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Revised February 2018



## **ASSET MANAGEMENT PLAN**

**PREPARED FOR:**

**TOWN OF ABERDEEN, SK**

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# Town of Aberdeen | Asset Management Plan

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## 1.0 Introduction

The Asset Management Plan (AMP) document is a comprehensive report outlining the Asset Management (AM) program of an organization, along with information on the current state of assets, the desired level of service, financing strategy, and risk management for assets. It is an important document to ensure appropriate and consistent investment in the Town's infrastructure assets. It will serve as a valuable planning tool for budgeting, decision-making, and risk assessment for Administration and Council. It will provide continuity as elected officials and staff members change. Ultimately, the AMP will benefit the municipality by ensuring that assets are well-managed and investment into municipal infrastructure is efficiently allocated. The creation of an integrated AMP is a priority for the Town of Aberdeen at this time to ensure responsible management of existing infrastructure and to provide information for prioritizing investment.

It is imperative for a municipality to manage and maintain the highly visible infrastructure assets, given the replacement cost and level of scrutiny they receive from residents and visitors. The AMP is a tool for Town representatives to ensure adequate management of infrastructure, to evaluate existing state of infrastructure and compare to practical desired levels of service, and to communicate risks associated with neglecting asset investment.

The AMP strives to provide direction to the Town in order to accomplish the strategic priorities identified in the recently completed Strategic Plan: infrastructure/resource management, business development, and community development. Consistency with the Strategic Plan was considered during the preparation of the AMP.

The following AMP strives to provide a practical approach to AM while referencing industry-standard ISO standards (ISO 55000-55002 Asset Management Standards).





## 2.0 Asset Management System

### 2.1 AM Background

The following is a discussion from the Town regarding the background AM work prior to the preparation of this AMP:

“The asset management idea has been an immense undertaking for our community. Much of the information we began collecting in 2009 was not easily accessible, so many hours were spent by staff gathering the details for our Tangible Capital Asset Listing/Registry. In 2010, we purchased the PubWorks program software to store the data we collected. We are now able to track the complete list of assets we own, their life cycle, upgrade expectations, maintenance requirements and disposal. In 2017, we began to pursue the idea of obtaining a professional Asset Management Plan. We hired our engineers Catterall & Wright to provide us with a plan that would maximize the assets, devise an asset management solution, identify and improve wasteful purchasing practices, develop proactive solutions in risk management, account for amortization in cooperation with our financial statements, forecast for our budgetary needs, and that this cost in the long term would be worth the time and investment.”

### 2.2 AM Policy

The purpose of the AM policy is to ensure consistent commitment to the AM system by Administration and Council. The scope of the policy extends to all staff members and elected officials. Adopting this AM policy will formalize the commitment of Council to the AM system presented in this document. Once the AMP has been reviewed and approved by Council, the adoption of the AM policy should be formalized with authorization of the policy, included in Appendix A.

### 2.3 AM Strategy

The purpose of the AM strategy is to outline the organization’s intention for the AM system. The strategy includes defining objectives and establishing a roadmap for the AM system to follow, described in detail in the following sections.

### 2.4 AM Objectives

Establishing specific objectives for the AM system is an important component to ensuring the plan is contributing to the organization’s planning and decisions-making. In order for the AM plan to be most relevant and useful for an organization, the AM objectives should align with the goals and objectives of the organization as a whole.

The Strategic Plan identifies the Town’s Mission as follows: To support growth by favoring innovation and development while promoting quality of life and respecting our traditions and diversity. The values outlined in the Strategic Plan include: Trust/Integrity, Solutions Oriented, Financially Accountable, Customer Focused, Environmentally Responsible. The AMP should provide a tool that contributes to

each of these values; as such, each AMP objective listed below corresponds to the values outlined in the Strategic Plan.

The objectives of the AMP are:

- Create an environment where all Councillors and Staff Members take part in thorough management of municipal assets (Trust/Integrity);
- Demonstrate transparency and stewardship in management and investment of municipal assets (Trust/Integrity);
- Provide a resource for recommendations on asset investment and record-keeping (Trust/Integrity);
- Provide practical recommendations for improved asset management and asset investment (Solutions Oriented);
- Provide recommendations for infrastructure planning considering life-cycle infrastructure costing, including construction, maintenance, operations, repairs, and replacement (Financially Accountable);
- Provide recommendations to ensure assets provide appropriate levels of service to the residents (Customer Focused);
- Maintain infrastructure according to all current government regulations, including environmental regulations (Environmentally Responsible);
- Maintain AM program according to all government regulations, including Gas Tax and accounting requirements (Financially Accountable).

## 2.5 AM Roadmap

The following section describes a recommended “roadmap” for the AM program. This roadmap intends to provide a framework for how the AM program can continue to advance to become increasingly specific and relevant to the Town. AM programs can get incredibly sophisticated; however, it is our goal to keep this program practical for the Town.

An important distinction is that the following sections describe our recommended tasks for the AM program itself, but do NOT include recommendations for specific infrastructure tasks (ie. maintenance, renewal, replacement); recommendations for infrastructure priorities will be discussed in Section 7.

### 2.5.1 *Annual Tasks*

The AMP is a dynamic tool and will have to be kept up to date in order to be of ongoing value to municipal decision-makers. Thus, it is recommended that an annual review of the AMP be performed, including updating the asset summary tables. This annual review could be coordinated with the annual review of the Town’s Strategic Plan.

### *2.5.1.1 AM Objectives*

In coordination with review of the Strategic Plan, there should be an annual review to confirm that the AM Objectives remain relevant to the Town's priorities. Objectives should be modified or expanded to align with the Town's priorities.

### *2.5.1.2 Current State of Infrastructure Update*

Annual review of the AMP should at a minimum include updating the Current Condition of Infrastructure section by adjusting age of all assets, revising replacement costs to reflect current construction market conditions, and most importantly adding information regarding asset replacement or new construction.

### *2.5.1.3 Review of Regulations Regarding Asset Management*

The priorities of the AM program may change depending on changes by external entities such as federal or provincial government mandates. Annual review of pertinent regulations such as Gas Tax Fund requirements are recommended to ensure the AM program is consistent with changing industry requirements.

## **2.5.2 Short-term AM Program Priorities**

The recommended focus of AM priorities for the next 5 years (2019-2023) is expanded asset condition assessment, as outlined below.

### *2.5.2.1 Asset Condition Assessment*

Ongoing condition assessments of assets are recommended as follows:

- Water System: hydrant flow testing; creation of a comprehensive water model to identify available pressures within the system; valve exercising of all valves at least every second year.
- Waste-water System: flushing and video inspection of local sanitary sewers at least every 8 years; flushing and video inspection of main sanitary sewers at least every 5 years.
- Roads: visual condition assessment of all roads at least once every 5 years; comprehensive GPS survey of road cross-sections to determine detailed crown and longitudinal grade of roads.
- Drainage/Storm Water Management: comprehensive drainage review to identify drainage issues and infrastructure threatened by inadequate storm water management facilities.
- Culverts: condition assessment and capacity review of all culverts.
- Miscellaneous. – Buildings, Equipment: current appraisals by a Registered Appraiser of all buildings at least once every 10 years.

## **2.5.3 Medium-Term Priorities**

For AMP purposes, we discuss "medium-term" tasks as those recommended to be performed from five to ten years in advance (2023-2028).

Once the Asset Condition Assessments are completed and current, the Current Condition of Infrastructure within the AMP should much more closely reflect the infrastructure's existing conditions. From there, the recommended focus can shift to a more critical evaluation of the Infrastructure Levels of Service.

The Asset Management Team, along with input from Administration/Council should review the Levels of Service Rubric for each infrastructure class. If desired, Council may choose to engage with the public to reassess whether the acceptable Levels of Service align with the expectation of residents.

### **2.5.4 Long-Term Tasks**

For AMP purposes, we discuss "long-term" tasks as those recommended to be performed from ten to fifteen years in advance (2028-2033). At this stage, the long-term tasks can be generally summarized as any activities required to maintain at least minimal compliance with regulations (accounting, Gas Tax, etc.).

## **2.6 AM Program**

### **2.6.1 Responsibility**

The responsibility for the AM Program is shared among the elected officials and staff members of the Town.

### **2.6.2 Responsibility of Elected Officials**

The AM responsibilities of all elected officials are: to endorse the AM policy, and provide adequate funding to support the ongoing AM program as well as at least the minimal infrastructure investment recommended in the AMP.

### **2.6.3 Responsibility of Staff**

The AM responsibilities of the Town staff are to review the AMP as it is updated and endorse the AM policy in their associated work.

### **2.6.4 Cross-Functional AM Team**

It is recommended to have a cross-functional AM team identified. Given the size of the Town of Aberdeen, assigning one elected official and one staff member as the asset management team is sufficient. The responsibilities of the AM team will be to review compliance with the AMP, report to Council on AM status and compliance twice per year, and update the AMP annually (or work with Catterall & Wright to update accordingly) to ensure optimal effectiveness of the AMP for the Town. The purpose of establishing this team is to ensure clear accountability.

### **2.6.5 AM Training**

Taking opportunities to invest in AM training for the organization's members is an important component of the AM program. The AMP recommends approximately 10% of the annual AM budget be retained for AM training for Councillors and staff members, most notably, the AM team members.

Presently, Asset Management Saskatchewan is offering several training opportunities. The Town Administrator has engaged with several of these course offerings. We encourage ongoing participation in these course offerings.

### **2.6.6 Continued AM Investment**

In order to be of continued value to the municipality, asset management is intended to be an ongoing program. As such, continuous Council approval for AM investment is essential. Establishing an annual investment value for the AM program requires estimation of the internal and external resources required to maintain the program. The internal resources include the time required by the AM team members as well as the public works operators for additional record-keeping. External resources include services provided by contractors or consultants. In addition to resources required to maintain the AM program, Council support is required for the construction, maintenance, and renewal recommended in the AMP. The investment required to sustain the AM program should be measured and monitored over time.

## **3.0 Infrastructure Report Cards**

Infrastructure Report Cards provide a glimpse into the value and condition of current infrastructure. The report cards help decision-makers determine the shortfalls in each infrastructure system and establish reinvestment levels to ensure the proper management of assets in the future.

The following infrastructure report cards provide a high-level summary of the infrastructure constituents and the condition rating of each of the main infrastructure classes: roads, water, and waste water. The report cards also include a comparison of Aberdeen's infrastructure condition relative to the national average reported in Canada's Infrastructure Report Card (2016).

Subsequent sections of the report describe the current condition of infrastructure in greater detail.



VERY  
GOOD

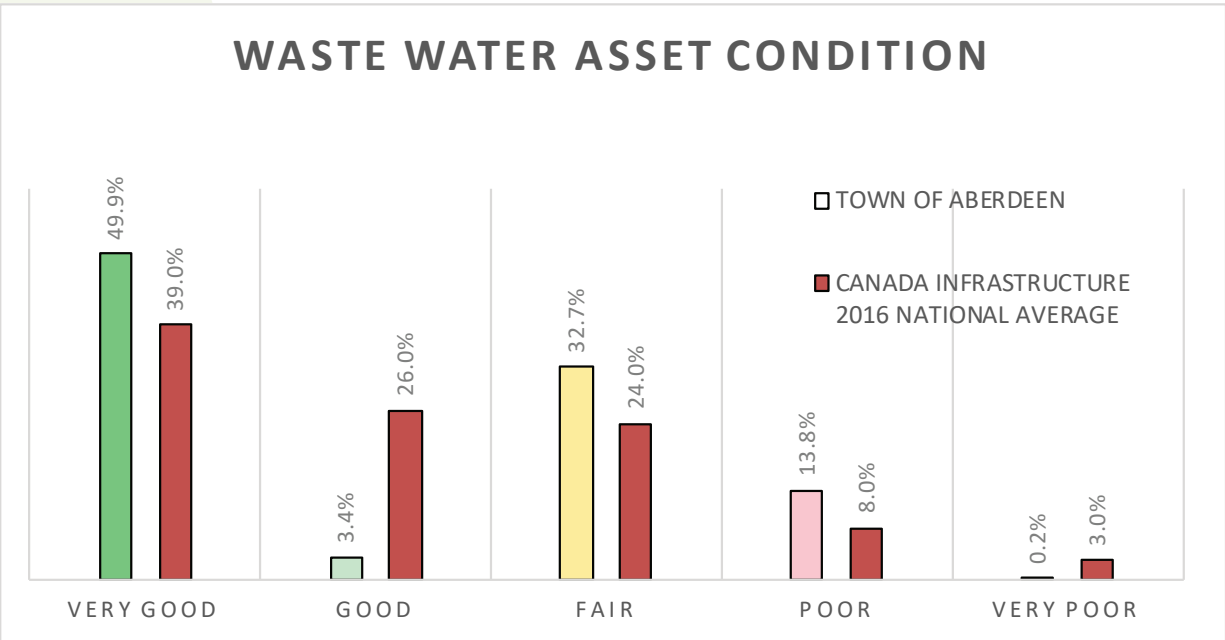
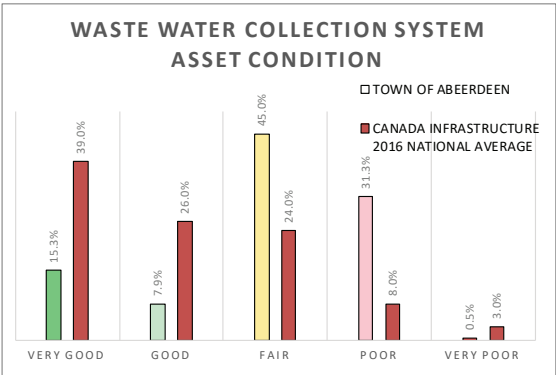
# Waste Water System

CURRENT VALUE  
**\$6.0 Million**

INCLUDES

- 1,370 m of Polyvinyl Chloride (PVC ) gravity sewer
- 3,695 m of Vitrified Clay (VC) gravity sewer
- 1,600 m of High-density Polyethylene (HDPE) sewage forcemain
- 52 manholes
- 1 sewage pumping station
- 1 facultative wastewater lagoon treatment system

Physical condition ratings are based on current replacement value. Replacement value is the approximate cost of reconstructing an asset to new condition. The overall system is rated as VERY GOOD. This reflects the newly constructed lagoon and sewage lift station. However, the waste water collection system alone receives an overall condition rating of FAIR.







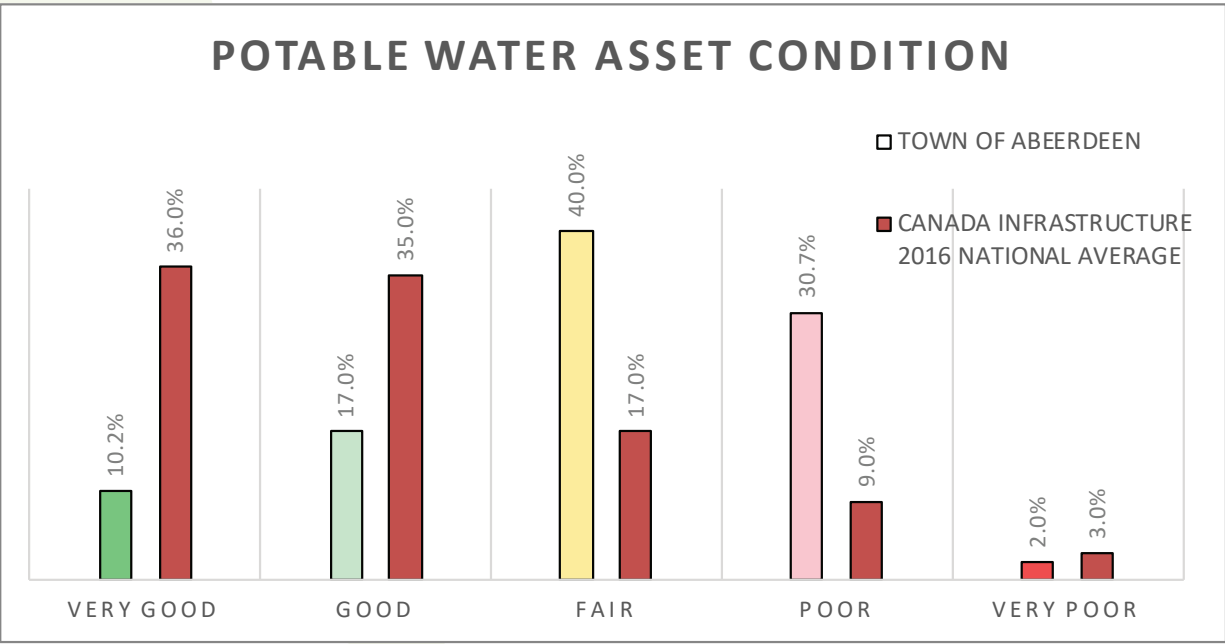
**FAIR**

# Potable Water System

CURRENT VALUE  
**\$4.9 Million**  
 INCLUDES

- 1 water pump house
- 2 reservoirs
- 2,925 m of Polyvinyl Chloride (PVC )watermains
- 5,600 m of Asbestos Cement (AC) watermains
- 220 m of High-density Polyethylene (HDPE) watermains
- 35 hydrants
- 95 valves

Physical condition ratings are based on current replacement value. Replacement value is the approximate cost of reconstructing an asset to new condition. The overall system is rated as FAIR. This reflects the age of the majority of the distribution system; it is nearing the end of its estimated service life. New development as well as recent upgrades and maintenance to the water pump house constitute most of the good and very good ratings. The very poor component is the natural gas engine for pump 2 deemed "Unsatisfactory" by SaskPower.





# Roadways

**FAIR**

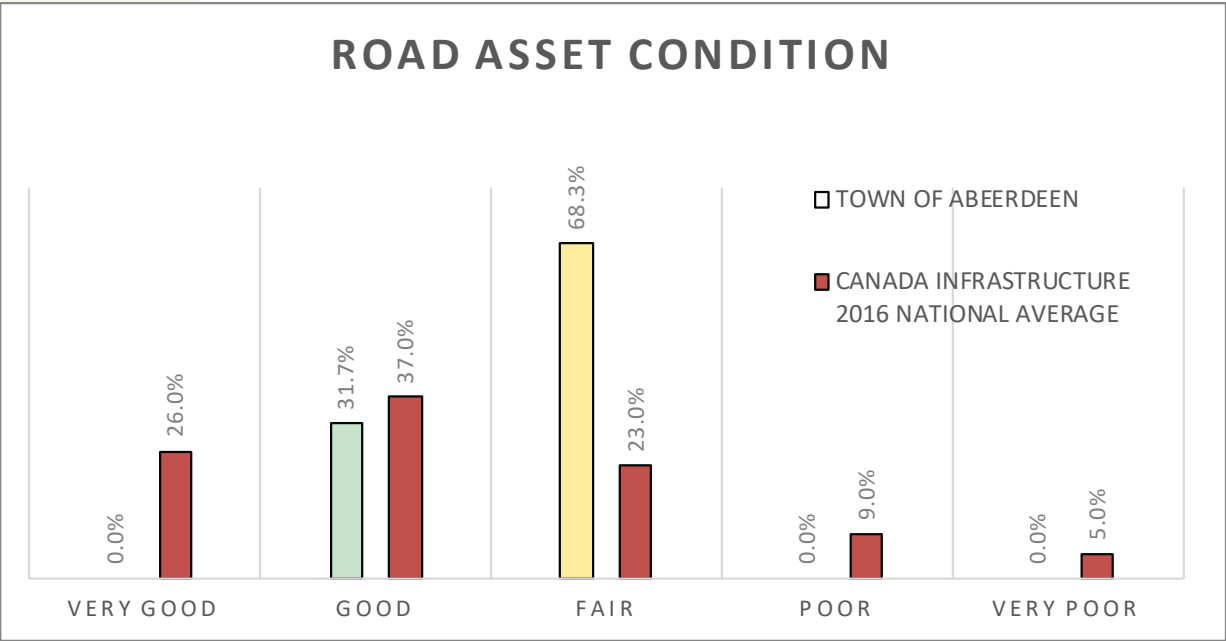
CURRENT VALUE

**\$4.65 Million**

INCLUDES

- 525** lin.m. of paved road
- 767** lin.m. of chip-sealed road
- 8.1** km of RAS/gravel roads
- 3.1** km of curb & gutter
- 1,710** lin. m of concrete sidewalk

Physical condition ratings are based on current replacement value. Replacement value is the approximate cost of reconstructing an asset to new condition. The overall system is rated as FAIR. This reflects the recent investment in Recycled Asphalt Shingles (RAS) surfacing material on granular roads. Roads surfaces are well-maintained, resulting in fair or good ride at the posted speed. Several roads contain good condition rolled curb & gutter.





### 4.0 Current Condition of Infrastructure

The most critical aspect of a useful AMP is having comprehensive, current, and accurate information on the existing assets. The first component of this infrastructure data collection involves accurate quantification of the existing assets using Global Positioning System (GPS) survey data, and the second component is infrastructure condition assessments.

#### 4.1 Quantification of Assets

As part of this project, a comprehensive GPS topographic survey was performed on Town municipal infrastructure (wastewater system, potable water system, drainage) during summer of 2018. The precise location and elevation data was collected for all available manholes, valves, hydrants, culverts, road width, sidewalk & curb extents. This information was used to update the Town's compiled plan maps, shown in Appendix B. The survey data was also used to confirm quantities included in the Town's asset summary tables, shown in Appendix C. These asset summary tables are an inventory of the major asset classes and offer the following information on the assets: asset ID, material, year constructed, design life, and current (2018) replacement cost.

It is important to distinguish between design life and service life of assets. The design life is the theoretical life expectancy of a product. The service life is the length of time that a product provides its required service; service life is dependent on a number of factors including material, soil conditions, proper installation, maintenance, etc. For example, the design life of water main is 50 years; however, we often see well-installed water main function adequately after 60 or 70 years. In asset management, we generally refer to the design life. Sometimes this may result in an overly critical evaluation of the infrastructure if much of the system is beyond its design life and still functioning adequately. The reason is that for prudent planning, we cannot assume infrastructure will consistently surpass its design life. On the other hand, there is no need to replace infrastructure that is beyond its design life if it is still performing adequately.

#### 4.2 Infrastructure Condition Assessments

Infrastructure condition assessments are technical assessments and analysis to provide insight into an asset's current physical condition, performance, probability of failure, and remaining useful life. Ongoing condition assessment of all assets offers valuable information to the asset inventory.

Performance data in the form of maintenance records and anecdotal information from Town operations personnel offers valuable additional information regarding many assets. If recorded, this performance data can be included in the condition assessment.

### 4.2.1 *Condition Assessment Criteria*

The condition assessment rating system for this AMP is based on that presented in Canada's Infrastructure Report Card – Asset Management Primer. The following offer general definitions of each rating condition:

- Very Good: Fit for the future; well maintained, good condition, new or recently rehabilitated; (80-100% of estimated service life remaining).
- Good: Adequate for now; acceptable, generally approaching mid-stage of expected service life; (60-79% of estimated service life remaining).
- Fair: Requires attention; signs of deterioration, some elements exhibit deficiencies; (40-59% of estimated service life remaining).
- Poor: At risk of affecting service; approaching end of service life, condition below standard, large portion of system exhibits significant deterioration; (20-40% of estimated service life remaining).
- Very Poor: Unfit for sustained service; near or beyond expected service life, widespread signs of advanced deterioration, some assets may be unusable (less than 20% of estimated service life remaining).

If available, condition assessment data should be used to determine the above rating for each asset. If condition data is not available, approximations based on age should be used (provided in brackets above).

When summarizing the overall condition of each asset class, it is important to base the overall rating on weighted based on the infrastructure current replacement costs.

## 4.3 Sanitary Sewer System

### 4.3.1 *Sanitary Sewer Pipes and Manholes*

In 2018, condition assessment by way of flushing and video inspection was performed on most sanitary sewer pipes. There is a summary of issues encountered during the sanitary sewer inspection included in Appendix D as well as representative photos of some of the defects discovered.

For condition assessment of the sanitary sewer system, subjective judgement was used to assign the grade based on the video inspection data. Several of the pipes were in good or fair condition, often showing slight signs of deterioration such as calcite buildup. Some of the defects discovered included extended service pipes into the main, excessive calcite buildup impeding flow, pipe settlement. Some of the pipes were in poor condition which included defects such as joint separation and foreign objects impeding flow.

It is important to note that a large portion of the Town's sanitary sewer pipes are approaching or exceeding their theoretical useful life (pre-1970s); yet much of this older sanitary sewer was deemed to be in good or fair condition on the video inspection. The public works personnel included manhole bottom restoration as a future priority.

### **4.3.2 Lagoon & Lift Station**

The lagoon and lift station are both newly constructed in 2018. They offer significant capacity for future growth for the Town. As such, their condition is considered very good.

## **4.4 Water System**

The water system condition assessment is based on review of the 2016 Water System Assessment (WSA) report prepared by Catterall & Wright for the Town and the Water Security Agency of Saskatchewan (WSASK), included for reference in Appendix E.

### **4.4.1 Water Mains, Valves, and Hydrants**

Condition assessment of the water distribution system was not included in this project. Therefore, the condition of water mains, valves, and hydrants are assumed based on age of infrastructure and anecdotal comments from the Town's public works personnel.

