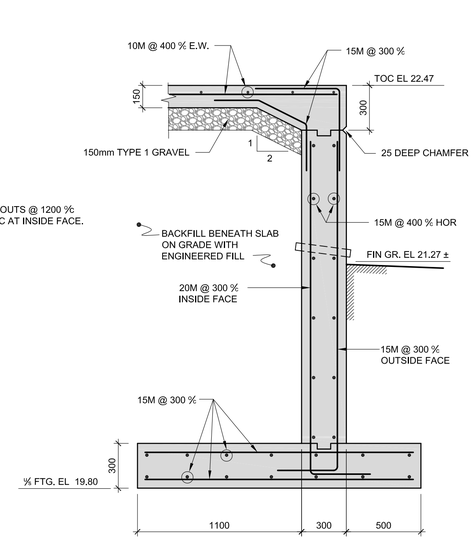
Scale: 1 : 50
This drawing is not to be scaled



SECTION 1
SCALE: 1:20

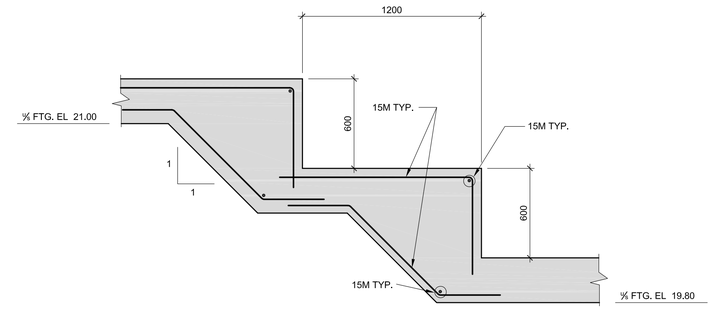


SECTION 2
SCALE: 1:20

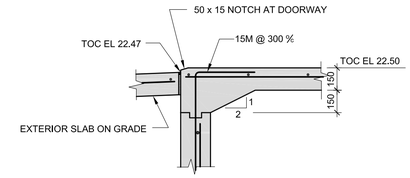


SECTION 3
SCALE: 1:20

NOTE:
ALL BUILDING AND RETAINING WALL FOOTINGS MUST BE FOUNDED ON THE NATIVE COMPACT TO DENSE CLAYEY SILTY SAND AND SAND LAYERS OR ON ENGINEERED FILL IN ACCORDANCE WITH THE GEOTECHNICAL REPORT



TYPICAL STEPPED FOOTING
SCALE: 1:20



TYPICAL SECTION @ EXT. DOORS.
SCALE: 1:20

SECTION 4
SCALE: 1:20

SECTION GENERATOR PAD 5
SCALE: 1:20

SECTION EQUIPMENT PAD 6
SCALE: 1:20

SECTION 7
SCALE: 1:20

FOOTING FOUNDED ON COMPACT TO DENSE CLAYEY SILTY SAND AND SAND LAYERS OR ON ENGINEERED FILL

TYPICAL FOUNDATION SECTION
SCALE: 1:100

No.	Issue	Date
1	Record Information Added	Nov. 2011
No.	Revision	Date

RECORD DRAWING

Stamp

ORIGINAL DRAWING STAMPED ON
02 July 2010
BY
D. G. BACH P. ENG.

Const. North

Drawn By: STAFF

Dwg. Standards Ckd. By:

Designed By:

Dwg. Design Ckd. By:

Date Printed: 2-JULY-2010

Branch Manager:

HORNER ASSOCIATES LIMITED
consulting and design engineers

89 Queen Street
Truro, NS

Client: Municipality of East Hants

Project Title: Shubenacadie Water Treatment Plant

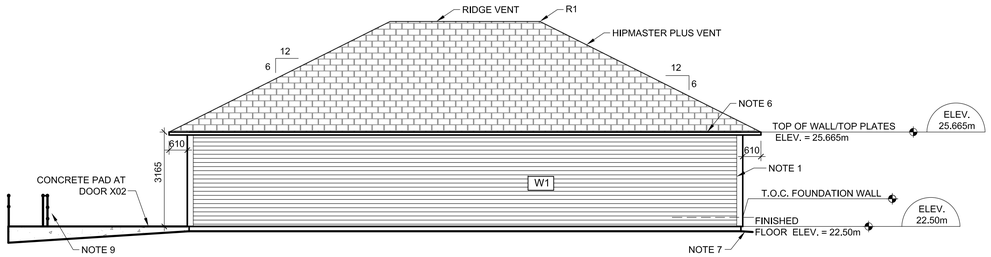
Drawing Title: Foundation Details

Project No.: LH0922160

Dwg. No.: 202

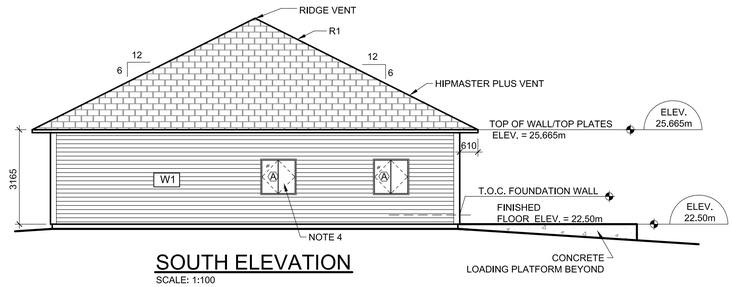
Rev. No.: 1

Scale: AS NOTED
This drawing is not to be scaled



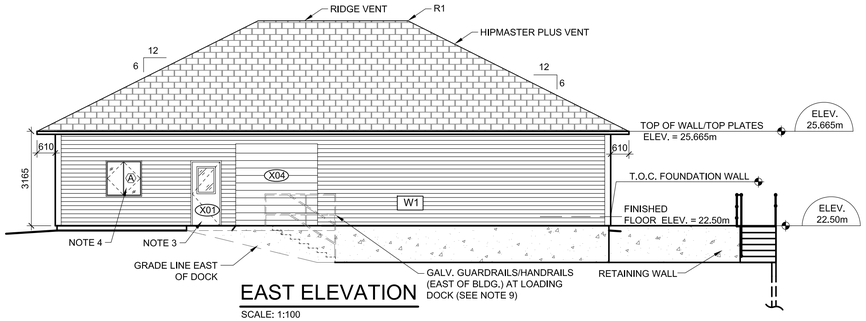
WEST ELEVATION

SCALE: 1:100



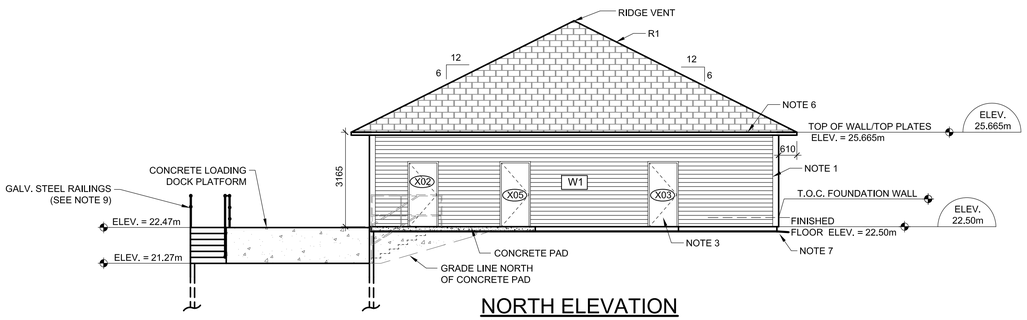
SOUTH ELEVATION

SCALE: 1:100



EAST ELEVATION

SCALE: 1:100



NORTH ELEVATION

SCALE: 1:100

WINDOW SCHEDULE (NEW WINDOWS)

WINDOWS (HIGH PERFORMANCE LOW E "ENERGLASS")							FRAMES			REMARKS
MARK	WIDTH (mm)	HEIGHT (mm)	GLASS THICKNESS (mm)	TINTING	TYPE	SASH OPERATION	MATERIAL	FINISH	QUANTITY	
(A)	1220	1220	25	BRONZE	LOW E (ENERGLAS)	OPERABLE CASEMENT	PVC	WHITE	3	DOUBLE GLAZED

NOTES

ALL WINDOWS SHALL MEET OR EXCEED THE PERFORMANCE CRITERIA AS OUTLINED IN CAN/CSA A440-M90 AND ALL CURRENT CWDMA CERTIFICATIONS AND HAVE AN ENERGY RATING OF 25 MIN. ENSURE ALL WINDOW FRAMES & GLAZING MEET ALL REQUIRED WIND LOAD CRITERIA FOR THE GEOGRAPHIC LOCATION.
ALL WINDOWS SHALL BE HEAVY DUTY COMMERCIAL GRADE SUPREME AS MANUFACTURED BY KOHLER INTERNATIONAL LTD. OR EQUIVALENT.
ENSURE ALL WINDOW OPENINGS ARE FRAMED TO COINCIDE WITH WINDOW MANUFACTURER'S ROUGH STUD/MASONRY OPENING SIZES.
PROVIDE ALL NECESSARY J NAILING TRIMS, BRICK MOULDS, ACCESSORIES & DRYWALL RETURNS, JAMB, HEAD & SILL & EXTENSIONS AS REQUIRED.
PROVIDE WIDE COMMERCIAL FRAME PROFILES FOR ALL UNITS.
CONFIRM WINDOW STYLE, QUANTITY, ETC. WITH ELEVATIONS & PLANS

NOTES:

1. 19mm x 89mm HARDIE BOARD OUTSIDE CORNERS & HORIZONTAL TRIMS (TYP.)

2. SEE ELECTRICAL DRAWINGS FOR EXTERIOR LIGHTING FIXTURE TYPES & LOCATIONS.

3. ALL EXTERIOR DOORS TO BE FRAMED FOR A 914mm WIDE x 2135mm HIGH EXTERIOR INSULATED HOLLOW METAL DOOR & TB PSF. (CONFIRM ON SITE)

4. CONTRACTOR TO CONFIRM ALL WINDOW / LOUVER SIZES & RSO PRIOR TO FABRICATION / SUPPLY OF NEW PRODUCTS.

5. PRE FINISHED SIDING, FASCIAS, SOFFITS, & TRIMS, ACCESSORIES BY JAMES HARDIE SIDING PRODUCTS. COLOURS BY OWNER.

6. PROVIDE COMMERCIAL GRADE PREFINISHED GUTTERS & DOWNSPOUTS & ACCESSORIES (127mm Ø MIN) AS REQUIRED TO MATCH BUILDING FINISHES. PROVIDE QUANTITY OF DOWNSPOUTS AS REQUIRED TO FACILITATE DRAINAGE FROM ROOF.

7. PROVIDE CONCRETE SPLASH BLOCKS AT BOTTOM OF ALL DOWNSPOUTS.

8. FOR WALL SECTIONS REFER TO DWG. 304.

9. GALV. ROUND PIPE, DM48.3 x 5.08 FOR RAILS (TOP & INTERMEDIATE) & POSTS (MAX SPACING 1220mm BETWEEN POSTS). SECURE PIPE TO 90 x 90 x 200 x 10mm THICK GALV. PLATES AT PIPE BASE & WAGNER BRACKETS @ SIDE WALL MOUNTING. SECURE TO CONCRETE WITH 13mm Ø S/S ANCHOR ROD BONDED WITH HILTI HIT-HY 150 MAX. ADHESIVE WITH 75mm EMBEDMENT. PIPE TO ASTM A53 GRADE B.

LEGEND:

T.O.C. - TOP OF CONCRETE
TB - THERMALLY BROKEN
RSO - ROUGH STUD OPENING
ELEV. - ELEVATION
FIN. - FINISHED
C/W - COMPLETE WITH
PSF - PRESSED STEEL FRAME

(X02) - DOOR IDENTIFICATION MARKER (SEE DOOR SCHEDULE DWG. 305)

(A) - WINDOW IDENTIFICATION (SEE WINDOW SCHEDULE THIS DWG.)

R1 - TYPICAL ROOF CONSTRUCTION

30 yr ASPHALT SHINGLES (COLOUR BY OWNER)
ASPHALT ROLL ROOFING
ICE & WATER SHIELD
16mm T&G PLYWOOD SHEATHING
PRE-ENGINEERED WOOD TRUSS @ 610 c/c
PROVIDE STRAPPING AS REQUIRED FOR ROOF TRUSS STABILITY
RSI 7.0 (R40) BATT INSULATION
0.15mm (6MIL) POLY VAPOUR BARRIER MEMBRANE
19mm x 89mm STRAPPING @ 410 c/c
16mm TYPE 'X' DRYWALL (PRODUCT MUST BE SUITABLE
FOR HUMID / DAMP CONDITIONS)

W-1 EXTERIOR WALL LEGEND:

HORIZ. SIDING (FIBRE CEMENT-PREFINISHED SIDING)
38 x 64 P. T. VERT. WOOD STRAPPING @ 410mm c/c
(AT STUD LOCATIONS)
AIR BARRIER MEMBRANE (SEAL / TAPE ALL JOINTS)
13mm EXTERIOR GRADE PLYWOOD
38 x 140 WOOD STUDS @ 410mm c/c
PROVIDE HORIZONTAL STUD BLOCKING @ ½ SPAN
RSI 4.23 (R24) BATTS INSULATION
16mm CGC TYPE 'X' AQUATOUGH GYPSUM BOARD U/N (RMS. 101)
16mm CGC TYPE 'X' GYPSUM BOARD (RMS. 102,103,104,105, 106, 107)

No.	Issue	Date

1	Record Information Added	GAR	Nov. 2011
No.	Revision	Ckd. By	Date

RECORD DRAWING

Stamp

ORIGINAL DRAWING
STAMPED ON
02 July 2010
BY
G. A. ROSS P. ENG.

Const. North

Drawn By: STAFF

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Branch Manager:

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89 Queen Street
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Client
Municipality of East Hants

Project Title
Shubenacadie
Water Treatment Plant

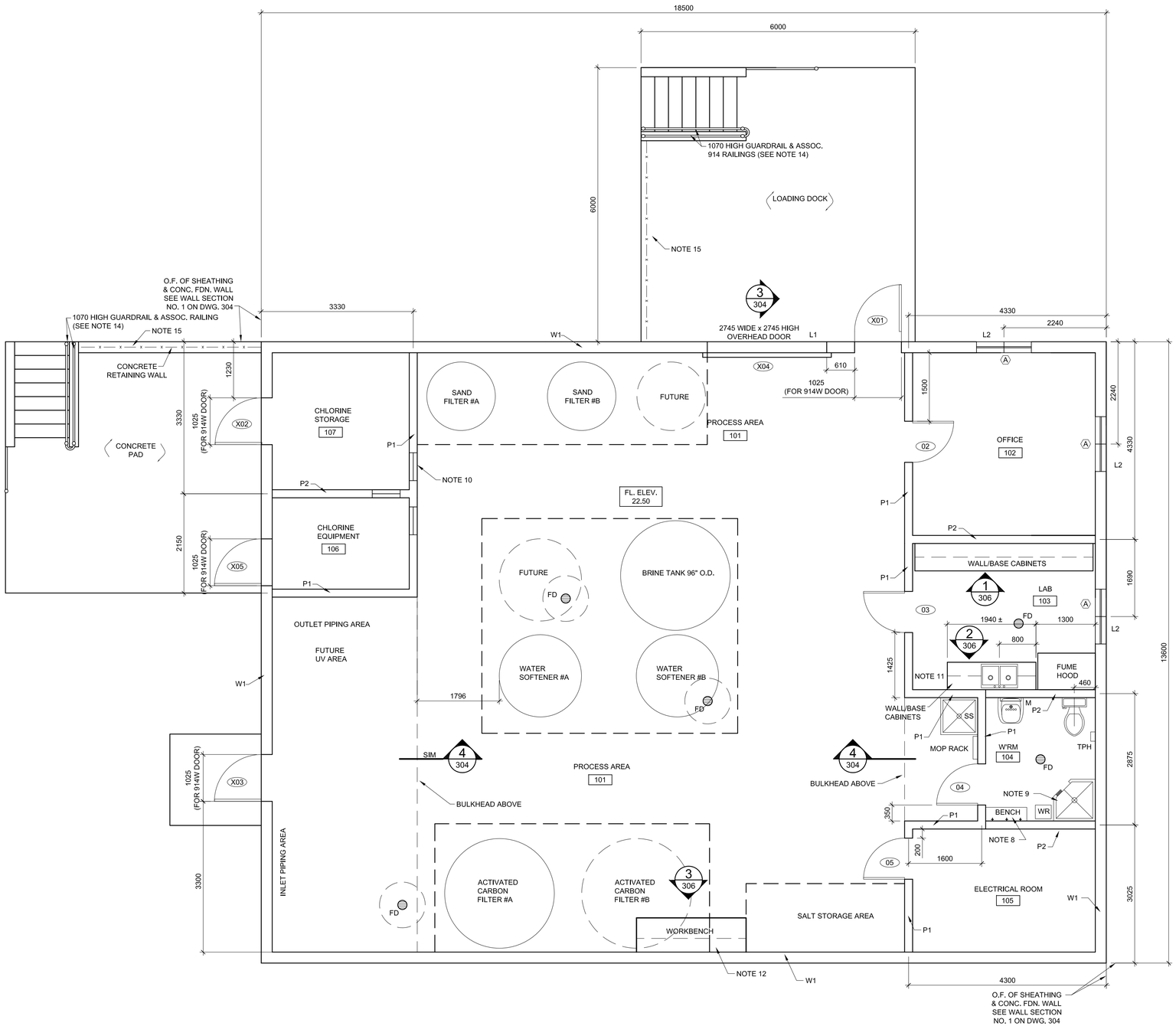
Drawing Title
Building Elevations

Project No. LH0922160

Dwg. No. 301

Rev. No. 1

Scale
1:100
This drawing is not to be scaled



BUILDING FLOOR PLAN

SCALE: 1:50

WOOD FRAMING NOTES:

1. DO WORK TO CAN/CSA - 086 - 01 "ENGINEERED DESIGN IN WOOD (LIMIT STATES DESIGN)"
2. **MATERIAL SPECIFICATIONS**,
   LUMBER - No1 / No2 S-P-F (GRADE STAMP ON EACH PIECE)
   PARALLAM PSL - 2.0 E
3. DO NOT CUT, NOTCH, OR DRILL HOLES IN PARALLAM PSL MEMBERS.
4. **ROOF SHEATHING -** USE 16mm T & G SHEATHING ATTACHED TO ROOF TRUSSES WITH 75mm NAILS SPACED AT 150mm CENTER TO CENTER ALONG SUPPORTED PANEL ENDS AND AT 305mm CENTER TO CENTER ALONG INTERMEDIATE TRUSSES.

   WALL SHEATHING - USE 13mm PLYWOOD SHEATHING ATTACHED TO EXTERIOR WALL STUDS USING 75mm NAILS SPACED AT 150mm CENTER TO CENTER ALL AROUND PERIMETER OF PANEL AND AT 305mm CENTER TO CENTER ALONG INTERMEDIATE WALL STUDS.
5. SUBMIT SHOP DRAWINGS OF WOOD TRUSSES, BEARING THE STAMP OF A PROFESSIONAL ENGINEER REGISTERED OR LICENSED IN NOVA SCOTIA, TO THE ENGINEER FOR REVIEW PRIOR TO FABRICATION.
   - SHOW PITCH, CHAMBER, CONFIGURATION, AND SPACING OF TRUSSES.
   - INDICATE SPECIES, SIZES, AND STRESS GRADES OF LUMBER USED AS TRUSS MEMBERS.
   - INDICATE CONNECTOR TYPES, THICKNESSES, SIZES, LOCATIONS, AND DESIGN VALUES.
   - SHOW BEARING DETAILS.
   - INDICATE DESIGN LOAD FOR EACH TRUSS MEMBER; INDICATE ALLOWABLE LOAD AND STRESS INCREASE.
   - SHOW LOCATION AND SIZES OF LATERAL BRACING FOR COMPRESSION MEMBERS.
   - INCLUDE LAYOUT DRAWING SHOWING LOCATION OF EACH INDIVIDUAL TRUSS, INCLUDING IDENTIFICATION OF EACH TRUSS TYPE.
   - SHOW LOCATION AND SIZE OF ALL REQUIRED BRACING MEMBERS.
6. LIMIT LIVE LOAD DEFLECTION TO 1 / 360th OF SPAN. LIMIT TOTAL LOAD DEFLECTION TO 1 / 240th OF SPAN.
7. PROVIDE GALV. HURRICANE ANCHORS AT EACH END OF ALL TRUSSES AND ROOF RAFTERS. MINIMUM SPECIFIED UPLIFT CAPACITY FOR EACH ANCHOR TO BE 2.7 KN.

WOOD LINTEL SCHEDULE

NO.	SIZE	MAX.	REMARKS
L1	PSL 133 x 229 (5 1/4" x 9")	2800mm	3 JACK STUDS 3 KING STUDS
L2	3 - 38 x 184	1500mm	DOUBLE JACK STUDS, DOUBLE KING STUDS

W1 - EXTERIOR WALL LEGEND:

HORIZ. SIDING (FIBRE CEMENT-PREFINISHED SIDING)
38 x 64 P. T. VERT. WOOD STRAPPING @ 410mm c/c
(AT STUD LOCATIONS)
AIR BARRIER MEMBRANE (SEAL / TAPE ALL JOINTS)
13mm EXTERIOR GRADE PLYWOOD
38 x 140 WOOD STUDS @ 410mm c/c
PROVIDE HORIZONTAL STUD BLOCKING @ ½ SPAN
RSI 4.23 (R24) BATTS INSULATION
16mm CGC TYPE 'X' AQUATOUGH GYPSUM BOARD U/N (RMS. 101)
16mm CGC TYPE 'X' GYPSUM BOARD (RMS. 102,103,104,105, 106, 107)

INTERIOR PARTITION LEGEND:

P1 - INTERIOR PARTITIONS
16mm CGC TYPE 'X' AQUATOUGH PROCESS 101 SIDE ONLY, ON ONE SIDE OF 38 x 140 WOOD STUDS @ 410mm c/c EXTENDING TO U/S OF ROOF TRUSSES ABOVE.PROVIDE HORIZ. BLOCKING AT 1/3 SPAN. 16mm CGC TYPE 'X' GYPSUM BOARD FOR INSIDE OF RMS 102, 103, 104, 105, 106, 107 (1 HR FIRE SEPARATION)

P2 - INTERIOR PARTITIONS
16mm CGC TYPE 'X' GYPSUM BOARD EACH SIDE OF 38 x 140 WOOD STUDS @ 410mm c/c EXTENDING TO U/S OF ROOF TRUSSES ABOVE.PROVIDE HORIZ. BLOCKING AT 1/3 SPAN.
(1 HR FIRE SEPARATION)

GENERAL NOTES:

1. REFER TO DRAWING 306 FOR MILLWORK ELEVATIONS, LOCATIONS, & DETAILS.
2. INSTALL 50mm WIDE ADHESIVE HIGHLIGHT STRIP AT EDGE OF RAISED CONC. PADS/CURBS.
3. REFER TO DRAWING FOR MECHANICAL LOUVER DETAILS.
4. PROVIDE 25mm PLYWOOD (GIC) BACKERBOARDS FOR ELECTRICAL / COMMUNICATIONS PANELS. PAINT WITH FIRE RESISTANT PAINT. CO-ORDINATE SIZES WITH ELECTRICAL EQUIPMENT IN ROOM 105.
5. REFER TO DWG. 305 FOR DOOR SCHEDULE & ROOM FINISH SCHEDULE.
6. PROVIDE STRUCTURAL BRACING, BRACKETS AS REQUIRED AT TOP TO STABILIZE & MAKE RIGID ALL NEW INTERIOR PARTITIONS.
7. FURR OUT AND FINISH AROUND EXPOSED TO VIEW VERTICAL DUCTWORK & PIPES.
8. 300mm DEEP x 900mm LONG HARDWOOD BENCH WITH 3 ROBE HOOKS ABOVE ON WALL. SEE DETAIL B ON DWG. 306.
9. PREFAB SHOWER UNIT C/W BASE AND SHOWER ACCESSORIES (CURTAIN, ROD, HOOKS, ETC.)
10. 600mm W. x 914mm H. INTERIOR BORROWED LITES (6mm WIRED GLASS) C/W PRESSED STEEL FRAMES. SEE DOOR SCHEDULE FOR INFORMATION.
11. SHOWER EYE WASH STATION. (HAWS MODEL 8300)
12. REFER TO DWG. 306 FOR WORKBENCH DETAILS.
13. PROVIDE 610mm x 610mm INSULATED ATTIC HATCH. LOCATION TO BE DETERMINED.
14. GALV. ROUND PIPE, DM48.3 x 5.08 FOR RAILS (TOP & INTERMEDIATE) & POSTS (MAX SPACING 1220mm BETWEEN POSTS). SECURE PIPE TO 90 x 90 x 200 x 10mm THICK GALV. PLATES AT PIPE BASE & WAGNER BRACKETS @ SIDE WALL MOUNTING. SECURE TO CONCRETE WITH 13mm Ø S/S ANCHOR ROD BONDED WITH HILTI HIT-HY 150 MAX. ADHESIVE WITH 75mm EMBEDMENT. PIPE TO ASTM A53 GRADE B.
15. PROVIDE FLOURESCENT GALV. SAFETY CHAIN c/w ALL MOUNTING ACCESSORIES AND "DANGER SIGN" AT NORTH LOADING DOCK & EAST SIDE OF EXTERIOR CONC. PAD AT CHLORINE STORAGE 107.