The water distribution system condition rating can be refined following completion of the recommended water system assessment tasks described in Section 2.4.2.1 above.

### **4.4.2 Water Reservoir & Pump House**

The WSA generalizes the reservoir and pump house to be in fair to good condition. Recommendations for system improvements are included and should be completed to maintain the present good condition of this infrastructure.

Since the completion of the WSA report, the Town has installed a small generator in the water plant, which is capable of running one pump and related essentials for the short-term.

### **4.4.3 Water Meters**

All water meters in Town are considered in good condition. All meters were replaced in 2010; however, this style of meter requires access to each property to read. The Town is presently upgrading the meters to Radio Frequency (RF) meters which can be read from the street, eliminating the need for property access. The upgrading the RF meters is scheduled to be completed by 2021.

## **4.5 Roadways**

In 2018, a high-level road assessment was performed as well, which evaluated road surfacing quality, drainage condition, and presence of concrete curbs. The road summary sheets are included in Appendix C.

A comprehensive roadway condition assessment was performed on all roadways as part of this project. Good roads include those where negligible failures are present and the ride is good at the posted speed. Fair roads offer decent ride at the posted speed, but may include select failures. Poor roads contain

significant failures to the surface, resulting in a poor ride and driver's desire to travel below the posted speed.

### **4.5.1 Paved Roads**

Central Ave. is the only paved road in Town. It is in good pavement condition. Negligible pavement distresses were observed and the ride was good.

Main St. and Cannon Ct. are surfaced using chip-seal. They are in fair condition, presenting moderate cracking and fair ride at the posted speed. The far east extents of Cannon Ct. exhibits more severe failures.

### **4.5.2 Unpaved Roads**

The majority of the Town's roads are gravel or gravel with a recently applied Recycled Asphalt Shingles (RAS) surfacing. The majority of the unpaved road surfacing condition was considered fair, which typically included minor wash boarding/potholes and rutting along the road edges.

## **4.6 Drainage**

All drainage infrastructure in Town is at-grade and includes ditches, culverts, and concrete curbs. There is presently no storm sewer system.

High-level drainage assessment was performed in coordination with the roadways condition assessment. It is important to note that this assessment was performed in the fall; a spring drainage assessment would offer a better representation of the drainage condition and likely a more critical evaluation.

Good drainage condition streets were those that have a definite and consistent cross-section and showed no visible evidence of ponding along ditches or road edges. Fair drainage condition streets are those that had a consistent cross-section but obviously lacked adequate grade due to evidence of ponding in ditches or soft road edges. Poor drainage condition streets were those that have an inconsistent cross-section (rural to urban) and demonstrated considerable drainage issues.

## **4.7 Curbs, Swales & Sidewalks**

The purpose of concrete curbs and swales are to help facilitate drainage of an urban cross-section road. The purpose of concrete sidewalks are to facilitate pedestrian connectivity and accessibility in Town.

The condition of the rolled curb and gutter was generally in good condition. The condition of monolithic concrete walks varied from very good to fair. Note, the narrow separate concrete walks were not included in the assessment as they are in the process of being removed by the Town.



## 5.0 Levels of Service

The condition assessments described above provide a technical generalization of the status of infrastructure. It is useful to extend the discussion to customer levels of service. It is often more practical to discuss levels of service of infrastructure with rate-payers compared to condition assessment ratings.

Table 1 below provides a level of service rubric that outlines “Unsatisfactory”, “Acceptable”, and “Ideal” levels of service for various infrastructure classes including tangible descriptors. The following offers a general description of each level of service category:

- “Ideal”: new or near-new infrastructure constructed based on current design standards;
- “Acceptable” : any deficiencies can be improved with maintenance measures;
- “Unsatisfactory” : requires a renewal or upgrade.

Table 1 outlines a level of service rubric for various infrastructure classes; it offers a tool for Administration/Council to discuss levels of service with rate-payers. The Town can review and confirm the level of service descriptors included in Table 1.

Table 1: Infrastructure Level of Service Rubric

Infrastructure Class	Level of Service		
	Unsatisfactory	Acceptable	Ideal
Water	<ul style="list-style-type: none"> <li>• Treated Potable Water not available at all premises.</li> <li>• Interruptions to service/boil water advisories more than twice per year.</li> <li>• Inadequate fire flow capacity.</li> </ul>	<ul style="list-style-type: none"> <li>• Treated Potable Water to all premises.</li> <li>• Interruptions to service/boil water advisories between 1 and 2 times per year.</li> <li>• Sufficient fire flow capacity to all premises.</li> </ul>	<ul style="list-style-type: none"> <li>• Treated Potable Water to all premises.</li> <li>• Interruptions to service/boil water advisories at most once per year.</li> <li>• Sufficient fire flow capacity to all premises.</li> </ul>
Waste Water	<ul style="list-style-type: none"> <li>• Significant odours extending beyond 600m from the lagoon.</li> <li>• Inadequate lagoon treatment resulting in effluent exceeding Operating Permit.</li> <li>• Insufficient sanitary sewer collection capacity.</li> </ul>	<ul style="list-style-type: none"> <li>• Sufficient waste water treatment capacity for all existing premises and 5 year future residential development.</li> <li>• Sufficient sanitary sewer collection.</li> </ul>	<ul style="list-style-type: none"> <li>• No noticeable odours extending beyond 600m from the lagoon.</li> <li>• Sufficient sanitary sewer and lagoon capacity for waste water capacity for commercial/industrial development opportunities.</li> </ul>

Drainage	<ul style="list-style-type: none"> <li>Major flooding of roads relating to 1:5 year storm events.</li> <li>Premise flooding relating to overland flow or sewer backup from 1:5 year storm.</li> <li>Road grades: less than 1.0% crown; less than 0.5% longitudinal grade.</li> <li>Inadequate culvert capacity or ground cover.</li> <li>Damaged culverts affecting drainage.</li> </ul>	<ul style="list-style-type: none"> <li>Major flooding of roads relating to 1:25 year storm events.</li> <li>Premise flooding relating to overland flow or sewer backup from 1:25 year storm.</li> <li>Road grades: 1.0-2.0% crown; 0.5-1.0% longitudinal grade.</li> </ul>	<ul style="list-style-type: none"> <li>Major flooding of roads relating to 1:100 year storm events.</li> <li>Premise flooding relating to overland flow or sewer backup from 1:100 year storm.</li> <li>Road grades: over 2.0-3.0% crown; over 1.0% longitudinal grade.</li> </ul>
Roads	<ul style="list-style-type: none"> <li>Significant road failures affecting driveability (potholes, wash-boarding, etc.).</li> </ul>	<ul style="list-style-type: none"> <li>Arterial roads are paved with a Pavement Condition Index (PCI) rating of “fair” or better.</li> <li>Local roads are granular or paved with good driveability.</li> </ul>	<ul style="list-style-type: none"> <li>All paved roads with Pavement Condition Index (PCI) rating of “fair” or better.</li> </ul>
Pedestrian Connection	<ul style="list-style-type: none"> <li>No provision made for pedestrian connection.</li> </ul>	<ul style="list-style-type: none"> <li>For arterial roads: concrete sidewalks complete with accessibility ramps at crossings.</li> <li>For local roads: concrete sidewalks or sufficient granular shoulder on roads to allow for safe pedestrian access (1.5m).</li> </ul>	<ul style="list-style-type: none"> <li>Concrete sidewalks on all roads, complete with accessibility ramps at crossings.</li> <li>For children’s crossing areas (school, playgrounds, recreation complex): pedestrian crossing designation such as traffic calming concrete structures.</li> </ul>

## 5.1 Current Level of Service

Presently, we do not have enough information to assign a level of service to each infrastructure segment. However, with deliberate record-keeping and assessment, the AM team can assign a level of service to each infrastructure class, if desired. The Town may expand the Asset Summary Sheets provided to assign a current level of service rating for each asset.

With the information available at this time, this AMP will use the condition ratings in lieu of customer level of service grades, where “good/very good” condition is considered ideal, “fair” condition is considered acceptable, and “poor/very poor” is considered unsatisfactory.

### 5.2 Desired Level of Service

It is ideal for a municipality to strive for providing the desired level of service that is aligned with what the rate-payers are interested in investing. It is crucial to be reasonable and practical when discussing the desired level of service of infrastructure. In discussing infrastructure desired levels of service with rate-payers, it is important to relate increased levels of service with the associated investment required; framing discussions as “what do you want to pay for” rather than “what do you want” can facilitate agreement on establishing affordable desired levels of service.

Once the existing levels of service are summarized, and the desired levels of service are established, a financing strategy can be established to correlate the desired level of service and investment required.

## 6.0 Financing Strategy

Infrastructure financing is a challenge for every municipality. Financing is required for operations, maintenance, renewal, and new construction, yet adequate funding seems impossible. It is a constant struggle for municipalities to balance the expectations of rate-payers with their willingness to pay.

### 6.1 Capital Expenditures

Capital projects for renewal or new construction often receive funding from provincial and federal infrastructure grant programs such as stimulus funding or ongoing Gas Tax revenue.

Recent upgrades to major infrastructure items in Aberdeen have received government funding. This is extremely beneficial for long-term infrastructure delivery and will allow the Town to have a favourable budget for ongoing asset management. Without these funding streams, capital expenditures for short and long-term forecasting would be drastically different.

The uncertainty of grant opportunities from other levels of government can be a challenge to long-term financial planning and asset management. Prudent AMP financial strategies include no expectation for additional grants; if additional funding is secured in this capacity, the AM team members should be consulted prior to proceeding with the projects.

Additionally, it is important to consider and adequately plan for the long-term operations and maintenance costs associated with all capital projects.

### 6.2 Life-Cycle Costs

When considering infrastructure costs, it is important to look beyond merely the capital construction cost of the asset to a total life-cycle cost approach, which considers all spending on construction, preservation, maintenance, rehabilitation, and disposal.

Evaluation of the life-cycle costs of assets requires record-keeping data on amount invested in preservation and maintenance. To start, the costs associated with maintenance can be tracked by asset category: sanitary sewer system, water system, roads, drainage, and curbs & sidewalks. The maintenance costs should include all labour, equipment, and supplies required. The cost-tracking completed in order to determine water rates in the WSA is precisely the tracking required to determine life-cycle costs for each asset class.

Operations and maintenance costs are typically 2-10% of the replacement cost of infrastructure; therefore, for budgeting purposes at this time, it is recommended that the Town review its annual maintenance budget to ensure adequate investment.

### 6.3 Sustainable Infrastructure Investment

In order for the AMP to inform financial decisions, a link between the AMP and the organization's annual budgets and long-term financial plans need to be offered. It is important to plan infrastructure investment so that current users are paying for current services, and future users will pay for future services. If infrastructure investment is insufficient and therefore unsustainable, future users will be forced to pay for deferred costs associated with previous planning inadequacies.

#### 6.3.1 *Average Annual Reinvestment Rate*

The financial attribute discussed in Canada's Infrastructure Report Card is the Average Annual Reinvestment Rate (AARR). The Report Card recommends a target Average Annual Reinvestment Rate between 1.0 to 3.0% of the Total Current Replacement Costs, depending on the asset class. The reinvestment rate is a percentage of the total infrastructure renewal/rehabilitation budget compared to the total infrastructure current replacement costs.

#### 6.3.2 *Financial Sustainability Recommendations*

In order to budget appropriately for the operations, maintenance, and renewal costs of all assets, we recommend working towards a budget that includes:

- Operations = current fixed fee increasing annually relative to inflation;
- Maintenance = at least 2% of the Total Current Replacement Costs; and,
- Capital Renewal Expenditures = 2% of the Total Current Replacement Costs.

## 7.0 Risk Management

### 7.1 Risk Identification

The first aspect of risk management is identifying relevant risks. Discussion with Town personnel can help identify current operational risks. These operational risks should be clearly communicated to Council. Systematic review of maintenance and upgrading priorities annually should also include discussion of risk management. Risk identification is especially important for those assets that are not currently receiving priority maintenance/renewal investment. The risks associated with deferred investment should be identified, analyzed, and managed, if possible.

### 7.2 Risk Analysis

Risk analysis should include evaluation of two components of the possible consequence: the likelihood of the consequence and the severity of the consequence. Since the AMP cannot offer risk analysis of any potential situation, applying the risk rating table below offers some risk management direction for Council and Administration.

Table 2: Risk Evaluation Matrix

Likelihood of Consequence	Severity of Consequence			
	Low	Medium	High	Catastrophic
<b>Improbable</b>	1	4	6	10
<b>Possible</b>	2	5	8	11
<b>Probable</b>	3	7	9	12

The risk tolerance of the organization is unique to each and should be decided by Council; however, as a suggestion, risk scores of 6 or less would generally be considerable tolerable, those between 7-10 would be undesirable, and those above 10 would be intolerable. This risk evaluation can provide valuable direction to compare multiple alternatives.

### 7.3 Minimizing Risk

It is most prudent to minimize risk by prioritizing management of situations that would have high severity consequences. Many risks cannot be eliminated; however, it is possible to reduce risk of by reducing the severity of consequence or reducing the likelihood of consequence, whichever is most practical given the situation.

For a more detailed discussion of Risk Assessment refer to ISO Standard 31000.

### 8.0 Priority Investments

There are several factors that affect infrastructure investment prioritization including political considerations and operational challenges. When planning and prioritizing asset upgrades, it is important to consider sequencing. For example, all underground utility upgrades should be performed prior to road improvements.

#### 8.1 Recommendations

For Town of Aberdeen's priority infrastructure investments, Catterall & Wright recommends initially focussing on drainage planning and improvements. Drainage infrastructure was overall some of the worst rated infrastructure in the condition assessments. Addressing widespread drainage issues will provide functional and aesthetic improvements for the Town, as well as operational efficiencies and risk management. Also, if the Town intends on performing road surfacing upgrades in the future, it is important to ensure proper drainage conditions. Improved surfaces, such as asphalt, will increase runoff, making drainage improvements imperative.

#### 8.2 Town Priorities

Input from the Town's public works personnel and administration provides the following intended priority infrastructure investments.

##### 8.2.1 *Water*

- Reservoir upgrade to expand storage capacity to at least double average day demand;
- Blake Cres. – water service replacement prior to sidewalk/pavement upgrade (existing service pipe material is incorrect, which necessitates use of inferior products to facilitate repairs);
- Mobile homes – relocate water meters inside the trailer;
- Comprehensive water meter upgrades and software replacement (AMI System from Neptune);
- Computer generated billing software;
- Ongoing valve extensions to facilitate easier access close to surface;
- All – ongoing replacement of main curbstops.

##### 8.2.2 *Waste Water*

- Manholes require restoration of bottoms including benching;
- Ongoing manhole grade ring additions to facilitate easier access;
- Former lagoon – decommissioning and potential sale of land.

##### 8.2.3 *Roads*

- Soft spots requiring new granular material:
  - 4<sup>th</sup> Ave.,



- Industrial Dr.,
  - Rupert St./ 5<sup>th</sup> Ave. corner,
  - Central Ave. north of Rec Centre,
  - 3<sup>rd</sup> Ave. in front of infill housing,
  - Main St.,
  - 7<sup>th</sup> Ave.
- Main Street:
  - Short term: slurry seal to seal existing cracks;
  - Long term: full rehabilitation. An asphalt overlay is likely not an option due to the high existing elevation of the road surface relative to adjacent features. Full rehabilitation design would consider site conditions such as review of surrounding elevations, test holes to determine existing granular thickness, and consideration of depth of bury of utilities.
- Road Paving:
  - 4<sup>th</sup> Avenue: Main St. to McDonald St. (short term priority: Main to Rupert);
  - Thompson St: Central Ave. to 5th Ave. (short-term priority: 4th Ave. to Central Ave.).
- New Road Construction:
  - 5<sup>th</sup> Avenue: 300 and 400 blocks (north of the new lift station).

### 8.2.4 *Curbs/Walks*

- Blake Cres. – sidewalk sunken requires repair;
- Removal of all old sidewalks excluding Blake Cres;
- New concrete sidewalk:
  - Short term: Thompson St. (Central to 4<sup>th</sup> Ave. North side);
  - Long term: New sidewalk on priority pedestrian routes, as determined by the Town.
- Blake Cres. – sidewalk sunken requires repair;

### 8.2.5 *Drainage*

- Comprehensive Drainage Plan;
- Comprehensive Lot Grade Plan;
- Blake Cres. – drainage concerns due to former slough conditions;
- Culvert replacements – Rupert St., Thompson St./Norman Ave intersection, 3<sup>rd</sup> Ave. in front of infill housing (culvert too long and always freezes up);
- Back alley at Cannon Court (cement swale and curb damaged from frost);
- 2<sup>nd</sup> Ave. swale between the Community Hall and the Equestrian Centre;
- 5<sup>th</sup> Ave. at the new lift station requires a new cement swale.

### 8.2.6 Back Alleys

- Reconstruction of several lanes to eliminate issues of poor material and poor drainage (between Jackson Ave. and Norman Ave, 200 block of 4<sup>th</sup> Ave., 200 block of 5<sup>th</sup> Ave., 500 block of Main St., 300 block between 3<sup>rd</sup> and 4<sup>th</sup> Ave);
- New Alley Construction:
  - 5<sup>th</sup> Ave. – 300 and 400 blocks (north of the new lift station).

## 9.0 Reference Materials

There are several excellent resources for developing an AMP. The following documents were referenced during the preparation of this document:

- Canadian Infrastructure Report Card (2016);
- AWWA Asset Management Definitions Guidebook (2018);
- Canadian Infrastructure Report Card – Asset Management Primer (2014).

## 10.0 Summary

This report strives to provide useful information and recommendations for preserving and improving the valuable infrastructure assets in the Town of Aberdeen. The benefits of proper AM include improved: financial performance, asset decision-making, sustainability, risk management, efficiency, and ultimately performance of infrastructure.

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The preparation of this project was carried out with assistance from the Government of Canada and the Federation of Canadian Municipalities. Notwithstanding this support, the views expressed are the personal views of the authors, and the Federation of Canadian Municipalities and the Government of Canada accept no responsibility for them.

**Appendix A: Asset Management Policy**

## 1.0 Policy Name: Asset Management (Version 1)

### 1.1 AM Policy

The purpose of the AM Policy is to ensure consistent commitment to the AM system by Administration and Council. The scope of the policy extends to all staff members and elected officials. Adopting this AM policy will formalize the commitment of Council to the AM system presented in this document.

### 1.2 AM Strategy

The purpose of the AM Strategy is to outline the organization's intention for the AM system. The strategy includes outlining objectives and establishing a roadmap for the AM system to follow, described in detail in the AMP.

### 1.3 AM Objectives

Establishing specific objectives for the AM system is an important component to ensuring the plan is contributing to the organization's planning and decisions-making. In order for the AM plan to be most relevant and useful for an organization, the AM objectives should align with the goals and objectives of the organization as a whole.

The Strategic Plan identifies the Town's Mission as follows: To support growth by favoring innovation and development while promoting quality of life and respecting our traditions and diversity. The values outlined in the Strategic Plan include: Trust/Integrity, Solutions Oriented, Financially Accountable, Customer Focused, Environmentally Responsible. The AMP should provide a tool that contributes to each of these values, as such, each AMP objective listed below corresponds to the values outlined in the Strategic Plan. The objectives of the AMP are:

- Create an environment where all Councillors and Administration take part in thorough management of municipal assets (Trust/Integrity);
- Demonstrate transparency and stewardship in management and investment of municipal assets (Trust/Integrity);
- Provide a resource for recommendations on asset investment and record-keeping (Trust/Integrity);
- Provide practical recommendations for improved asset management and asset investment (Solutions Oriented);
- Provide recommendations for infrastructure planning considering life-cycle infrastructure costing, including construction, maintenance, operations, repairs, and replacement (Financially Accountable);
- Provide recommendations to ensure assets provide appropriate levels of service to the residents (Customer Focused);

- Maintain infrastructure according to all current government regulations, including environmental regulations (Environmentally Responsible);
- Maintain Asset Management Program according to all government regulations, including Gas Tax and Accounting requirements (Financially Accountable).

### 1.4 AM Program

#### 1.4.1 *Responsibility*

The responsibility for the AM Program is shared among the elected officials and staff of the Town.

#### 1.4.2 *Responsibility of Elected Officials*

The AM responsibilities of all elected officials are: to endorse the AM policy, provide adequate funding to support the ongoing AM program as well as working towards infrastructure investment recommended in the AMP.

#### 1.4.3 *Responsibility of Staff*

The AM responsibilities of the Town staff are to review the AMP as it is updated, and endorse the AM policy in their associated work.

#### 1.4.4 *Cross-Functional AM Team*

It is recommended to have a cross-functional AM team identified; given the size of the Town of Aberdeen, assigning one elected official and one staff member as the asset management team is sufficient. The responsibilities of the AM team will be to review compliance with the AMP, report to Council on AM status and compliance twice per year, and update the AMP annually (or work with Catterall & Wright to update accordingly) to ensure optimal effectiveness of the AMP for the Town. The purpose of establishing this team is not ensure clear accountability.

\*AM Team Member Names: \_\_\_\_\_

#### 1.4.5 *AM Training*

Taking opportunities to invest in AM training for the organization's members is an important component of the AM Program. The Plan recommends approximately 10% of the annual AM budget be retained for AM training for Councillors and staff members, most notably, the AM team members.

#### 1.4.6 *Continued AM Investment*

Asset management is intended to be an ongoing program to be of continued value to the municipality. As such, continuing Council approval for AM investment is essential. Establishing an annual investment value for the AM program requires estimation of the internal and external resources required to maintain the program. The internal resources include the time required by the AM team members as well as the

public works operators for additional record-keeping. External resources include services provided by contractors or consultants. In addition to resources required to maintain the AM program, Council support is required for the construction, maintenance, and renewal recommended in the AMP. The investment required to sustain the AM program should be measured and monitoring over time.

### **1.5 Endorsement**

This policy has been approved by Council for the remainder of this Council term. It will be reviewed within 3 months of each Council election and is intended to remain for the Council term.

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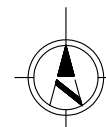
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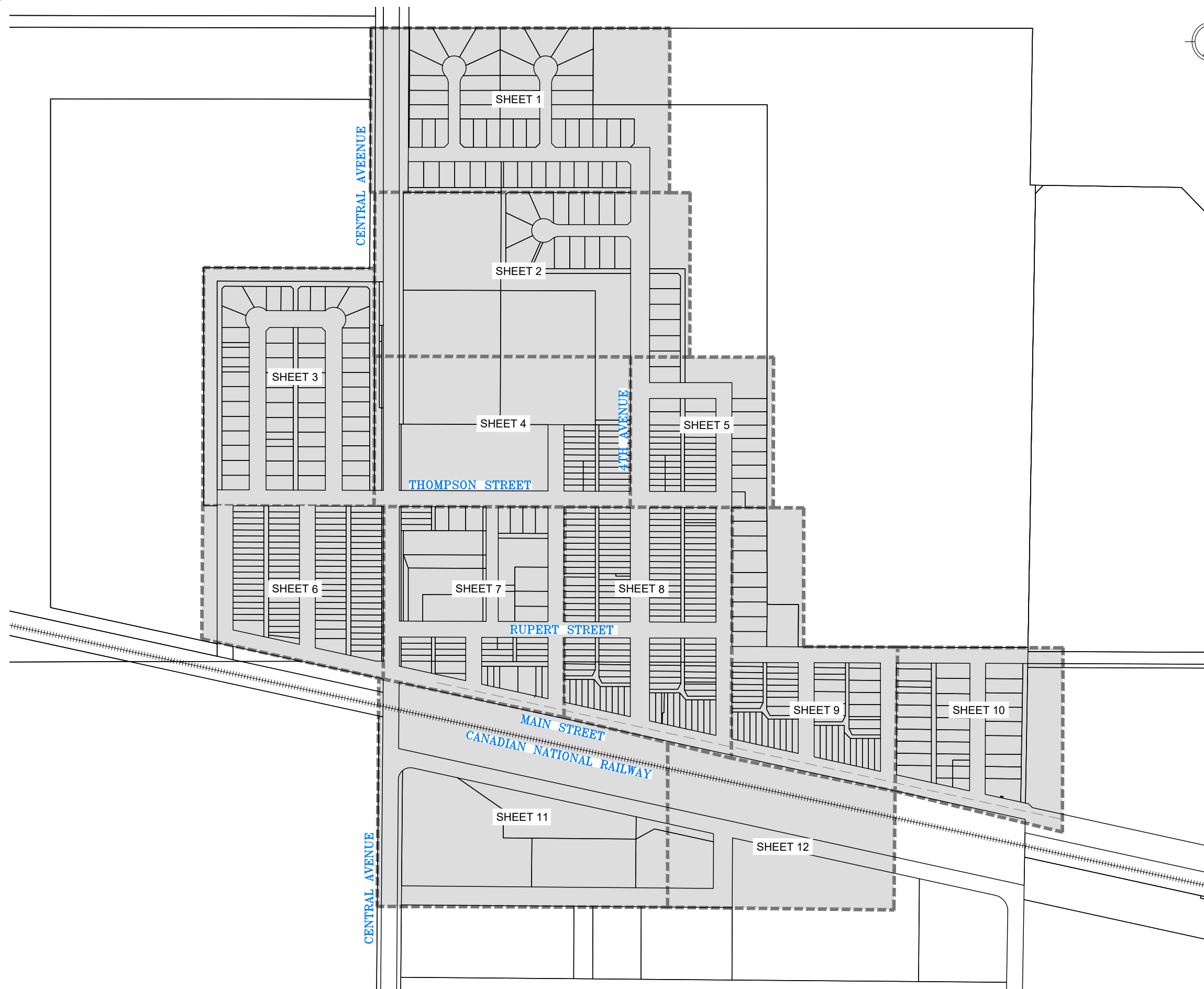
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**Appendix B: Compiled Plan Maps**



**SANITARY SEWER & DOMESTIC WATER  
MAPS & ASSET IDENTIFICATION**



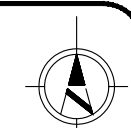
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**CATTERALL & WRIGHT**  
CONSULTING ENGINEERS

1221 - 8th Street East  
SASKATOON SK S7H 0S5  
Tel: (306) 343-7280, Fax: (306) 956-3199

**NOTE:**  
DATA PROVIDED COMPILED FROM SURVEY  
TAKEN IN THE MONTH OF MAY, 2018



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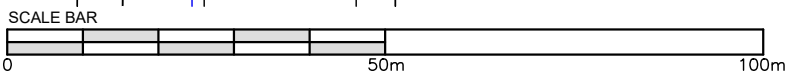
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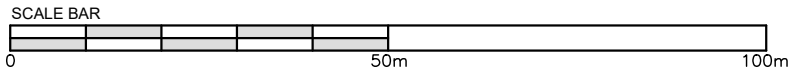
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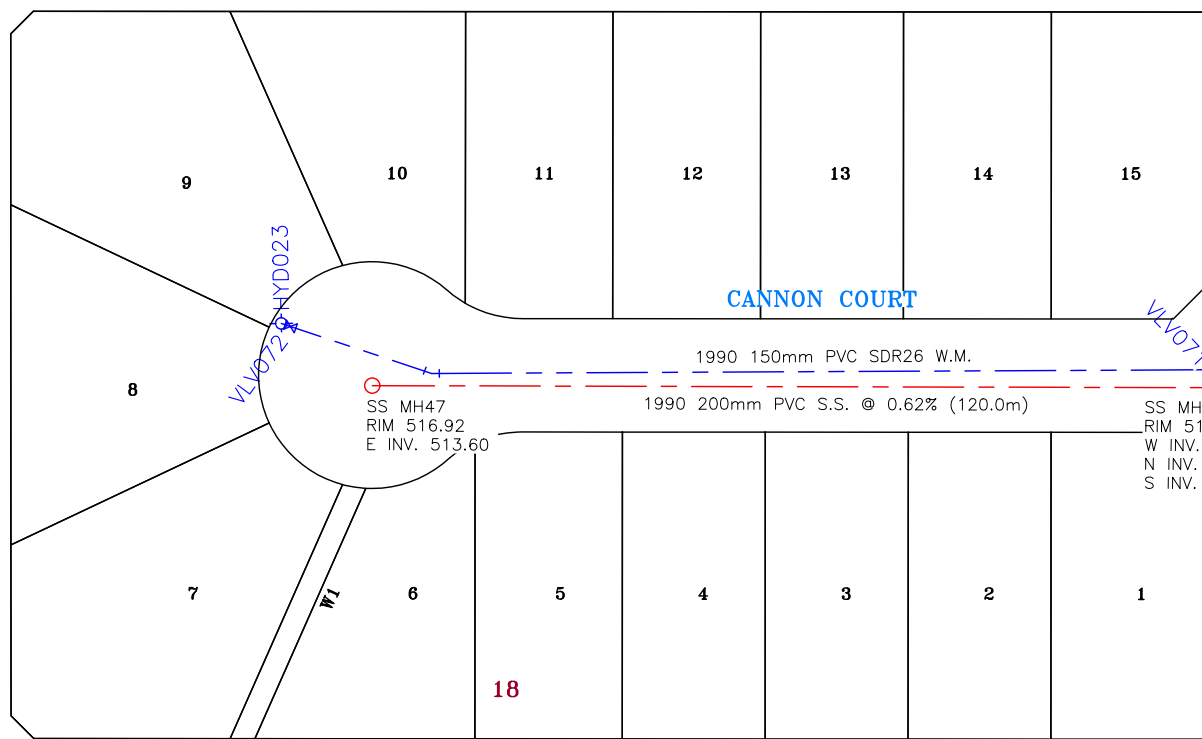
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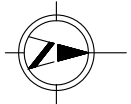
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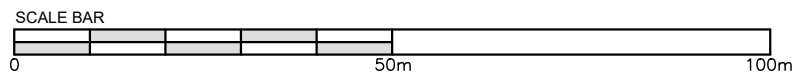
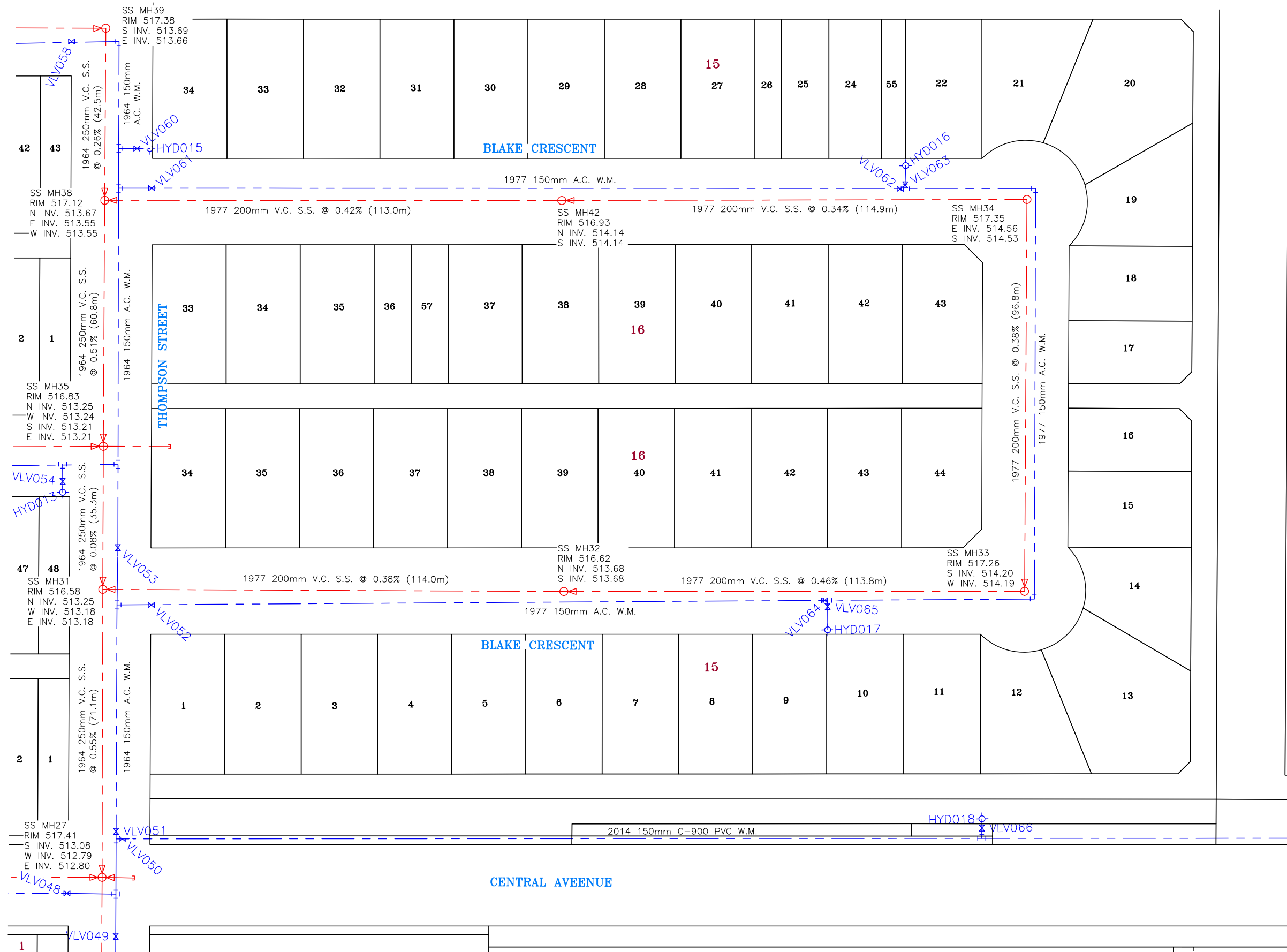
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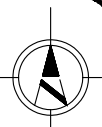
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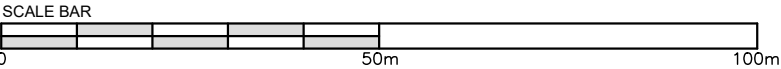
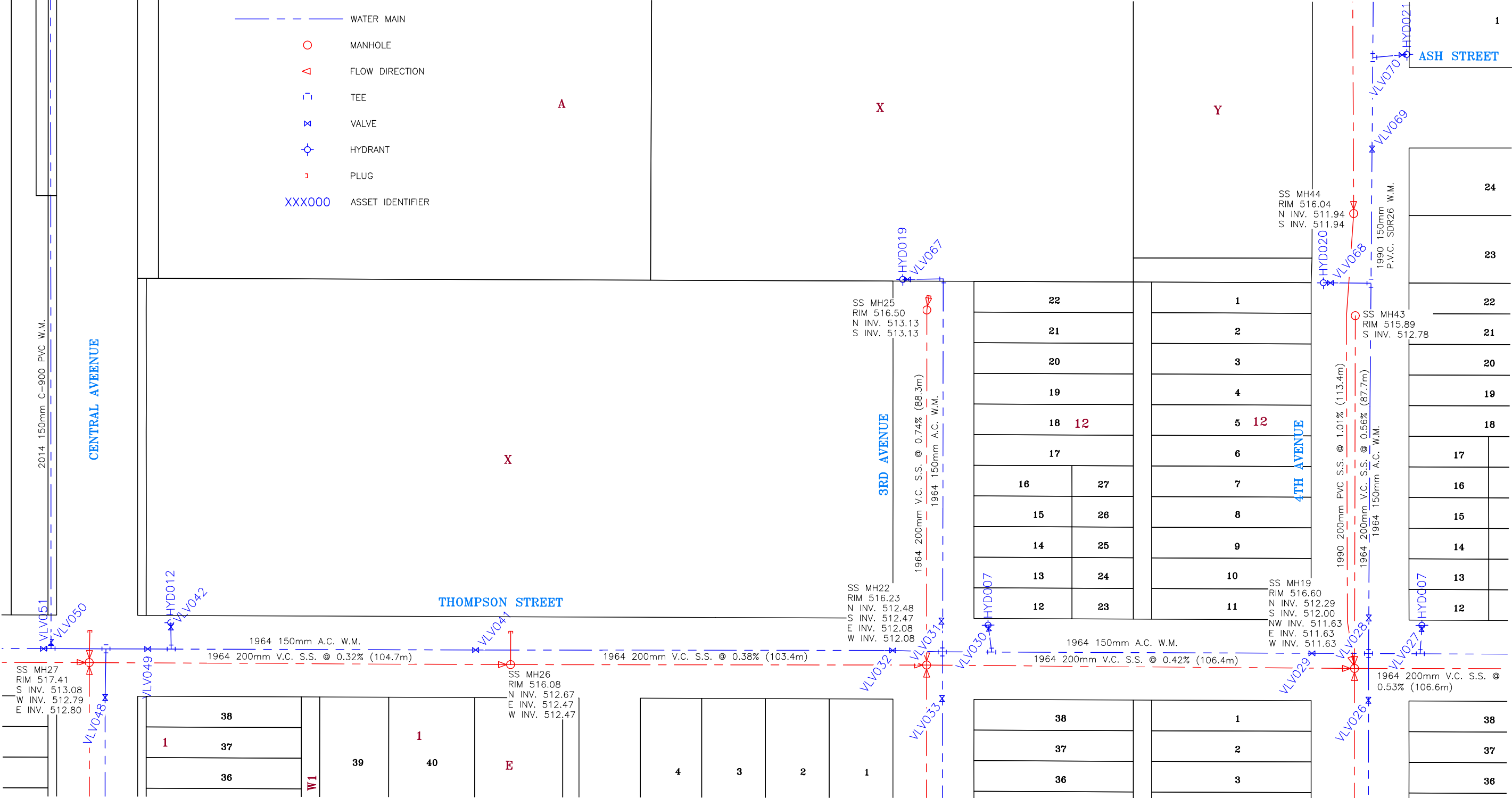
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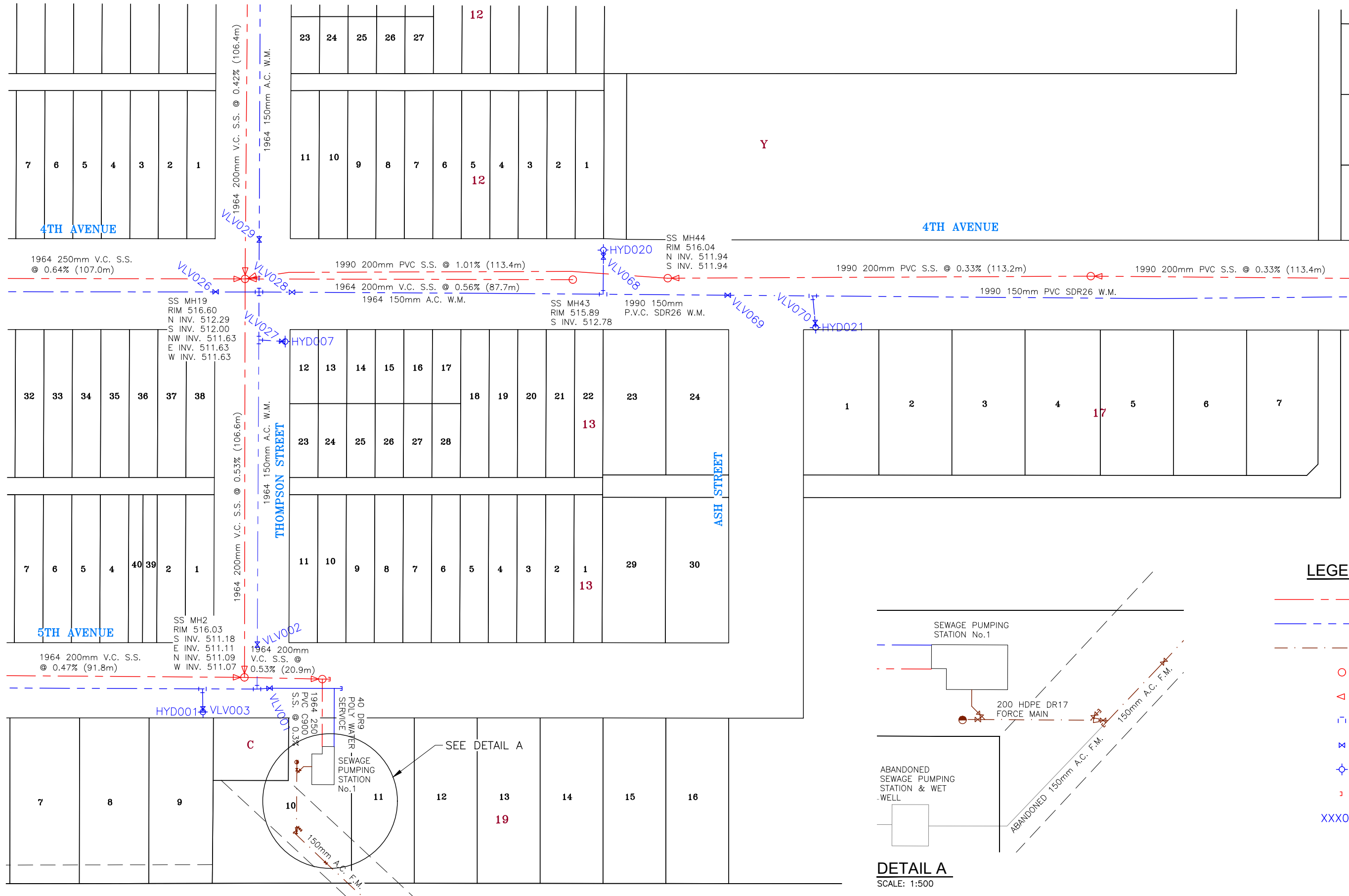
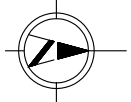


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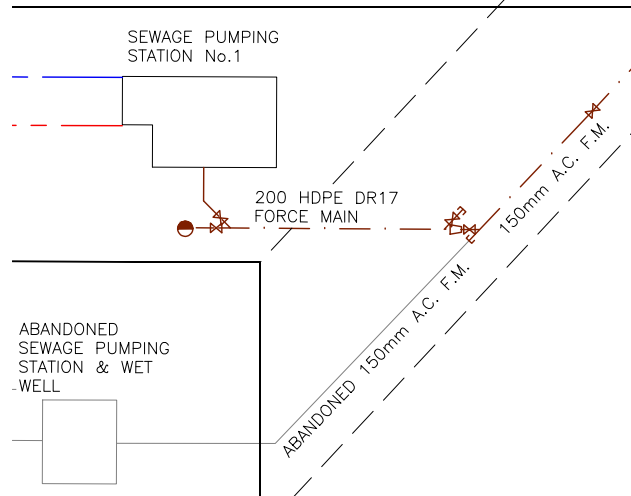


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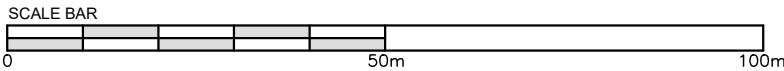


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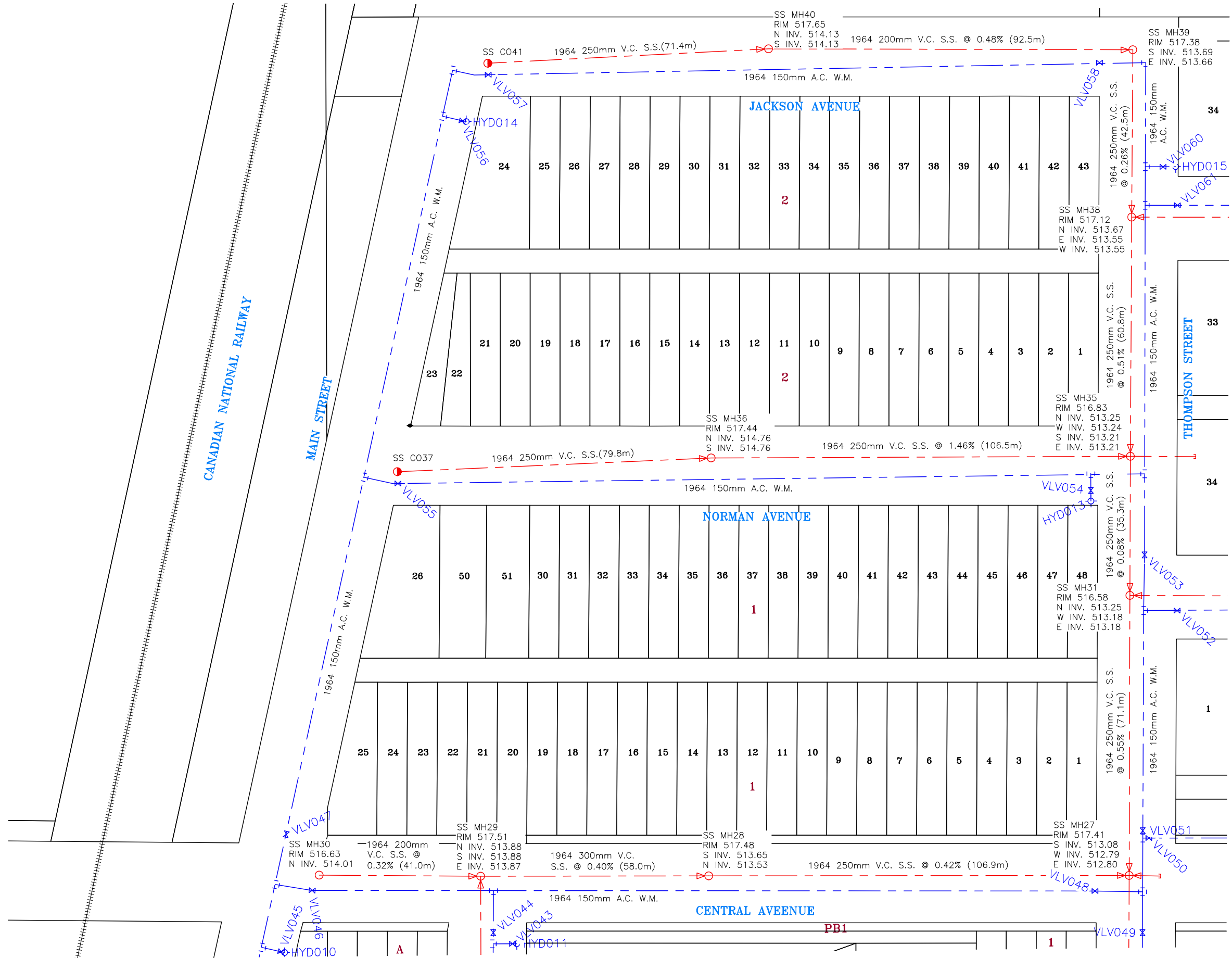
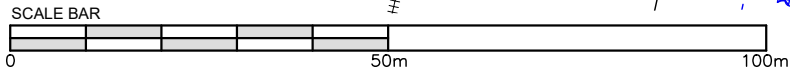


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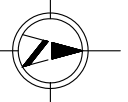
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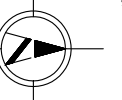
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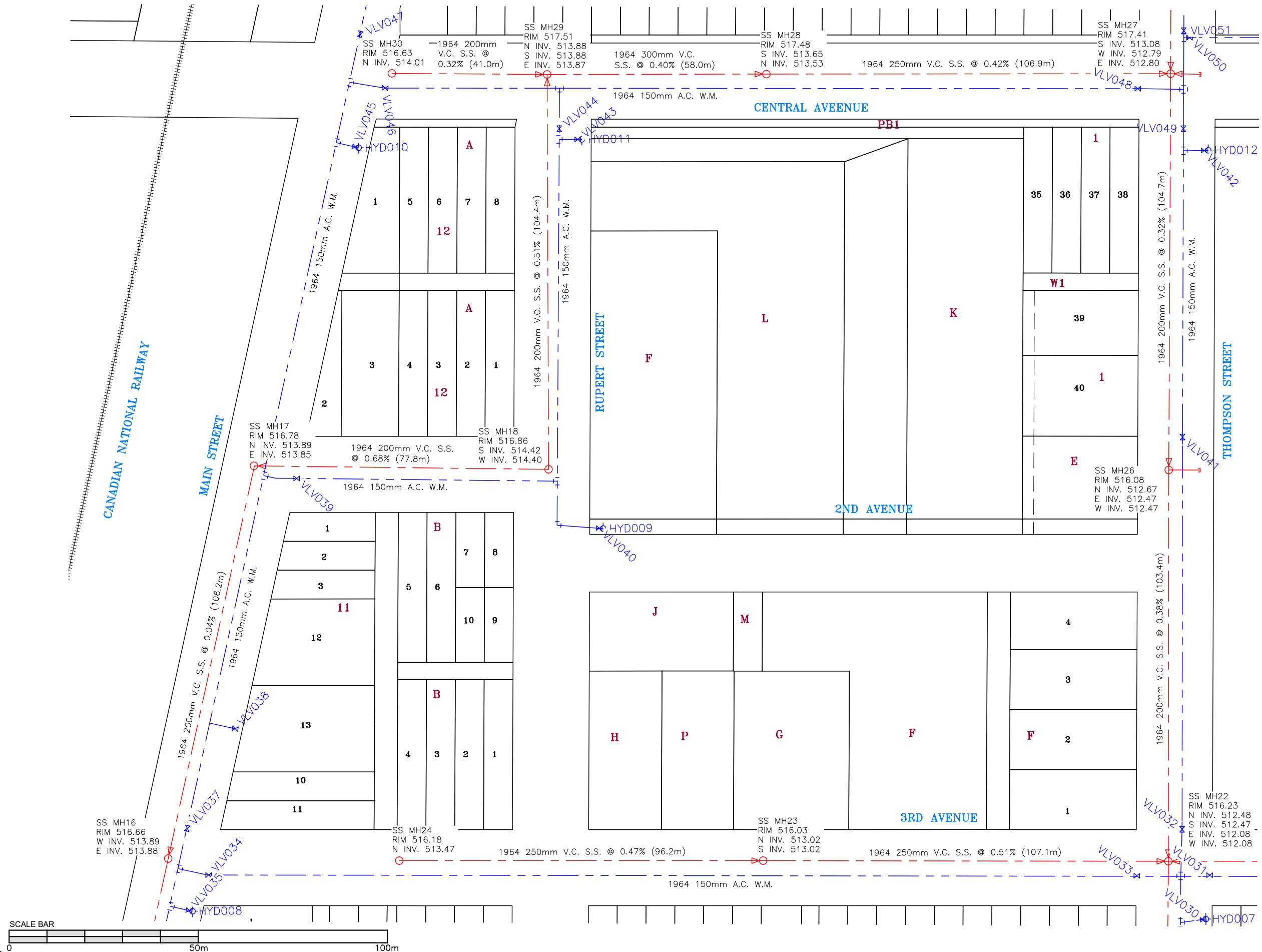
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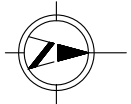
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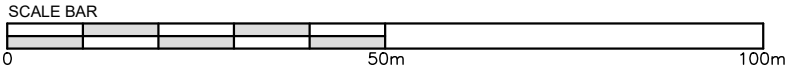