LEGEND:

- (01) DOOR IDENTIFICATION (REFER TO DOOR SCHEDULE DWG.305)
- (A) WINDOW IDENTIFICATION MARKER (REFER TO WINDOW SCHEDULE DWG. 301)
- [101] ROOM NUMBERS

ABBREVIATIONS:

BS - BUILDING SECTION
C/C - CENTER TO CENTER SPACING
CONC - CONCRETE
C/W - COMPLETE WITH
DWG. - DRAWING
FD - FLOOR DRAIN
FDN. - FOUNDATION
F - FRIDGE (NIC)
GR - GUARD RAIL (1070mm HIGH MIN.)
HORIZ. - HORIZONTAL
LI - LINTEL DESIGNATIONS
LSD - LIQUID SOAP DISPENSER
M - MIRROR
M. O. - MASONRY OPENING
NIC - NOT IN CONTRACT
O/F - OUTSIDE FACE
P1 - INTERIOR PARTITION TYPE
PTD - PAPER TOWEL DISPENSER
RH - ROBE HOOK
SS - SLOP / SERVICE SINK
TPH - TOILET PAPER HOLDER
U/C - UNDER CABINET
U/S - UNDERSIDE
W1 - EXTERIOR WALL TYPE
WR - WASTE RECEPTACLE
WS - WALL SECTION

No.	Issue	Date
1	Record Information Added	GAR	Nov. 2011
No.	Revision	Ckd. By	Date

RECORD DRAWING

Stamp

ORIGINAL DRAWING
STAMPED ON
02 July 2010
BY
G. A. ROSS P. ENG.

Const. North

Drawn By: STAFF

Dwg. Standards Ckd. By:

Designed By:

Dwg. Design Ckd. By:

Date Printed: 2-JULY-2010

Branch Manager:

HORNER
ASSOCIATES LIMITED
consulting and design engineers
89 Queen Street
Truro, NS

Client: Municipality of East Hants

Project Title: Shubenacadie Water Treatment Plant

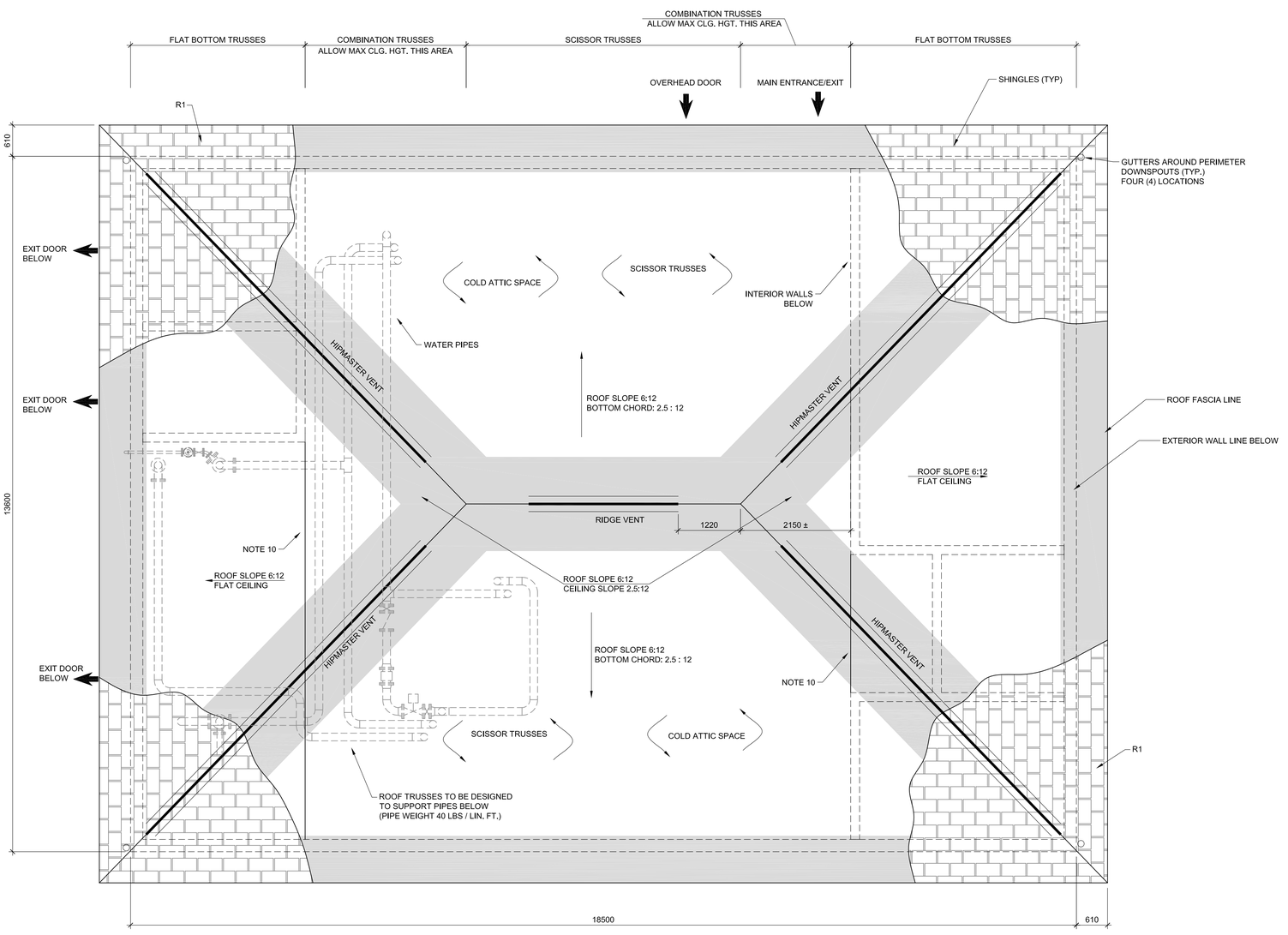
Drawing Title: Floor Plan

Project No.: LH0922160

Dwg. No.: 302

Rev. No.: 1

Scale: 1 : 50
This drawing is not to be scaled



ROOF PLAN
SCALE: 1:50

R1 - TYPICAL ROOF CONSTRUCTION

30 yr ASPHALT SHINGLES (COLOUR BY OWNER)
ASPHALT ROLL ROOFING
ICE & WATER SHIELD
16mm T&G PLYWOOD SHEATHING
PRE-ENGINEERED WOOD TRUSS @ 610 c/c
PROVIDE STRAPPING AS REQUIRED BY ROOF TRUSS
MAUNUFACTURER FOR ROOF TRUSS STABILITY
RSI 7.0 (R40) BATT INSULATION
0.15mm (6MIL) POLY VAPOUR BARRIER MEMBRANE
19mm x 89mm STRAPPING @ 410 c/c
16mm TYPE 'X' DRYWALL (PRODUCT MUST BE SUITABLE FOR HUMID / DAMP CONDITIONS)

LEGEND:

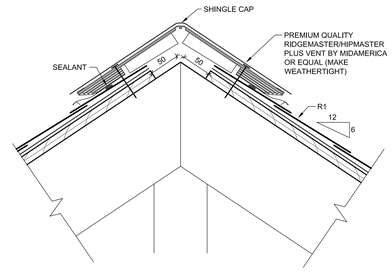
ROOF PROTECTION MEMBRANE - EXTEND 3'-0" MIN. BEYOND ALL ROOF PENETRATIONS

EXIT / ENTRANCE DOORS BELOW

50mm SLOT THROUGH ROOF SHEATHING @ RIDGE & HIPS. (PROVIDE DISTANCE OF 1220mm FROM ROOF EDGE) SEE DETAIL ON THIS DRAWING

ABBREVIATIONS:

BS - BUILDING SECTION



RIDGE VENT DETAIL
SCALE: 1:5

NOTES:

1. PREFABRICATED WOOD ROOF TRUSSES, BRACING, BRIDGING AND CONNECTIONS SHALL BE DESIGNED IN ACCORDANCE WITH PART 4, NBC AND CSA - 086.1
2. TRUSS FABRICATOR IS RESPONSIBLE FOR DESIGN OF ALL TRUSS TO TRUSS AND TRUSS TO BEARING PLATES CONNECTIONS.
3. TRUSS FABRICATOR TO SUBMIT ERECTION DRAWINGS AND TRUSS DETAIL SHOP DRAWINGS BEARING THE SIGNATURE AND STAMP OF A PROFESSIONAL ENGINEER LICENSED TO PRACTICE IN THE PROVINCE OF NOVA SCOTIA.
4. ROOF TRUSS DESIGN BASED ON THE FOLLOWING DESIGN CRITERIA:
   SNOW - 2.55 kPa CASE I
   - 3.00 kPa CASE II
   WITH Is=1.25 (POST DISASTER)

   TOP CHORD DEAD - 0.40 kPa
   BOTTOM CHORD DEAD - 0.85 kPa

   WIND UPLIFT - IN ACCORDANCE WITH NBCC 2005 FOR STEWIACKE, N.S. WOOD TRUSS DESIGN TO INCLUDE IMPORTANCE FACTORS APPROPRIATE FOR A POST DISASTER BUILDING.
5. ROOF TRUSS ERECTION DRAWINGS SHALL INDICATE PRINCIPLE DIMENSIONS OF THE STRUCTURE, PIECE MARKS, SPACING, BEARING DETAILS AND ALL OTHER INFORMATION NECESSARY FOR ASSEMBLY OF THE STRUCTURE.
6. PROVIDE COMMERCIAL GRADE GUTTER / DOWNSPOUTS & ACCESSORIES (127mm Ø MIN) AS REQUIRED. (FOUR (4) LOCATIONS) PROVIDE CONCRETE SPLASH PADS.
7. PROVIDE SOLID PROFILE RIDGE & HIP VENTS, RIDGEMASTER / HIPMASTER PLUS BY MID AMERICA.
8. INSULATE / PROTECT ALL MECHANICAL / HVAC PIPING/DUCTS PASSING THROUGH COLD ATTIC SPACE ABOVE INULATION.
9. PROVIDE PREFIN. PLUMBING VENT COVER VERTICAL VENT PIPE. COLOUR TO MATCH SHINGLES.
10. CONTRACTOR SHALL CONSTRUCT A DRYWALL BULKHEAD FOR NORTH AND SOUTH ENDS OF THE BUILDING AROUND PROCESS 101 AREA.

No.	Revision	Ckd. By	Date
1	Record Information Added	GAR	Nov. 2011

RECORD DRAWING

Stamp

ORIGINAL DRAWING
STAMPED ON
02 July 2010
BY
G. A. ROSS P. ENG.

Const. North

Drawn By: STAFF

Dwg. Standards Ckd. By:

Designed By:

Dwg. Design Ckd. By:

Date Printed: 2-JULY-2010

Branch Manager:

HORNER ASSOCIATES LIMITED
consulting and design engineers
89 Queen Street
Truro, NS

Client: Municipality of East Hants

Project Title: Shubenacadie Water Treament Plant

Drawing Title: Roof Plan

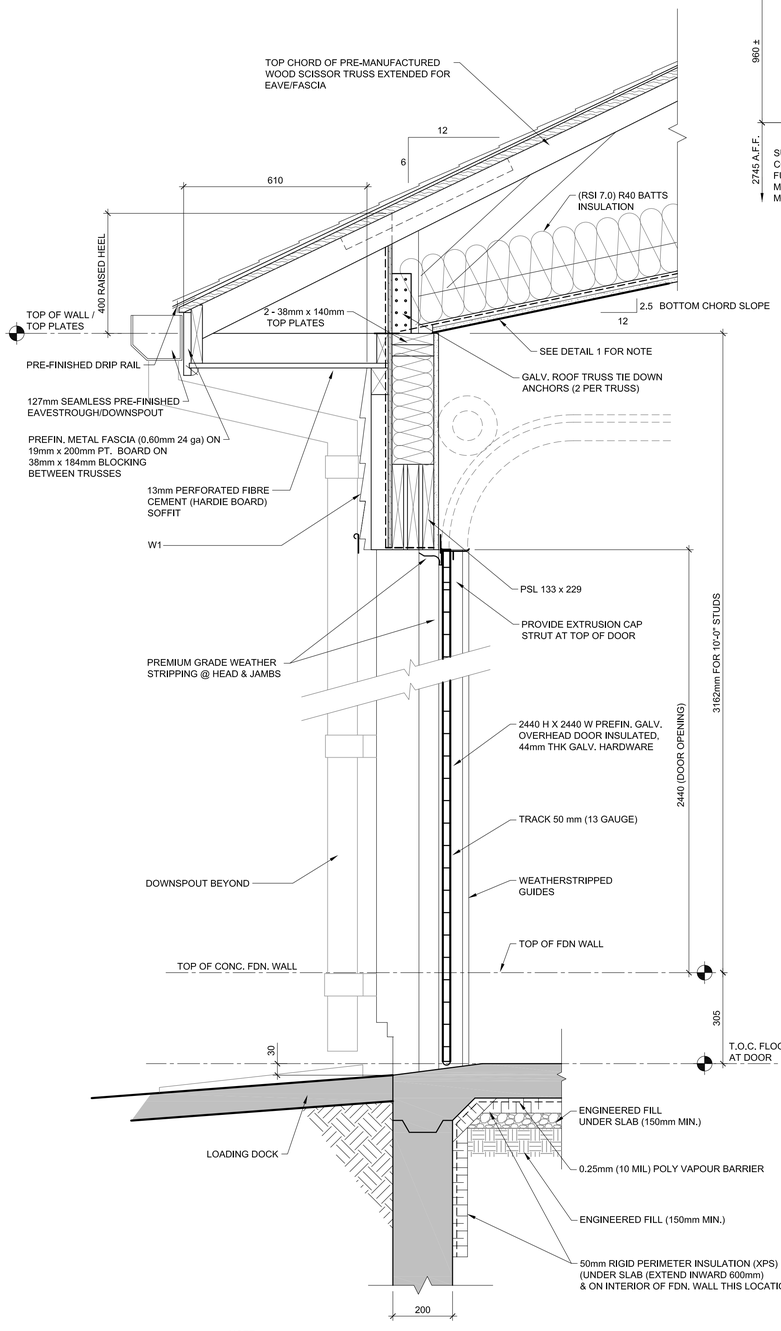
Project No.: LH0922160

Dwg. No.: 303

Rev. No.: 1

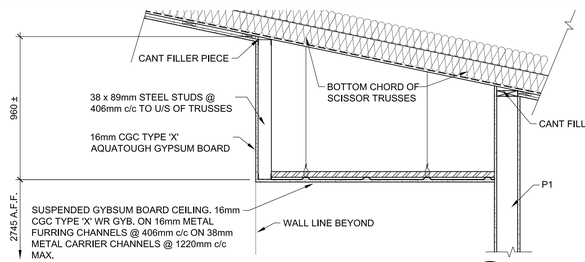
Scale: AS NOTED
This drawing is not to be scaled

0 5 10 20 25 30 cm

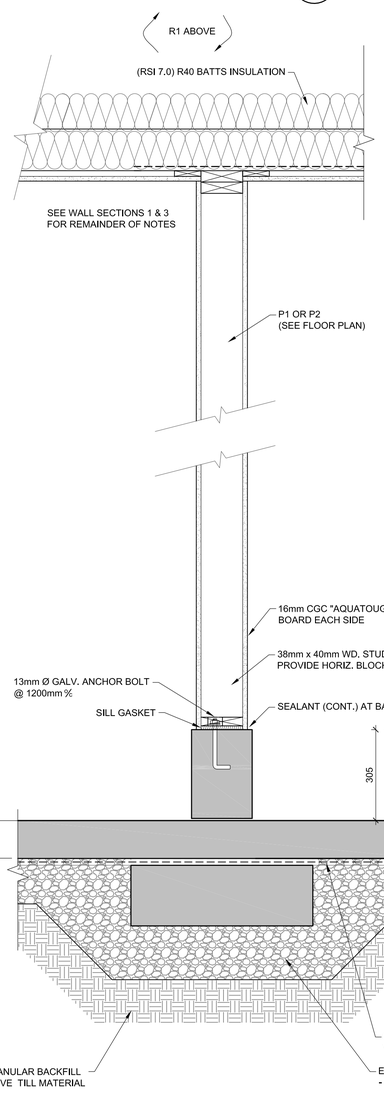


NOTE:
FOR CONCRETE SLAB, FOUNDATION & FOOTING SIZES & REINF. SEE STRUCT. DWGS.

GARAGE DOOR SECTION 3/302
SCALE: 1:10



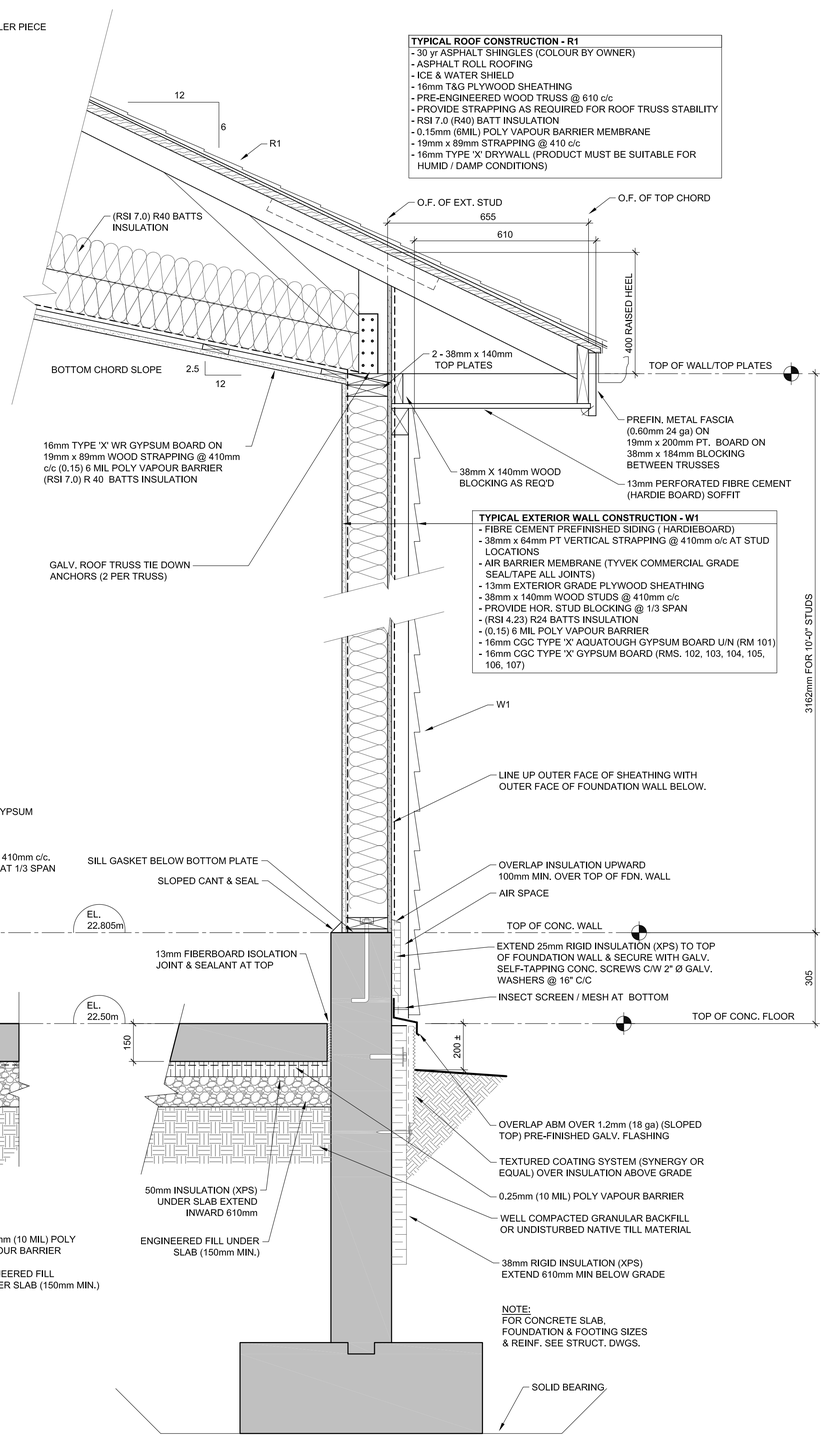
BULKHEAD DETAIL 4/302
SCALE: 1:20



NOTE:
FOR CONCRETE SLAB, FOUNDATION & FOOTING SIZES & REINF. SEE STRUCT. DWGS.

SECTION AT ALL INTERIOR PARTITIONS (HIGH CONCRETE CURB) 2/302
SCALE: 1:10

TYPICAL ROOF CONSTRUCTION - R1
- 30 yr ASPHALT SHINGLES (COLOUR BY OWNER)
- ASPHALT ROLL ROOFING
- ICE & WATER SHIELD
- 16mm T&G PLYWOOD SHEATHING
- PRE-ENGINEERED WOOD TRUSS @ 610 c/c
- PROVIDE STRAPPING AS REQUIRED FOR ROOF TRUSS STABILITY
- RSI 7.0 (R40) BATT INSULATION
- 0.15mm (6MIL) POLY VAPOUR BARRIER MEMBRANE
- 19mm x 89mm STRAPPING @ 410 c/c
- 16mm TYPE 'X' DRYWALL (PRODUCT MUST BE SUITABLE FOR HUMID / DAMP CONDITIONS)



TYPICAL EXTERIOR WALL CONSTRUCTION - W1
- FIBRE CEMENT PREFINISHED SIDING (HARDIEBOARD)
- 38mm x 64mm PT VERTICAL STRAPPING @ 410mm o/c AT STUD LOCATIONS
- AIR BARRIER MEMBRANE (TYVEK COMMERCIAL GRADE SEAL/TAPE ALL JOINTS)
- 13mm EXTERIOR GRADE PLYWOOD SHEATHING
- 38mm x 140mm WOOD STUDS @ 410mm c/c
- PROVIDE HOR. STUD BLOCKING @ 1/3 SPAN
- (RSI 4.23) R24 BATTS INSULATION
- (0,15) 6 MIL POLY VAPOUR BARRIER
- 16mm CGC TYPE 'X' AQUATOUGH GYPSUM BOARD U/N (RM 101)
- 16mm CGC TYPE 'X' GYPSUM BOARD (RMS. 102, 103, 104, 105, 106, 107)

NOTE:
FOR CONCRETE SLAB, FOUNDATION & FOOTING SIZES & REINF. SEE STRUCT. DWGS.