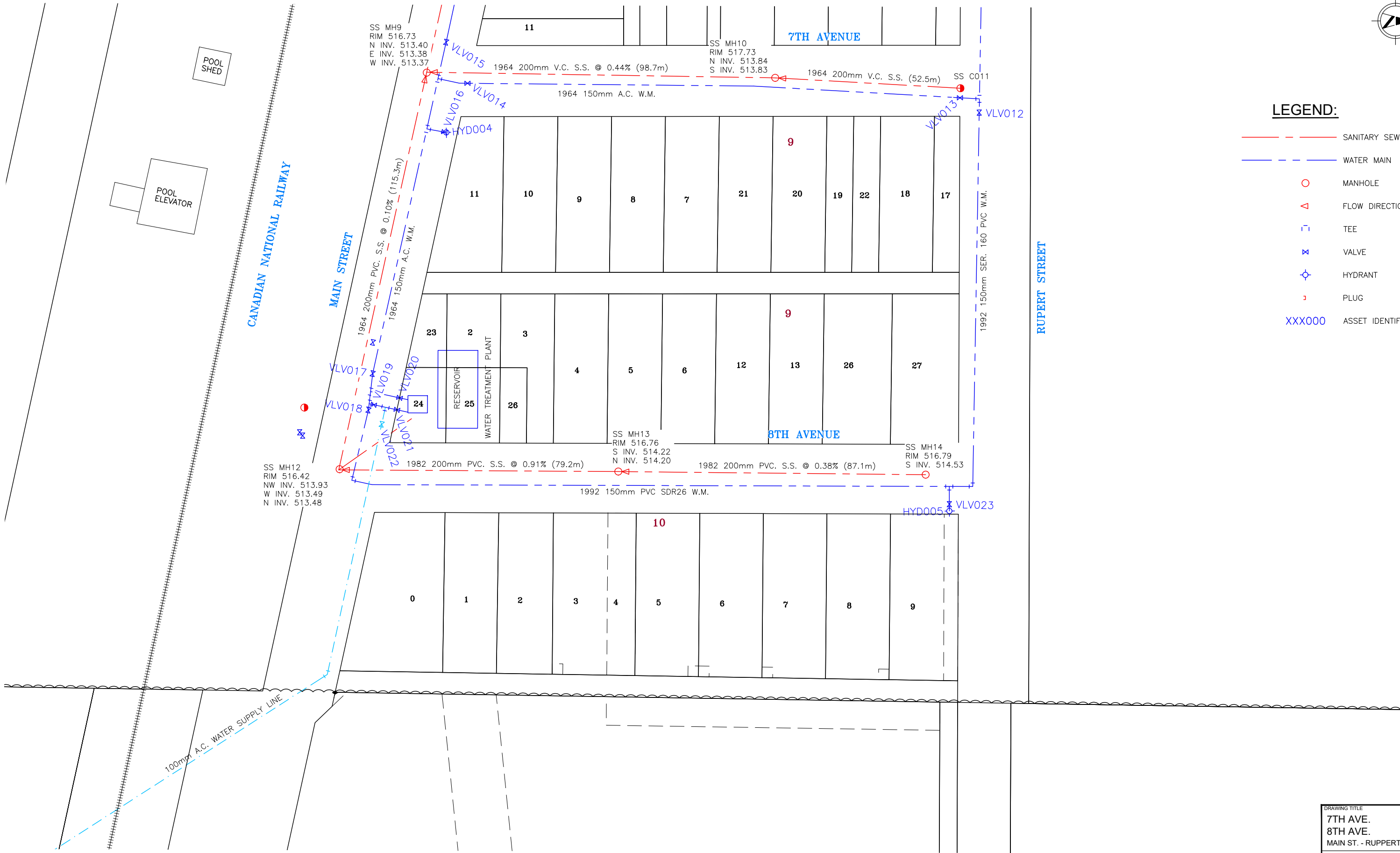
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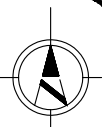
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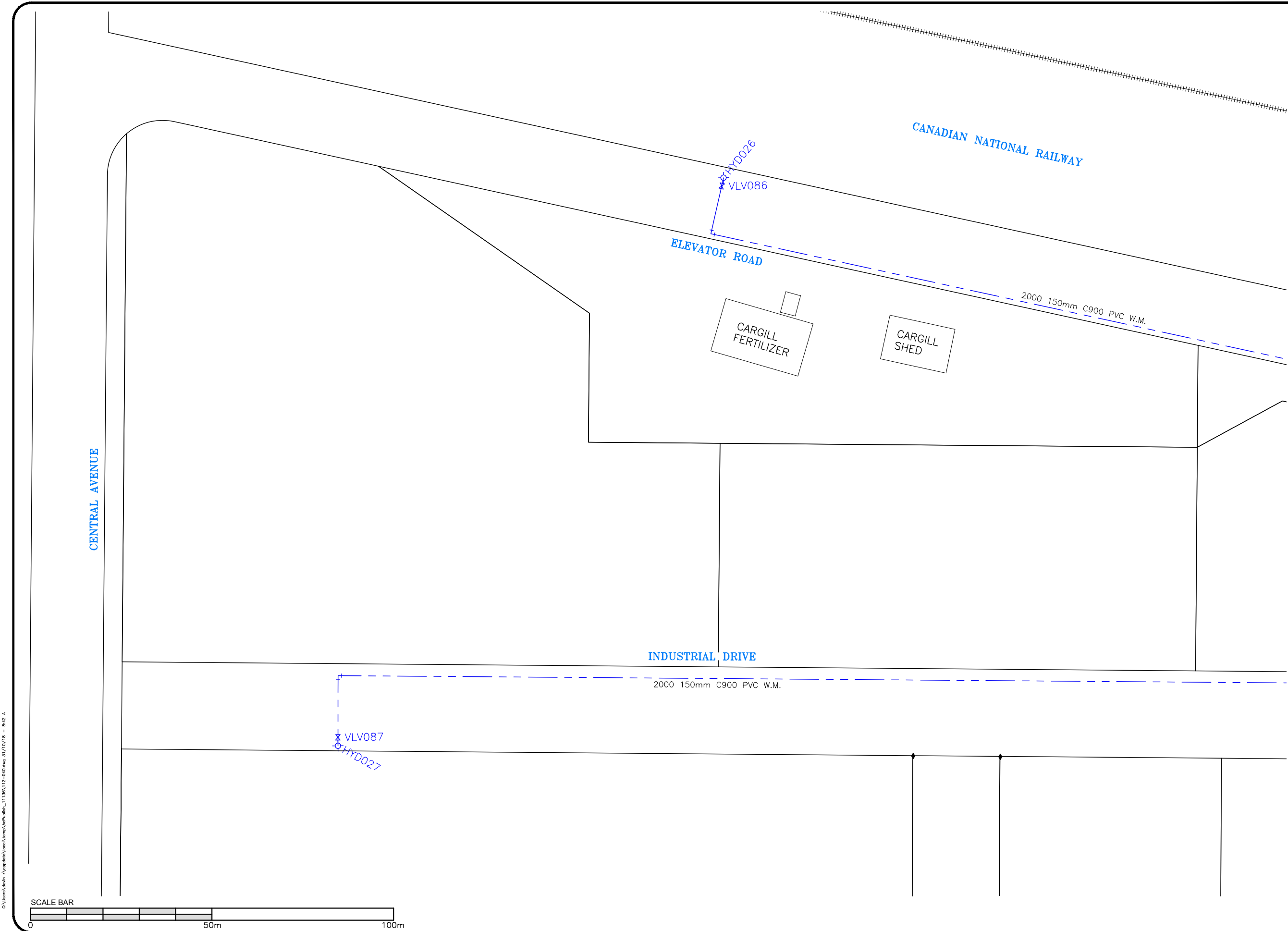
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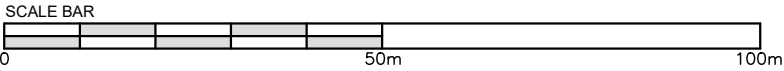


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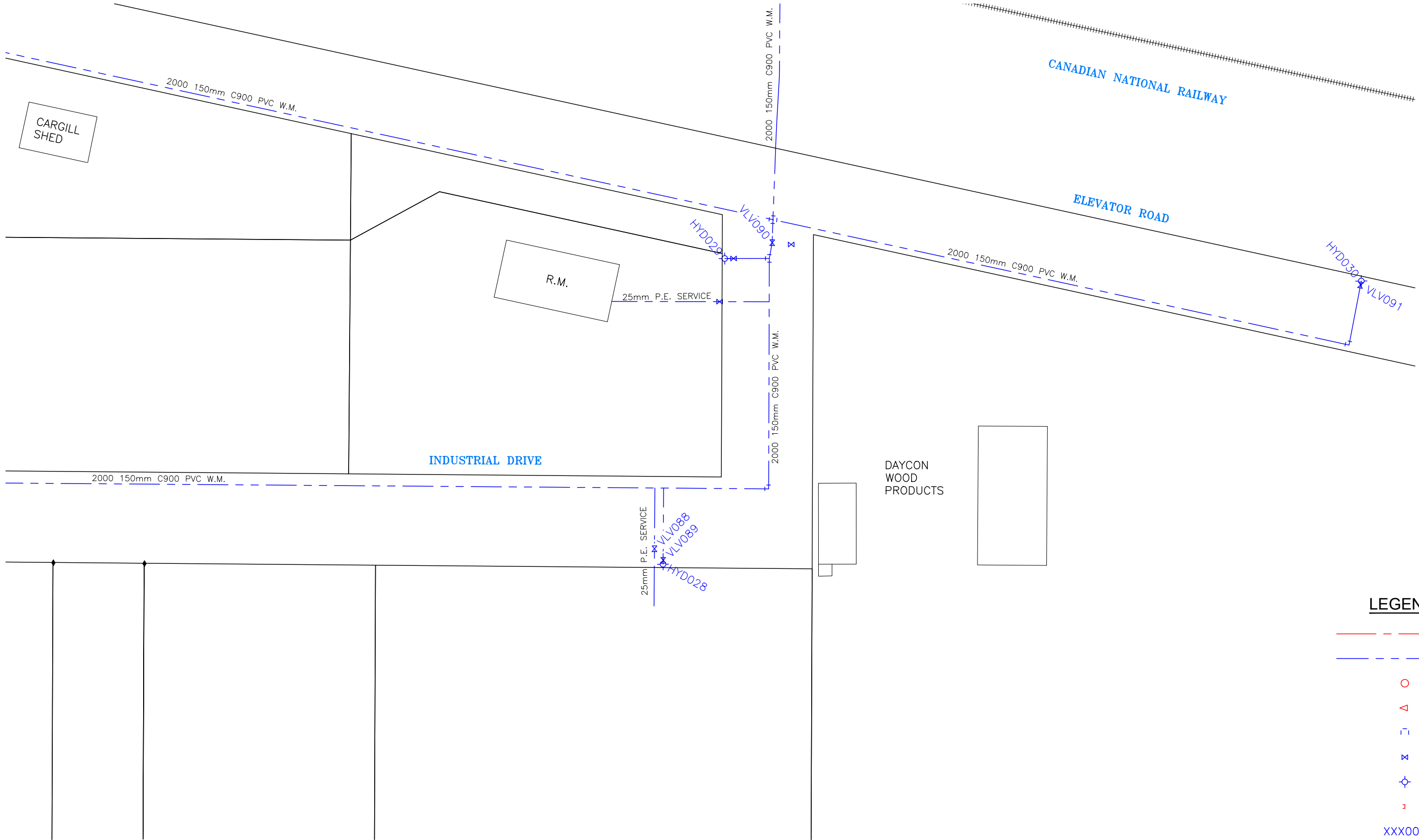
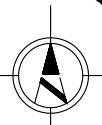
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- WATER MAIN
- MANHOLE
- ▶ FLOW DIRECTION
- ┘┐ TEE
- ✕ VALVE
- ⊕ HYDRANT
- ┘ PLUG
- XXX000 ASSET IDENTIFIER



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CENTRAL AVE, ELEVATOR RD & CENTRAL AVE.	
DATE	
18/10/05	
SCALE	DRAWING
1:1000	SHEET 11



**LEGEND:**

- SANITARY SEWER
- WATER MAIN
- MANHOLE
- ◁ FLOW DIRECTION
- └┐ TEE
- ✕ VALVE
- ⊕ HYDRANT
- ┘ PLUG
- XXXXXX ASSET IDENTIFIER

DRAWING TITLE

ELEVATOR ROAD  
INDUSTRIAL DR.

DATE

18/10/05

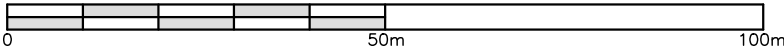
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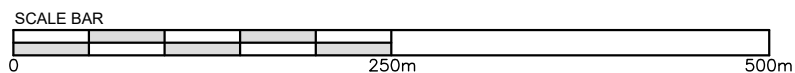
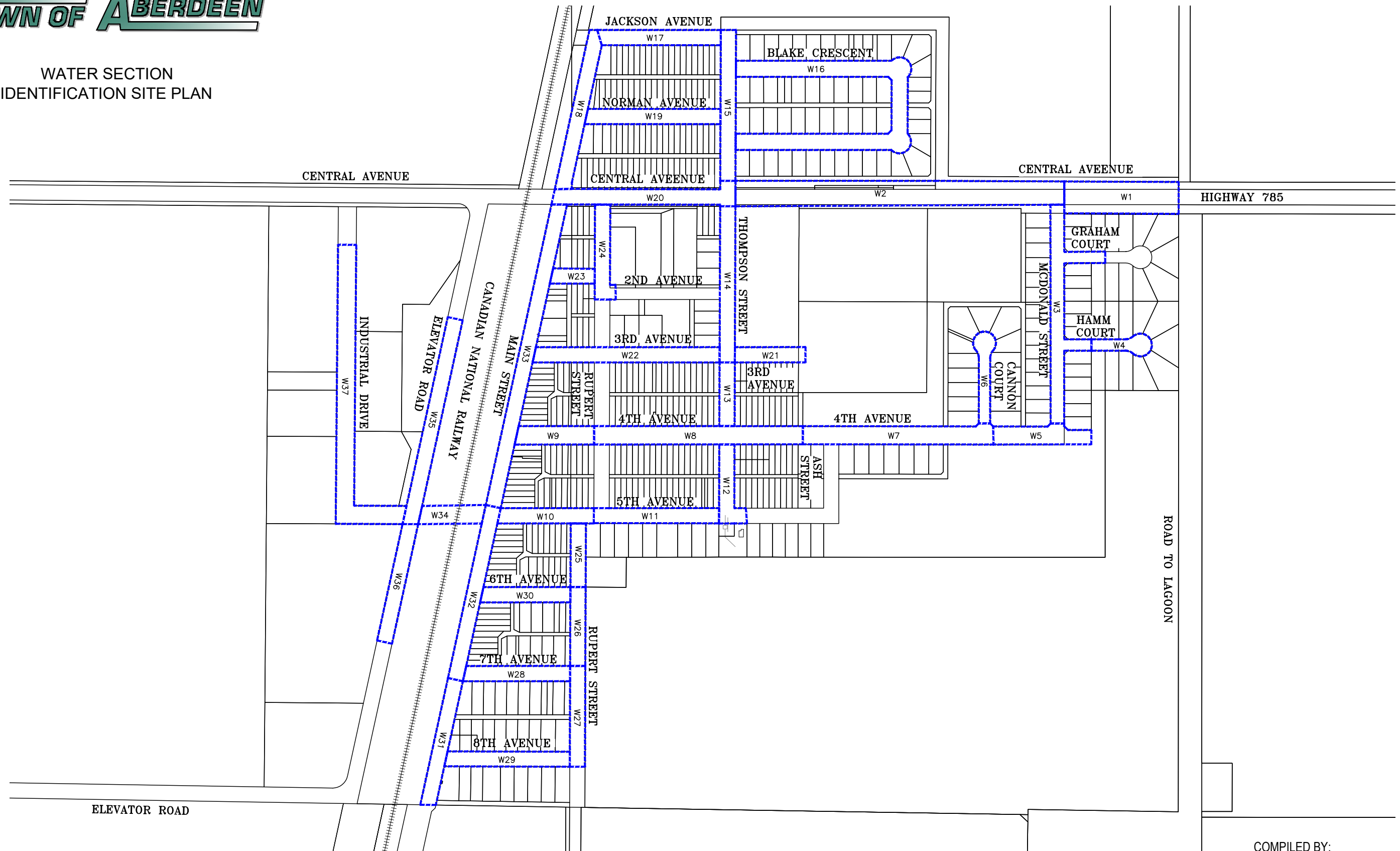
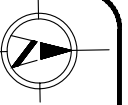
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SCALE BAR



## WATER SECTION IDENTIFICATION SITE PLAN

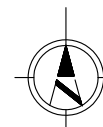


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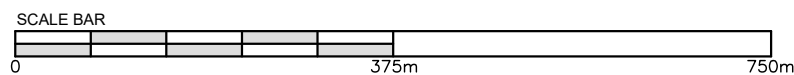
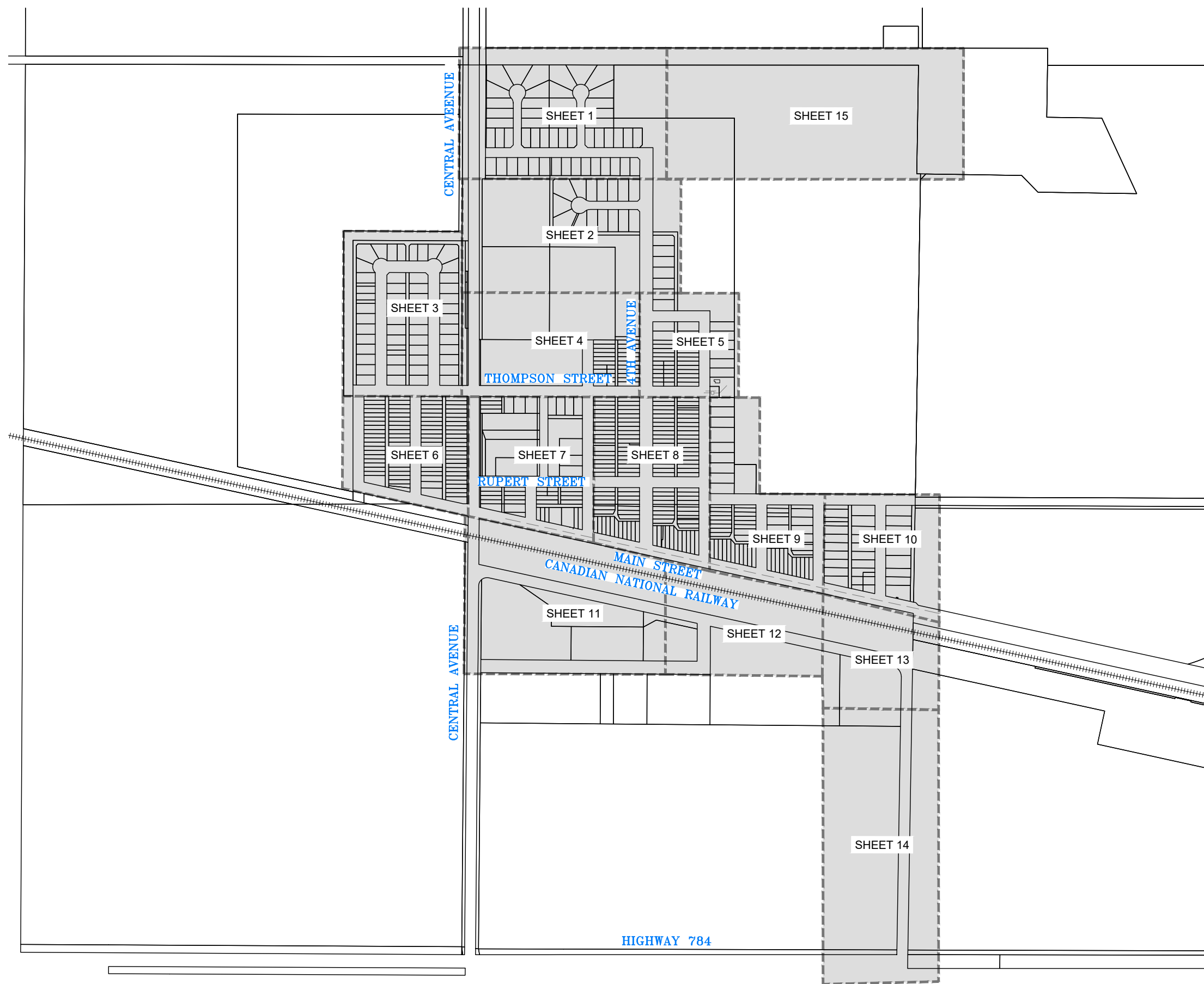


**CATTERALL & WRIGHT**  
CONSULTING ENGINEERS  
1221 - 8th Street East  
SASKATOON SK S7H 0S5  
Tel: (306) 343-7280, Fax: (306) 956-3199





ROADWAY & CULVERT  
MAPS & ASSET IDENTIFICATION



COMPILED BY:

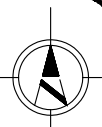


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SASKATOON SK S7H 0S5  
Tel: (306) 343-7280, Fax: (306) 956-3199

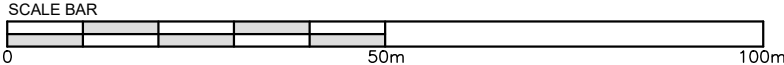
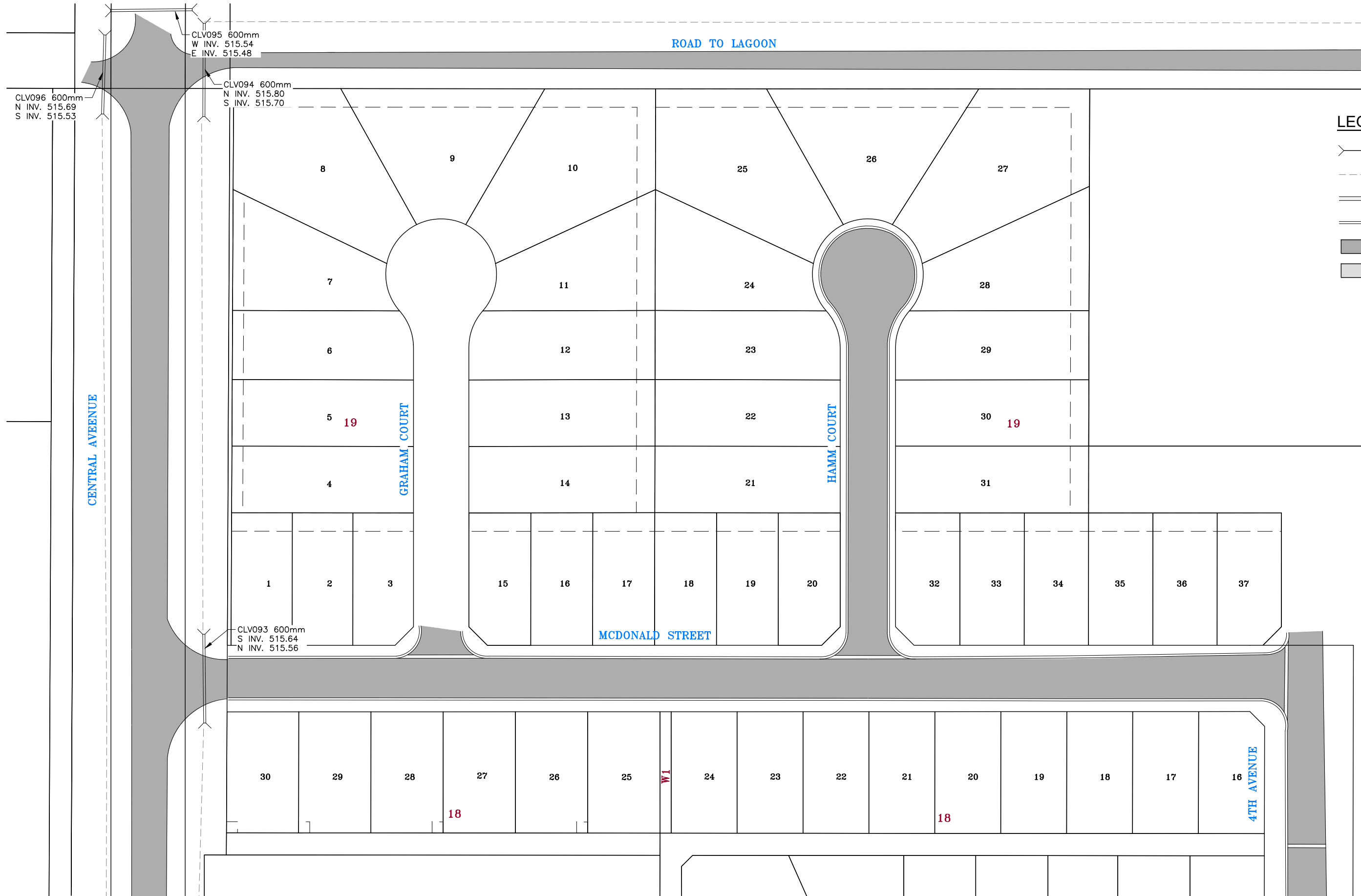
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DATA PROVIDED COMPILED FROM SURVEY  
TAKEN IN THE MONTH OF MAY, 2018





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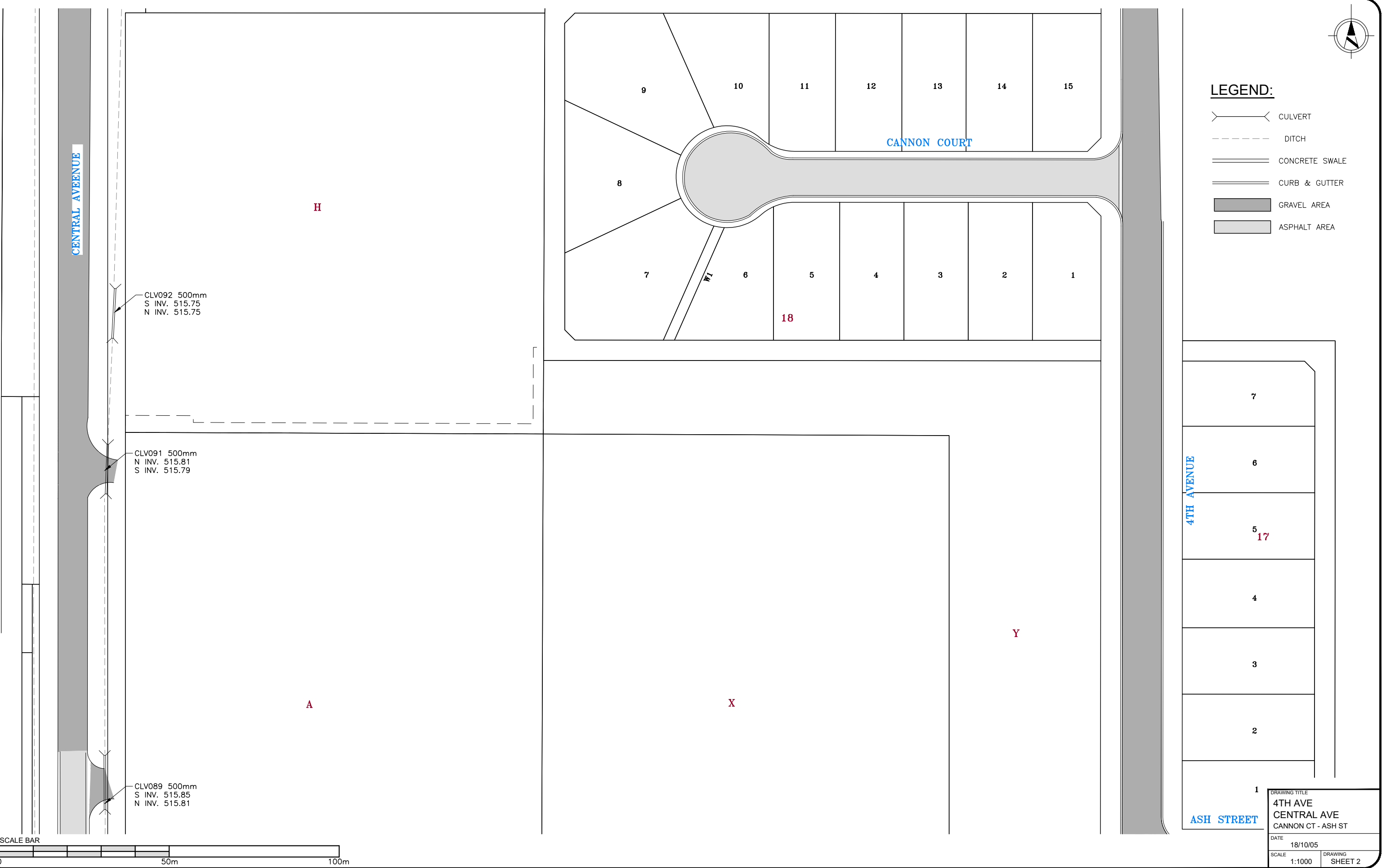
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- DITCH
- CONCRETE SWALE
- CURB & GUTTER
- GRAVEL AREA
- ASPHALT AREA

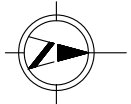


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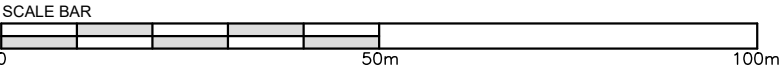
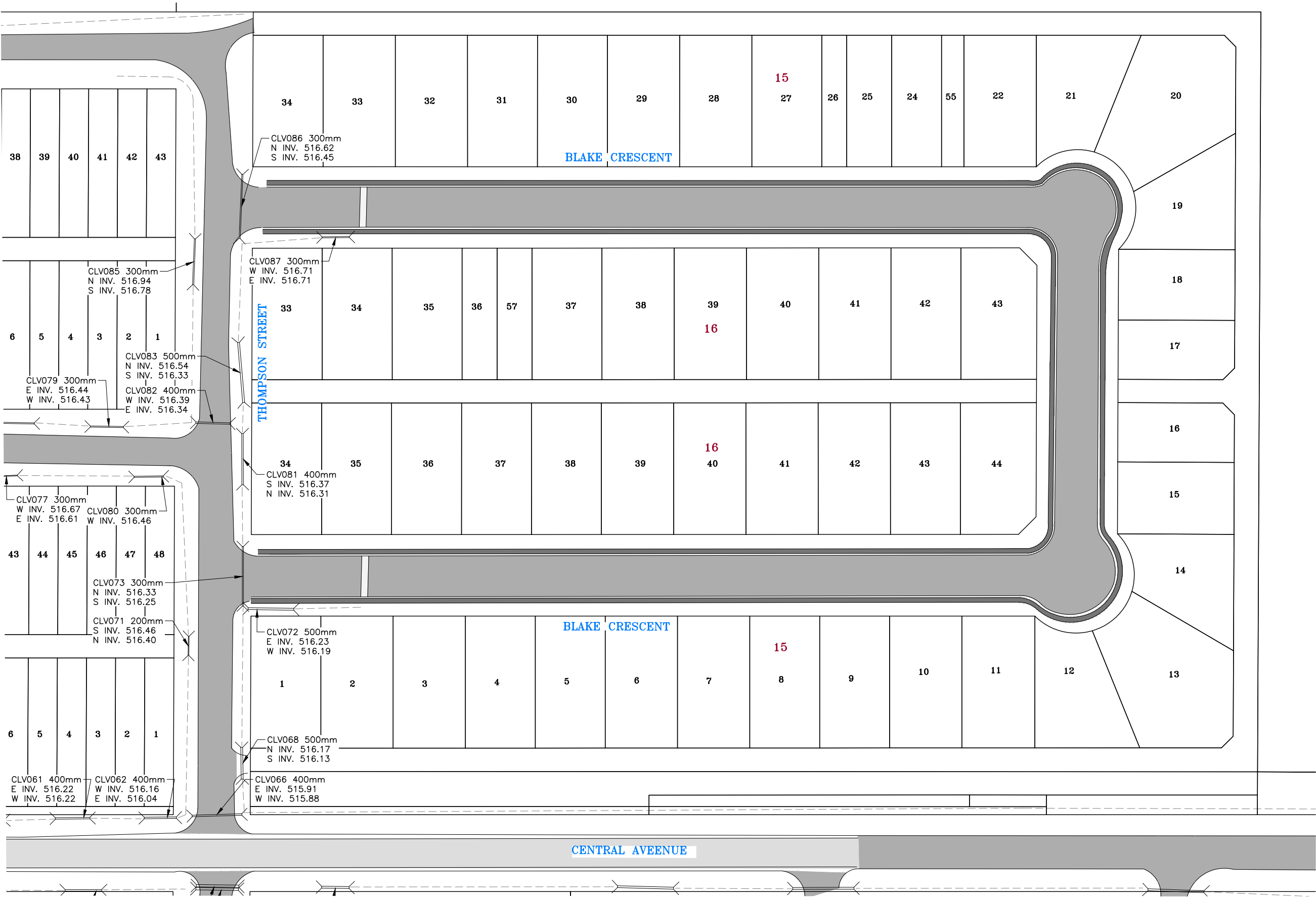
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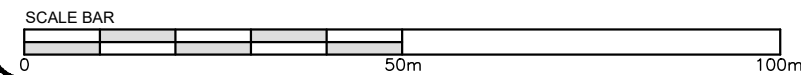
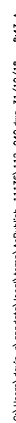


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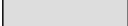

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- DITCH
- CONCRETE SWALE
- CURB & GUTTER
- GRAVEL AREA
- ASPHALT AREA
- SIDEWALK



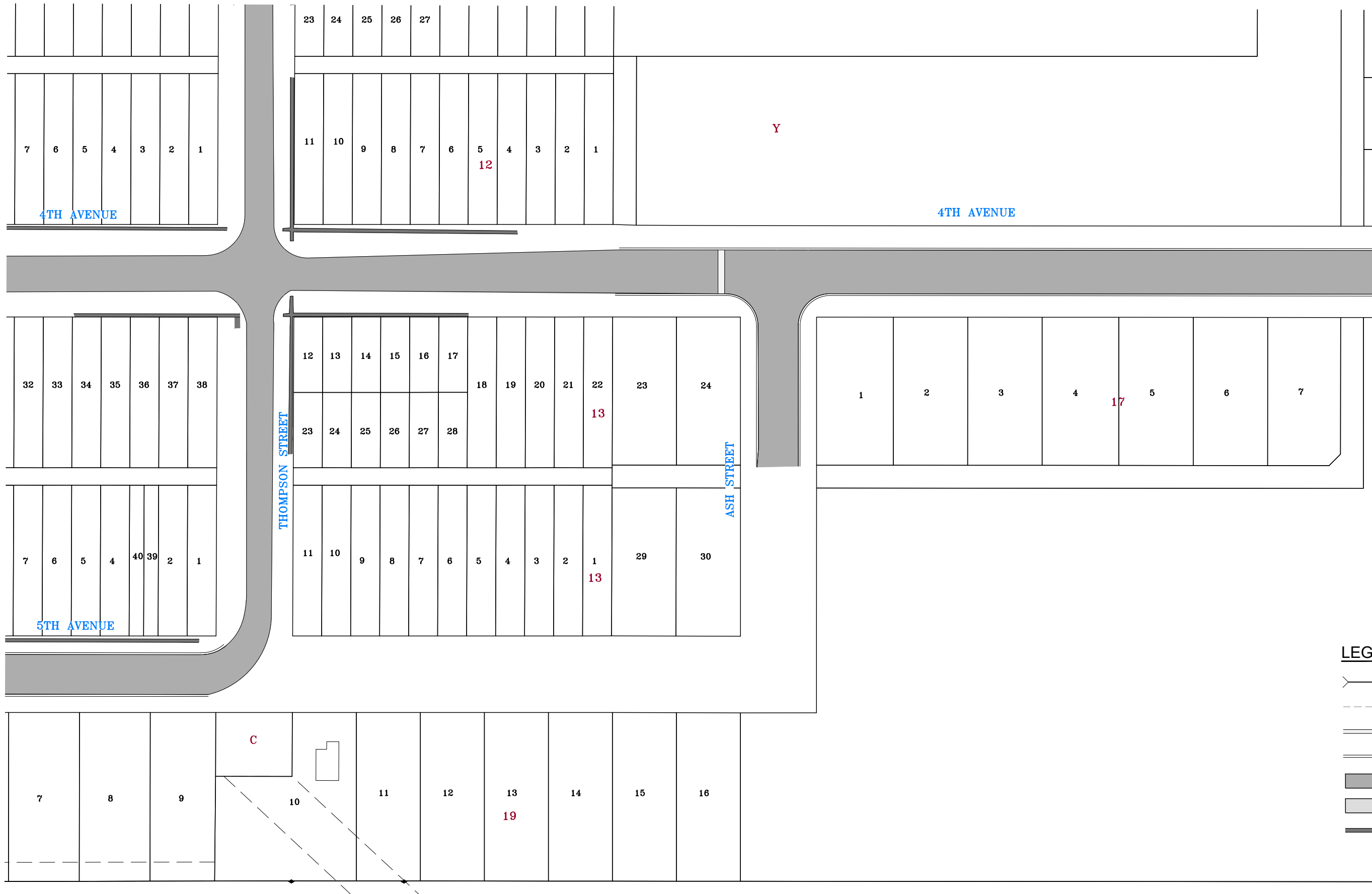
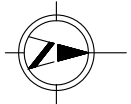
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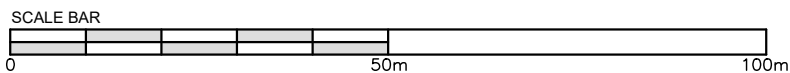
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	DITCH
	CONCRETE SWALE
	CURB & GUTTER
	GRAVEL AREA
	ASPHALT AREA
	SIDEWALK

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CENTRAL AVE - 4TH AVE	
DATE 18/10/05	
SCALE 1:1000	DRAWING SHEET 4

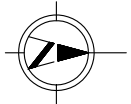


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- CONCRETE SWALE
- CURB & GUTTER
- GRAVEL AREA
- ASPHALT AREA
- SIDEWALK

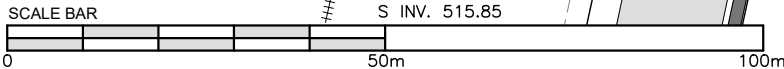
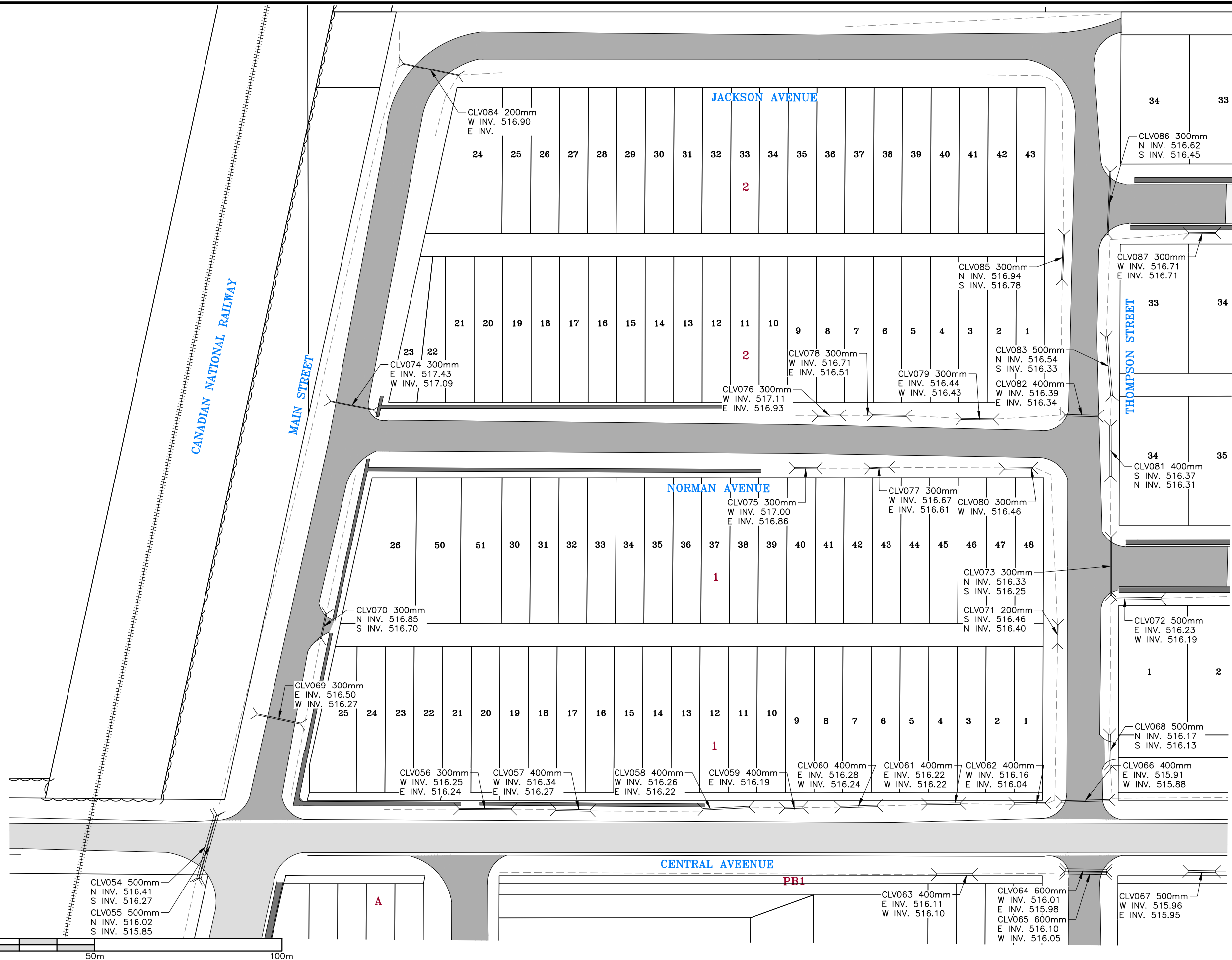


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18/10/05	
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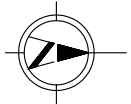
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- CONCRETE SWALE
- CURB & GUTTER
- GRAVEL AREA
- ASPHALT AREA
- SIDEWALK



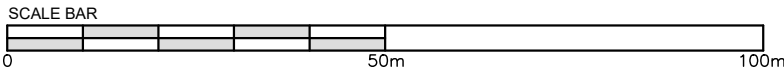
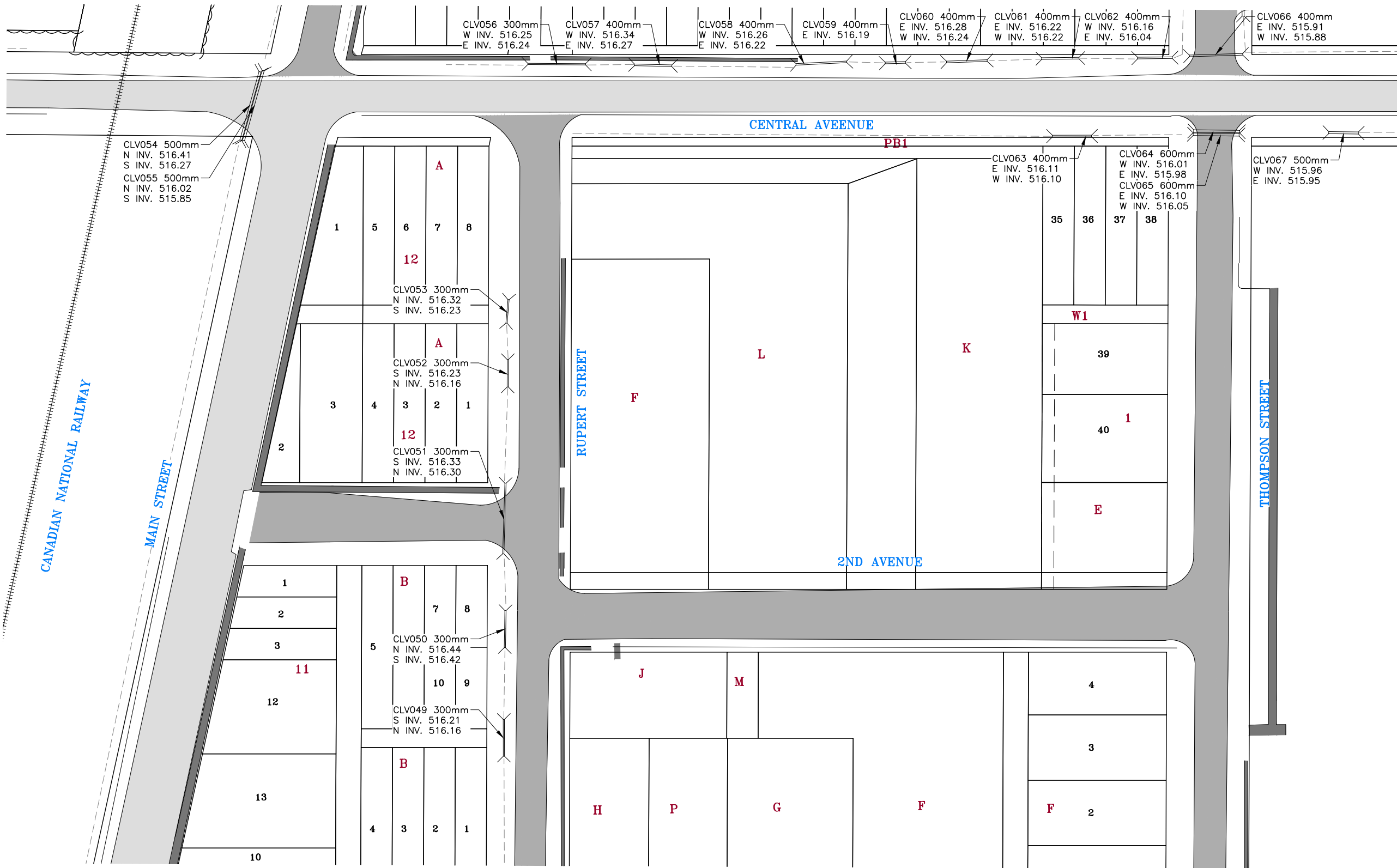
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MAIN ST. - THOMPSON ST.	
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18/10/05	
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LEGEND:

- CULVERT
- DITCH
- CONCRETE SWALE
- CURB & GUTTER
- GRAVEL AREA
- ASPHALT AREA
- SIDEWALK



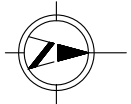
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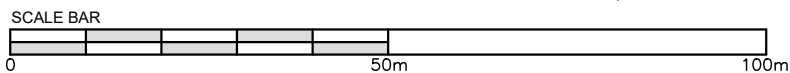




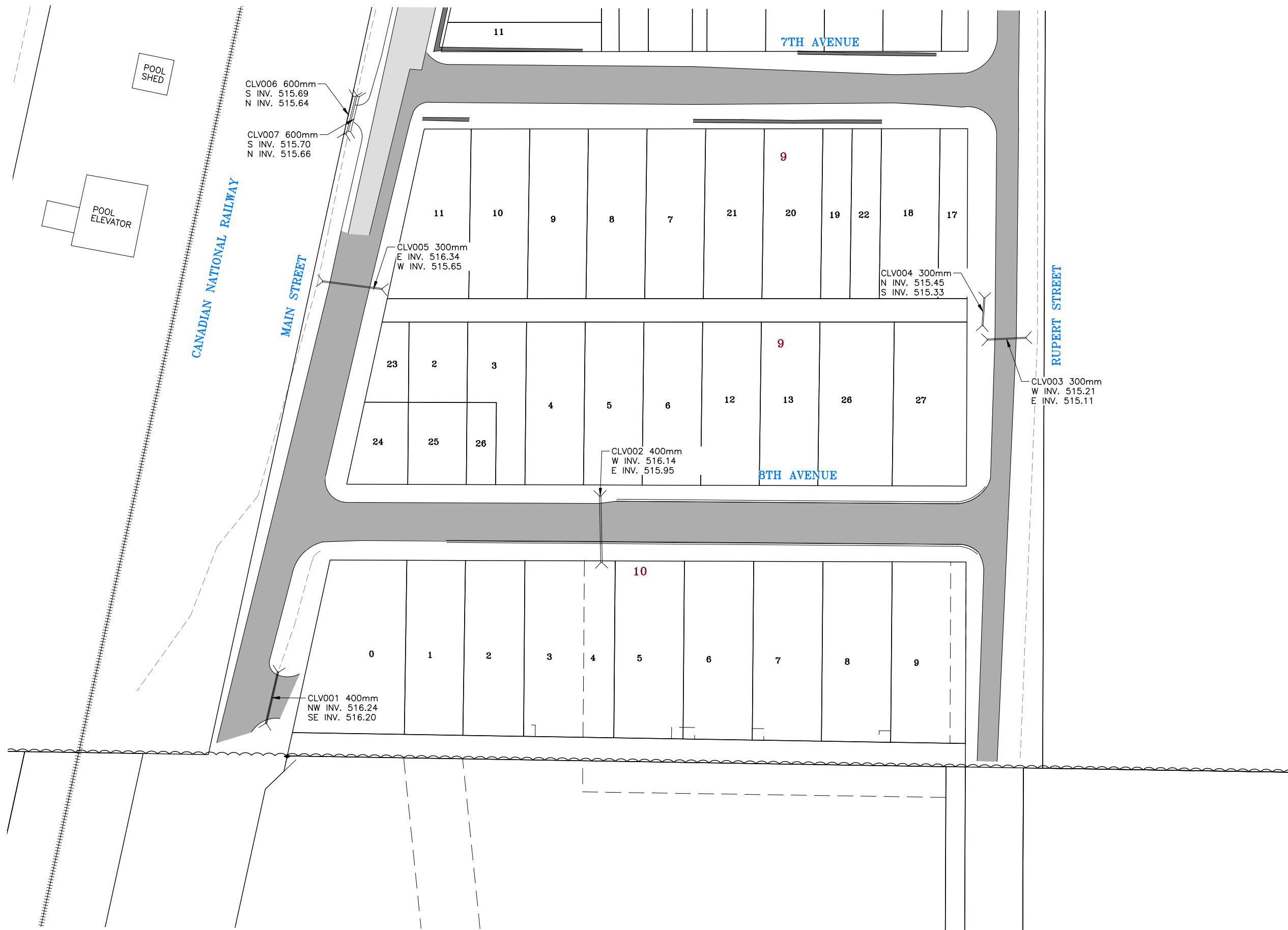
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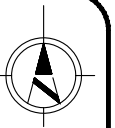
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- DITCH
- CONCRETE SWALE
- CURB & GUTTER
- GRAVEL AREA
- ASPHALT AREA
- SIDEWALK