TYP. WALL SECTION 1/302
SCALE: 1:10

No.	Issue	Date
2	Record Information Added	GAR	Nov. 2011
1	General Revisions		7-June-2010
No.	Revision	Ckd. By	Date

RECORD DRAWING

Stamp

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G. A. ROSS P. ENG.

Const. North

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Dwg. Standards Ckd. By:

Designed By:

Dwg. Design Ckd. By:

Date Printed: 2-JULY-2010

Branch Manager:

HORNER ASSOCIATES LIMITED
consulting and design engineers
89 Queen Street
Truro, NS

Client: Municipality of East Hants

Project Title: Shubenacadie Water Treatment Plant

Drawing Title: Wall Sections

Project No.: LH0922160

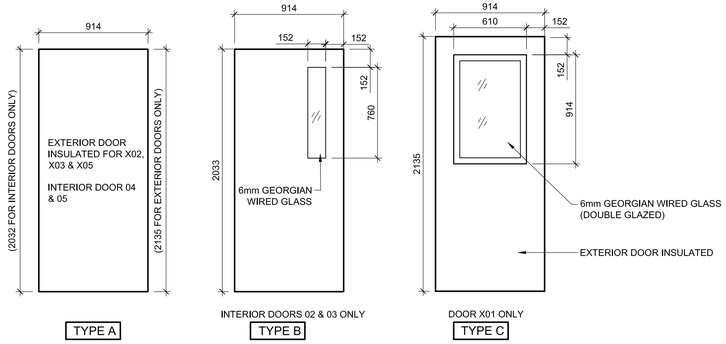
Dwg. No.: 304

Rev. No.: 2

Scale: AS NOTED
This drawing is not to be scaled

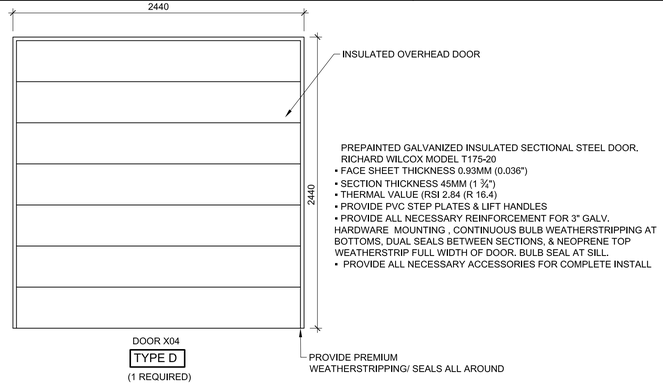
DOOR SCHEDULE

	DOOR No.	LOCATION	DOORS TYPE	DOORS WIDTH (FT-IN)	DOORS HEIGHT (FT-IN)	DOORS THICKNESS (IN)	DOORS MATERIAL	DOORS FINISH	DOORS GLASS	FRAMES TYPE	FRAMES MATERIAL	FRAMES FINISH	WALLS THICKNESS (FT-IN)	WALLS MATERIAL	WALLS FINISH	GRILLES SIZE (IN)	GRILLES MAT'L	DOOR & FRAME FIRE RATING (HR)	HARDWARE SET No.	DOOR No.	REMARKS
EXTERIOR	X01	101 TO EXT	C	914	2135	45	HMI	PF	YES	P2	PSF	PF	226	WD/FCS	PF	——	——	——	——	X01	SEE NOTE 1 FOR HARDWARE
EXTERIOR	X02	107 TO EXT	A	914	2135	45	HMI	PF	——	P2	PSF	PF	226	WD/FCS	PF	——	——	——	——	X02	SEE NOTE 1 FOR HARDWARE
EXTERIOR	X03	101 TO EXT	A	914	2135	45	HMI	PF	——	P2	PSF	PF	226	WD/FCS	PF	——	——	——	——	X02	SEE NOTE 1 FOR HARDWARE — PROVIDE PANIC HARDWARE BAR C/W ALL ACCESSORIES FROM CHLORINE STORAGE TO EXTERIOR
EXTERIOR	X04	101 TO EXT	D	2745	2745	45	STEEL/INSUL.	PREFIN.	NO	P3	75mm STL	PREFIN.	226	WD/FCS	PF	——	——	——	——	X04	ALL REQUIRED O/H DOOR HARDWARE BY DOOR SUPPLIER
EXTERIOR	X05	106 TO EXT	A	914	2135	45	HMI	PF	——	P2	PSF	PF	226	WD/FCS	PF	——	——	——	——	X05	SEE NOTE 1 FOR HARDWARE — PROVIDE PANIC HARDWARE BAR C/W ALL ACCESSORIES FROM CHLORINE EQUIPMENT TO EXTERIOR
INTERIOR	02	101 TO 102	B	914	2032	45	HMD	PF	YES	P1	PSF	PF	172	WD/GYB	PF	——	——	——	——	02	SEE NOTE 1 FOR HARDWARE
INTERIOR	03	101 TO 103	B	914	2032	45	HMD	PF	YES	P1	PSF	PF	172	WD/GYB	PF	——	——	¾ HR	——	03	SEE NOTE 1 FOR HARDWARE — PROVIDE PANIC HARDWARE BAR C/W ALL ACCESSORIES FROM PROCESS 101 TO LAB 103
INTERIOR	04	104 TO 101	A	914	2032	45	HMD	PF	——	P1	PSF	PF	172	WD/GYB	PF	——	——	——	——	04	SEE NOTE 1 FOR HARDWARE
INTERIOR	05	105 TO 101	A	914	2032	45	HMD	PF	——	P1	PSF	PF	172	WD/GYB	PF	——	——	¾ HR	——	05	SEE NOTE 1 FOR HARDWARE
	NOTE:									PROVIDE PRESSED STEEL FRAMES & GLASS FOR 3 INTERIOR BORROWED LITES - 610mm W. x 914mm H.											CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING HARDWARE SCHEDULE / SHOP DRAWINGS FOR APPROVAL. SEE NOTE 1 FOR GENERAL GUIDELINES.



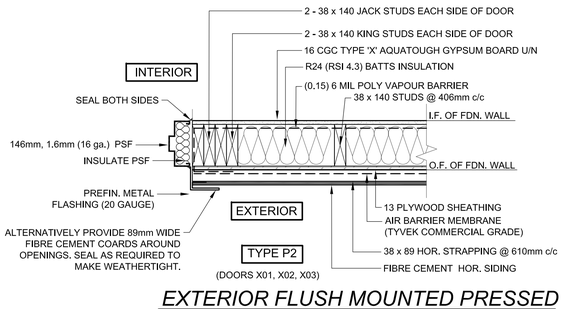
DOOR ELEVATIONS

SCALE: 1:25



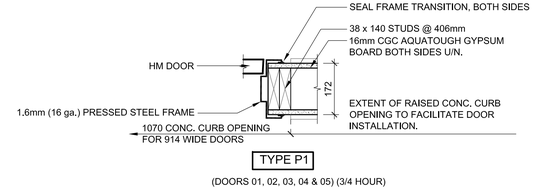
OVERHEAD DOOR ELEVATION

SCALE: 1:25



EXTERIOR FLUSH MOUNTED PRESSED STEEL DOOR FRAME TYPE

SCALE: 1:10



INTERIOR PRESSED STEEL DOOR FRAME TYPE

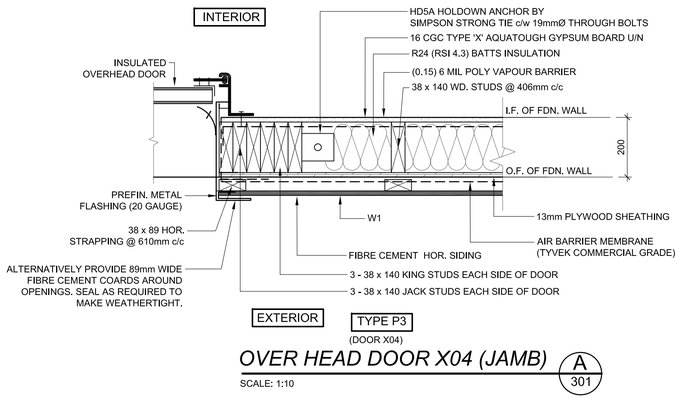
SCALE: 1:10

ROOM FINISH SCHEDULE

ROOMS AND AREAS	ROOM NUMBERS	FLOOR: CONC. FLOOR (UNPAINTED)	FLOOR: CONC. FLOOR (PRIMED & PAINTED WITH PREMIUM, CONCRETE EPOXY NON-SLIP FLOOR PAINT)	FLOOR: CONC. HARDENER (NON COLORED)	FLOOR: VINYL COMPOSITE TILE	FLOOR: SHEET VINYL 2 - 2.5mm THICKNESS	BASE: 100mm (4") VINYL BASE	WALLS: 16mm CGC AQUATOUGH TYPE 'X' GYPSUM BOARD (PAINTED) SEAL / FILL ALL JOINTS	WALLS: FIBRE CEMENT BOARD (PAINTED)	WALLS: FRP (FIBERGLASS REINFORCED PANELS) OR PREFIN. METAL LINER PANEL	CEILING: 16mm CGC TYPE 'X' GYPSUM BOARD	CEILING: 16mm CGC TYPE 'X' GYPSUM BOARD CEILING (PAINTED)	CEILING: 16mm CGC TYPE 'X' WATER RESISTANT GYPSUM BOARD CEILING (PAINTED)	CEILING: FRP (FIBERGLASS REINFORCED PANELS) OR PREFIN. METAL LINER PANEL	CEILING HEIGHTS (ft)	MISCELLANEOUS: MISC. WOOD TRIM (PAINT, VARNISH) POLYURETHANE FINISH)	MISCELLANEOUS: DOORS AND FRAMES (PAINTED)	MISCELLANEOUS: BUILT-IN CABINET WORK (STAIN/POLYURETHANE FINISH) PLAN GRADE CABINETS	MISCELLANEOUS: BUILT-IN WOOD SHELVING (STAIN/POLYURETHANE FINISH)	ROOM NUMBERS	MATERIALS AND FINISHES REMARKS
PROCESS AREA	101		▲	▲						▲					▲	VARIES		▲			101	SLOPED CEILING
OFFICE	102		▲	▲			▲					▲	▲			9'-0"	▲	▲			102	SUSPENDED DRYWALL
LAB	103		▲	▲			▲			▲		▲	▲			9'-0"	▲	▲	▲		103	SUSPENDED DRYWALL
WASHROOM	104		▲	▲			▲			▲				▲		9'-0"		▲			104	SUSPENDED DRYWALL
ELECTRICAL ROOM	105		▲	▲			▲					▲	▲			9'-0"		▲			105	SUSPENDED DRYWALL
CHLORINE EQUIPMENT	106		▲	▲			▲			▲				▲		9'-0"		▲			106	SUSPENDED DRYWALL
CHLORINE STORAGE	107		▲	▲			▲			▲				▲		9'-0"		▲			107	SUSPENDED DRYWALL

CEILING SUSPENSION SYSTEM

16mm TYPE 'X' GYB.
16mm FURRING CHANNELS @ 410mm C/C.
38mm CARRIER CHANNELS @ 1200mm MAX
GALV. WIRE SUSPENSION TIES.



OVER HEAD DOOR X04 (JAMB)

A 301

SCALE: 1:10

No.	Issue	Date

NOTES:

1. HARDWARE SHALL BE FIRE RATED AS REQUIRED.
   MANUFACTURES: SCHLAGE, SARGENT, LCN, STANDARD METAL, CANAROPA, HAGER.
   PROVIDE EACH DOOR WITH:
   - 1 1/2 PR. HINGES 114 x 101 (NRP FOR X01 & X02)
   - 1 LOCKSET (PROVIDE 3 MASTER KEYS & 3 KEYS FOR EACH LOCKSET USER) REFER TO SPECIFICATION
   - 1 MORTISE CYLINDER
   - 1 CLOSER
   - 1 KICKPLATE
   - 1 SET WEATHERSTRIP (FOR DOORS X01, X02 & X03)
   - 1 THRESHOLD ALUMINUM (FOR DOORS X01, X02 & X03)
   - PROVIDE PANIC BAR ON PROCESS ROOM 101 SIDE OF DOOR 03
2. ALL WALLS, CEILINGS & FLOORS TO BE CLEANED,PRIMED & PAINTED. PRIME & APPLY TWO FINISHED COATS OF PREMIUM GRADE EPOXY PAINT. CONCRETE FLOORS TO BE FINISHED SMOOTH & PAINTED WITH TWO COATS OF PREMIUM GRADE NON - SLIP EPOXY CONCRETE FLOOR PAINT.
3. REVIEW WALL COMPONENTS & PARTITION THICKNESS IN ORDER TO CONFIRM PSF THROAT OPENING SIZES.
4. PROVIDE INTERIOR BORROWED LITES, (RMS 106,107) 610mm W x 914mm H C/W WRAP AROUND PRESSED STEEL FRAME & 6mm WIRED GLASS. PROVIDE STEEL GASKETTED STOPS AS REQUIRED ALL AROUND. DETAIL SIMILAR TO TYPE P1 THIS DRAWING.

ABBREVIATIONS:

C/W	-COMPLETE WITH
CONC.	-CONCRETE
FCS	-FIBRE CEMENT SIDING
GYB	-GYPSUM BOARD
HMD	-HOLLOW METAL DOOR
HMI	-HOLLOW METAL INSULATED
HR	-HOUR
HP	-HORSE POWER
HTSG	-HEAT TREATED SAFETY GLASS
MTL.	-METAL
PF	-PAINT FINISH
POLY	-POLYETHLENE
PSF	-PRESSED STEEL FRAME
WD / CB	-WOOD / CEMENT BOARD
WD / VMS	-WOOD / VERTICAL METAL SIDING

No.	Revision	Ckd. By	Date
1	Record Information Added	GAR	Nov. 2011

RECORD DRAWING

Stamp

ORIGINAL DRAWING STAMPED ON
02 July 2010
BY
G. A. ROSS P. ENG.

Const. North

Drawn By: STAFF

Dwg. Standards Ckd. By:

Designed By:

Dwg. Design Ckd. By:

Date Printed: 2-JULY-2010

Branch Manager:

HORNER ASSOCIATES LIMITED
consulting and design engineers
89 Queen Street
Truro, NS

Municipality of East Hants

Project Title: Shubenacadie Water Treatment Plant

Drawing Title: Door Schedule, Room Finish Schedule & Details

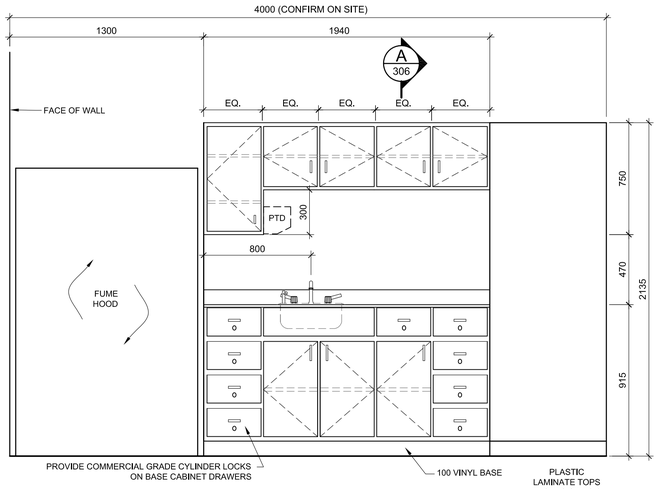
Project No.: LH0922160

Dwg. No.: 305

Rev. No.: 1

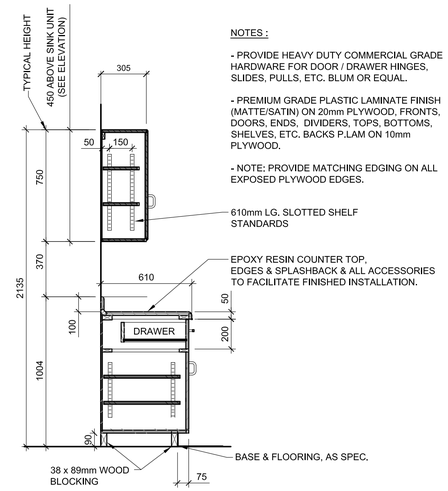
Scale: AS SHOWN
This drawing is not to be scaled

0 5 10 20 25 30 cm



MILLWORK ELEVATION 2/302

LAB 103 (WEST WALL) SCALE: 1:20



NOTES :

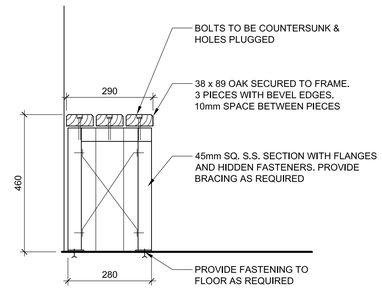
- PROVIDE HEAVY DUTY COMMERCIAL GRADE HARDWARE FOR DOOR / DRAWER HINGES, SLIDES, PULLS, ETC. BLUM OR EQUAL.

- PREMIUM GRADE PLASTIC LAMINATE FINISH (MATTE/SATIN) ON 20mm PLYWOOD, FRONTS, DOORS, ENDS, DIVIDERS, TOPS, BOTTOMS, SHELVES, ETC, BACKS P.LAM ON 10mm PLYWOOD.

- NOTE: PROVIDE MATCHING EDGING ON ALL EXPOSED PLYWOOD EDGES.

TYPICAL SECTION - LAB 103 A/306

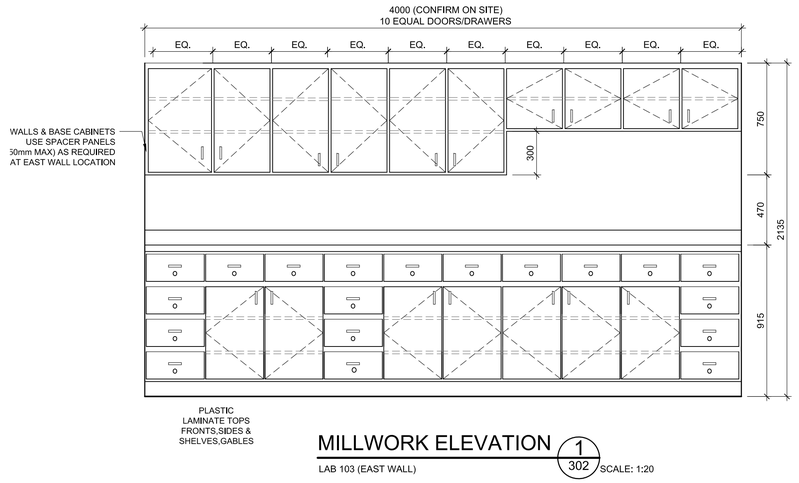
SCALE: 1:20



RM. 104

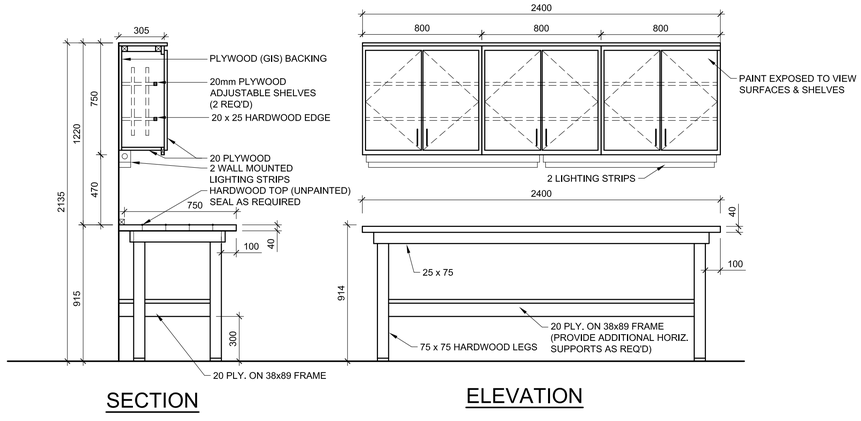
BENCH DETAIL - W'RM 104 B/302

SCALE: 1:10



MILLWORK ELEVATION 1/302

LAB 103 (EAST WALL) SCALE: 1:20



WORKBENCH 3/302

(PROCESS AREA 101) SCALE: 1:20

No.	Issue	Date

No.	Revision	Ckd. By	Date
1	Record Information Added	GAR	Nov. 2011

RECORD DRAWING

Stamp

ORIGINAL DRAWING STAMPED ON
02 July 2010
BY
G. A. ROSS P. ENG.

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Date Printed 2-JULY-2010

Branch Manager:

HORNER ASSOCIATES LIMITED
consulting and design engineers
89 Queen Street
Truro, NS

Client: Municipality of East Hants

Project Title: Shubenacadie Water Treatment Plant

Drawing Title: Miscellaneous Details

Project No. LH0922160

Dwg. No. 306

Rev. No. 1

Scale: AS NOTED
This drawing is not to be scaled

POTENTIAL FUTURE WELL

PRODUCTION WELL (PW-10)

PRODUCTION WELL (PW-11)

POTENTIAL FUTURE SAND FILTER

SAND FILTER

SAND FILTER

SAND FILTER

POTENTIAL FUTURE ION EXCHANGE WATER SOFTENER

BY-PASS FLOW METER

ION EXCHANGE WATER SOFTENER

ION EXCHANGE WATER SOFTENER

BRINE TANK

N/C BY-PASS

N/C BY-PASS

POTENTIAL FUTURE CARBON FILTER

FUTURE CARBON FILTER

CARBON FILTER

POTENTIAL FUTURE UV DISINFECTION

PLANT PRODUCTION FLOW METER

CHLORINE INJECTION

GAS CHLORINE

CHLORINE CONTACT PIPING

TO DISTRIBUTION SYSTEM

DISCHARGE TO EXISTING MANHOLE

BACKWASH WATER EQUALIZATION BASIN

DUPLEX PUMPS

REFER TO NAPIER REID O & M MANUAL FOR DETAILED P & ID DRAWING

No.	Issue	Date

LEGEND:

- FLOW METER
- MOTORIZED VALVE
- CHECK VALVE
- VALVE
- FLOOR / FUNNEL DRAIN
- C — CONDUCTIVITY METER
- Cl — CHLORINE RESIDUAL ANALYZER
- Tu — TURBIDITY METER
- pH — PH METER
- T — TEMPERATURE PROBE
- P — PRESSURE SENSOR

No.	Revision	Ckd. By	Date
2	Record Information Added	GAR	Nov. 2011
1	Pipe Sizes Added Per AD#1		07 Sept 2010

RECORD DRAWING

Stamp

ORIGINAL DRAWING STAMPED ON 02 July 2010 BY G. A. ROSS P. ENG.