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DATE	
18/10/05	
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CANADIAN NATIONAL RAILWAY

ELEVATOR ROAD

INDUSTRIAL DRIVE

CENTRAL AVENUE

CARGILL FERTILIZER

CARGILL SHED

CLV097 500mm  
N INV. 516.10  
S INV. 515.90

CLV098 600mm  
W INV. 516.46  
E INV. 516.44  
CLV099 600mm  
W INV. 516.49  
E INV. 516.44

CLV106 300mm  
SE INV. 516.13  
NW INV. 515.95

CLV102 300mm  
E INV. 516.59  
W INV. 516.45

CLV103 500mm  
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E INV. 516.39

CLV105 400mm  
W INV. 516.26  
E INV. 516.26

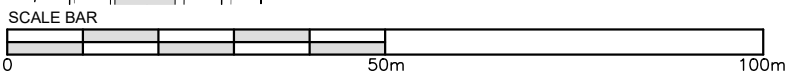
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S INV. 516.46  
N INV. 516.35

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S INV. 516.48  
N INV. 516.40

CLV104 500mm  
E INV. 516.49  
W INV. 516.47

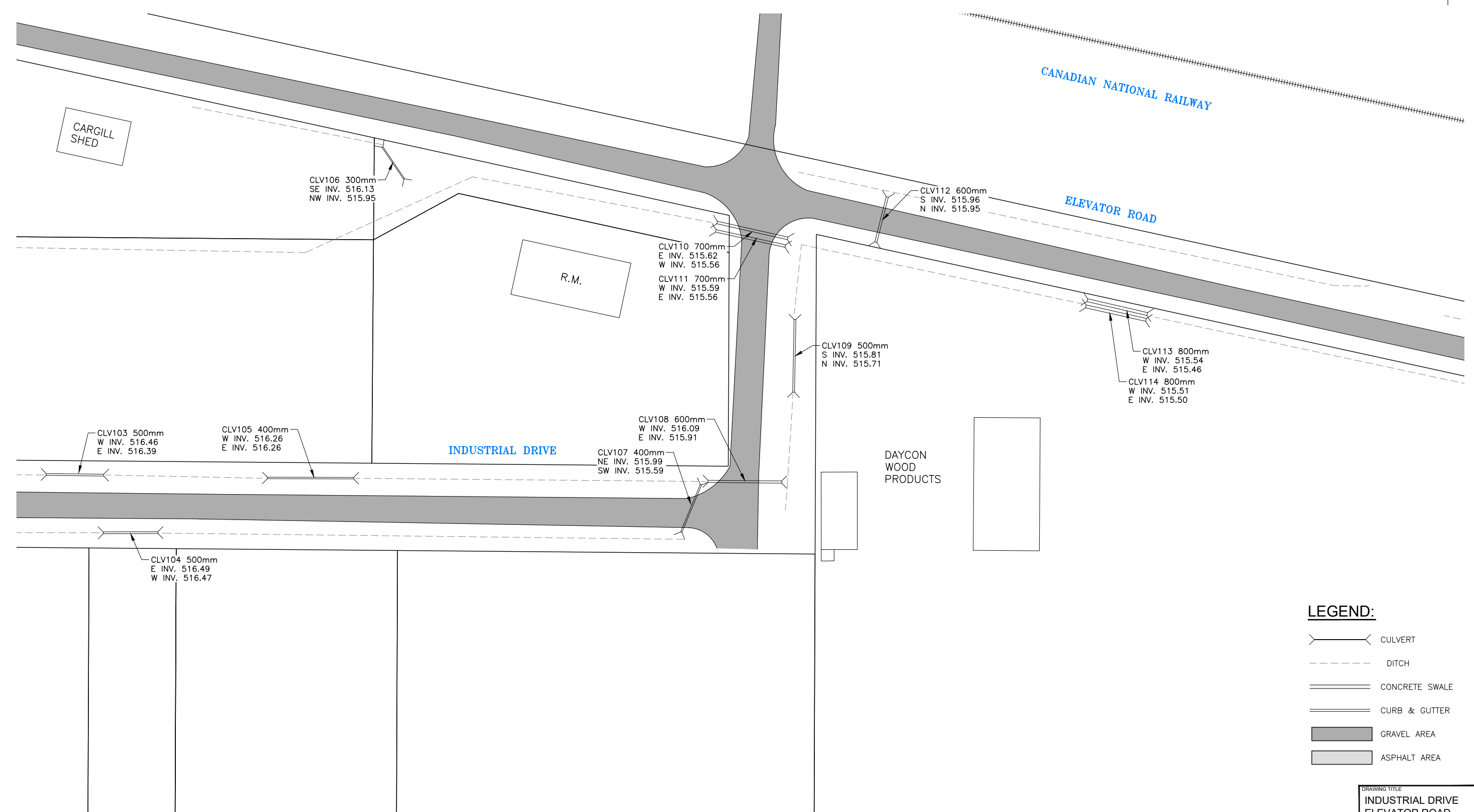
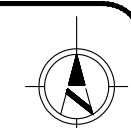
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- CULVERT
- DITCH
- CONCRETE SWALE
- CURB & GUTTER
- GRAVEL AREA
- ASPHALT AREA



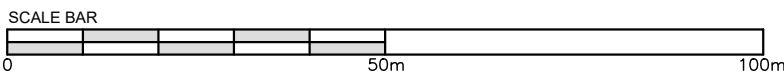
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- DITCH
- CONCRETE SWALE
- CURB & GUTTER
- GRAVEL AREA
- ASPHALT AREA

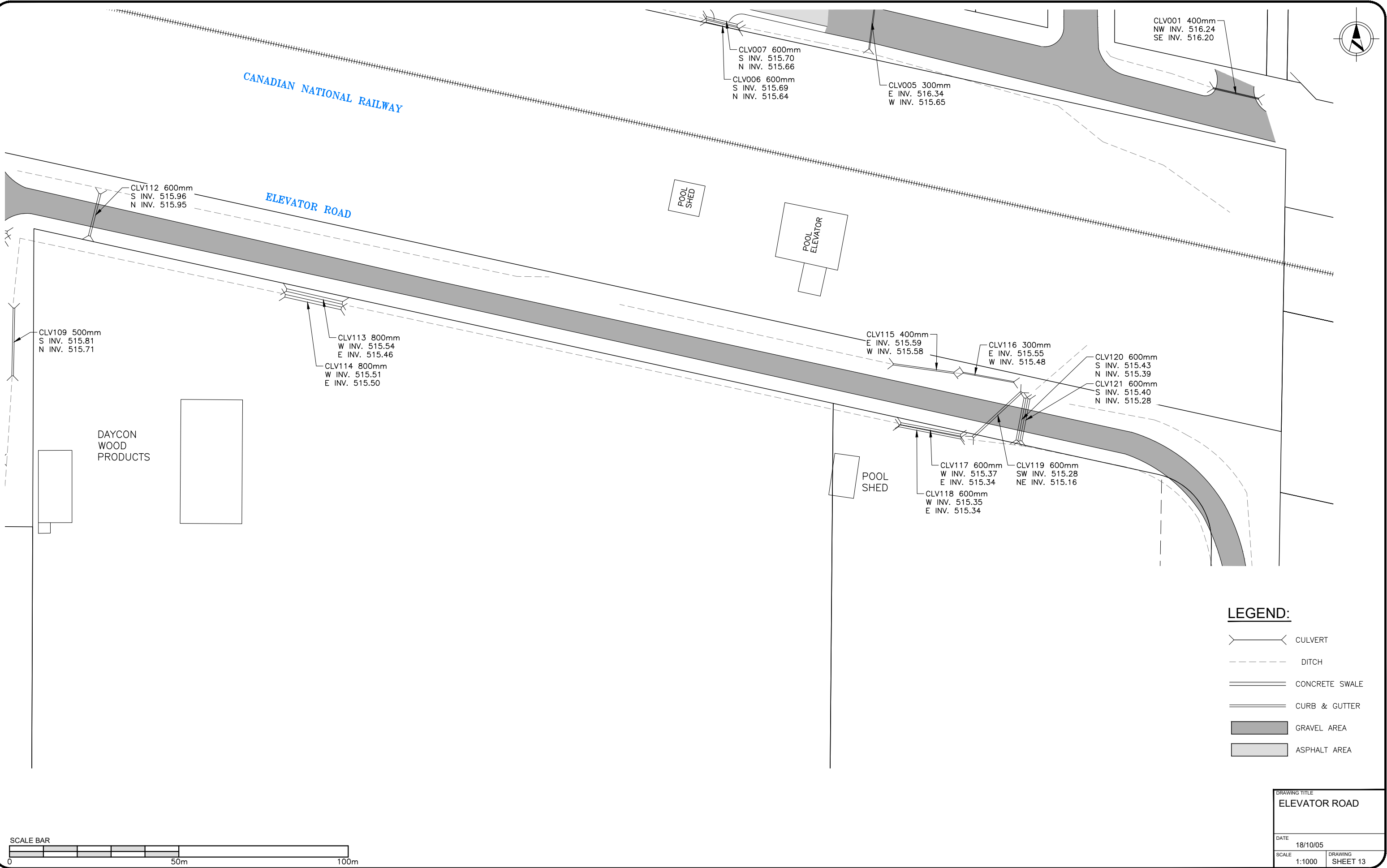


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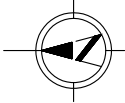
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MATCH LINE

ELEVATOR ROAD

CLV122 600mm  
S INV. 515.94  
N INV. 515.92

LEGEND:

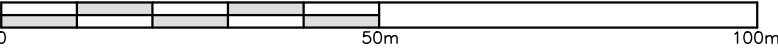
- CULVERT
- DITCH
- CONCRETE SWALE
- CURB & GUTTER
- GRAVEL AREA
- ASPHALT AREA

MATCH LINE

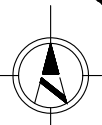
ELEVATOR ROAD

HIGHWAY 784

SCALE BAR



DRAWING TITLE	
ELEVATOR ROAD HIGHWAY 784	
DATE	
18/10/05	
SCALE	DRAWING
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ROAD TO LAGOON

MATCH LINE

26

27

28

29

30

19

31

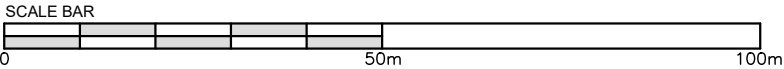
HAMM COURT

ROAD TO LAGOON

MATCH LINE

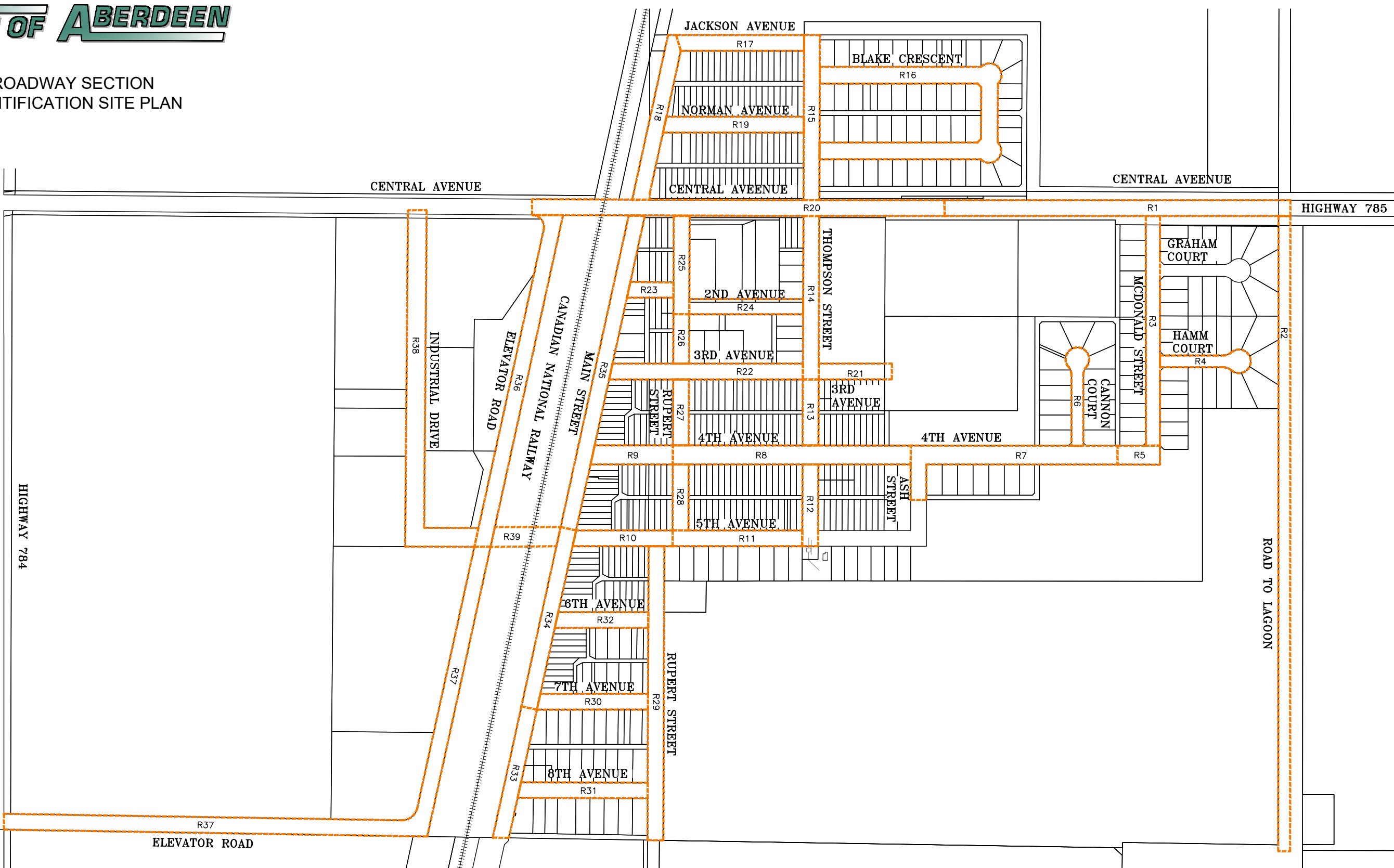
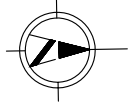
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- DITCH
- CONCRETE SWALE
- CURB & GUTTER
- GRAVEL AREA
- ASPHALT AREA



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DATE	
18/10/05	
SCALE	DRAWING
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ROADWAY SECTION  
IDENTIFICATION SITE PLAN

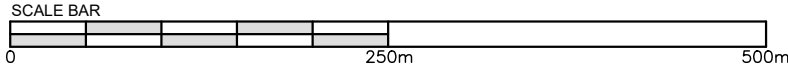


COMPILED BY:



CATTERALL & WRIGHT  
CONSULTING ENGINEERS

1221 - 8th Street East  
SASKATOON SK S7H 0S5  
Tel: (306) 343-7280, Fax: (306) 956-3199



**Appendix C: Asset Summary Tables**

APPENDIX C  
ASSET SUMMARY TABLES  
WASTE WATER, FORCEMAINS  
2018

<u>Asset ID</u>	<u>Description</u>	<u>Location</u>	<u>Quantity</u>	<u>Unit</u>	<u>Condition:</u>	<u>Year Installed</u>	<u>Service Life</u>	<u>Years Remaining</u>	<u>Cost Per Unit</u>	<u>Total Value</u>
SS (SPS1 - MH1)	250mm PVC C900	SPS1	18.0	vert. metre	Fair	1964	50	-4	\$1370.00	\$ 24,660.00
MH1		5th Avenue North of Thompson Street	5.5	vert. metre	Fair	1964	50	-4	\$1370.00	\$ 7,576.10
SS (MH1-2)	200mm VC	5th Avenue North of Thompson Street	20.9	lin. metre	Fair	1964	50	-4	\$455.00	\$ 9,509.50
MH2		Thompson Street and 5th Avenue	5.0	vert. metre	Fair	1964	50	-4	\$1370.00	\$ 6,795.20
SS (MH2-3)	200mm VC	5th Avenue Between Rupert Street and Thompson Street	91.8	lin. metre	Fair	1964	50	-4	\$455.00	\$ 41,769.00
MH3		5th Avenue Mid Block Between Rupert Street and Thompson Street	4.6	vert. metre	Fair	1964	50	-4	\$1370.00	\$ 6,343.10
SS (MH3-4)	200mm VC	5th Avenue Mid Block Between Rupert Street and Thompson Street	100.8	lin. metre	Poor	1964	50	-4	\$455.00	\$ 45,864.00
MH4		5th Avenue and Rupert Street	3.8	vert. metre	Fair	1964	50	-4	\$1370.00	\$ 5,192.30
SS (MH4-5)	200mm VC	5th Avenue Between Rupert Street and Main Street	117.3	lin. metre	Poor	1964	50	-4	\$455.00	\$ 53,371.50
MH5		5th Avenue and Main Street	4.0	vert. metre	Fair	1964	50	-4	\$1370.00	\$ 5,480.00
SS (MH5-6)	200mm VC	Main Street Between 5th Avenue and 6th Avenue	106.1	lin. metre	Fair	1964	50	-4	\$455.00	\$ 48,275.50
MH6		Main Street and 6th Avenue	3.5	vert. metre	Fair	1964	50	-4	\$1370.00	\$ 4,781.30
SS (MH6-7)	200mm VC	6th Avenue Between Main Street and Rupert Street	77.0	lin. metre	Fair	1964	50	-4	\$455.00	\$ 35,035.00
MH7		6th Avenue Mid Block	2.8	vert. metre	Fair	1964	50	-4	\$1370.00	\$ 3,767.50
SS (MH7-CO8)	200mm VC	6th Avenue Between Main Street and Rupert Street	51.4	lin. metre	Fair	1964	50	-4	\$455.00	\$ 23,387.00
CO8		6th Avenue and Rupert Street	1.0	each	Fair	1964	50	-4	\$1,500.00	\$ 1,500.00
SS (MH6-9)	200mm VC	Main Street Between 6th Avenue and 7th Avenue	106.5	lin. metre	Fair	1964	50	-4	\$455.00	\$ 48,457.50
MH9		Main Street and 7th Avenue	3.4	vert. metre	Fair	1964	50	-4	\$1370.00	\$ 4,603.20
SS (MH9-10)	200mm VC	7th Avenue Between Main Street and Rupert Street	98.7	lin. metre	Fair	1964	50	-4	\$455.00	\$ 44,908.50
MH10		7th Avenue Mid Block	3.9	vert. metre	Fair	1964	50	-4	\$1370.00	\$ 5,343.00
SS (MH10-CO11)	200mm VC	7th Avenue Between Main Street and Rupert Street	52.5	lin. metre	Fair	1964	50	-4	\$455.00	\$ 23,887.50
CO11		7th Avenue and Rupert Street	1.0	each	Fair	1964	50	-4	\$1,500.00	\$ 1,500.00
SS (MH9-12)	200mm PVC	Main Street Between 7th Avenue and 8th Avenue	115.3	lin. metre	Fair	1964	50	-4	\$455.00	\$ 52,461.50
MH12		Main Street and 8th Avenue	2.9	vert. metre	Fair	1964	50	-4	\$1370.00	\$ 4,027.80
SS (MH12-13)	200mm PVC	8th Avenue Between Main Street and Rupert Street	79.2	lin. metre	Good	1982	50	14	\$455.00	\$ 36,036.00
MH13		8th Avenue Mid Block	2.6	vert. metre	Fair	1982	50	14	\$1370.00	\$ 3,507.20
SS (MH13-14)	200mm PVC	8th Avenue Between Main Street and Rupert Street	87.1	lin. metre	Fair	1982	50	14	\$455.00	\$ 39,630.50
MH14		8th Avenue and Rupert Street	2.3	vert. metre	Fair	1982	50	14	\$1370.00	\$ 3,096.20
SS (MH5-15)	200mm VC	Main Street Between 4th Avenue and 5th Avenue	108.5	lin. metre	Poor	1964	50	-4	\$455.00	\$ 49,367.50
MH15		Main Street and 4th Avenue	3.8	vert. metre	Very Poor	1964	50	-4	\$1370.00	\$ 5,151.20
SS (MH15-16)	200mm VC	Main Street Between 3rd Avenue and 4th Avenue	108.7	lin. metre	Poor	1964	50	-4	\$455.00	\$ 49,458.50
MH16		Main Street and 3rd Avenue	2.8	vert. metre	Very Poor	1964	50	-4	\$1370.00	\$ 3,808.60
SS (MH16-17)	200mm VC	Main Street Between 2nd Avenue and 3rd Avenue	106.2	lin. metre	Poor	1964	50	-4	\$455.00	\$ 48,321.00
MH17		Main Street and 2nd Avenue	2.9	vert. metre	Fair	1964	50	-4	\$1370.00	\$ 4,014.10
SS (MH17-18)	200mm VC	2nd Avenue Between Main Street and Rupert Street	77.8	lin. metre	Fair	1964	50	-4	\$455.00	\$ 35,399.00
MH18		2nd Avenue and Rupert Street	2.5	vert. metre	Fair	1964	50	-4	\$1370.00	\$ 3,370.20
SS (MH2-19)	200mm VC	Thompson Street Between 4th Avenue and 5th Avenue	106.6	lin. metre	Fair	1964	50	-4	\$455.00	\$ 48,503.00
MH19		4th Avenue and Thompson Street	5.0	vert. metre	Fair	1990	50	22	\$1370.00	\$ 6,808.90
SS (MH19-20)	200mm VC	4th Avenue Between Thompson Street and Rupert Street	107.0	lin. metre	Fair	1964	50	-4	\$455.00	\$ 48,685.00
MH20		4th Avenue Mid Block Between Thompson Street and Rupert Street	3.2	vert. metre	Fair	1964	50	-4	\$1370.00	\$ 4,411.40
SS (MH20-21)	200mm VC	4th Avenue Between Thompson Street and Main Street	115.3	lin. metre	Fair	1964	50	-4	\$455.00	\$ 52,461.50
MH21		4th Avenue Mid Block Between Rupert Street and Main Street	3.3	vert. metre	Fair	1964	50	-4	\$1370.00	\$ 4,534.70
SS (MH19-22)	200mm VC	Thompson Street Between 3rd Avenue and 4th Avenue	106.4	lin. metre	Poor	1964	50	-4	\$455.00	\$ 48,412.00
MH22		3rd Avenue and Thompson Street	4.1	vert. metre	Fair	1964	50	-4	\$1370.00	\$ 5,685.50
SS (MH22-23)	250mm VC	3rd Avenue Between Thompson Street and Rupert Street	107.1	lin. metre	Poor	1964	50	-4	\$455.00	\$ 48,730.50
MH23		3rd Avenue Mid Block Between Thompson Street and Rupert Street	3.0	vert. metre	Fair	1964	50	-4	\$1370.00	\$ 4,123.70



APPENDIX C  
ASSET SUMMARY TABLES  
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2018

<u>Asset ID</u>	<u>Description</u>	<u>Location</u>	<u>Quantity</u>	<u>Unit</u>	<u>Condition:</u>	<u>Year Installed</u>	<u>Service Life</u>	<u>Years Remaining</u>	<u>Cost Per Unit</u>	<u>Total Value</u>
SS (MH23-24)	250mm VC	3rd Avenue Between Thompson Street and Main Street	96.2	lin. metre	Poor	1964	50	-4	\$455.00	\$ 43,771.00
MH24		3rd Avenue Mid Block Between Rupert Street and Main Street	2.7	vert. metre	Fair	1964	50	-4	\$1370.00	\$ 3,712.70
SS (MH22-25)	200mm VC	3rd Avenue North of Thompson Street	88.3	lin. metre	Fair	1964	50	-4	\$455.00	\$ 40,176.50
MH25		North End of 3rd Avenue	3.4	vert. metre	Fair	1964	50	-4	\$1370.00	\$ 4,616.90
SS (MH22-26)	200mm VC	Thompson Street Between Central Avenue and 3rd Avenue	103.4	lin. metre	Poor	1964	50	-4	\$455.00	\$ 47,047.00
MH26		Thompson Street Mid Block Between Central Avenue and 3rd Avenue	3.6	vert. metre	Fair	1964	50	-4	\$1370.00	\$ 4,945.70
SS (MH26-27)	200mm VC	Thompson Street Between Central Avenue and 3rd Avenue	104.7	lin. metre	Poor	1964	50	-4	\$455.00	\$ 47,638.50
MH27		Central Avenue and Thompson Street	4.6	vert. metre	Fair	1964	50	-4	\$1370.00	\$ 6,329.40
SS (MH27-28)	250mm VC	Central Avenue Between Thompson Street and Rupert Street	106.9	lin. metre	Poor	1964	50	-4	\$455.00	\$ 48,639.50
MH28		Central Avenue Mid Block Between Thompson Street and Rupert Street	4.0	vert. metre	Fair	1964	50	-4	\$1370.00	\$ 5,411.50
SS (MH28-29)	300mm VC	Central Avenue Between Thompson Street and Rupert Street	58.0	lin. metre	Poor	1964	50	-4	\$455.00	\$ 26,390.00
MH29		Central Avenue and Rupert Street	3.6	vert. metre	Fair	1964	50	-4	\$1370.00	\$ 4,986.80
SS (MH29-30)	200mm VC	Central Avenue Between Rupert Street and Main Street	41.0	lin. metre	Fair	1964	50	-4	\$455.00	\$ 18,655.00
MH30		Central Avenue and Main Street	2.6	vert. metre	Fair	1964	50	-4	\$1370.00	\$ 3,589.40
SS (MH18-29)	200mm VC	Rupert Street Between Central Avenue and 2nd Avenue	104.4	lin. metre	Poor	1964	50	-4	\$455.00	\$ 47,502.00
SS (MH27-31)	250mm VC	Thompson Street Between Blake Crescent East Leg and Central Avenue	71.1	lin. metre	Fair	1964	50	-4	\$455.00	\$ 32,350.50
MH31		Thompson Street and Blake Crescent East Leg	3.4	vert. metre	Fair	1964	50	-4	\$1370.00	\$ 4,658.00
SS (MH31-32)	200mm VC	Blake Crescent East Leg	114.0	lin. metre	Poor	1977	50	9	\$455.00	\$ 51,870.00
MH32		Blake Crescent Mid Block East Leg	2.9	vert. metre	Fair	1977	50	9	\$1370.00	\$ 4,027.80
SS (MH32-33)	200mm VC	Blake Crescent East Leg	113.8	lin. metre	Fair	1977	50	9	\$455.00	\$ 51,779.00
MH33		Blake Crescent North End of East Leg	3.1	vert. metre	Fair	1977	50	9	\$1370.00	\$ 4,205.90
SS (MH33-34)	200mm VC	Blake Crescent Between West Leg and East Leg	96.8	lin. metre	Fair	1977	50	9	\$455.00	\$ 44,044.00
MH34		Blake Crescent North End of West Leg	2.8	vert. metre	Fair	1977	50	9	\$1370.00	\$ 3,863.40
SS (MH34-42)	200mm VC	Blake Crescent West Leg	114.9	lin. metre	Poor	1977	50	9	\$455.00	\$ 52,279.50
MH42		Blake Crescent Mid Block West Leg	2.8	vert. metre	Fair	1977	50	9	\$1370.00	\$ 3,822.30
SS (MH42-38)	200mm VC	Blake Crescent West Leg	113.0	lin. metre	Fair	1977	50	9	\$455.00	\$ 51,415.00
MH35		Thompson Street and Norman Avenue	3.6	vert. metre	Very Poor	1964	50	-4	\$1370.00	\$ 4,959.40
SS (MH31-35)	250mm VC	Thompson Street Between Norman Avenue and Blake Crescent East Leg	35.3	lin. metre	Fair	1964	50	-4	\$455.00	\$ 16,061.50
SS (MH35-36)	250mm VC	Norman Avenue Between Thompson Street and Main Street	106.5	lin. metre	Fair	1964	50	-4	\$455.00	\$ 48,457.50
MH36		Norman Avenue Mid Block	2.7	vert. metre	Fair	1964	50	-4	\$1370.00	\$ 3,671.60
SS (MH36-CO37)	250mm VC	Norman Avenue Between Thompson Street and Main Street	79.8	lin. metre	Fair	1964	50	-4	\$455.00	\$ 36,309.00
CO37		Norman Avenue and Main Street	1.0	each	Fair	1964	50	-4	\$1,500.00	\$ 1,500.00
SS (MH35-38)	250mm VC	Thompson Street Between Blake Crescent West Leg and Norman Avenue	60.8	lin. metre	Fair	1964	50	-4	\$455.00	\$ 27,664.00
MH38		Thompson Street and Blake Crescent West Leg	3.6	vert. metre	Fair	1964	50	-4	\$1370.00	\$ 4,890.90
SS (MH38-39)	250mm VC	Thompson Street Between Jackson Avenue and Blake Crescent West Leg	42.5	lin. metre	Fair	1964	50	-4	\$455.00	\$ 19,337.50
MH39		Thompson Street and Jackson Avenue	3.7	vert. metre	Fair	1964	50	-4	\$1370.00	\$ 5,096.40
SS (MH39-40)	200mm VC	Jackson Avenue Between Thompson Street and Main Street	92.5	lin. metre	Fair	1964	50	-4	\$455.00	\$ 42,087.50
MH40		Jackson Avenue Mid Block	3.5	vert. metre	Fair	1964	50	-4	\$1370.00	\$ 4,822.40
SS (MH40-41)	200mm VC	Jackson Avenue Between Thompson Street and Main Street	71.4	lin. metre	Poor	1964	50	-4	\$455.00	\$ 32,487.00
CO41		Jackson Avenue and Main Street	1.0	each	Fair	1964	50	-4	\$1,500.00	\$ 1,500.00
SS (MH19-43)	200mm VC	4th Avenue Between Thompson Street and Ash Street	87.7	lin. metre	Fair	1964	50	-4	\$455.00	\$ 39,903.50
MH43		4th Avenue Mid Block Between Thompson Street and Ash Street	3.11	vert. metre	Fair	1990	50	22	\$1370.00	\$ 4,260.70
SS (MH19-44)	200mm PVC	4th Avenue Between Thompson Street and Ash Street	113.4	lin. metre	Poor	1990	50	22	\$455.00	\$ 51,597.00
MH44		4th Avenue Between Thompson Street and Ash Street	4.1	vert. metre	Poor	1990	50	22	\$1370.00	\$ 5,617.00
SS (MH44-45)	200mm PVC	4th Avenue Between Thompson Street and Cannon Court	113.2	lin. metre	Good	1990	50	22	\$455.00	\$ 51,506.00
MH45		4th Avenue Mid Block Between Ash Street and Cannon Court	4.2	vert. metre	Good	1990	50	22	\$1370.00	\$ 5,767.70



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2018

<u>Asset ID</u>	<u>Description</u>	<u>Location</u>	<u>Quantity</u>	<u>Unit</u>	<u>Condition:</u>	<u>Year Installed</u>	<u>Service Life</u>	<u>Years Remaining</u>	<u>Cost Per Unit</u>	<u>Total Value</u>
SS (MH45-46)	200mm PVC	4th Avenue Between Ash Street and Cannon Court	113.4	lin. metre	Good	1990	50	22	\$455.00	\$ 51,597.00
MH46		4th Avenue and Cannon Court	3.5	vert. metre	Good	1990	50	22	\$1370.00	\$ 4,849.80
SS (MH46-47)	200mm PVC	Cannon Court	120.0	lin. metre	Good	1990	50	22	\$455.00	\$ 54,600.00
MH47		Cannon Court Bubble	3.3	vert. metre	Good	1990	50	22	\$1370.00	\$ 4,548.40
SS (MH46-48)	200mm PVC	4th Avenue Between Cannon Court and McDonald Street	95.7	lin. metre	Very Good	2009	50	41	\$455.00	\$ 43,543.50
MH48		4th Avenue and McDonald Street	3.2	vert. metre	Very Good	2009	50	41	\$1370.00	\$ 4,315.50
SS (MH48-Plug)	200mm PVC	4th Avenue North of McDonald Street	53.1	lin. metre	Very Good	2009	50	41	\$455.00	\$ 24,160.50
SS (MH48-Plug)	200mm PVC	McDonald Street East of 4th Avenue	20.0	lin. metre	Very Good	2009	50	41	\$455.00	\$ 9,100.00
SS (MH48-49)	200mm PVC	McDonald Street Between Hamm Court and 4th Avenue	120.0	lin. metre	Very Good	2009	50	41	\$455.00	\$ 54,600.00
MH49		McDonald Street and Hamm Court	3.2	vert. metre	Very Good	2009	50	41	\$1370.00	\$ 4,384.00
SS (MH49-50)	200mm PVC	Hamm Court	110.7	lin. metre	Very Good	2012	50	44	\$455.00	\$ 50,368.50
MH50		Hamm Court Bubble	3.3	vert. metre	Very Good	2012	50	44	\$1370.00	\$ 4,466.20
SS (MH49-51)	200mm PVC	McDonald Street Between Graham Court and Hamm Court	115.5	lin. metre	Very Good	2009	50	41	\$455.00	\$ 52,552.50
MH51		Graham Court and McDonald Street	3.1	vert. metre	Very Good	2009	50	41	\$1370.00	\$ 4,301.80
SS (MH51-Plug)	200mm PVC	Graham Court	52.9	lin. metre	Very Good	2009	50	41	\$455.00	\$ 24,069.50
SS (MH51-52)	200mm PVC	McDonald Street Between Central Avenue and Graham Court	45.4	lin. metre	Very Good	2009	50	41	\$455.00	\$ 20,657.00
MH52		McDonald Street Between Central Avenue and Graham Court	3.1	vert. metre	Very Good	2009	50	41	\$1370.00	\$ 4,192.20
SS (MH52-HWY 785)	37mm HDPE	McDonald Street and Central Avenue to North East Corner of Highway 785 and Central Avenue	231.1	lin. metre	Very Good	2008	50	40	\$455.00	\$ 105,150.50
SS (MH12-WTP)	200mm VC	Main Street and 8th Avenue to WTP	25.2	lin. metre	Fair	1964	50	-4	\$455.00	\$ 11,466.00
Sewage Pumping Station		5th Avenue and Thompson Street	1.0	each	Very Good	2018	30	30	\$1,349,032.02	\$ 1,349,032.02
SPS1-Lagoon Forcemain	200mm HDPE	Sewage Pumping Station #1 to Lagoon	1603.0	lin. metre	Very Good	2018	50	50	\$120.00	\$ 192,360.00
Lagoon		Lagoon	1.0	each	Very Good	2018	50	50	\$1,076,224.96	\$ 1,076,224.96

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W1		Central Avenue								
	50mm HDPE Service		lin.metre	219.8	Very Good	\$ 125	\$ 27,475.00	2008	70	60
W2		Central Avenue								
	150mm PVC C-900		lin.metre	451.9	Very Good	\$ 275	\$ 124,272.50	2014	70	66
	150mm Valve		each	1.0	Very Good	\$ 2,300	\$ 2,300.00	2014	70	66
	Hydrant		each	1.0	Very Good	\$ 8,100	\$ 8,100.00	2014	70	66
W3		McDonald Street								
	150mm PVC C-900		lin.metre	396.3	Very Good	\$ 275	\$ 108,982.50	2009	70	61
	50mm Valve		each	1.0	Very Good	\$ 1,800	\$ 1,800.00	2009	70	61
	150mm Valve		each	7.0	Very Good	\$ 2,300	\$ 16,100.00	2009	70	61
	Hydrant		each	2.0	Very Good	\$ 8,100	\$ 16,200.00	2009	70	61
W4		Hamm Court								
	150mm PVC C-900		lin.metre	78.3	Very Good	\$ 275	\$ 21,532.50	2012	70	64
	150mm Valve		each	1.0	Very Good	\$ 2,300	\$ 2,300.00	2012	70	64
	Hydrant		each	1.0	Very Good	\$ 8,100	\$ 8,100.00	2012	70	64
W5		4th Avenue								
	150mm PVC C-900		lin.metre	177.8	Very Good	\$ 275	\$ 48,895.00	2009	70	61
	150mm Valve		each	3.0	Very Good	\$ 2,300	\$ 6,900.00	2009	70	61
	Hydrant		each	1.0	Very Good	\$ 8,100	\$ 8,100.00	2009	70	61
W6		Cannon Court								
	150mm PVC C-900		lin.metre	119.0	Good	\$ 275	\$ 32,725.00	1990	70	42
	150mm Valve		each	1.0	Good	\$ 2,300	\$ 2,300.00	1990	70	42
	Hydrant		each	1.0	Good	\$ 8,100	\$ 8,100.00	1990	70	42
W7		4th Avenue								
	150mm PVC C-900		lin.metre	297.4	Good	\$ 275	\$ 81,785.00	1990	70	42
	150mm Valve		each	5.0	Good	\$ 2,300	\$ 11,500.00	1990	70	42
	Hydrant		each	2.0	Good	\$ 8,100	\$ 16,200.00	1990	70	42
W8		4th Avenue								
	150mm AC		lin.metre	311.1	Poor	\$ 275	\$ 85,552.50	1964	70	16
	150mm Valve		each	4.0	Poor	\$ 2,300	\$ 9,200.00	1964	70	16
	Hydrant		each	1.0	Poor	\$ 8,100	\$ 8,100.00	1964	70	16
W9		4th Avenue								
	150mm AC		lin.metre	110.7	Poor	\$ 275	\$ 30,442.50	1964	70	16
	150mm Valve		each	2.0	Poor	\$ 2,300	\$ 4,600.00	1964	70	16
	Hydrant		each	1.0	Poor	\$ 8,100	\$ 8,100.00	1964	70	16
W10		5th Avenue								
	150mm AC		lin.metre	133.7	Poor	\$ 275	\$ 36,767.50	1964	70	16
	150mm Valve		each	2.0	Poor	\$ 2,300	\$ 4,600.00	1964	70	16
W11		5th Avenue								
	150mm AC		lin.metre	171.1	Poor	\$ 275	\$ 47,052.50	1964	70	16
	150mm Valve		each	1.0	Poor	\$ 2,300	\$ 2,300.00	1964	70	16
	Hydrant		each	1.0	Poor	\$ 8,100	\$ 8,100.00	1964	70	16
W12		Thompson Street								
	150mm AC		lin.metre	153.0	Poor	\$ 275	\$ 42,075.00	1964	70	16
	150mm Valve		each	3.0	Poor	\$ 2,300	\$ 6,900.00	1964	70	16
	Hydrant		each	1.0	Poor	\$ 8,100	\$ 8,100.00	1964	70	16

<u>Section ID</u>	<u>Asset Description</u>	<u>Location</u>	<u>Units</u>	<u>Quantity</u>	<u>Condition</u>	<u>Cost Per Unit</u>	<u>Total Value</u>	<u>Year Installed</u>	<u>Service Life</u>	<u>Years Remaining</u>
W13		Thompson Street								
	150mm AC		lin.metre	90.6	Poor	\$ 275	\$ 24,915.00	1964	70	16
	150mm Valve		each	1.0	Poor	\$ 2,300	\$ 2,300.00	1964	70	16
	Hydrant		each	1.0	Poor	\$ 8,100	\$ 8,100.00	1964	70	16
W14		Thompson Street								
	150mm AC		lin.metre	225.9	Poor	\$ 275	\$ 62,122.50	1964	70	16
	150mm Valve		each	6.0	Poor	\$ 2,300	\$ 13,800.00	1964	70	16
	Hydrant		each	1.0	Poor	\$ 8,100	\$ 8,100.00	1964	70	16
W15		Thompson Street								
	150mm AC		lin.metre	235.0	Poor	\$ 275	\$ 64,625.00	1964	70	16
	150mm Valve		each	2.0	Poor	\$ 2,300	\$ 4,600.00	1964	70	16
	Hydrant		each	1.0	Poor	\$ 8,100	\$ 8,100.00	1964	70	16
W16		Blake Crescent								
	150mm AC		lin.metre	550.9	Fair	\$ 275	\$ 151,497.50	1977	70	29
	150mm Valve		each	6.0	Fair	\$ 2,300	\$ 13,800.00	1977	70	29
	Hydrant		each	2.0	Fair	\$ 8,100	\$ 16,200.00	1977	70	29
W17		Jackson Avenue								
	150mm AC		lin.metre	550.9	Fair	\$ 275	\$ 151,497.50	1977	70	29
	150mm Valve		each	6.0	Fair	\$ 2,300	\$ 13,800.00	1977	70	29
	Hydrant		each	2.0	Fair	\$ 8,100	\$ 16,200.00	1977	70	29
W18		Central Avenue								
	150mm AC		lin.metre	221.7	Poor	\$ 275	\$ 60,967.50	1964	70	16
	150mm Valve		each	2.0	Poor	\$ 2,300	\$ 4,600.00	1964	70	16
	Hydrant		each	1.0	Poor	\$ 8,100	\$ 8,100.00	1964	70	16
W19		Norman Avenue								
	150mm AC		lin.metre	184.9	Poor	\$ 275	\$ 50,847.50	1964	70	16
	150mm Valve		each	2.0	Poor	\$ 2,300	\$ 4,600.00	1964	70	16
	Hydrant		each	1.0	Poor	\$ 8,100	\$ 8,100.00	1964	70	16
W20		Central Avenue								
	150mm AC		lin.metre	291.5	Poor	\$ 275	\$ 80,162.50	1964	70	16
	150mm Valve		each	4.0	Poor	\$ 2,300	\$ 9,200.00	1964	70	16
W21		3rd Avenue								
	150mm AC		lin.metre	94.4	Poor	\$ 275	\$ 25,960.00	1964	70	16
	150mm Valve		each	1	Poor	\$ 2,300	\$ 2,300.00	1964	70	16
	Hydrant		each	1	Poor	\$ 8,100	\$ 8,100.00	1964	70	16
W22		3rd Avenue								
	150mm AC		lin.metre	244.9	Poor	\$ 275	\$ 67,347.50	1964	70	16
	150mm Valve		each	1.0	Poor	\$ 2,300	\$ 2,300.00	1964	70	16
W23		3rd Avenue								
	150mm AC		lin.metre	57.4	Poor	\$ 275	\$ 15,785.00	1964	70	16
	150mm Valve		each	1.0	Poor	\$ 2,300	\$ 2,300.00	1964	70	16
W24		Rupert Street								
	150mm AC		lin.metre	137.0	Poor	\$ 275	\$ 37,675.00	1964	70	16
	150mm Valve		each	3.0	Poor	\$ 2,300	\$ 6,900.00	1964	70	16
	Hydrant		each	2.0	Poor	\$ 8,100	\$ 16,200.00	1964	70	16

Section ID	Asset Description	Location	Units	Quantity	Condition	Cost Per Unit	Total Value	Year Installed	Service Life	Years Remaining
W25		Rupert Street								
	150mm SER. 160 PVC		lin.metre	88.9	Good	\$ 275	\$ 24,447.50	1992	70	44
	150mm Valve		each	1.0	Good	\$ 2,300	\$ 2,300.00	1992	70	44
	Hydrant		each	1.0	Good	\$ 8,100	\$ 8,100.00	1992	70	44
W26		Rupert Street								
	150mm AC		lin.metre	110.9	Poor	\$ 275	\$ 30,497.50	1964	70	16
W27		Rupert Street								
	150mm SER. 160 PVC		lin.metre	134.6	Good	\$ 275	\$ 37,015.00	1992	70	44
	150mm Valve		each	1.0	Good	\$ 2,300	\$ 2,300.00	1992	70	44
W28		7th Avenue								
	150mm AC		lin.metre	139.6	Poor	\$ 275	\$ 38,390.00	1964	70	16
	150mm Valve		each	2.0	Poor	\$ 2,300	\$ 4,600.00	1964	70	16
W29		8th Avenue								
	150mm SDR26 PVC		lin.metre	170.6	Good	\$ 275	\$ 46,915.00	1992	70	44
	150mm Valve		each	1.0	Good	\$ 2,300	\$ 2,300.00	1992	70	44
	Hydrant		each	1.0	Good	\$ 8,100	\$ 8,100.00	1992	70	44
W30		6th Avenue								
	150mm AC		lin.metre	117.6	Poor	\$ 275	\$ 32,340.00	1964	70	16
	150mm Valve		each	1.0	Poor	\$ 2,300	\$ 2,300.00	1964	70	16
W31		Main Street								
	150mm AC		lin.metre	249.9	Poor	\$ 275	\$ 68,722.50	1964	70	16
	150mm Valve		each	5.0	Poor	\$ 2,300	\$ 11,500.00	1964	70	16
	Hydrant		each	1.0	Poor	\$ 8,100	\$ 8,100.00	1964	70	16
	100mm AC Supply Line		lin.metre	201.0	Poor	\$ 150	\$ 30,150.00	1964	70	16
	100mm Valve		each	1.0	Poor	\$ 2,000	\$ 2,000.00	1964	70	16
W32		Main Street								
	150mm AC		lin.metre	275.9	Poor	\$ 275	\$ 75,872.50	1964	70	16
	150mm Valve		each	5.0	Poor	\$ 2,300	\$ 11,500.00	1964	70	16
	Hydrant		each	1.0	Poor	\$ 8,100	\$ 8,100.00	1964	70	16
W33		Main Street								
	150mm AC		lin.metre	738.5	Poor	\$ 275	\$ 203,087.50	1964	70	16
	150mm Valve		each	5.0	Poor	\$ 2,300	\$ 11,500.00	1964	70	16
	Hydrant		each	2.0	Poor	\$ 8,100	\$ 16,200.00	1964	70	16
W34		Industrial Drive								
	150mm PVC C-900		lin.metre	83.1	Good	\$ 275	\$ 22,852.50	2000	70	52
W35		Elevator Road								
	150mm PVC C-900		lin.metre	298.1	Good	\$ 275	\$ 81,977.50	2000	70	52
	150mm Valve		each	1.0	Good	\$ 2,300	\$ 2,300.00	2000	70	52
	Hydrant		each	1.0	Good	\$ 8,100	\$ 8,100.00	2000	70	52
W36		Elevator Road								
	150mm PVC C-900		lin.metre	161.5	Good	\$ 275	\$ 44,412.50	2000	70	52
	150mm Valve		each	1.0	Good	\$ 2,300	\$ 2,300.00	2000	70	52
	Hydrant		each	1.0	Good	\$ 8,100	\$ 8,100.00	2000	70	52
W37		Elevator Road								
	150mm PVC C-900		lin.metre	467.3	Good	\$ 275	\$ 128,507.50	2000	70	52
	150mm Valve		each	5.0	Good	\$ 2,300	\$ 11,500.00	2000	70	52
	Hydrant		each	3.0	Good	\$ 8,100	\$ 24,300.00	2000	70	52

<u>Section ID</u>	<u>Asset Description</u>	<u>Location</u>	<u>Units</u>	<u>Quantity</u>	<u>Condition</u>	<u>Cost Per Unit</u>	<u>Total Value</u>	<u>Year Installed</u>	<u>Service Life</u>	<u>Years Remaining</u>
WTP#1		Main Street and 8th Avenue								
	Building		each	1.0	Poor	\$ 50,000	\$ 50,000.00	1964	30	-
	Building (Expansion)		each	1.0	Good	\$ 50,000	\$ 50,000.00	2012	30	-
	Mechanical (Less Distribution Pumps)		each	1.0	Good	\$ 50,000	\$ 50,000.00	1964-2012	30	-
	Electrical		each	1.0	Good	\$ 100,000	\$ 100,000.00	1964-2012	20	-
	Reservoir Storage		each	1.0	Fair	\$ 800,000	\$ 800,000.00	1964-1984	50	-
	Pumps		each	1.0	Very Good	\$ 100,000	\$ 100,000.00	1964-2012	30	-
	Truckfill Facilities		each	1.0	Good	\$ 20,000	\$ 20,000.00	1964-2012	20	-
	Engine		each	1.0	Very Poor	\$ 100,000	\$ 100,000.00	1964	30	-
Services	25mm Service		each	270.0	Fair	\$ 3,000	\$ 810,000.00	-	-	-