Const. North

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Branch Manager:

HORNER ASSOCIATES LIMITED
consulting and design engineers
89 Queen Street
Truro, NS

Client: Municipality of East Hants

Project Title: Shubenacadie Water Treatment Plant

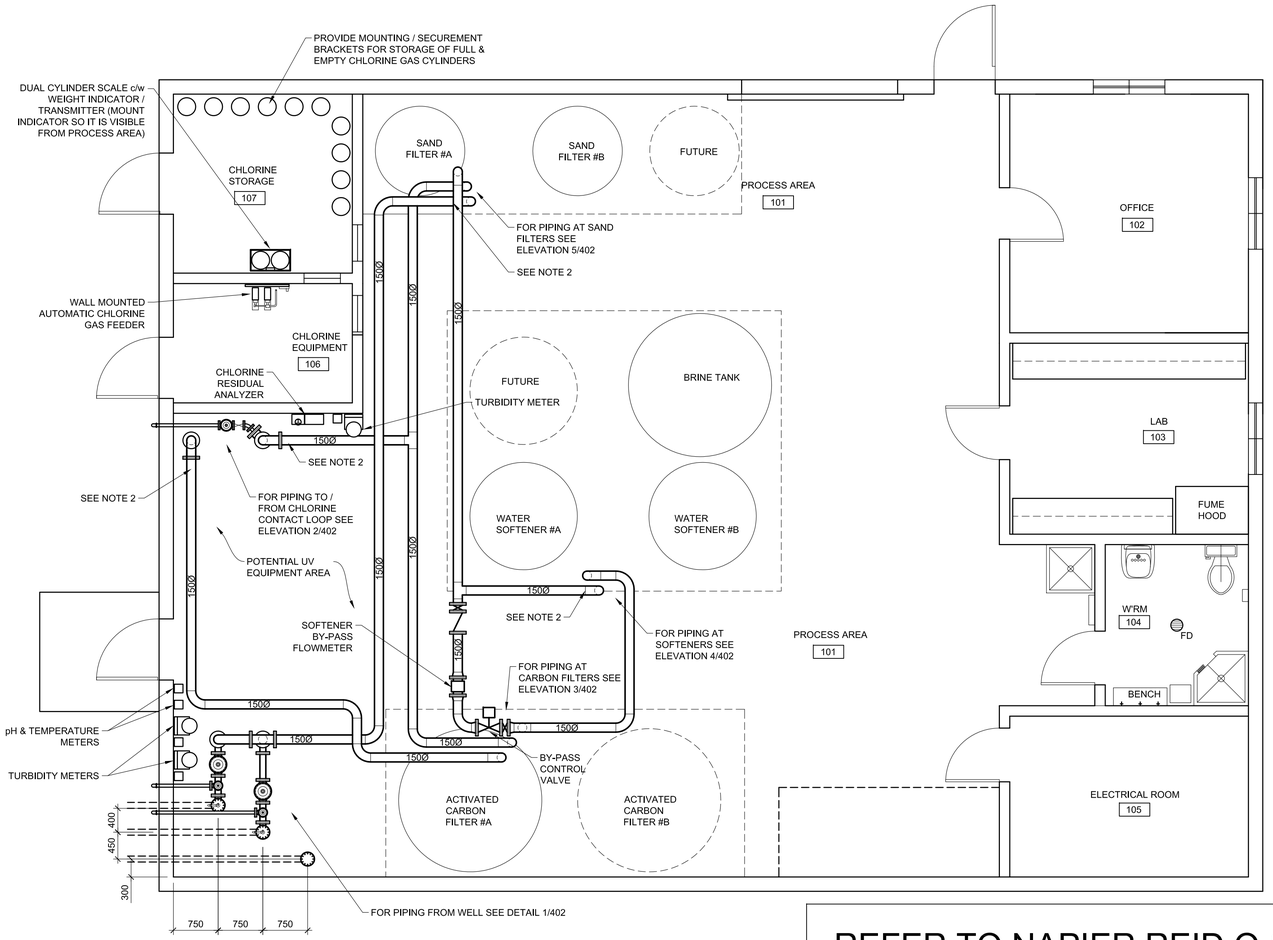
Drawing Title: Process Schematic

Project No.: LH0922160

Dwg. No.: 401

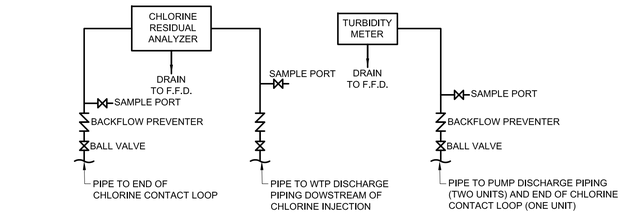
Rev. No.: 2

Scale: NTS
This drawing is not to be scaled

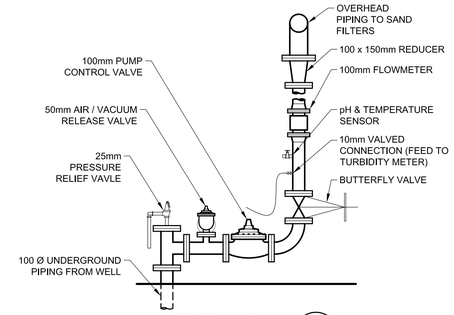


PROCESS PIPING PLAN
SCALE 1:50

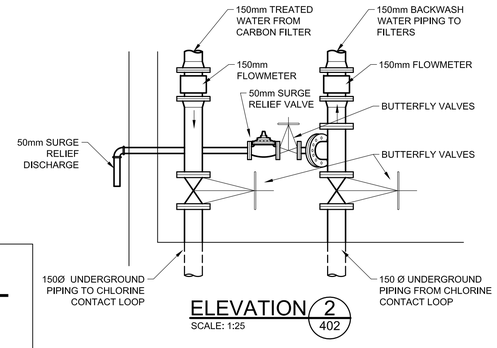
REFER TO NAPIER REID O & M MANUAL FOR DETAILED FACE PIPING



ANALYZER / METER SCHEMATIC A 401
SCALE: NTS.



ELEVATION 1 402
SCALE: 1:25



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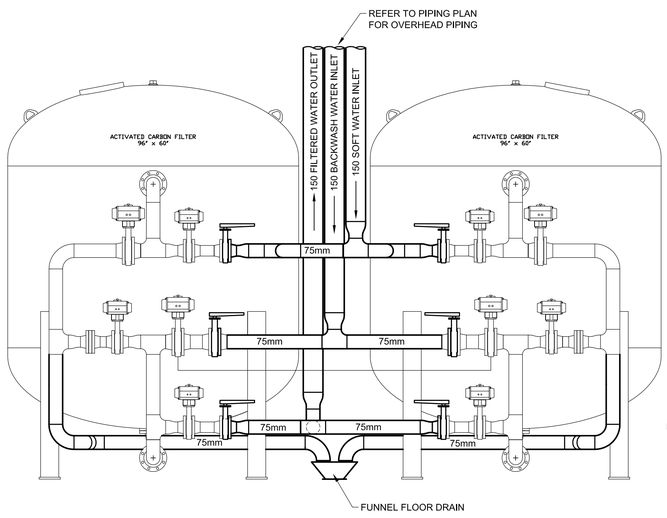

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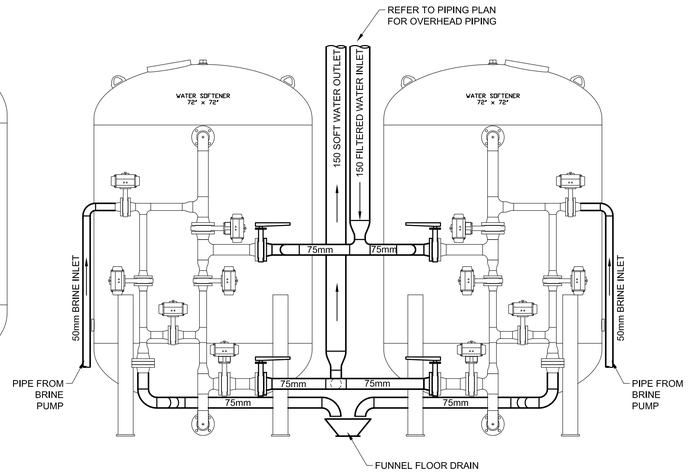

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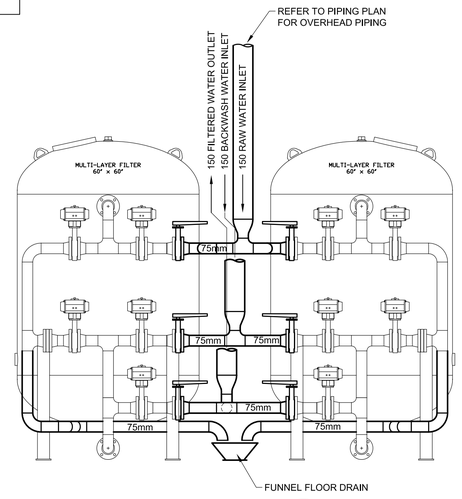
SCALE: 1:25



ELEVATION 5 402
SCALE: 1:25

No.	Issue		Date
2	Record Information Added	GAR	Nov. 2011
1	Pipe Sizes Added		26 July 2010
No.	Revision	Ckd. By	Date

NOTES:

1. PIPE SUPPORTS ARE NOT INDICATED ON THE DRAWINGS. CONTRACTOR IS TO PROVIDE STANCHION TYPE SUPPORTS WITH U-BOLT YOKE AND BASE PLATE, FOR PIPING NEAR THE FLOOR AND HANGER TYPE SUPPORTS FROM THE ROOF STRUCTURE FOR PIPING NEAR THE CEILING.
2. AIR RELEASE VALVES (25mm) ARE TO BE INSTALLED ON ALL OVERHEAD PIPING.
3. ALL WATER TREATMENT PROCESS PIPING SHALL BE TYPE 316 STAINLESS STEEL (S.S.) SCHEDULE 10S WELDED PIPE WITH FLANGE CONNECTIONS AT VALVES, ETC.
4. SUPPLY AND INSTALL A 100mm DIA. PRESSURE GUAGE AND A VALVED SAMPLE PORT AT THE RAW WATER PIPE FROM EACH WELL PUMP. THE SUPPLY PIPE, TREATED WATER DISCHARGE, BACKWASH WATER SUPPLY PIPE AND BACKWASH WATER DISCHARGE PIPE FOR EACH FILTER AND SOFTENER, AND TREATED WATER DISCHARGE PIPE FROM THE FACILITY, ALSO SUPPLY AND INSTALL A CORPORATION STOP AND 10mm DIA. UNDERGROUND PIPING FROM THE DISTRIBUTION END OF THE UNDERGROUND CHLORINE CONTACT LOOP NEAR THE BUILDING TO A SAMPLE VALVE THE CHLORINE RESIDUAL ANALYZER, AND THE TURBIDITY METER.
5. BUTTERFLY VALVES SHALL BE IN ACCORDANCE WITH ANSI/AWWA STANDARD C-504 AS MANUFACTURED BY PRATT, BRAY, KEYSTONE OR APPROVED EQUIVALENT.
6. INSTALL OVERHEAD PIPING AS CLOSE TO THE CEILING AS PRACTICAL (APPROX. 3m TO UNDERSIDE OF PIPE) AND SLOPE PIPE (1%) UP TO THE AIR RELEASE VALVES.
7. WATER TREATMENT PROCESS PIPING ARRANGEMENT SHOWN ON THE DRAWING IS BASED ON A TYPICAL EQUIPMENT LAYOUT. SUPPLY AND INSTALL PIPING AND VALVES IN ACCORDANCE WITH REVIEWED SHOP DRAWINGS.

RECORD DRAWING

Stamp

ORIGINAL DRAWING STAMPED ON
02 July 2010
BY
G. A. ROSS P. ENG.

Const. North

Drawn By: STAFF

Dwg. Standards Ckd. By:

Designed By:

Dwg. Design Ckd. By:

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Branch Manager:

HORNER ASSOCIATES LIMITED
consulting and design engineers
89 Queen Street
Truro, NS

Client: Municipality of East Hants

Project Title: Shubenacadie Water Treatment Plant

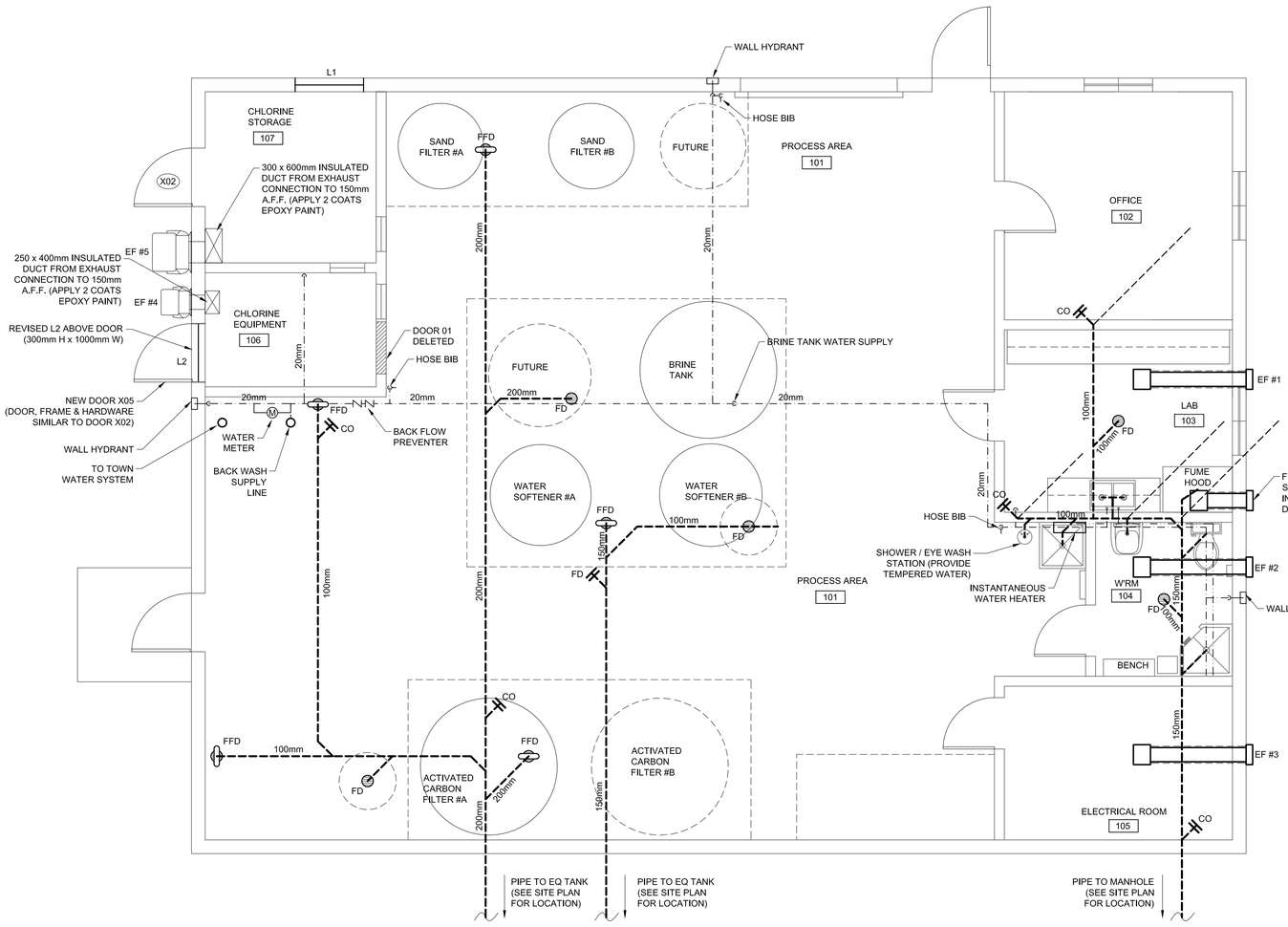
Drawing Title: Process Piping Plan & Details

Project No.: LH0922160

Dwg. No.: 402

Rev. No.: 2

Scale: AS NOTED
This drawing is not to be scaled



PLUMBING & VENTILATION PLAN FLOOR PLAN

SCALE: 1:50

NOTES (VENTILATION):

1. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH APPLICABLE VENTILATION BY-LAWS OF THE MUNICIPALITY IN WHICH THE BUILDING IS LOCATED, & THE REQUIREMENTS OF THE NBC (LATEST REVISION), THE ASHRAE GUIDE, DATA AND HANDBOOKS (LATEST REVISION), & THE CANADIAN PLUMBING CODE (LATEST REVISION).

2. ALL DUCTWORK AND OTHER EQUIPMENT SHALL BE INSTALLED WITH STRUCTURAL SUPPORTS, HANGERS & BRACES TO FIRMLY ANCHOR & SUPPORT THE EQUIPMENT. MAXIMUM SPACING OF DUCT HANGERS TO BE 2.4m O.C. DIFFUSERS AND GRILLES TO BE SUPPORTED FROM THE DUCTWORK.

3. ALL EQUIPMENT & MATERIALS SHALL BE INSTALLED IN A MANNER TO LIMIT NOISE LEVEL. FLEXIBLE DUCT CONNECTIONS SHALL BE USED TO ISOLATE THE DUCT WORK FROM THE VENTILATION UNIT.

4. ALL DUCTS SHALL BE GALVANIZED STEEL. (24 GAUGE - LESS THAN 350mmØ; 22 GAUGE - LESS THAN 660mmØ; 20 GAUGE - LESS THAN 900mmØ)

5. ALL BENDS, ELBOWS & JOINTS SHALL BE CONSTRUCTED IN A NEAT WORKMANLIKE MANNER BY QUALIFIED SKILLED SHEET METAL WORKERS. SQUARE BENDS SHALL BE MADE WITH APPROVED TURNING VANES INSTALLED IN THE BENDS. THE INSIDE RADIUS OF ELBOWS IN DUCTS SHALL NOT BE LESS THAN THE WIDTH OF THE DUCT IN THE PLANE OF THE TURN. GREAT CARE SHALL BE EXERCISED TO AVOID SHARP PROJECTIONS OR SUDDEN CHANGES IN DIRECTION OF DUCTS OR MISALIGNMENTS AT FLEXIBLE COUPLINGS.

6. RECTANGULAR DUCTS SHALL BE CONSTRUCTED IN SECTIONS WITH LOCK-SEAMS & JOINED WITH STANDING DRIVE SLIP CONNECTIONS. ALL JOINTS MUST BE MECHANICALLY RIGID, TAPED FOR TIGHTNESS USING AN APPROVED TAPE CONFIRMING TO ULC-S109-1969.

7. ALL INTAKE AND EXHAUST AIR DUCTS SHALL BE INSULATED WITH ONE INCH THICK FIBERGLASS INSULATION WITH VAPOUR BARRIER.

8. EXACT LOCATION OF DIFFUSERS AND GRILLES TO BE CO-ORDINATED WITH LIGHTING PLAN.

9. INSTALLATION OF DUCTWORK AND EQUIPMENT SHALL BE COORDINATED WITH THE BUILDING CONTRACTOR. PROVIDE BUILDING CONTRACTOR WITH EQUIPMENT DIMENSION AND MINIMUM REQUIRED CLEARANCES TO ALLOW FOR APPROPRIATE CONSTRUCTION OF BUILDING STRUCTURE AND EQUIPMENT ACCESS.

10. SUPPLY THREE (3) OPERATIONS AND MAINTENANCE MANUALS INCLUDING EQUIPMENT DESCRIPTIONS, OPERATING INSTRUCTIONS, AS BUILT DRAWINGS, TROUBLE SHOOTING TECHNIQUES, A RECOMMENDED MAINTENANCE SCHEDULE AND RECOMMENDED LUBRICANTS.

EXHAUST FAN SYSTEMS:

1. EXHAUST FAN (E.F. #1, E.F. #2, E.F. #3,) - COOK MODEL GEMINI, GN 220 @ 1050 RPM C/W 8" x 8" GRILLE (NAILER MODEL 61EC), 150mm x 300mm DUCT TO FAN, 150mmØ INSULATED DUCT TO ALUMINUM SOFFIT GRILLE. WIRE EXHAUST FANS TO SEPARATE WALL MOUNTED SWITCHES. PROVIDE REVERSE ACTING THERMOSTAT FOR E.F.#3.

2. EXHAUST FAN (EF #5) - COOK MODEL ACW-B 120 W2B @ 1110 RPM; RATED 427 L/S @ 93 PA c/w WALL HOUSING, BIRD SCREEN, DISCONNECT SWITCH, AND REVERSE ACTING THERMOSTAT. WIRE CONTROLS TO MOTORIZED DAMPER (L1). ALLOW FOR DUCTWORK CONNECTION.

3. EXHAUST FAN (EF #4) - COOK MODEL ACW-B 100 W2B @ 1165 RPM; RATED 148 L/S @ 93 PA c/w WALL HOUSING, BIRD SCREEN, DISCONNECT SWITCH, AND REVERSE ACTING THERMOSTAT. WIRE CONTROLS TO MOTORIZED DAMPER (L2). ALLOW FOR DUCTWORK CONNECTION.

LOUVERS

L1 - VENTEX MODEL 2590 (900mm H x 1200mm W) c/w INSECT SCREEN AND MOTORIZED DAMPER (WIRED TO EXHAUST FAN), MOUNTING HEIGHT IS 1.4m A.F.F.

L2 - VENTEX MODEL 2590 (300mm H x 1000mm W) c/w INSECT SCREEN & MOTORIZED DAMPERS (WIRED TO EXHAUST FAN), MOUNTING HEIGHT IS ABOVE DOOR.

NOTES:

1. ALL PLUMBING WORK TO BE IN ACCORDANCE WITH THE NATIONAL BUILDING CODE, CANADIAN PLUMBING CODE AND LOCAL PLUMBING BY-LAWS.
2. DRAINAGE AND VENT PIPING AND FITTINGS SHALL BE PVC-DWV CONFORMING TO CSA STANDARD B181.2. DOMESTIC WATER PIPING AND FITTINGS ABOVE FLOOR SHALL BE TYPE "L" COPPER CONFORMING TO CSA STANDARD HC7.5, DOMESTIC WATER PIPING BELOW GROUND TO BE HDPE PIPE.
3. SUPPLY AND INSTALL 13mm INSULATION ON ALL DOMESTIC HOT WATER PIPING.
4. INSTALL PIPES STRAIGHT, PARALLEL AND CLOSE TO WALLS AND CEILINGS. PIPING IN FINISHED ROOMS TO BE CONCEALED (EXCEPT AT TOILETS AND LAVS).
5. SUPPLY AND INSTALL VENT PIPING FROM ALL FIXTURES TO A SINGLE VENT THROUGH THE ROOF LOCATED NEAR ROOM 104. INCLUDE PREFORMED VENT PIPE FLASHING AND DUAL WALL VENT PIPE COVER TO SUIT ROOFING. COORDINATE WITH ROOFING CONTRACTOR.
6. THE WORK IS TO INCLUDE EXCAVATION, BEDDING AND BACKFILL (INCLUDING COMPACTION) FOR ALL UNDERFLOOR PLUMBING IN THE BUILDING AREAS. BACKFILL SHALL BE TYPE 2 GRAVEL COMPACTED TO 100% PROCTOR.
7. COORDINATE THE WORK OF THIS CONTRACT WITH THE CONCRETE CONTRACTOR AND THE BUILDING CONTRACTOR.
8. WHERE POSSIBLE, THERE SHALL BE NO EXPOSED TO VIEW PIPING.
9. ALL UNDER SLAB PIPING AND VERTICAL PIPING RISER LOCATIONS IN FINISHED AREAS TO BE LOCATED IN CONJUNCTION WITH PARTITION LOCATIONS. CO-ORDINATE WATER CLOSET DRAINAGE OPENINGS & FLOOR DRAINS, ETC. WITH DIMENSIONED PARTITION PLANS.
10. WHERE POSSIBLE, INSTALL CLEANOUTS CONCEALED IN THE WALLS WITH ACCESS HATCHES. CO-ORDINATE LOCATIONS WITH BUILDING DETAILS. WHERE FLOOR MOUNTED CLEANOUTS ARE REQUIRED THEY SHALL BE INSTALLED FLUSH WITH THE FINISHED FLOOR.
11. SUPPLY THREE (3) OPERATIONS AND MAINTENANCE MANUALS INCLUDING EQUIPMENT DESCRIPTIONS, OPERATING INSTRUCTIONS, AS BUILT DRAWINGS, TROUBLE SHOOTING TECHNIQUES, A RECOMMENDED MAINTENANCE SCHEDULE AND RECOMMENDED LUBRICANTS.

PLUMBING FIXTURES:

LAVATORY (RM104) :
AMERICAN STANDARD MODEL LOW VOLUME FLUSH FIT AQUALYN COUNTERTOP SINK WITH 100mm FAUCET HOLE PUNCH & EXTRA RIGHT HAND SOAP DISPENSER HOLE c/w MONTERREY TWO-HANDLE (100mm BLADE) CENTRE SET SINK FAUCET WITH CONVENTIONAL SPOUT, SUPPLIES WITH STOPS AND ESCUTCHEONS, TAIL PIECE AND ESCUTCHEON.

LAB SINK (RM 103) :
KINDRED INDUSTRIES, STEEL QUEEN MODEL QDL-2 c/w, MONTERRAY FAUCET GL-7500.1700, TRAP (WITH CLEANOUT), ANGLE SUPPLIES (WITH STOPS) AND ESCUTCHEONS.

WATER CLOSET (RM 104) :
AMERICAN STANDARD CHAMPION ELONGATED TOILET ⅝ BOLT CAPS, OPEN FRONT SEAT, SOLID PLASTIC LID AND ANGLE SUPPLY (WITH STOP AND ESCUTCHEON), AND BOLTED DOWN TANK COVER.

JANITOR SINK (RM 101) :
FIAT MODEL TSB 3001 BASIN c/w 830-AA SERVICE SINK FITTINGS, 832-AA HOSE AND WALL HOOK, 889-CC MOP HANGER, 1239 BB BUMPER GUARD AND MSG 3232 STAINLESS STEEL WALL GUARDS.

FLOOR DRAINS (RMS 101, 103, & 104) :
ZURN MODEL ZN-415-B-P, CAST IRON BODY, ADJUSTABLE HEAD, NICKEL BRONZE STRAINER, INTEGRAL SEEPAGE PAN, CLAMPING COLLAR AND TRAP SEAL PRIMER CONNECTION. FLOOR DRAIN PIPE SIZE AS INDICATED, SUPPLY FUNNEL GRATES WHERE INDICATED (OVERSIZE FUNNELS AT SAND FILTERS, SOFTENERS & CARBON FILTERS).

NON-FREEZING WALL HYDRANT (THREE):
ZURN MODEL 1300-VB C/W INTEGRAL VACUUM BREAKER, NPS 3/4 HOSE OUTLET AND REMOVABLE OPERATING KEY. INCLUDE SHUT OFF VALVE ON WATER SUPPLY.

HOSE BIBS (RM 101):
HOSE BIB SHALL CONSIST OF 13mm REGULAR HANDLE FAUCET WITH BACKFLOW PREVENTER. (PROVIDE ONE HOSE RACK AND 7.6m OF HOSE IN EACH ROOM).

EMERGENCY SHOWER / EYEWASH (RM 103) :
HAWS MODEL 8300 c/w WATER TEMPERING CONTROL VALVE. CONNECT EYEWASH BASIN TO DRAIN.

TRAP SEAL PRIMER (RM 103 & 104) :
PRECISION PLUMBING PRODUCTS MODEL P-2 TRAP PRIMER. PROVIDE TRAP SEAL PRIMING PIPE FOR THE FLOOR DRAINS IN RMS 103 AND 104 PLUS THE SHOWER IN RM 104.

WATER HEATER (RM 101) :
STIEBEL ELTRON MODEL 36 PLUS INSTANTANEOUS WATER HEATER.

SHOWER (RM 104) :
FIAT MODEL S86 COMMANDER, STAINLESS STEEL INSIDE AND OUTSIDE c/w BRASS CHROMIUM PLATED BRACKETS, CURTAIN ROD, CURTAIN, SOAP DISH, TERRAZZO SHOWER FLOOR, DRAIN CONNECTION, WASTE TRAP, SINGLE HANDLE PRESSURE BALANCING VALVE, SHOWER HEAD & COVER PLATES.

LEGEND:

- CO — CLEAN OUT
- VENT PIPING
- FD — FLOOR DRAIN
- TRAP PRIMER SUPPLY
- DOMESTIC HOT WATER SUPPLY
- DOMESTIC COLD WATER SUPPLY
- HB — HOSE BIB

No.	Issue	Date
1	Record Information Added	Nov. 2011
No.	Revision	Date

RECORD DRAWING

Stamp

ORIGINAL DRAWING STAMPED ON 02 July 2010 BY G. A. ROSS P. ENG.

Const. North

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Designed By:

Dwg. Design Ckd. By:

Date Printed: 2-JULY-2010

Branch Manager:

HORNER ASSOCIATES LIMITED
consulting and design engineers
89 Queen Street
Truro, NS

Client: Municipality of East Hants

Project Title: Shubenacadie Water Treatment Plant

Drawing Title: Plumbing & Ventilation

Project No.: LH0922160

Dwg. No.: 403

Rev. No.: 1

Scale: 1 : 50
This drawing is not to be scaled

SPECIFICATIONS & NOTES

S1. GIVE ALL NOTICES, OBTAIN ALL PERMITS AND PAY ALL FEES REQUIRED SO THE WORK MAY BE CARRIED OUT, SUPPLY ELECTRICAL INSPECTION CERTIFICATE AT COMPLETION OF JOB.

S2. THE COMPLETE ELECTRICAL INSTALLATION SHALL BE MADE IN ACCORDANCE WITH C.E. CODE C22-1, PART 1 ALONG WITH LOCAL AMENDMENTS BY NOVA SCOTIA POWER CORP., , THE OFFICE OF THE FIRE MARSHALL (N.S. DEPT. OF LABOUR) AND EAST HANTS PLANNING DEPARTMENT AS WELL AS THE N.S. HEALTH AND SAFETY ACT.

S3. CO-ORDINATE WORK WITH OTHER CONTRACTORS, REFER TO OWNERS ARCHITECTURAL DRAWINGS FOR CONSTRUCTION DETAILS PRIOR TO ROUGH-IN, VERIFY EQUIPMENT REQUIRING ELECTRICAL CONNECTIONS WITH MECHANICAL DRAWINGS AND MECHANICAL CONTRACTOR, FINAL HOOK UP OF ELECTRICAL EQUIPMENT BY THIS CONTRACTOR.

S4. ALL WIRING SHALL BE CONCEALED WHEN POSSIBLE, MINIMUM WIRE SIZE SHALL BE #12 AWG RW90; USE RW90 CABLE IN RIGID PVC CONDUIT FOR UNDERGROUND SERVICE WORK, USE CORILINE PVC CONDUIT UNDER FLOOR SLABS WITH ADAPTORS AND RIGID PVC CONDUIT BENDS . USE PVC CONDUIT OUTDOORS FOR BRANCH CIRCUIT WORK. AC90 ARMORED CABLE MAY BE USED FOR STEEL STUD CONSTRUCTION, NMD-7 MAY BE USED FOR CONCEALED BRANCH CIRCUIT WORK FOR WOOD FRAME CONSTRUCTION UP TO 250 VOLTS, USE ONLY APPROVED PVC CONNECTORS. USE T & B INSULATED THROAT WP CONNECTORS FOR TECK 90 OR DRIVE RX CABLE WHERE SUCH CABLE IS INDICATED. (SEE ALSO NOTE 29)

S5. OUTDOOR ELECTRICAL EQUIPMENT SHALL BE IN 3R/4X STAINLESS STEEL ENCLOSURES AND NEMA 1 OR 12 INDOORS.

S6. SUBMIT FOUR (4) COPIES OF SHOP DRAWINGS FOR APPROVAL FOR THE FOLLOWING ITEMS: LIGHT FIXTURES, GEN SET RACEWAYS, RECEPTACLES, SWITCHES, VFD'S, DISCONNECT SWITCHES, MAIN SWITCHBOARD, GEN SET, AUTO TRANSFER SWITCH, ETC.

S7. SUBMIT A "CERTIFICATE OF GUARANTEE" OF WORKMANSHIP AND MATERIALS FOR ONE YEAR FROM DATE OF ACCEPTANCE. THIS GUARANTEE SHALL BIND THE CONTRACTOR TO CORRECT, REPAIR OR REPLACE PROMPTLY AND DEFECTIVE EQUIPMENT OR WORKMANSHIP WITHOUT COST OT THE OWNER. ON COMPLETION OF PROJECT SUBMIT TWO (2) HARDCOVER 'OPERATING AND MAINTENANCE MANUALS' FOR APPROVAL THE MANUALS SHALL CONTAIN AN INDEX PAGE AND TABBED DIVIDER PAGES, A LIST OF THE SUPPLIERS NAMES, ADDRESSES AND TELEPHONE NUMBERS, OPERATING AND MAINTENANCE INSTRUCTIONS FOR ALL ELECTRICAL EQUIPMENT, COPIES OF TEST CERTIFICATES, ETC. INCLUDING A SET OF "APPROVED SHOP DRAWINGS".

S8. IDENTIFY ALL EQUIPMENT WITH SECURELY FASTENED BLACK LAMACOID NAMEPLATES WITH 13mm ENGRAVED WHITE LETTERS FOR NORMAL POWER AND RED NAMEPLATES FOR EMERGENCY POWER.TYPE ALL CIRCUIT DIRECTORIES FOR ELECTRICAL PANELS AND IDENTIFY PANEL AND CIRCUIT NUMBER FOR ALL DUPLEX 120V RECEPTACLES BOTH ON THE COVERPLATE AND INSIDE THE BOX AND AT EQUIPMENT CONNECTIONS .

S9. COORDINATE WITH NOVA SCOTIA POWER INC. FOR NEW ELECTRICAL SERVICES AS INDICATED. PAY ALL APPLICABLE UTILITY COSTS AS PART OF THIS CONTRACT. INSTALL U/G SERVICE ADAPTERS, CONDUIT BENDS AND EXPANSION FITTINGS AT BASE OF POLE. EXTEND SERVICE CONDUIT UP POLE TO HEIGHT REQUIRED BY UTILITIES AND PLACE WEATHERHEAD AT TOP.

S10. ALL CONDUCTORS FOR CABLE SHALL BE COPPER OF 98% CONDUCTIVITY MIN, AND SIZES SHALL BE AMERICAN WIRE GAUGE STANDARDS UNLESS NOTED OTHERWISE.

S11. THE ELECTRICAL CONTRACTOR SHALL BE DEEMED TO MAKE AN INSPECTION OF THE SITE OF THIS WORK DURING THE TENDERING PERIOD AND SHALL INCLUDE IN HIS PRICE FOR ANY DIFFICULTIES THAT MAY BE ENCOUNTERED WITH REGARD TO THE INSTALLATION AND NO 'ADDITIONAL CHARGES' SHALL BE ALLOWED FOR ADDITIONAL WORK THAT COULD HAVE BEEN FORESEEN BY SUCH A SITE VISIT.

S12. RETAIN ONE (1) CLEAN SET OF WHITE PRINTS ON SITE, AND AS THE JOB PROGRESSES MARK-UP THESE PRINTS TO ACCURATELY INDICATE THE WORK 'AS BUILT'. THESE WHITE SHEETS SHALL BE AVAILABLE FOR REVIEW ON THE SITE AT ALL TIMES. ON COMPLETION OF WORK SUBMIT THESE PRINTS TO THE ENGINEER FOR REVIEW.

S13. ALL CONNECTORS FOR WIRING AND BRANCH CIRCUITS SHALL BE MADE USING TWIST ON CONNECTORS MARRETTE #31, 33 OR 35 AS REQUIRED OR EQUAL BY IDEAL OR BUCHANNON. ALL OTHER JOINTS OR MOTOR CONNECTIONS SHALL BE MADE T&B 54000 SERIES WITH 1st LAYER OF COVER USING A RUBBER COMPOUND TAPE AND OUTER LAYER OF #38 SCOTCH. APPROVED TYPE CONNECTORS ARE TO BE USED FOR TECK 90 & DRIVE RX CABLE APPLICATIONS.

S14. ALL EQUIPMENT SHALL BE NEW AS SPECIFIED AND CSA OR ULC CERTIFIED UNLESS OTHERWISE NOTED.

S15. COVER PLATES FOR WIRING DEVICES ARE TO BE WHITE NYLON AS SPECIFIED C/W STAINLESS STEEL SCREWS. USE SCEPTER "W" SERIES PVC COVERPLATES FOR WIRING DEVICES IN MECHANICAL PROCESS ROOM UNLESS OTHERWISE NOTED.

S16. IDENTIFY ALL DATA AND VOICE CABLE RUNS AT BOTH THE OUTLET AND SOURCE (RACK OR BIX TERMINAL) IN ACCORDANCE WITH THE LATEST FEDERAL STANDARDS.

S17. THE ELECTRICAL CONTRACTOR SHALL PROVIDE THE GEN SET FOR INSTALLATION ON CONCRETE BASE BY THE GENERAL CONTRACTOR. THIS GEN SET SHALL BE A KOHLER (SANSON EQUIPMENT LTD.) MODEL 100REOZD 100KW, 600/347V, 3P, 4W, 120A, 0.8PF, 4S7 SERIES EMERGENCY STANDBY GENERATOR COUPLED TO A 4 CYCLE TURBO CHARGED DIESEL 4 CYLINDER 4.5 LITRE MODEL 4045 HF 285I DIESEL ENGINE OR EQUAL BY CATERPILLAR (ATLANTIC CAT) OR ONAN CUMMINGS LTD. OF EQUAL CAPACITY, FEATURES AND ACCESSORIES. THE GEN SET IS TO BE C/W AN APPROVED PREMIUM QUALITY WEATHERPROOF SILENCED SOUND SHIELD ALUMINUM ENCLOSURE WITH INSULATION & AUTO LOUVERS, A DECISION MAKER 550 ELECTRONIC CONTROL PANEL TO CSA STANDARDS, 12 VOLT AUTO FLOAT/EQUALIZE TYPE BATTERY CHARGER (TO BE REMOTE MOUNTED INSIDE THE BUILDING), BLOCK AND STRIP HEATERS, HEAVY DUTY BATTERIES AND RACK WHICH ARE ALL TO BE INSTALLED ON A CONCRETE BASE AS PER DETAILS ON STRUCTURAL DRAWING 202. SEE ALSO NOTE S18, S19, & S30.

S18. THE GEN SET REMOTE ANNUNCIATOR, REMOTE TEST SWITCH, SUMMARY ALARM, LOW WATER LEVEL, FUEL LINE WITH SAFETY CONTROLS TO CSA AND NFPA STANDARDS & REMOTE ALARM ASSEMBLIES ARE TO BE TIED INTO THE BUILDING MONITORING SYSTEM BY THE CONTRACTOR & ALL ADAPTERS, INTERFACES ETC. REQUIRED IN THIS REGARD ARE TO BE PROVIDED BY THE GEN SET MANUFACTURER.

S19. THE GEN SET SHALL ALSO BE PROVIDED WITH A HEAVY DUTY SOLID STATE, 3 PHASE, 4 WIRE, 42 KAIC, 150 AMP, 600/347 VOLT, AUTOMATIC TRANSFER SWITCH IN STANDARD EEMAC 1 GENERAL PURPOSE CONTROL PANEL ENCLOSURE FEATURING NEUTRAL ETC. THIS AUTO TRANSFER SWITCH SHALL BE COMPLETELY COMPATIBLE WITH THE GEN SET ACCCESSORIES INCLUDING VOLTMETER, AMMETER ON THE DIGITAL DISPLAY CONTROL PANEL AND ANNUNCIATOR PANEL WITH REMOTE START AND PLANT EXERCISER, REMOTE WIRING HARNESS, CHARGER AND BATTERY PACK WITH SELECTOR ON-OFF-TEST SWITCH. THE NORMAL POSITION SHALL HAVE #3 - #1/0 AWG TERMINAL LUGS SUITABLE FOR COPPER OR ALUMINUM AND THE EMERGENCY LOAD TERMINALS SHALL BE #3 - #1/0 AWG LUGS.

S20. THE ELECTRICAL CONTRACTOR WILL INCLUDE IN HIS PRICE FOR BEING PRESENT FOR THE INSTALLATION AND COMMISSIONING OF THE GEN SET, AUTO TRANSFER SWITCH AND RELATED ASSEMBLIES BY THE EQUIPMENT MANUFACTURES IN ORDER TO ENSURE THAT ALL ELECTRICAL CONNECTIONS ARE CORRECT & COMPLETE.

S21. ELECTRICAL CONTRACTOR TO PROVIDE A 3P 40A CONTRACTOR C/W H.O.A. SELECTOR SWITCH AND 120V COIL FOR OUTSIDE AND PARKING AREA LIGHTING (TO BE LOCATED IN THE ELECTRICAL ROOM), ALSO PROVIDE A P105A FLUSH MOUNTED PHOTO CONTROL TO BE LOCATED ON NORTH SIDE OF BUILDING MOUNTED APPROX. 3.0m ABOVE FINISHED GRADE AND WIRE TO COIL OF CONTRACTOR ON CIR # 1A.

S22. ALL BALLASTS FOR FLUORESCENT LIGHTING FIXTURES ARE TO BE CGE MOTOROLA SERIES ELECTRONIC TYPE OR EQUAL OR LESS THAN 10% TOTAL HARMONIC DISTORTION & ALL FLOURESCENT LAMPS ARE TO BE T8 SERIES.

S23. ELECTRICAL CONTRACTOR MUST VERIFY EXACT HP, VOLTAGE, PHASE & LOCATION OF ALL MOTORS ON ALL MECHANICAL DRAWINGS AND/OR SHOP DRAWINGS BEFORE INSTALLING CONDUIT AND BOXES FOR SAME AS ESTABLISHED BY THE OWNERS REPRESENTATIVE ON SITE.

S24. ELECTRICAL CONTRACTOR TO PROVIDE CONDUIT SLEEVES AT WALL & FLOOR FOR RX DRIVE AND TECK 90 CABLES ENTERING THE BUILDING.

S25. ELECTRICAL CONTRACTOR TO PROVIDE A 100A 600V 3P MOTOR CONTROL CENTER c/w TWO CELLS OF CUTTER HAMMER MODEL SVX-9000 AFD 22A 600V 20HP 3 PHASE VARIABLE SPEED DRIVES c/w LINE & LOAD REACTORS, HOA & START STOP AND SPEED POT FOR MANUAL CONTROL ALSO PROVIDE PROVISION FOR ADDING A THIRD VFD IN THE FUTURE CELL. ALSO PROVIDE ONE ANALOG INPUT (FOR SPEED POT), ONE ANALOG OUTPUT (FOR FAULT), AND ONE DISCRETE INPUT AND ONE DISCRETE OUTPUT (FOR FAULT INDICATED ON EACH VARIABLE SPEED DRIVE).

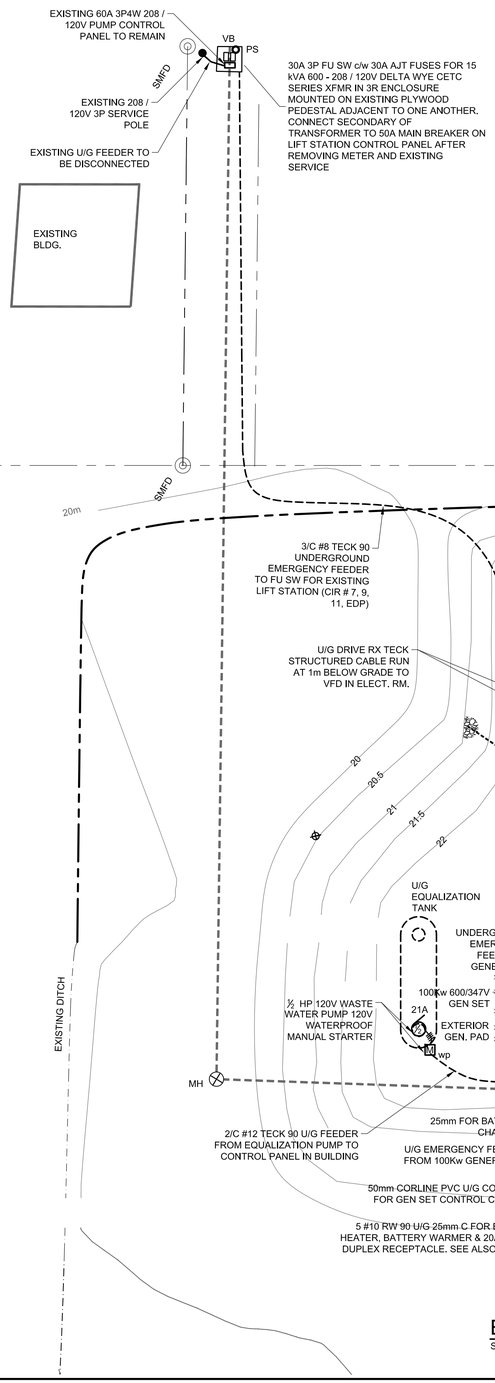
S26. ALL UNDERGROUND PVC CONDUITS ARE TO BE c/w BENDS, ADAPTERS, AND EXPANSION FITTINGS (AT POLE AND BUILDING).

S27. WHERE TECH 90 & DRIVE RX CABLES ENTER THE BUILDING PVC SLEEVE ARE TO BE USED FROM ONE METER OUTSIDE BUILDING WALLS TO VFD'S, PANEL OR EQUIVALENT.

S28. ALL TRANSFORMERS SHALL BE AS MANUFACTURED BY DELTA GROUP INC. OR APPROVED EQUAL BY HAMMOND, MIRUS, OR SYNERGY ENERGY.

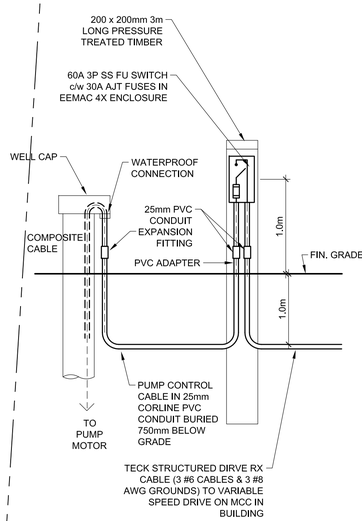
S29. ALL CONDUIT AND/OR CABLE IN OFFICE, LAB, WASHROOM ETC. ARE TO BE RUN CONCEALED AND WHERE PRACTICAL IN OTHER AREAS.

S30. THE GEN SET SHALL BE SUPPLIED WITH A 1200 L SUBBASE DOUBLE WALL FUEL TANK (SIZED FOR 36 HR OF OPERATION) c/w MONITORING AND ALARM EQUIPMENT AS NOTED IN NOTE S18.



ELECTRICAL SITE PLAN

SCALE: 1:250



DETAIL 1/501 TYPICAL WELL PUMP MOTOR CONNECTION

SCALE: NTS

No.	Issue	Date
1	Record Information Added	GAR	Nov. 2011
No.	Revision	Ckd. By	Date

RECORD DRAWING

Stamp

ORIGINAL DRAWING STAMPED ON
02 July 2010
BY
D. J. CAMERON P. ENG.

Const. North

Drawn By: STAFF

Dwg. Standards Ckd. By:

Designed By:

Dwg. Design Ckd. By:

Date Printed: 2-JULY-2010

Branch Manager:

HORNER ASSOCIATES LIMITED
consulting and design engineers
89 Queen Street
Truro, NS
ADI

Client: Municipality of East Hants

Project Title: Shubenacadie Water Treatment Plant

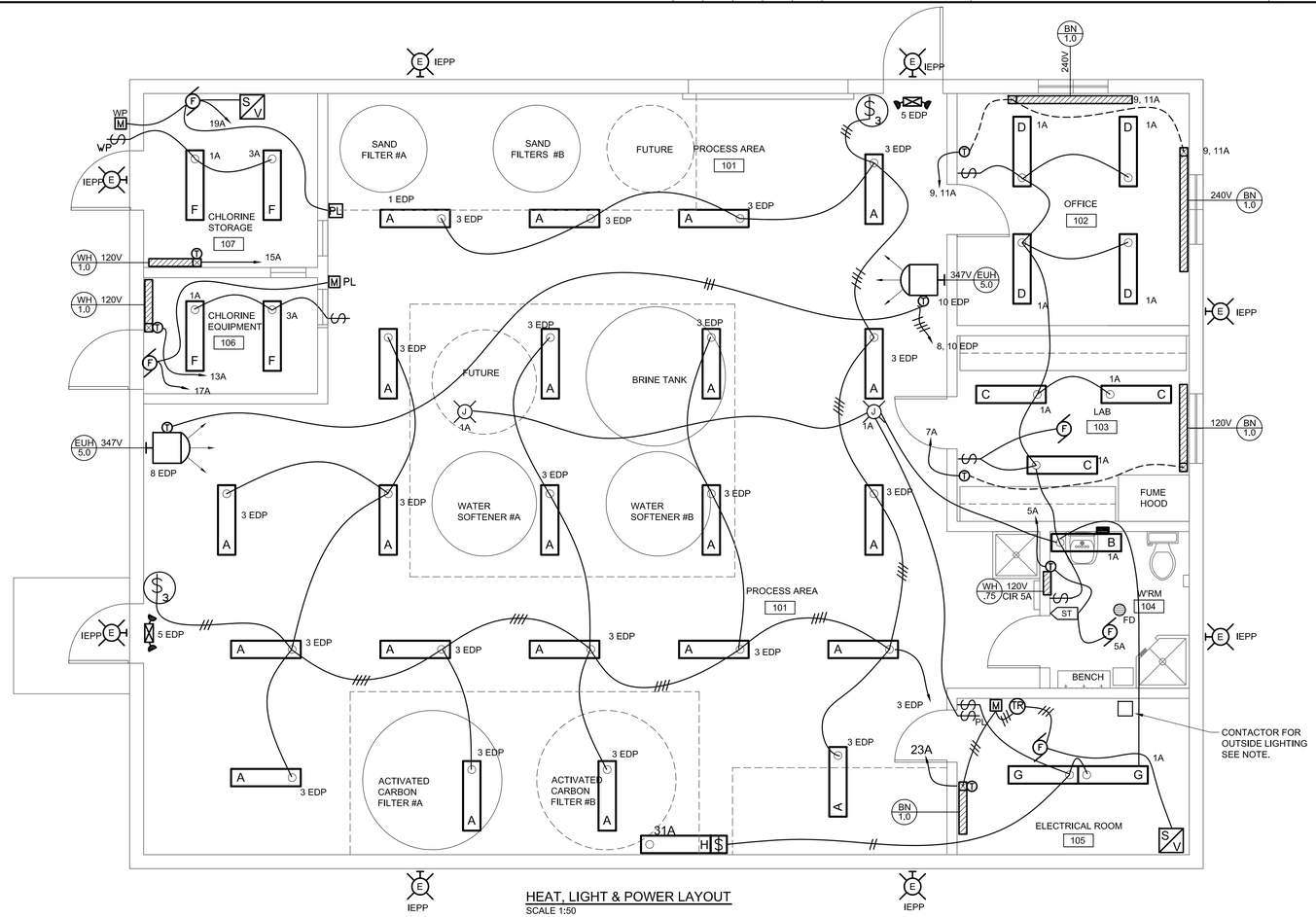
Drawing Title: Electrical Site Plan, Specifications & Details

Project No.: LH0922160

Dwg. No.: 501

Rev. No.: 1

Scale: AS NOTED
This drawing is not to be scaled



HEAT, LIGHT & POWER LAYOUT
SCALE 1:50

HEATING & VENTILATION LEGEND

- (TR) REVERSE ACTING T'STAT BY DIV 15 MECH CONTRACTOR TO BE WIRED BY DIV 16 ELECTRICAL CONTRACTOR
- (T) TS931 / TD932 LINE VOLTAGE THERMOSTAT SUPPLIED AND INSTALLED BY ELECTRICAL CONTRACTOR.
- (TL) T86A 24 VOLT THERMOSTAT BY MECHANICAL CONTRACTOR TO BE WIRED BY ELECTRICAL CONTRACTOR
- (S T) BROAN MODEL P65WN0-60 MIN CONTROL AND SWITCH BY DIV 15 TO BE WIRED BY DIV 16 ON 2-GANG BOX.
- WH .75 120V (T) CHROMALOX TYPE WH 750W 120V SINGLE PHASE FAN DRIVEN WALL HEATER c/w BUILT IN T'STAT.
- BN 1.0 120V (T) CHROMALOX TYPE BN BASEBOARD HEATER (WITH & WITHOUT BUILT IN T'STAT. REFER TO PLAN)
- BUX 5.0 347V (T) CHROMALOX TYPE EUH FAN DRIVEN UNIT HEATER RATED 347V 5kW SINGLE PHASE c/w BUILT IN T'STAT.
- (F) 120V CONNECTION FOR EXHAUST FAN MOTOR WITH INTEGRAL OVERLOAD PROTECTION BY MECHANICAL CONTRACTOR TO BE CONNECTED TO SWITCH IN SAME ROOM OR TIMER FOR WASHROOMS, DRESSING ROOMS OR OFFICE AREA. SEE MECHANICAL DRAWINGS FOR EXACT LOCATION AND SPECIFICATION FOR FAN CONTROL.
- (M) CUTLER HAMMER FLUSH MOUNTED TYPE MS MANUAL STARTER (WP INDICATES c/w WP COVER PLATE SCEPTER VSC
- (M PL) CUTLER HAMMER FLUSH MOUNTED TYPE MS MANUAL STARTER (WP INDICATES c/w WATERPROOF COVER, PL INDICATES c/w PILOT LIGHT
- (PL) PILOT LIGHT ASSEMBLY

LIGHTING LEGEND

- A — TYPE "A": STAMPRO CAT # VT-232-248-347 51" LONG SURFACE MOUNTED VAPOUR TIGHT FLUORESCENT FIXTURE c/w 2-32 WATT T8 LAMPS AND 347V ELECTRONIC BALLAST OR EQUAL BY CFI OR LITHONIA.
- B — TYPE "B": CFI CAT # CTW 248-120-SO-ZA CUBELITE SERIES 48" LONG (WHITE) FLUORESCENT FIXTURE c/w OPAL ACRYLIC LENS, 2 / 32 WATT T8 LAMPS, AND ELECTRONIC BALLAST.
- C — TYPE "C": STELPRO CAT # SFC-T8-332-24-A-48 CELL SURFACE MOUNTED PARBOLIC SERIES 610mm WIDE FIXTURE C/w 3 - 32 WATT T8 LAMPS AND 120V 3 LAMP ELECTRONIC BALLAST OR EQUAL BY LITHONIA OR CFI CAMLYTE.
- D — TYPE "D": SAME AS ABOVE BUT WITH 2 / 32 WATT LAMPS AND ELECTRONIC BALLAST CAT # SFC-T8-232-24-A-48.
- (E) — TYPE "E": KEENE RADIANCE SERIES 175W METAL HALIDE FIXTURE CAT # RD-W-175W-MA-L c/w 175 WATT E17 LAMP WIRE GUARD AND MOG LAMP BASE CONNECTED TO CONTRACTOR SUPPLIED P105 PHOTOCELL AND CONTACTOR WITH HOA SELECTOR SWITCH. FIXTURE IS TO BE MOUNTED ABOVE DOORS OR ON WALLS AT A HEIGHT OF 10' AFG OR EQUAL BY STANPRO OR LITHONIA.
- F — TYPE "F": CFI VANDAL RESESTANT WRAP AROUND POLYCARBONANTE LENS FIXTURE 210mm WIDE CAT # VA-248-120-SO OR EQUAL BY STANPRO OR LITHONIA c/w 2/32 WATT LAMPS AND ELECTRONIC BALLAST.
- G — TYPE "G": 191mm WIDE x 127mm HIGH x 1220 mm LONG INDUSTRIAL FLUORESCENT FIXTURE FEATURING WHITE REFLECTOR & 2/32 WATT LAMPS AND ELECTRONIC BALLASTCAT # SB9R14-48-SO 120 FIXTURE
- $ H — TYPE "H": CFI CAT # CSM41-132PF-120-SO 1210mm LONG STRIP LIGHT OR EQUAL c/w 2 T8 32 WATT LAMP ELECTRONIC BALLAST & TOGGLE SWITCH ON ONE END.
- (J) TYPE "J" : LEVITON CAT.# 9800 LHG COMPACT FLUORESCENT LAMP HOLDER c/w 13W C.F. LAMP, ACRYLIC GUARD ON FLUSH MOUNTED PVC OCTAGON BOX.
- EXIT LIGHT: STAMPRO SPEXR WALL MOUNTED COMBINATION SERIES EXIT EMERGENCY LIGHT CAT # SPEXR-12-1108-2-2D-20W-Q-WM FEATURING FIBERGLASS REINFORCED PLASTIC HOUSING, 2 HEADS 72 AMP HOUR BATTERY, CHARGER, LED EXIT SIGN, ETC. OR EQUAL BY UNIGLO OR LUMACELL.
- $ — 120V 15A SINGLE POLE NYLON WHITE DECORA STYLE SWITCH LEVITON CAT. No. 5691-2W C/W 80301W WHITE COVER PLATE AND SINGLE GANG BOX OR EQUAL BY HUBBELL SUFFIX WP INDICATES c/w SCEPTER VPT PLUNGER TYPE COVER PLATE.
- $3,4 — SAME AS ABOVE EXCEPT THE SUBSCRIPT 3 OR 4 INDICATES 3 WAY CAT # 5623-2W OR 4-WAY CAT # 5624-2W SWITCH ASSEMBLY RESPECTIVELY.
- ($) — LEVITON 20A BROWN 347V TOGGLE SWITCH CAT # 54521-B C/W 347V BOX & COVER PLATE OR EQUAL BY HUBBELL.
- ($3) — SAME AS ABOVE BUT 3 WAY 347V TOGGLE SWITCH CAT # 54523 B C/W MATCHING BOX AND COVER PLATE.
- ($4) — LEVITON 347V 20A TOGGLE SWITCH CAT # 54524B B C/W MATCHING BOX AND COVER PLATE.
- ($$) — 2 GANG 347V SWITCH STATION WITH 2 GANG COVER PLATE.

NOTES:

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL ELECTRICAL SPECIFICATION DRAWINGS, AS WELL AS ALL MECHANICAL, STRUCTURAL, AND ARCHITECTURAL DRAWINGS AND CONTRACT DOCUMENTS.

2. EQUIVALENT HEATING UNITS BY OUELETTE OR STELPRO ARE ACCEPTABLE AS EQUAL PROVIDED THEY FEATURE THE SAME CHARACTERISTICS AS THOSE SPECIFIED IN LEGEND.

TABLE 1/502 PANEL "A" SCHEMATIC

PANEL : "A" FEEDER : SEE DETAIL 3/503
LOCATION : Office Rm. 102
VOLTS: 208/120V ENTER AT: BOTTOM
PHASE: 3 MAINS: 150A (60 CIR CAP)
WIRE: 5W (DOUBLE NEUTRAL)

Remarks	Loads	Description of Equipment	BKR AMP	CIR No.	L1 L2 L3	CIR No.	BKR AMP	Description of Equipment	Loads	Remarks	BRANCH CIRCUIT LOAD (WATTS) PH A	PH B	PH C
	800	LIGHTING IN LAB OFF., WASH RM., ELECT RM.	15	1		2	15	SCALE & WEIGHT INDICATOR RECEPTACLE IN CHLORINE STORAGE	1500		2300		
	300	LIGHTING IN CHLORINE STORAGE & EQUIP. ROOMS	15	3		4	2P		1500			1800	
	1000	HEATING & EXHAUST FAN IN WASH RM.	15	5		6	15	FUME HOOD LIGHTING & FAN	400				1400
	1000	HEATING IN LAB	15	7		8	20	FUME HOOD 15A 120V RECEPTACLE	400		1400		
	1000	HEATING IN OFFICE 2 - 1.0 kW 240V BASEBOARDS	15	9		10	15	230V RECEPTACLE IN FUME HOOD IN LAB	3000			4000	
	1000		2P	11		12	2P		3000				4000
	1000	HEATING IN CHLORINE EQUIP. RM. 106	15	13		14	20	SPLIT WIRED 5-20R DUPLEX 120V RECEPTACLE	1500		2500		
	1000	HEATING IN CHLORINE STOR. RM. 107	15	15		16	2P	IN LAB RM 103	1500			2500	
	300	EXHAUST FAN IN CHLORINE EQUIP. RM. 106	15	17		18	20	SPLIT WIRED 5-20R DUPLEX 120V RECEPTACLE	1500				1800
	400	EXHAUST FAN IN CHLORINE STOR. RM. 107	15	19		20	2P	IN LAB RM 103	1500		1900		
	600	WASTE WATER PUMP ½ HP 120V (EQU TANK)	20	21		22	20	SPLIT WIRED 5-20R DUPLEX 120V RECEPTACLE	1500			2100	
	600	HEATER & EXHAUST FAN IN ELECT. RM	20	23		24	2P	IN LAB RM 103	1500				2100
	400	15A 120V RECEPTACLES IN PROCESS & ELECT. RM.	15	25		26	20	SPLIT WIRED 5-20R DUPLEX 120V RECEPTACLE	1500		1900		
*	200	15A 120V GFCI RECEPTACLES	15	27		28	2P	IN LAB RM 103	1500			1700	
	200	15A 120V RECEPTACLES IN PROCESS AREA	15	29		30	15	3 RECEPTACLES IN OFFICE	600				800
	300	15A 120V RECEPTACLES & LIGHTING IN PROCESS AREA	15	31		32	15	2 DUPLEX RECEPTACLES IN OFFICE (SURGE PROT. & IG)	1000		1300		
	300	CHLORINE ANALYZER IN RM. 101	15	33		34	15	15A 120V RECEPTACLES IN PROCESS RM. (NEAR OFFICE)	400			700	
	300		2P	35		36	15	15A 120V FOR TURBIDITY IN PROCESS RM.	200				500
	200	15A 120V RECEPTACLES IN PROCESS AREA	15	37		38	15	15A 120V FOR TURBIDITY IN PROCESS RM.	200		400		
*	3000	30A 120V CONNECTION FOR LCP - 01 (SAND FILTER)	30	39		40	15	15A 120V FOR TURBIDITY IN PROCESS RM.	200			3200	
*	3000	30A 120V CONNECTION FOR LCP - 02 (SOFTENER FILTER)	30	41		42	15	15A 120V FOR TURBIDITY IN PROCESS RM.	200				3200
*	3000	30A 120V CONNECTION FOR LCP - 03 (CARBON FILTER)	30	43		44	20	120V 1.44 kW HOT WATER HEATER	1440		4440		
*	400	BRIME PUMP MOTOR IN PROCESS AREA	15	45		46	20	120V 20A 5-20R RECEPTACLE IN GEN SET ENCLOSURE	1500	*		1900	
	750	SPARE	20	47		48	20	120V DIRECT CONNECTION TO 1500W BLOCK HEATER	1500				2250
	1500	208 / 120V CONNECTION FOR SCADA CONTROL PANEL IN OFFICE	20	49		50	15	120V DIRECT CONNECTION TO BATTERY CHARGER	600		2100		
	1500		2P	51		52	15	120V DIRECT CONNECTION TO BATTERY WARMER	100			1600	
	300	CHLORINE GAS METERING PUMP IN RM. 106	15	53		54	15	MONITORING PANEL IN OFFICE	200				500
	300		2P	55		56	15	SPARE			300		
*		SPARE	15	57		58		SPACE					
		SPARE	15	59		60		SPACE					
										TOTAL PH A	18140		
										TOTAL PH B		19500	
										TOTAL PH C			19750
								ANTICIPATED MAX DEMAND: 40KVA		CONN. LOAD	57,390		

10KAIC: ON BREAKERS & PANEL
3P 150A MAIN BREAKER
SNR A B C SN1
* DENOTES GFCI BKR

THESE BREAKERS MAY BE REPLACED WITH A 50A 3P BREAKER & 4 #6 RW90 FEEDER TO AN INTEGRAL BREAKER PANEL IN GEN SET ENCLOSURE c/w SAME BREAKERS (OPTIONAL)

TABLE 2/502 PANEL "EDP" SCHEMATIC

PANEL : "EDP"
LOCATION : Electrical Rm. 105 FEED FROM : AUTO TRANSFER SWITCH
VOLTS: 600/347V ENTER AT: BOTTOM
PHASE: 3 MAINS: 150A (60 CIR CAP)
WIRE: 4W STYLE: SURFACE C/W TRIM AND DOOR

Remarks	Loads	Description of Equipment	BKR AMP	CIR No.	L1 L2 L3	CIR No.	BKR AMP	Description of Equipment	Loads	Remarks	PH A	PH B	PH C
	1500	OUTSIDE LIGHTING	15	1		2	100		20000		21500		
	1500	LIGHTING IN PROCESS AREA	15	3		4	3P	MOTOR CONTROL CENTER	20000			21500	
	200	EXIT LIGHTS				6	BKR		20000				20200
	5000	SEWERAGE LIFT STATION XFMR 15KVA 600 - 208 / 120 V c/w 30A DISCONNECT	30	7		8	20	5 kW HEATER IN PROCESS RM. 101	5000		10000		
	5000		3P	9		10	2P	5 kW HEATER IN PROCESS RM. 101	5000			10000	
	5000		BKR	11		12		SPARE					5000
	15000	45KVA 600 - 208 / 120 V DELTAWYE TRANSFORMER FOR PANEL "A"	70	13		14	15				15000		
	15000		3P	15		16	3P	SPARE 3 POLE BREAKER FOR FUTURE UV REACTOR				15000	
	15000		BKR	17		18	BKR						15000
	3000	30A 600V 3 PHASE SWITCH / RECEPTACLE ASSEMBLY FOR BATTERY CHARGER	30	19		20		SPACE					
	3000		3P	21		22		SPACE					
	3000		BKR	23		24		SPACE					
										TOTAL PH A	46500		
										TOTAL PH B		46500	
										TOTAL PH C			40200
										CONN. LOAD	133200		

18KAIC: ON BREAKERS & PANEL
SN1 A B C SN2
* DENOTES GFCI BKR

No.	Issue	Date
1	Record Information Added	Nov. 2011
No.	Revision	Date

RECORD DRAWING

Stamp
ORIGINAL DRAWING STAMPED ON
02 July 2010
BY
D. J. CAMERON P. ENG.

Const. North

Drawn By: STAFF
Dwg. Standards Ckd. By:
Designed By: DJC
Dwg. Design Ckd. By:
Date Printed: 2-JULY-2010
Branch Manager:

HORNER ASSOCIATES LIMITED
consulting and design engineers
89 Queen Street
Truro, NS

Client: Municipality of East Hants

Project Title: Shubenacadie Water Treatment Plant

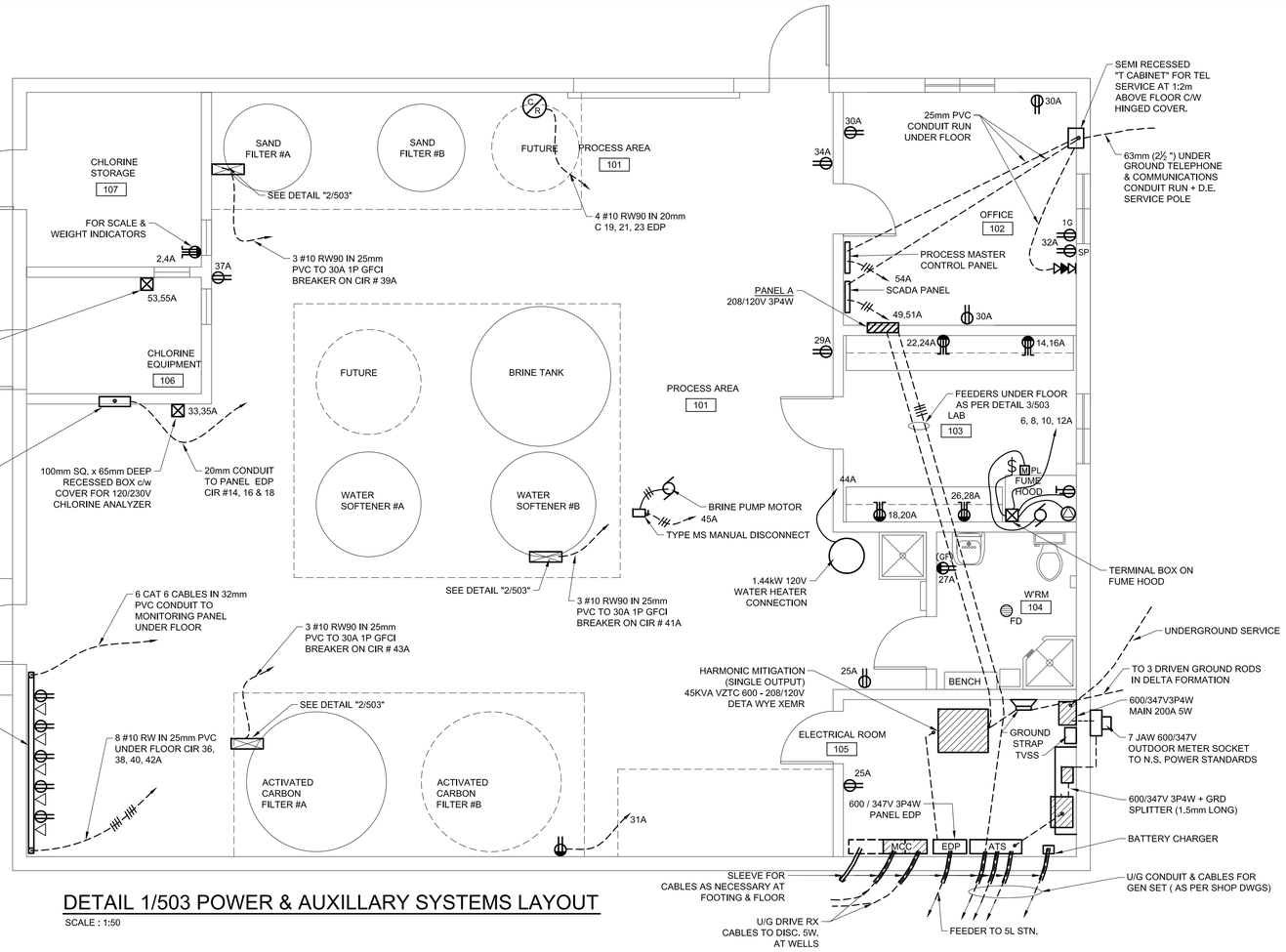
Drawing Title: Lighting and Heating Layout, Legend & Panel Schedules

Project No.: LH0922160

Dwg. No.: 502
Rev. No.: 1

Scale: AS NOTED
This drawing is not to be scaled

0 5 10 20 25 30 cm

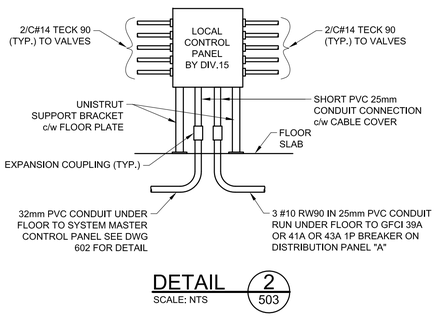


DETAIL 1/503 POWER & AUXILLARY SYSTEMS LAYOUT

SCALE : 1:50

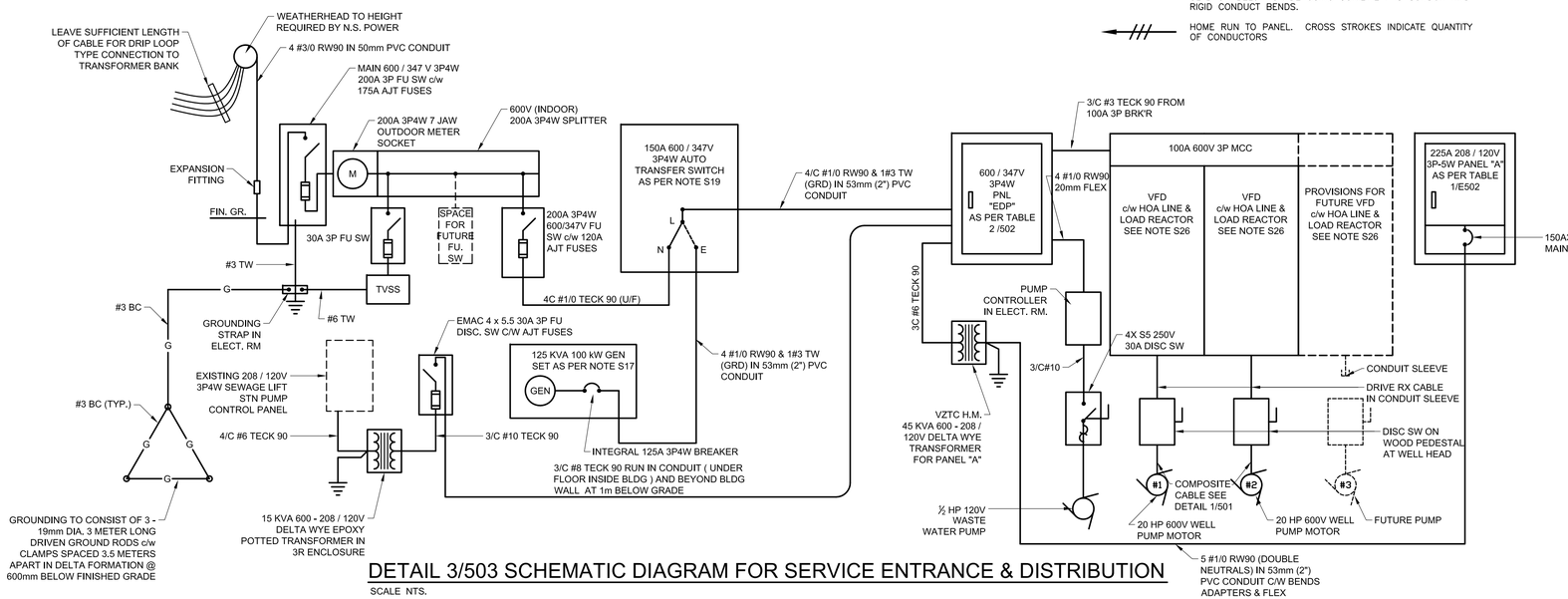
POWER LEGEND

GFCI WP SP	120V 15A 5–15R GROUNDED WHITE NYLON DECORA STYLE RECEPTACLE ASSEMBLY MOUNTED 18" (457mm) A.F.F. UNLESS OTHERWISE NOTED. LEVITON CAT. No. 16252W C/W SINGLE GANG BOX AND LEVITON 80401–W WHITE DECORA STYLE COVER PLATE OR EQUAL BY HUBBELL, SUFFIX WP INDICATES TO BE C/W WEATHERPROOF COVERPLATE, SUFFIX GF INDIATES TO BE GFCI PROTECTED LEVITON CAT. No. 8599W. SUFFIX SP INDICATES TO BE SURGEPROTECTED WITH ISOLATED GROUND LEVITON CAT. No. 5280–IG–W. ALL RECEPTACLES IN FINISHED AREAS ARE TO BE RECESSED MOUNTED.
	SAME AS ABOVE BUT MOUNTED 42" (1066mm) A.F.F. UNLESS OTHERWISE NOTED.
	120V 20A 5–20R GROUNDED WHITE DECORA STYLE RECEPTACLE ASSEMBLY MOUNTED 18" (457mm) A.F.F. UNLESS OTHERWISE NOTED. LEVITON CAT. No. 16352W C.W SINGLE GANG BOX AND 80401–W WHITE DECORA STYLE COVER PLATE OR EQUAL BY HUBBELL
	SAME AS ABOVE BUT MOUNTED 42" (1066mm) A.F.F. UNLESS OTHERWISE NOTED.
	SAME AS ABOVE BUT SPLIT WIRED.
	DATA/PHONE JACK ASSEMBLY 2 PORT HUBBELL H12CBSS BOX C/W CAT5E JACKS AND H1C CONNECTOR COVERS WITH 2 CAT 5e RUN TO TELCOM T CABINET. (TO BE MOUNTED AT 18" A.F.F. UNLESS OTHERWISE NOTED).
	SIMILAR TO ABOVE BUT INCLUDES JACK FOR FAX AND FED WITH 3 CAT CABLES.
	DIRECT CONNECTION TO MECHANICAL EQUIPMENT AS INDICATED ON PLAN
	600V 3P4W DISCONNECT SWITCH NEMA TYPE AS PER NOTE S5 RATED HUBBELL CAT. No. HBLDSC FOR 30A AND HBLDS6 FOR 60A C/W GROUND AND NEUTRAL BLOCKS AND AUX. CONTACT KIT.
F	600V 3P4W FUSED DISC NEMA TYPE 4X RATED HUBBELL CAT. No. FDS30 FOR 30A AND FDS60 FOR 60A C/W TIME DELAY FUSES AS NOTED ON PLAN OR DETAIL. (SEE ALSO NOTE S5)
	600V 3PH CONNECTION TO 60V 3 PH MOTOR SUPPLIED UNDER MECHANICAL CONTRACT.
F	120V CONNECTION FOR EXHAUST FAN MOTOR WITH INTEGRAL OVERLOAD PROTECTION BY MECHANICAL CONTRACTOR TO BE CONNECTED TO LIGHT SWITCH IN SAME ROOM OR TIMER FOR WASHROOMS. SEE MECHANICAL DRAWINGS FOR LOCATION AND SPECIFICATION FOR FAN CONTROL FOR DESTRATIFICATION FANS IN GARAGE/SHOP AREA.
	120V MOTOR ON EQUIPMENT BY MECHANICAL CONTRACTOR, TO BE WIRED BY ELEC CONTRACTOR. SEE MECHANICAL PLAN FOR SPECIFICATIONS.
M	EATON CUTLER HAMMER TYPE MS 120V MANUAL MOTOR STARTER C/W OL PROTECTION ("F" INDICATES FLUSH MOUNTED AND SUFFIX "PL" INDICATES C/W PILOT LIGHT.
M/D	120V MOTORIZED DAMPER BY MECHANICAL CONTRACTOR, TO BE WIRED BY ELECTRICAL CONTRACTOR. SEE MECHANICAL PLAN FOR SPECIFICATIONS.
C/R	HUBBLE 30A 600V 3P4W PIN & SLEVE CIRCUIT LOCK SWITCH / RECEPTACLE ASSEMBLY HBL 430 M15WR FOR BATTERY CHARGER SEE NOTE 2
	BRANCH CIRCUIT WIRING RW90 IN EMT CONDUIT OR AC90 CABLE; NMD–7 CABLE MAY BE USED IF CONCEALED IN WOOD FRAME CONSTRUCTION FOR 250V MAX, CROSS STROKES INDICATE THE NUMBER OF CONDUCTORS. IN THIS CASE 3/C #12 AWG OR 3 #12 AWG PLUS GROUND/BONDING CONDUCTOR IN CONDUIT, ENSURE #12 AWG CONDUCTORS ARE LESS THAN 80', (FROM SOURCE) USE #10 FOR FOR 15A OR 20A CIRCUITS WITH CONDUCTORS LONGER THAN 80'. (SEE ALSO NOTES S27 & S28)
	BRANCH CIRCUIT WIRING OR FEEDER RUN UNDER FLOOR SLAB OR BELOW GRADE USING CORILINE PVC CONDUIT AND RIGID CONDUCT BENDS.
	HOME RUN TO PANEL. CROSS STROKES INDICATE QUANTITY OF CONDUCTORS



DETAIL 2/503

SCALE: NTS



DETAIL 3/503 SCHEMATIC DIAGRAM FOR SERVICE ENTRANCE & DISTRIBUTION

SCALE NTS.

No.	Issue	Date

NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS AND SPECIFICATIONS.
2. ELECTRICAL CONTRACTOR TO VERIFY THAT PLUG / CORD ASSEMBLY OR BATTERY CHARGER IS COMPATIBLE WITH HUBBELL CIRCUIT LOCK RECEPTACLE TYPE.

No.	Revision	Ckd. By	Date
1	Record Information Added	GAR	Nov. 2011

RECORD DRAWING

Stamp

ORIGINAL DRAWING STAMPED ON 02 July 2010 BY D. J. CAMERON P. ENG.

Const. North

Drawn By: STAFF

Dwg. Standards Ckd. By:

Designed By:

Dwg. Design Ckd. By:

Date Printed 2-JULY-2010

Branch Manager:

HORNER ASSOCIATES LIMITED
consulting and design engineers
89 Queen Street
Truro, NS

Client: Municipality of East Hants

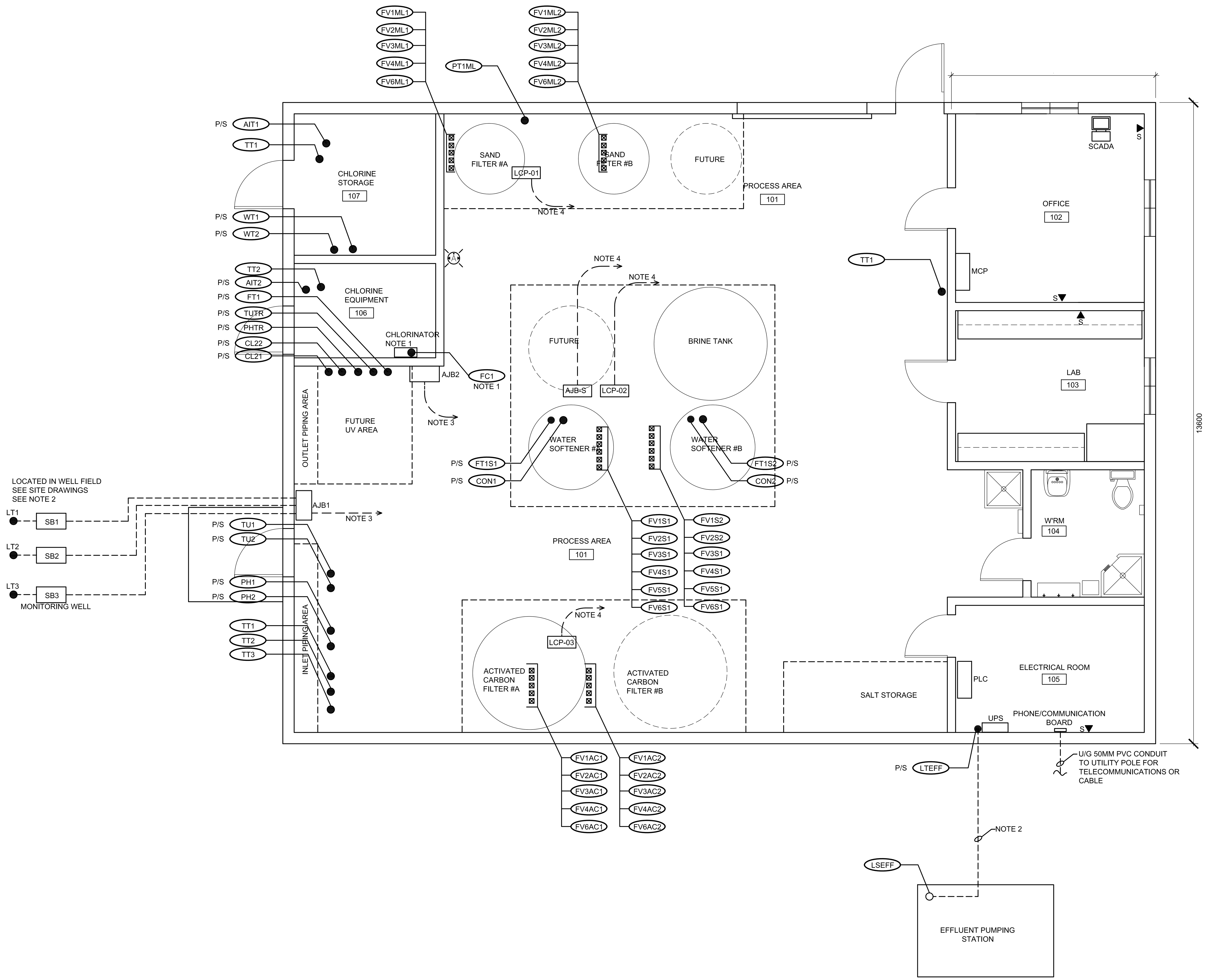
Project Title: Shubenacadie Water Treatment Plant

Drawing Title: Electrical Power & Auxiliary Systems Layout & Details

Project No.: LH0922160

Dwg. No.: 503 Rev. No.: 1

Scale: AS NOTED
This drawing is not to be scaled



BUILDING FLOOR PLAN

SCALE: 1:50

TABLE 1 - INSTRUMENTATION & CONTROLS LEGEND

Symbol	Description
○	ANALOG SENSOR
●	ANALOG DEVICE (TRANSMITTER)
□	DISCRETE ELEMENT
■	DISCRETE DEVICE (INPUT)
⊠	DISCRETE DEVICE MOTORIZED VALVE (OUTPUT)
P/S	120VAC INSTRUMENT POWER SUPPLY JUNCTION BOX (PSJB)
AJB	ANALOG JUNCTION BOX (AJB)
DJB	DISCRETE JUNCTION BOX (DJB)
SB	TYPICAL SPLICE OR JUNCTION BOX OR FITTING
CP	EQUIPMENT CONTROL PANEL
PB	TYPICAL ELECTRICAL PULL BOX
P/S	INSTRUMENT 120V POWER REQUIRED
A	GAS ALARM CONTROLLER LIGHT & HORN ASSEMBLY
▶S	SCADA COMMUNICATION JACK
- - - -	UNDERFLOOR CONDUIT (EMBEDDED)
PLC	PLANT PLC CONTROL PANEL
MCP	PROCESS MAIN CONTROL PANEL

NOTES

1. CHLORINATOR HAS CL2 RESIDUAL INPUT AND CL2 RESIDUAL SIGNAL OUT AS WELL AS FLOW PACING INPUT FROM PLC
2. INSTALL UNDERGROUND IN 17MM CONDUIT 1M BELOW GRADE. INSTALL 75MM SAND AROUND CONDUIT AND BACKFILL WITH WARNING TAPE BURIED AT 200MM BELOW GRADE.
3. ROUTE UNDERGROUND PVC CONDUIT TO PLC LOCATED IN ELECTRICAL ROOM.
4. ROUTE UNDERFLOOR PVC CONDUIT TO MCP LOCATED IN OFFICE

No.	Issue	Date

No.	Revision	Ckd. By	Date
1	Record Information Added	GAR	Nov. 2011
0	Preliminary Review		02-July-2010

RECORD DRAWING

Stamp

ORIGINAL DRAWING STAMPED ON
02 July 2010
BY
M. E. JENKINS P. ENG.

Const. North

Drawn By: JW

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Dwg. Design Ckd. By:

Date Printed: 2-JULY- 2010

Branch Manager:

HORNER ASSOCIATES LIMITED
consulting and design engineers

89 Queen Street
Truro, NS

ADI

Client: Municipality of East Hants

Project Title: Shubenacadie Water Treatment Plant

Drawing Title: Control Device Location Drawing

Project No.: LH0922160

Dwg. No.: 601

Rev. No.: 1

Scale: 1 : 50

This drawing is not to be scaled

0 5 10 20 25 30 cm

ELECTRICAL ROOM

EMPTY 50MM CONDUIT TO UTILITY POLE FOR FUTURE COMMUNICATIONS

COMMUNICATIONS MOUNTING BOARD

FUTURE SCADA CONNECTION TO INTERNET

HUB-RADIO-C1

SCADA RADIO

R R R R

NOTE 1 P/S

ANTENNA

R R R

1 CAT 6 UTP IN 17MM CONDUIT

TYPICAL RJ45 JACK

NETWORK SWITCH

HUB-PLC-C1

HUB-SCADA-C1

1 CAT 6 UTP IN 17MM CONDUIT

HUB-MCP-C1

1 CAT 6 UTP IN 17MM CONDUIT

PLC-MCP-D1

12C #16 IN 25MM PVC

PLC-MCP-A1

4 PAIRS IN 25MM PVC

NOTE 3

OFFICE AREA

SCADA

UPS

NOTE 1 P/S

PROCESS MASTER CONTROL PANEL MCP

20C #16 IN 41MM PVC MCP-LCP01-D1 MCP-AJBML-A1

1 PAIR

20C #16 IN 41MM PVC MCP-LCP02-D1 MCP-AJBS-A1

6 PAIRS

20C #16 IN 41MM MCP-LCP03-D1

SAND FILTER AREA

120VAC (NOTE 1)

2C #14 TECK (TYPICAL)

NOTE 3

LCP-01 FILTER SYSTEM JUNCTION BOX

FV1ML1 FV2ML1 FV3ML1 FV4ML1 FV6ML1 FV1ML2 FV2ML2 FV3ML2 FV4ML2 FV6ML2

NOTE 3

1PR #16 TECK (TYPICAL)

PT 1ML

GENERATOR (OUTSIDE)

8C #16 IN 25MM U/G PVC CONDUIT

PLANT PLC

2 x 12 PAIR INSTRUMENT CABLES IN 50MM PVC NOTE 3

2 x 12 PAIR INSTRUMENT CABLES IN 50MM PVC NOTE 3

120VAC SEE NOTE 1

PLC-MCC-A1

PLC-MCC-D1

1 PAIR IN 25MM PVC

6 PAIR

12C #16 IN 25MM PVC

8C #16 IN 25MM U/G PVC CONDUIT

MCC NOTE 2

ATS TRANSFER SWITCH

LT EFF P/S

SEE NOTE 5

LS EFF

EFFLUENT TANK (OUTSIDE)

PROCESS AREA

PLC-AJB1-A1

AJB 1

AJB 2

1PR #16 TECK ARMORED CABLE (TYPICAL)

1PR #16 TECK ARMORED CABLE (TYPICAL)

PH 01 P/S

PH 02 P/S

TU 1 P/S

TU 2 P/S

TT 1 TE 1

TT 2 TE 2

TT 3 TE 3

TU TR

FT 1

PH TR P/S

TT 4 TE 4

CL2 1 P/S

CL2 2 P/S

NOTE 4

SB LT 1

SB LT 2

SB LT 3

WELL FIELD (OUTSIDE)

AIT 1 P/S TT 5 TE 5

AIT 2 P/S

TT 6 TE 6

WT 1 P/S

WT 2 P/S

FC 1

CHLORINATOR

CHLORINE AREA

SOFTENER AREA

P 1S

120VAC (NOTE 1)

2C #14 TECK (TYPICAL)

NOTE 3

LCP-02 SOFTENER SYSTEM JUNCTION BOX

FV1S1 FV2S1 FV3S1 FV4S1 FV5S1 FV6S1 FV1S2 FV2S2 FV3S2 FV4S2 FV5S2 FV6S2 FVBYPASS

NOTE 3

AJB-S

CON 1 P/S

CON 2 P/S

FT 1S2 FE 1S2 P/S

FT 1S1 FE 1S1 P/S

1PR #16 TECK (TYPICAL)

CARBON FILTER AREA

120VAC (NOTE 1)

2C #14 TECK (TYPICAL)

NOTE 3

LCP-03 FILTER SYSTEM JUNCTION BOX

FV1AC1 FV2AC1 FV3AC1 FV4AC1 FV6AC1 FV1AC2 FV2AC2 FV3AC2 FV4AC2 FV6AC2

NOTES

1. SEE ELECTRICAL DRAWINGS FOR P/S SOURCE WIRING
2. FOR MCC EQUIPMENT CONTROL SCHEMATIC SEE ELECTRICAL DRAWINGS
3. CONDUIT EMBEDDED UNDERFLOOR
4. SINGLE PAIR UNARMORED CABLE IN 25MM PVC UNDERGROUND CONDUIT
5. SIGNAL CABLE IN UNDERGROUND CONDUIT

CABLE TYPE LEGEND

- ANALOG
- DISCRETE
- COMMUNICATIONS
- RF SIGNAL
- FLOOR/WALL PENETRATION

No.	Issue	Date

No.	Revision	Ckd. By	Date
1	Record Information Added	GAR	Nov. 2011
0	Preliminary Review		02-July-2010

RECORD DRAWING

Stamp

ORIGINAL DRAWING STAMPED ON 02 July 2010 BY M. E. JENKINS P. ENG.

Const. North

Drawn By: JW

Dwg. Standards Ckd. By:

Designed By:

Dwg. Design Ckd. By:

Date Printed 2-JULY-2010

Branch Manager:

HORNER ASSOCIATES LIMITED
consulting and design engineers
89 Queen Street
Truro, NS

Client: Municipality of East Hants

Project Title: Shubenacadie Water Treatment Plant

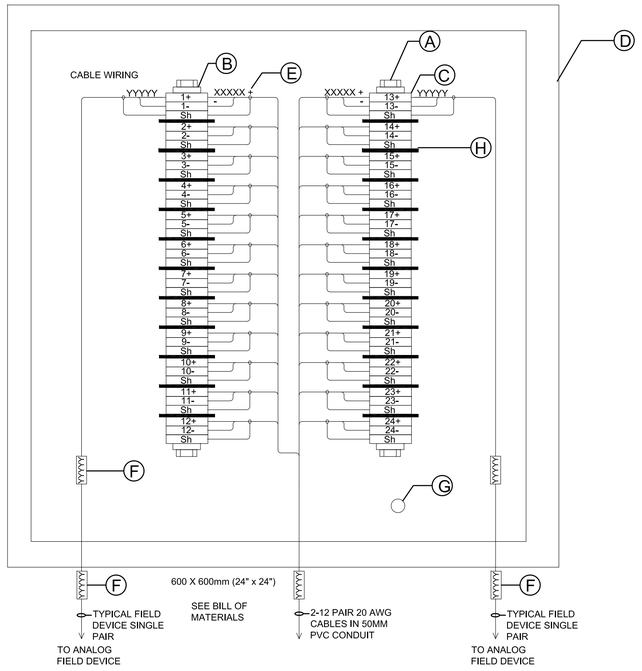
Drawing Title: Controls Cable Block Diagram

Project No. LH0922160

Dwg. No. 602

Rev. No. 1

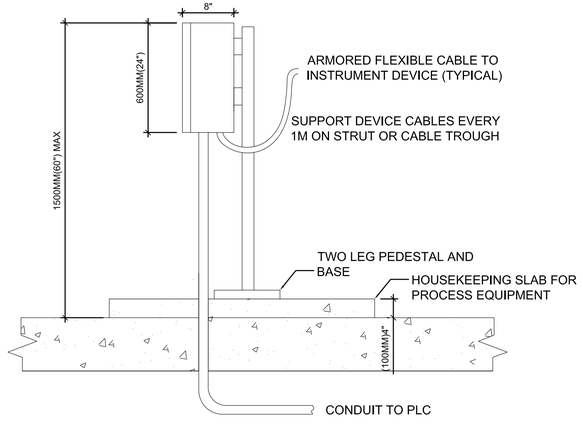
Scale: NTS
This drawing is not to be scaled



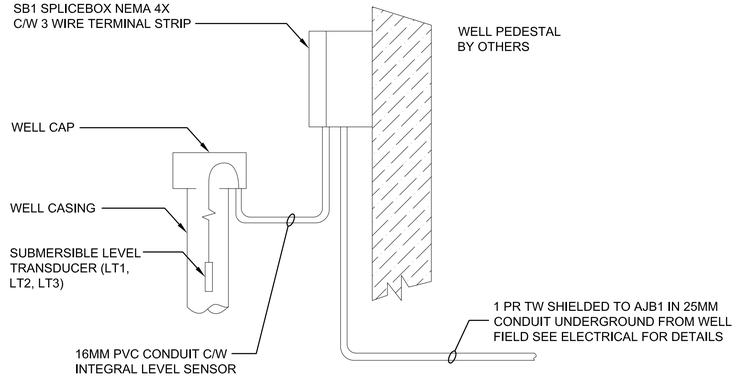
1/603 DETAIL 1/603 - ANALOG JB ARRANGEMENT
N.T.S.

BILL OF MATERIALS

ITEM	DESCRIPTION	QTY/PANEL
A	DIN MOUNTING RAIL	1
B	TERMINAL BLOCK CLAMP	2
C	4mm FEED THROUGH TERMINAL	AS REQ
D	ENCLOSURE C/W BACKPLATE SIZE AS SHOWN	AS REQ
E	WIRE TAGS	AS REQ
F	CABLE TAGS	AS REQ
G	GROUND LUG	1
H	TYPICAL BARRIER & TERMINAL BLOCK	AS REQ



2/603 DETAIL 2/603 - METHOD OF MOUNTING JB
N.T.S.



3/603 DETAIL 3/603 - LEVEL SENSOR MOUNTING
N.T.S.

No.	Issue	Date
1	Record Information Added	GAR	Sept. 2011
0	Preliminary Review		02-July-2010
No.	Revision	Ckd. By	Date

RECORD DRAWING

Stamp

ORIGINAL DRAWING STAMPED ON
02 July 2010
BY
M. E. JENKINS P. ENG.

Const. North

Drawn By: JW

Dwg. Standards Ckd. By:

Designed By:

Dwg. Design Ckd. By:

Date Printed: 2-SEPT-2010

Branch Manager:

HORNER ASSOCIATES LIMITED
consulting and design engineers
89 Queen Street
Truro, NS

Client: Municipality of East Hants

Project Title: Shubenacadie Water Treatment Plant

Drawing Title: Details

Project No.: LH0922160

Dwg. No.: 603

Rev. No.: 1

Scale: NTS
This drawing is not to be scaled

APPENDIX B

Quotations from Suppliers

Certified to ISO9001:2015

10 Alden Road, Markham, ON, Canada L3R 2S1
(905) 475-1545 Fax: (905) 475-2021, E-Mail: info@napier-reid.com www.napier-reid.com

RV. Anderson
2001 Sheppard Ave. E
Toronto ON M2J4Z8
Attn: Ian Lake-Thompson, M.A.Sc, P.Eng

Date: Jan. 25th, 2023

File: PR-8922

BUDGETARY PROPOSAL

Re: Water Treatment Equipment, East Hants Shubenacadie WTP, NS

We are pleased to present this budgetary proposal for the supply of water treatment equipment consisting of sand filters, water softeners, activated carbon filter complete with instrumentation and controls for the above referenced wastewater treatment facility.

SCOPE OF SUPPLY (BY NAPIER-REID LTD.)

Sand Filters

TWO Sand pressure filters designed for a treated water peak flow rate of 200 USgpm per filter at a maximum pressure drop of 10 psi. Backwash water is 300 USgpm per filter using treated chlorinated water from the owner's distribution system.

Filter tankage and piping will be designed for a normal operating pressure of 105 psi and a maximum operating pressure of 150 psi, as specified.

Filter tankage will be 1520mm diameter by 1520mm sidewall height and constructed of carbon steel complete with top and bottom heads, four structural steel support legs and lifting lugs.

Each filter shall include the following components:

- 350 x 450mm man way on the top head.
- Lifting lugs provided in the top head.
- 25mm coupling on top head c/w air/vacuum release valve.
- 25mm coupling on bottom head c/w ball valve (vessel drain).
- 100mm flanged connections for inlet & outlet.
- 100mm influent distribution/backwash outlet header in 304SS construction.

- Underdrain system consisting of 100mm PVC Sch. 80 hub with 16 slotted PVC laterals.

- Filter media conforming/certified to NSF 61/AWWA standard is as follows:

  - 1360 kg of support gravel
  - 545 kg of 8 x 12 garnet
  - 730 kg of 30 x 40 garnet
  - 1365 kg of silica sand 0.45 to 0.55 mm
  - 0.68 m^3 of anthracite 0.9-1.0 mm

- Process control valves per filter including:

  Four (4) 100mm diameter lug style butterfly valves c/w pre-mounted On/Off electric actuator (influent, effluent, rinse and backwash out) and one (1) 100mm diameter lug style butterfly valve c/w pre-mounted modulating electric actuator (backwash inlet).

- Manual valves per filter:

  Three (3) 100mm diameter lug style manual butterfly valves (influent, effluent and backwash inlet).

  Two (2) 100mm diameter check valves (influent and backwash inlet).

  One (1) 50mm diameter manual ball valve (drain).

  One (1) 25mm diameter manual ball valve (vessel drain).

  Two (2) 6mm diameter ball valves for sample (influent and effluent).

- Instruments and sensors per filter:

  Differential pressure transmitter with display and 4-20 mA output for indication of head loss through the filters (common for two filters).

  Pressure gauges, 0-160 psi on filter inlet and outlet line.

  Local filter control junction box, NEMA1 rating.

ONE Common Face Piping for the two sand filters:

Face piping and fittings for each filter will be supplied in Sch. 10 316L stainless steel. The piping will be supplied in spool pieces for onsite installation by others.

Water Softeners

TWO Water softeners, designed for a treated water peak flow rate of 155 USgpm per softener at a maximum pressure drop across the softener of 15 psi. Backwash water shall be limited to 130 USgpm per softener using filtered water from the sand filters.

Softener tankage and piping will be designed for a normal operating pressure of 105 psi and a maximum operating pressure of 150 psi, as specified.

Softener tankage will be 1830mm diameter by 1830mm sidewall height and constructed of carbon steel complete with top and bottom heads, four structural steel support legs and lifting lugs.

Each water softener will include the following components:

- 350 x 450mm manway on the top head.
- Lifting lugs provided in the top head.
- 25mm coupling on top head c/w air/vacuum release valve.
- 38mm coupling on bottom head c/w ball valve (vessel drain).
- 100mm flanged connections for inlet & outlet.
- 100mm influent distribution/backwash outlet header in SS 304 construction.
- Under drain system consisting of 100 mm PVC Sch. 80 hub with 16 slotted PVC laterals.
- Softener media consists of the following specified materials:
  - 1590 kg of support gravel
  - 2.83 m^3 of cation exchange resin, 8% cross-link
- Process control valves per softener:

  Two (2) 100mm diameter lug style butterfly valves c/w pre-mounted On/Off electric actuator (influent and effluent).

  Two (2) 75mm diameter lug style butterfly valves c/w pre-mounted On/Off electric actuator (rinse/brine outlet and backwash out).

  One (1) 75mm diameter lug style butterfly valve c/w pre-mounted modulating electric actuator (backwash in).

  One (1) 50mm diameter lug style butterfly valve c/w pre-mounted On/Off electric actuator (brine inlet).

- Manual valves per softener:

  Two (2) 100mm diameter lug style manual butterfly valves (influent and effluent).

  One (1) 100mm check valve (influent).

  One (1) 50mm diameter lug style manual butterfly valve (brine inlet).

  One (1) 50mm diameter manual ball valve (drain).

  One (1) 38mm diameter manual ball valve (vessel drain).

  Two (2) 6mm diameter ball valves for sample (influent and effluent).

- Instruments and sensors per softener:

  Differential pressure transmitter with display and 4-20 mA output for indication of head loss through the softeners (common for two softeners).

  4" ABB magnetic flow meter (at inlet of each softener).

  Pressure gauges, 0-150 psi on softener inlet and outlet line.

  Local softener control junction box, NEMA1 rating.

ONE Common Face Piping for the two water softeners:

Face piping for each softener will be supplied in Sch. 10 316L stainless steel. The piping will be supplied in spool pieces for onsite installation, by others.

ONE Brine regeneration system consists of:

- Polyethylene brine solution tank 2438mm (96") dia.x1956mm (77") H
- Two float level switches
- Centrifugal brine pump c/w 575/3/60 motor
- Feed water control valve
- 1.5" ABB magnetic flow meter for Brine solution
- Specified piping and isolation valves

<u>Activated Carbon Filter</u>

ONE Activated carbon filter designed for a treated water peak flow rate of 200 USgpm at a maximum pressure drop of 10 psi. Backwash water shall be limited to 500 USgpm using treated chlorinated water from Owner's distribution system.

Filter tankage and piping will be designed for a normal operating pressure of 105 psi and a maximum operating pressure of 150 psi, as specified.

Filter tankage will be 2440mm diameter by 1520mm sidewall height and constructed of carbon steel complete with top and bottom heads, four structural steel support legs and lifting lugs.

The filter will include the following components:

- 350 x 450mm man way on the top head.
- Lifting lugs provided in the top head.
- 25mm coupling on top head c/w air/vacuum release valve.
- 38mm coupling on bottom head c/w ball valve (vessel drain).
- 100mm flanged connections for inlet and outlet.
- 100mm influent distribution/backwash outlet header in 304SS construction.
- Under drain system consisting of 100mm 304SS header with 18 slotted PVC laterals.
- Filter media conforming/certified to NSF 61/AWWA standard consisting of:
    - 4090 kg of No.20 washed and graded gravel sub-fill;
    - 5.6 m^3 of HAC 12 x 40 or equal, granular activated carbon
- Process control valves:

  Four (4) 100mm diameter lug style butterfly valves c/w pre-mounted On/Off electric actuator (influent, effluent, rinse and backwash out) and one (1) 100mm diameter lug style butterfly valve c/w pre-mounted Modulating electric actuator (backwash in).

- Manual valves:

  Three (3) 100mm diameter lug style manual butterfly valves (influent, effluent and backwash inlet).

  Two (2) 100mm diameter check valves (influent and backwash inlet).

  One (1) 50mm diameter manual ball valve (drain).

  One (1) 38mm diameter manual ball valve (drain).

Two (2) 6mm diameter ball valves for sample (influent and effluent).

- Instruments and sensors:

  Differential pressure transmitter with display and 4-20 mA output for indication of head loss through the filter.

  Pressure gauges, 0-150 psi for filter inlet and outlet line.

  Local filter control junction box, NEMA1 rating.

ONE Set of common face piping:

Face piping for each filter will be supplied in Sch. 10 316L stainless steel. The piping will be supplied in spool pieces for onsite installation, by others.

Master Treatment System Control

PLC based master control panel designed to control operation of the sand filters, softeners and carbon filter. Control panel will monitor the flow rate and water usage through the treatment equipment, and will schedule and control the backwashing of the equipment based on the backwash program for each component.

Master treatment system control shall consist of the following:

ONE EEMAC 4, 120/1/60 PLC Control panel complete with:

- Main disconnect
- Primary and secondary fusing
- Control relays complete with bases
- Allen-Bradley CompactLogix processor with digital input and output cards analog input and output card, battery and power supply
- Wiring terminals
- Pilot lights
- PanelView Plus touch-screen operator interface

Wiring to and from the panel is supplied and installed by others.

Shop Drawings

4 Sets of shop drawings

Operation & Maintenance Manuals

4 Sets of O & M manuals in English

Field Service and Inspection

Napier-Reid will provide site services as follows:

- One (1) day: Installation instruction for the systems
- Three (3) days: Mechanical equipment inspection
- Five (5) days: Start-up and commissioning
- One (1) day: Inspection, adjustment & calibration, 6 months after start-up
- One (1) day: Inspection, adjustment & calibration, 12 months after start-up

Additional site visits can be provided based on following rate:

- Weekdays: CAD$1,280 per man.day (up to 8man.hours/day)
- Overtime, weekends & holidays: CAD$200 per man.hour (up to 10man.hours/day)
- Travel time: CAD$150 per man.hour (up to $1,280/man.day)

Expenses will be extra and billed at cost plus 10%. All Napier Reid site personnel are non-union.

Warranty

Napier-Reid Ltd. warrants all equipment manufactured or supplied by it to be free from defects in design, workmanship and material, and conforming to the specification for a period of 12 months from the day of successful start-up or 18 months after shipment, whichever occurs first.

TOTAL LOT BUDGETARY PRICE For the Equipment Above……CAD$1,130,000.00

OPTION: ADDING ITEMS TO MATCH THE EXISTING

Sand Filter

ONE Sand pressure filter (same as the existing sand filter) designed for a treated water peak flow rate of 200 USgpm at a maximum pressure drop of 10 psi. Backwash water is 300 USgpm using treated chlorinated water from the owner's distribution system.

Filter tankage and piping will be designed for a normal operating pressure of 105 psi and a maximum operating pressure of 150 psi, as specified.

Filter tankage will be 1520mm diameter by 1520mm sidewall height and constructed of carbon steel complete with top and bottom heads, four structural steel support legs and lifting lugs.

The filter shall include the following components:

- 350 x 450mm man way on the top head.

- Lifting lugs provided in the top head.

- 25mm coupling on top head c/w air/vacuum release valve.

- 25mm coupling on bottom head c/w ball valve (vessel drain).

- 100mm flanged connections for inlet & outlet.

- 100mm influent distribution/backwash outlet header in 304SS construction.

- Underdrain system consisting of 100mm PVC Sch. 80 hub with 16 slotted PVC laterals.

- Filter media conforming/certified to NSF 61/AWWA standard is as follows:

  - 1360 kg of support gravel
  - 545 kg of 8 x 12 garnet
  - 730 kg of 30 x 40 garnet
  - 1365 kg of silica sand 0.45 to 0.55 mm
  - 0.68 m^3 of anthracite 0.9-1.0 mm

- Process control valves, including:

  Four (4) 100mm diameter lug style butterfly valves c/w pre-mounted On/Off electric actuator (influent, effluent, rinse and backwash out) and one (1) 100mm diameter lug style butterfly valve c/w pre-mounted modulating electric actuator (backwash inlet).

- Manual valves:

  Three (3) 100mm diameter lug style manual butterfly valves (influent, effluent and backwash inlet).

  Two (2) 100mm diameter check valves (influent and backwash inlet).

  One (1) 50mm diameter manual ball valve (drain).

  One (1) 25mm diameter manual ball valve (vessel drain).

  Two (2) 6mm diameter ball valves for sample (influent and effluent).

- Instruments and sensors:

Differential pressure transmitter with display and 4-20 mA output for indication of head loss through the filters (common for two filters).

Pressure gauges, 0-160 psi on filter inlet and outlet line.

Local filter control junction box, NEMA1 rating.

- Face Piping:

  Face piping and fittings for the filter will be designed to match the existing filters and supplied in Sch. 10 316L stainless steel. The piping will be supplied in spool pieces for onsite installation by others.

Water Softener

ONE Water softener (same as the existing softener) designed for a treated water peak flow rate of 155 USgpm at a maximum pressure drop across the softener of 15 psi. Backwash water shall be limited to 130 USgpm using filtered water from the sand filters.

Softener tankage and piping will be designed for a normal operating pressure of 105 psi and a maximum operating pressure of 150 psi, as specified.

Softener tankage will be 1830mm diameter by 1830mm sidewall height and constructed of carbon steel complete with top and bottom heads, four structural steel support legs and lifting lugs.

The water softener will include the following components:

- 350 x 450mm manway on the top head.
- Lifting lugs provided in the top head.
- 25mm coupling on top head c/w air/vacuum release valve.
- 38mm coupling on bottom head c/w ball valve (vessel drain).
- 100mm flanged connections for inlet & outlet.
- 100mm influent distribution/backwash outlet header in SS 304 construction.
- Under drain system consisting of 100 mm PVC Sch. 80 hub with 16 slotted PVC laterals.
- Softener media consists of the following specified materials:

- 1590 kg of support gravel
- 2.83 m^3 of cation exchange resin, 8% cross-link

- Process control valves:

  Two (2) 100mm diameter lug style butterfly valves c/w pre-mounted On/Off electric actuator (influent and effluent).

  Two (2) 75mm diameter lug style butterfly valves c/w pre-mounted On/Off electric actuator (rinse/brine outlet and backwash out).

  One (1) 75mm diameter lug style butterfly valve c/w pre-mounted modulating electric actuator (backwash in).

  One (1) 50mm diameter lug style butterfly valve c/w pre-mounted On/Off electric actuator (brine inlet).

- Manual valves:

  Two (2) 100mm diameter lug style manual butterfly valves (influent and effluent).

  One (1) 100mm check valve (influent).

  One (1) 50mm diameter lug style manual butterfly valve (brine inlet).

  One (1) 50mm diameter manual ball valve (drain).

  One (1) 38mm diameter manual ball valve (vessel drain).

  Two (2) 6mm diameter ball valves for sample (influent and effluent).

- Instruments and sensors:

  Differential pressure transmitter with display and 4-20 mA output for indication of head loss through the softeners (common for two softeners).

  4” ABB magnetic flow meter (at inlet of each softener).

  Pressure gauges, 0-150 psi on softener inlet and outlet line.

  Local softener control junction box, NEMA1 rating.

- Face Piping:

  Face piping for the softener will be designed to match the existing softeners and supplied in Sch. 10 316L stainless steel. The piping will be supplied in spool pieces for onsite installation, by others.

- Brine regeneration system consists of:

  - Polyethylene brine solution tank 2438mm (96") dia.x1956mm (77") H
  - Two float level switches
  - Centrifugal brine pump c/w 575/3/60 motor
  - Feed water control valve
  - 1.5" ABB magnetic flow meter for Brine solution
  - Specified piping and isolation valves

Activated Carbon Filter

ONE Activated carbon filter (same as the existing GAC filter) designed for a treated water peak flow rate of 200 USgpm at a maximum pressure drop of 10 psi. Backwash water shall be limited to 500 USgpm using treated chlorinated water from Owner's distribution system.

Filter tankage and piping will be designed for a normal operating pressure of 105 psi and a maximum operating pressure of 150 psi, as specified.

Filter tankage will be 2440mm diameter by 1520mm sidewall height and constructed of carbon steel complete with top and bottom heads, four structural steel support legs and lifting lugs.

The filter will include the following components:

- 350 x 450mm man way on the top head.

- Lifting lugs provided in the top head.

- 25mm coupling on top head c/w air/vacuum release valve.

- 38mm coupling on bottom head c/w ball valve (vessel drain).

- 100mm flanged connections for inlet and outlet.

- 100mm influent distribution/backwash outlet header in 304SS construction.

- Under drain system consisting of 100mm 304SS header with 18 slotted PVC laterals.

- Filter media conforming/certified to NSF 61/AWWA standard consisting of:

  - 4090 kg of No.20 washed and graded gravel sub-fill;
  - 5.6 m^3 of HAC 12 x 40 or equal, granular activated carbon

- Process control valves:

  Four (4) 100mm diameter lug style butterfly valves c/w pre-mounted On/Off electric actuator (influent, effluent, rinse and backwash out) and one (1) 100mm diameter lug style butterfly valve c/w pre-mounted Modulating electric actuator (backwash in).

- Manual valves:

  Three (3) 100mm diameter lug style manual butterfly valves (influent, effluent and backwash inlet).

  Two (2) 100mm diameter check valves (influent and backwash inlet).

  One (1) 50mm diameter manual ball valve (drain).

  One (1) 38mm diameter manual ball valve (drain).

  Two (2) 6mm diameter ball valves for sample (influent and effluent).

- Instruments and sensors:

  Differential pressure transmitter with display and 4-20 mA output for indication of head loss through the filter.

  Pressure gauges, 0-150 psi for filter inlet and outlet line.

  Local filter control junction box, NEMA1 rating.

- Face Piping:

  Face piping for the filter will be designed to match the existing GAC filter and supplied in Sch. 10 316L stainless steel. The piping will be supplied in spool pieces for onsite installation, by others.

<u>Master Treatment System Control</u>

PLC based master control panel (same as the existing panel) designed to control operation of the sand filters, softeners and carbon filter. Control panel will monitor the flow rate and water usage through the treatment equipment, and will schedule and control the backwashing of the equipment based on the backwash program for each component.

Master treatment system control shall consist of the following:

ONE EEMAC 4, 120/1/60 PLC Control panel complete with:

- Main disconnect
- Primary and secondary fusing
- Control relays complete with bases
- Allen-Bradley CompactLogix processor with digital input and output cards analog input and output card, battery and power supply
- Wiring terminals
- Pilot lights
- PanelView Plus touch-screen operator interface

Wiring to and from the panel is supplied and installed by others.

TOTAL LOT BUDGETARY PRICE For the Optional Items…….CAD$870,000.00

Terms:

- Ex-Work, Napier-Reid shops, Markham, ON, Canada
- Any Tax and duty excluded, if applicable
- Terms: Net 30 days after receipt of invoices.
- Payment schedule:
- 10% upon the receipt of shop drawings by the buyer's representative
- 25% upon the arrival of major materials at our shop for filter tank fabrication
- 20% upon the completion of the filter tank fabrication prior to sandblasting and coating
- 30% when equipment is ready for shipping
- 10% upon the arrival of the equipment on site, in good conditions
- 5% upon successful completion of Acceptance Test based on the electrical/mechanical performance of Napier-Reid supplied equipment
- Delivery: 22 to 26 weeks from approved drawings
- Drawings: 4 to 6 weeks from approved purchase order
- Price valid for 30 days.
- Napier-Reid Ltd. reserves its right to withhold equipment and/or services when payment is not received as per our terms, without penalty, not withstanding the terms and conditions in the purchaser' purchase order, tender specifications, or any other documents.
- In the event the purchase order is cancelled, Napier-Reid Ltd. reserves the right to receive reimbursement from the purchaser for all costs incurred up to the date of cancellation including design, manufacturing, fabrication, shipping, restocking charges and a prorated portion of profits.

NAPIER-REID LTD.

Peggy Pan, P.Eng., PMP
Project Manager

Note:

1. The stainless-steel face piping and fittings (shop fabricated to maximum possible extent), valves and instrumentation will be shipped loose for installation by others.
2. Filter and softener media will be delivered to site in 0.5 or 1.0 cubic foot bags for installation by others.
3. Butterfly valves will be supplied in accordance with ANSI/AWWA Standard C-504 as manufactured by Pratt, Bray or Keystone.
4. The backwash inlet valves for the sand filters, softeners and activated carbon filter will be equipped with upsized actuators to ensure its smooth operation under the high line pressure from the supply side.
5. Sand filter, softener and activated carbon filter tankage interior will be primed and epoxy coated suitable for potable water applications. Exterior of tankage will be primed and epoxy coated.
6. Pressure vessels shall be designed, fabricated and tested as per ASME Sec. VIII, Div 1 and provided with appropriate code stamp.
7. Motor starter for brine pump will be provided in plant MCC by others.

Exclusions

Napier-Reid Ltd. excludes from its scope of supply the following items:

- Equipment shipping, unloading and storage at the jobsite.
- Field installation.
- Interconnecting piping including instrument air piping.
- Field wiring and conduits, field wire ways.
- Power, water, chemicals and labor for operating the equipment.
- Any field and laboratory testing.
- Field painting if required.
- Any equipment or services not specifically listed in this proposal.