<u>Section ID</u>	<u>Asset Description</u>	<u>Asset Condition</u>	<u>Location</u>	<u>Length (m)</u>	<u>Width of Asset (m)</u>	<u>Area (m²)</u>	<u>Cost Per Unit</u>	<u>Total Value</u>
R1			Central Avenue					
	Reclaimed Asphalt Shingles Roadway	Fair		439.8	9.5	4178.1	\$ 36.50	\$ 152,500.65
R2			Road to Lagoon					
	Gravel Roadway	Fair		807.7	5.5	4442.4	\$ 36.50	\$ 162,145.78
R3			McDonald Street					
	Gravel Roadway	Fair		292.0	10.5	3066.0	\$ 36.50	\$ 111,909.00
	Rolled Curb and Gutter	Good		271.0			\$ 150.00	\$ 40,650.00
	Concrete Swale	Good		20.4	1.0	20.4	\$ 300.00	\$ 6,120.00
R4			Hamm Court					
	Gravel Roadway	Fair		115.0	10.5	1207.5	\$ 36.50	\$ 44,073.75
	Rolled Curb and Gutter	Good		245.9			\$ 150.00	\$ 36,885.00
	Concrete Swale	Good		20.4	1.0	20.4	\$ 300.00	\$ 6,120.00
R5			4th Avenue					
	Gravel Roadway	Fair		58.0	10.0	580.0	\$ 36.50	\$ 21,170.00
	Rolled Curb and Gutter	Good		52.7			\$ 150.00	\$ 7,905.00
R6			Cannon Court					
	Chipseal Roadway	Fair		125.0	10.5	1312.5	\$ 66.50	\$ 87,281.25
	Rolled Curb and Gutter	Good		264.1			\$ 150.00	\$ 39,615.00
R7			4th Avenue					
	Reclaimed Asphalt Shingles Roadway	Fair		305.5	11.5	3513.3	\$ 36.50	\$ 128,233.63
	Rolled Curb and Gutter	Good		528.7			\$ 150.00	\$ 79,305.00
	Concrete Swale	Good		20.0	1.1	22.0	\$ 300.00	\$ 6,600.00
R8			4th Avenue					
	Reclaimed Asphalt Shingles Roadway	Fair		302.5	9.5	2873.8	\$ 36.50	\$ 104,891.88
	Concrete Swale	Good		11.3	1.8	20.3	\$ 300.00	\$ 6,102.00
R9			4th Avenue					
	Reclaimed Asphalt Shingles Roadway	Fair		102.1	15.3	1562.1	\$ 36.50	\$ 57,017.75
	Monolithic Sidewalk	Good		138.7	1.2	166.4	\$ 300.00	\$ 49,932.00
	Rolled Curb and Gutter	Good		214.1			\$ 150.00	\$ 32,115.00
R10			5th Avenue					
	Reclaimed Asphalt Shingles Roadway	Fair		125.8	12.5	1572.5	\$ 36.50	\$ 57,396.25
R11			5th Avenue					
	Reclaimed Asphalt Shingles Roadway	Fair		164.9	10.5	1731.5	\$ 36.50	\$ 63,197.93
	Rolled Curb and Gutter	Good		307.5			\$ 150.00	\$ 46,125.00
R12			Thompson Street					
	Gravel Roadway	Fair		97.4	7.0	681.8	\$ 36.50	\$ 24,885.70
R13			Thompson Street					
	Gravel Roadway	Fair		84.8	7.5	636.0	\$ 36.50	\$ 23,214.00
R14			Thompson Street					
	Reclaimed Asphalt Shingles Roadway	Fair		207.9	8.0	1663.2	\$ 36.50	\$ 60,706.80
R15			Thompson Street					
	Gravel Roadway	Fair		208.0	8.0	1664.0	\$ 36.50	\$ 60,736.00
R16			Blake Crescent					
	Gravel Roadway	Fair		511.5	10.5	5370.8	\$ 36.50	\$ 196,032.38
	Rolled Curb and Gutter	Fair		1055.6			\$ 150.00	\$ 158,340.00
	Monolithic Sidewalk	Fair		1055.6	1.2	1266.7	\$ 300.00	\$ 380,016.00
	Concrete Swale	Good		10.6	1.8	19.1	\$ 300.00	\$ 5,724.00
R17			Jackson Avenue					
	Reclaimed Asphalt Shingles Roadway	Fair		159.7	7.0	1117.9	\$ 36.50	\$ 40,803.35
R18			Main Street					
	Reclaimed Asphalt Shingles Roadway	Good		209.8	8.0	1678.4	\$ 36.50	\$ 61,261.60



<u>Section ID</u>	<u>Asset Description</u>	<u>Asset Condition</u>	<u>Location</u>	<u>Length (m)</u>	<u>Width of Asset (m)</u>	<u>Area (m²)</u>	<u>Cost Per Unit</u>	<u>Total Value</u>
R19			Norman Avenue					
	Reclaimed Asphalt Shingles Roadway	Fair		176.5	8.0	1412.0	\$ 36.50	\$ 51,538.00
R20			Central Avenue					
	Asphalt Roadway	Good		524.5	9.5	4982.8	\$ 71.50	\$ 356,266.63
R21			Central Avenue					
	Gravel Roadway	Fair		92.9	8.0	743.2	\$ 36.50	\$ 27,126.80
R22			3rd Avenue					
	Gravel Roadway	Fair		244.7	9.5	2324.7	\$ 36.50	\$ 84,849.73
R23			2nd Avenue					
	Reclaimed Asphalt Shingles Roadway	Fair		57.0	10.6	604.2	\$ 36.50	\$ 22,053.30
R24			2nd Avenue					
	Reclaimed Asphalt Shingles Roadway	Fair		146.1	12.5	1826.3	\$ 36.50	\$ 66,658.13
R25			Rupert Street					
	Reclaimed Asphalt Shingles Roadway	Fair		125.9	10.5	1322.0	\$ 36.50	\$ 48,251.18
R26			Rupert Street					
	Gravel Roadway	Fair		62.8	7.5	471.0	\$ 36.50	\$ 17,191.50
R27			Rupert Street					
	Gravel Roadway	Fair		83.8	7.5	628.5	\$ 36.50	\$ 22,940.25
R28			Rupert Street					
	Gravel Roadway	Fair		83.9	7.5	629.3	\$ 36.50	\$ 22,967.63
R29			Rupert Street					
	Reclaimed Asphalt Shingles Roadway	Fair		376.1	6.5	2444.7	\$ 36.50	\$ 89,229.73
R30			7th Avenue					
	Gravel Roadway	Fair		137.9	10.0	1379.0	\$ 36.50	\$ 50,333.50
R31			8th Avenue					
	Reclaimed Asphalt Shingles Roadway	Fair		162.6	10.5	1707.3	\$ 36.50	\$ 62,316.45
	Rolled Curb and Gutter	Good		235.7			\$ 150.00	\$ 35,355.00
R32			6th Avenue					
	Gravel Roadway	Fair		116.8	9.5	1109.6	\$ 36.50	\$ 40,500.40
R33			Main Street					
	Reclaimed Asphalt Shingles Roadway	Fair		168.8	10.0	1688.0	\$ 36.50	\$ 61,612.00
R34			Main Street					
	Chipseal Roadway	Fair		233.6	9.5	2219.2	\$ 66.50	\$ 147,576.80
	Separate Concrete Sidewalk	Fair		167.3	1.1	184.0	\$ 300.00	\$ 55,209.00
R35			Main Street					
	Chipseal Roadway	Good		408.0	13.5	5508.0	\$ 66.50	\$ 366,282.00
	Separate Concrete Sidewalk	Good		349.3	1.8	628.7	\$ 300.00	\$ 188,622.00
R36			Elevator Road					
	Gravel Roadway	Good		430.2	6.5	2796.3	\$ 36.50	\$ 102,064.95
R37			Elevator Road / East Road					
	Gravel Roadway	Fair		880.3	6.5	5722.0	\$ 36.50	\$ 208,851.18
R38			Industrial Road					
	Gravel Roadway	Fair		482.4	8.0	3859.2	\$ 36.50	\$ 140,860.80
R39			Industrial Road					
	Gravel Roadway	Fair		83.5	7.5	626.3	\$ 36.50	\$ 22,858.13



**Appendix D: Sanitary Sewer Video Inspection Summary**

APPENDIX D  
SANITARY SEWER VIDEO INSPECTION SUMMARY  
2018

<u>Street Name:</u>	<u>Intersection</u>	<u>Upstream MH #:</u>	<u>Upstream MH Condition:</u>	<u>Downstream MH #:</u>	<u>Downstream MH Condition:</u>	<u>Sketch #</u>	<u>SS Size</u>	<u>SS Material</u>	<u>SS Length</u>	<u>SS Inspection Comments:</u>
Main Street	2nd Ave to 3rd Ave	MH 17	No Issue	MH 16	No issue	SK 1	200mm	Vitrified Clay	165m	Started out Submarined for the first 1.5m from MH 17. Survey Abandoned, camera could not travel over calcite @24.94m from MH 17 and @70.73m from MH 16. No camera in between.
Main Street	3rd Ave to 4th Ave	MH 16	Could not travel. Offset outside MH wall.	MH 15	Could not travel. Offset Outside MH wall.	SK 2	200mm	Vitrified Clay	109m	Survey Abandoned. No camera in between.
Main Street	4th Ave to 5th Ave	MH 15	Broken Pipe at bottom of MH, could not deploy camera.	MH 5	Submarined from 1 to 5m	SK 3	200mm	Vitrified Clay	108m	Camera could not travel. Something Under water caused it to stop @37.69m from MH 5. No camera between above point and MH 15.
Main Street	5th Ave to 6th Ave	MH 6	No Issue	MH 5	Could not get camera into pipe at MH 5	SK 4	200mm	Vitrified Clay	106m	No Issues, Full run (6 to 5)
Main Street	6th Ave to 7th Ave	MH 9	No Issue	MH 6	Could not get camera into pipe from manhole due to Offset.	SK 5	200mm	Vitrified Clay		No Camera between point @32.92m from MH 9 and MH 6.
Main Street	7th Ave to 8th Ave	MH 12	No Issue	MH 9	No issue	SK 6	200mm	Polyvinyl Chloride	113m	Full Run, No Issues (12 to 9)
8th Ave	Main st. to MH 13	MH 13	No Issue	MH 12	No issue	SK 7	200mm	Polyvinyl Chloride	77m	Full Run, No Issues (13 to 12)
8th Ave	MH 13 to Rupert St.	MH 14	No Issue	MH 13	No issue	SK 7	200mm	Polyvinyl Chloride	86m	Full Run, No Issues (14 to 13)
7th Ave	Main st. to MH 10	MH 10	No Issue	MH 9	No issue	SK 8	200mm	Vitrified Clay	97m	No issues in pipe other than over extended services. Camera stopped over Extended Service @24.63m from MH 10.
7th Ave	MH 10 to Rupert St.	MH 11 (North End)	Note: MH 11 does not exist, it is a cleanout. Pipe Capped.	MH 10	No issue	SK 8	200mm	Vitrified Clay		No issues in pipe other than over extended services. Camera stopped over Extended Service @3.47m from MH 10.
6th Ave	Main St. to MH 7	MH 7		MH 6	Camera Could not enter pipe due to Offset @ Manhole	SK 9	200mm	Vitrified Clay	75m	Camera stopped by Calcite @64.07m from MH 7. No Camera beyond above point up to MH 6.
6th Ave	MH 7 to Rupert St.	MH 8 (North End)	Note: MH 8 does not exist, it is a cleanout. (North End)	MH 7	No issue	SK 9	200mm	Vitrified Clay	48m	Full Run, No Issues ( MH 7 to North End)
5th Ave	Main st. to Rupert St.	MH 5	No Issue	MH 4	No issue	SK 10	200mm	Vitrified Clay	115m	Camera stopped by Calcite @47.14m from MH 5. Camera stopped by Calcite @16.77m from MH 4. No camera in between for 51.09m.

APPENDIX D  
SANITARY SEWER VIDEO INSPECTION SUMMARY  
2018

<u>Street Name:</u>	<u>Intersection</u>	<u>Upstream MH #:</u>	<u>Upstream MH Condition:</u>	<u>Downstream MH #:</u>	<u>Downstream MH Condition:</u>	<u>Sketch #</u>	<u>SS Size</u>	<u>SS Material</u>	<u>SS Length</u>	<u>SS Inspection Comments:</u>
Main Street	2nd Ave to 3rd Ave	MH 17	No Issue	MH 16	No issue	SK 1	200mm	Vitrified Clay	165m	Started out Submarined for the first 1.5m from MH 17. Survey Abandoned, camera could not travel over calcite @24.94m from MH 17 and @70.73m from MH 16. No camera in between.
Main Street	3rd Ave to 4th Ave	MH 16	Could not travel. Offset outside MH wall.	MH 15	Could not travel. Offset Outside MH wall.	SK 2	200mm	Vitrified Clay	109m	Survey Abandoned. No camera in between.
Main Street	4th Ave to 5th Ave	MH 15	Broken Pipe at bottom of MH, could not deploy camera.	MH 5	Submarined from 1 to 5m	SK 3	200mm	Vitrified Clay	108m	Camera could not travel. Something Under water caused it to stop @37.69m from MH 5. No camera between above point and MH 15.
Main Street	5th Ave to 6th Ave	MH 6	No Issue	MH 5	Could not get camera into pipe at MH 5	SK 4	200mm	Vitrified Clay	106m	No Issues, Full run (6 to 5)
Main Street	6th Ave to 7th Ave	MH 9	No Issue	MH 6	Could not get camera into pipe from manhole due to Offset.	SK 5	200mm	Vitrified Clay		No Camera between point @32.92m from MH 9 and MH 6.
Main Street	7th Ave to 8th Ave	MH 12	No Issue	MH 9	No issue	SK 6	200mm	Polyvinyl Chloride	113m	Full Run, No Issues (12 to 9)
8th Ave	Main st. to MH 13	MH 13	No Issue	MH 12	No issue	SK 7	200mm	Polyvinyl Chloride	77m	Full Run, No Issues (13 to 12)
8th Ave	MH 13 to Rupert St.	MH 14	No Issue	MH 13	No issue	SK 7	200mm	Polyvinyl Chloride	86m	Full Run, No Issues (14 to 13)
7th Ave	Main st. to MH 10	MH 10	No Issue	MH 9	No issue	SK 8	200mm	Vitrified Clay	97m	No issues in pipe other than over extended services. Camera stopped over Extended Service @24.63m from MH 10.
7th Ave	MH 10 to Rupert St.	MH 11 (North End)	Note: MH 11 does not exist, it is a cleanout. Pipe Capped.	MH 10	No issue	SK 8	200mm	Vitrified Clay		No issues in pipe other than over extended services. Camera stopped over Extended Service @3.47m from MH 10.
6th Ave	Main St. to MH 7	MH 7		MH 6	Camera Could not enter pipe due to Offset @ Manhole	SK 9	200mm	Vitrified Clay	75m	Camera stopped by Calcite @64.07m from MH 7. No Camera beyond above point up to MH 6.
6th Ave	MH 7 to Rupert St.	MH 8 (North End)	Note: MH 8 does not exist, it is a cleanout. (North End)	MH 7	No issue	SK 9	200mm	Vitrified Clay	48m	Full Run, No Issues ( MH 7 to North End)
5th Ave	Main st. to Rupert St.	MH 5	No Issue	MH 4	No issue	SK 10	200mm	Vitrified Clay	115m	Camera stopped by Calcite @47.14m from MH 5. Camera stopped by Calcite @16.77m from MH 4. No camera in between for 51.09m.

APPENDIX D  
SANITARY SEWER VIDEO INSPECTION SUMMARY  
2018

<u>Street Name:</u>	<u>Intersection</u>	<u>Upstream MH #:</u>	<u>Upstream MH Condition:</u>	<u>Downstream MH #:</u>	<u>Downstream MH Condition:</u>	<u>Sketch #</u>	<u>SS Size</u>	<u>SS Material</u>	<u>SS Length</u>	<u>SS Inspection Comments:</u>
5th Ave	Rupert st. to MH 3	MH 4	Large Offset from PVC to Clay at Manhole	MH 3	No issue	SK 11	200mm	Vitrified Clay		Camera stopped by Calcite @81m from MH 4. No camera after above until MH 3.
5th Ave	MH 3 to Thompson st.	MH 3	No Issue	MH 2	No issue	SK 12	200mm	Vitrified Clay	89m	Full Run, No Issues (MH 3 to MH 2)
2nd Ave	Main st. to Rupert St.	MH 18	No Issue	MH 17	No issue	SK 13	200mm	Vitrified Clay	78m	Camera stopped @11.41m from MH 17 due to large debris wedged in pipe. Camera stopped @2.4m from MH 18 due to major Offset - Repaired Fall 2018. No camera in between.
Rupert Street	2nd Ave to Central Ave	MH 18	No Issue	MH 29	No issue	SK 14	200mm	Vitrified Clay	104m	Camera submarined for 5m from MH 29 then stopped by debris under water. Camera stopped by Calcite @96m from MH 18. No camera between above points. No issue for 96m from MH 18.
Central Ave	Main st. to Rupert St.	MH 30	No Issue	MH 29	No issue	SK 15	200mm	Vitrified Clay	38m	Full Run, No Issues (MH 30 to MH 29)
Central Ave	Rupert st. to MH 28	MH 29	Calcite build-up at MH 29. Camera could not travel to MH 28.	MH 28	No issue	SK 16	200mm	Vitrified Clay	58m	Camera stopped @55m from MH 28 due to Calcite. No camera beyond above point up to MH 29. No issue for 55m from MH 28.
Central Ave	MH 28 to Thompson st.	MH 28	Could not get camera into pipe going towards MH 28	MH 27	No issue	SK 17	200mm	Vitrified Clay	107m	Camera stopped @44.66m from MH 28 due to Calcite. No camera beyond above point until MH 27.
Norman Ave	Main st. to MH 36	MH 37	No Issue	MH 36	No issue	SK 18	200mm	Vitrified Clay	77m	Full Run, No Issues (MH 36 to MH 37)
Norman Ave	MH 36 to Thompson st.	MH 36	No Issue	MH 35	Offset in pipe just outside MH	SK 19	200mm	Vitrified Clay	103.63m	Full Run, No Issue (MH 36 to MH 35)
3rd Ave	MH 24 to MH 23	MH 24	Camera could not travel. Calcite just outside Manhole.	MH 23	No issue	SK 20	200mm	Vitrified Clay	95m	Camera stopped due to over Extended Service @ 19.57m from MH 23. No Camera between above point and MH24 (75.43m).
3rd Ave	MH 23 to Thompson St.	MH 23	No Issue	MH 22	Broken Piece of clay pipe would not allow camera to travel outside MH 22	SK 21	200mm	Vitrified Clay	106m	Camera stopped due to Calcite @4.64m from MH 23. No camera between above point and MH 22 (101.36m).
3rd Ave	MH 22 to MH 25	MH 25	No Issue	MH 22	No issue	SK 22	200mm	Vitrified Clay	85m	Full Run, No Issues (MH 25 to MH 22)
Jackson Ave	Thompson St. to MH 40	MH 40	No Issue	MH 39	No issue	SK 23	200mm	Vitrified Clay		Camera stopped due to Calcite @18.14m from MH 39. Camera stopped over extended service @26.66m from MH 40. No camera in between above two points.
Jackson Ave	MH 40 to MH 41	MH 41	NOTE: Manhole does not exist. It is a cleanout. (South End)	MH 40	No issue	SK 23	200mm	Vitrified Clay	75m	Camera stopped due to piece of broken Claypipe stuck in pipe @8m from MH 40. No camera beyond above point until South end.

### Sanitary Sewer Video Inspection Photos



Figure 1: Calcite Buildup Blocking Camera (64m from MH 7 towards MH 6))



Figure 2: Extended Service (69.5m from MH 9 towards MH 10)

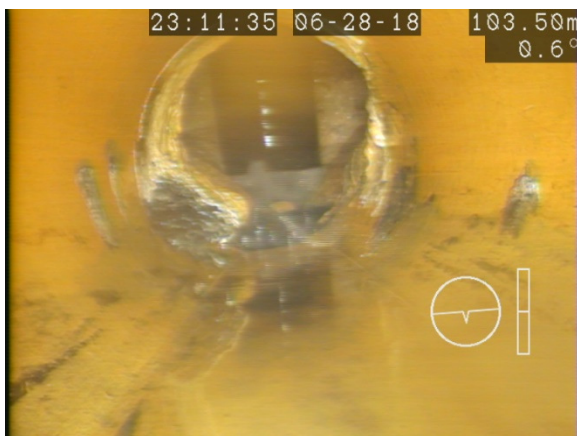


Figure 3: Calcite Buildup at Manhole (MH 5)



Figure 4: Calcite Buildup (69.62m from MH 16 towards MH 17)



Figure 5: Large Debris Lodged in Pipe (11.4 m from MH 17 toward MH 18)

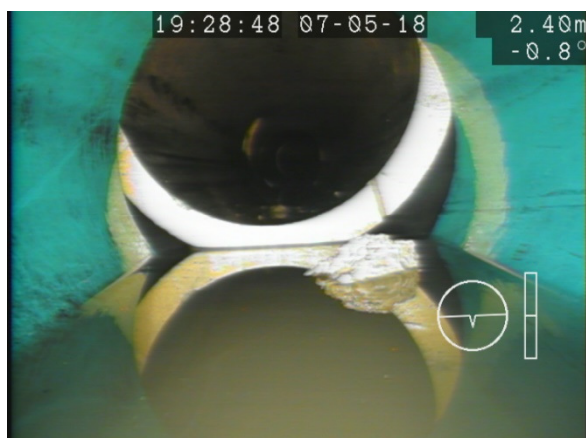


Figure 6: Major Offset (2.4m from MH 18 towards MH 17)





Figure 7: Calcite Buildup (4.6m from MH 23 towards MH 22)



Figure 8: Broken Piece of Clay Pipe (MH 22)



Figure 9: Over-extended Service with Calcite Buildup (19.6m from MH 23 towards MH 24)





Figure 10: Calcite Buildup (at MH 24)



Figure 11: Calcite Buildup (80.5m from MH 43 towards MH 19)



Figure 12: Calcium Buildup (MH 44)

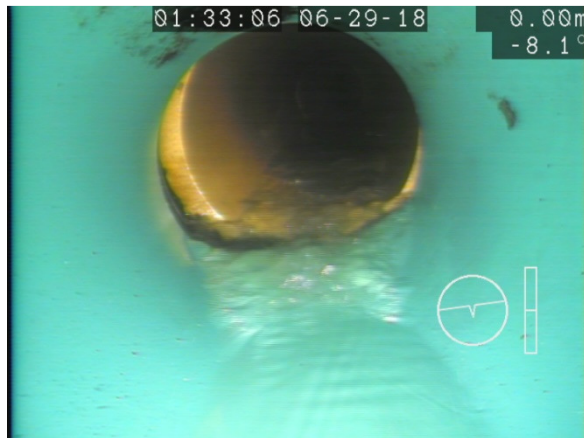


Figure 13: Large Offset from PVC to Clay at Manhole (MH 4)



Figure 14: Calcite Buildup (81m from MH 4 towards MH 3)



Figure 15: Calcite Buildup (47.1m from MH 5 towards MH 4)



Figure 16: Calcite Buildup (10.6m from MH 31 towards MH 32)



Figure 17: Calcite Buildup (15.5m from MH 32 towards MH 31)



Figure 18: Calcite Buildup (18m from MH 32 towards MH 33)



Figure 19: Calcite Buildup (87.74m from MH 33 to MH 32)



Figure 20: Calcite Buildup (56.6m from MH 34 towards MH 42)



Figure 21: Calcite Buildup (66.1m from MH 38 towards MH 42)





Figure 22: Calcite Buildup (4.1m from MH 42 towards MH 34)



Figure 23: Calcite Buildup (9.33m from MH 42 towards MH 38)



Figure 24: Calcite Buildup (44.66m from MH 28 towards MH 27)



Figure 25: Calcite Buildup (55m from MH 28 towards MH 29)



Figure 26: Calcite Buildup (18.14m from MH 39 towards MH 40)

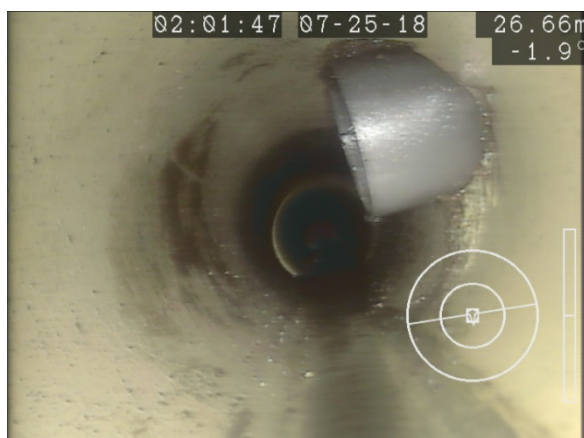


Figure 27: Over-extended Service (26.66m from MH 40 towards MH 39)

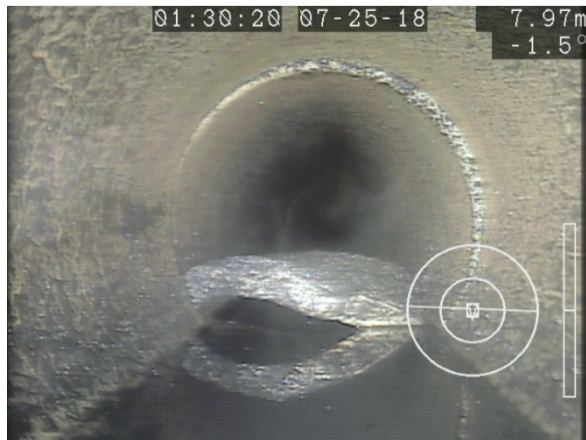


Figure 28: Broken Clay Pipe Piece (8m from MH 40 to MH 41)



Figure 29: Offset in Pipe Just Outside Manhole (MH 35)



Figure 30: Calcite Buildup (95.71m from MH 18 to MH 29)



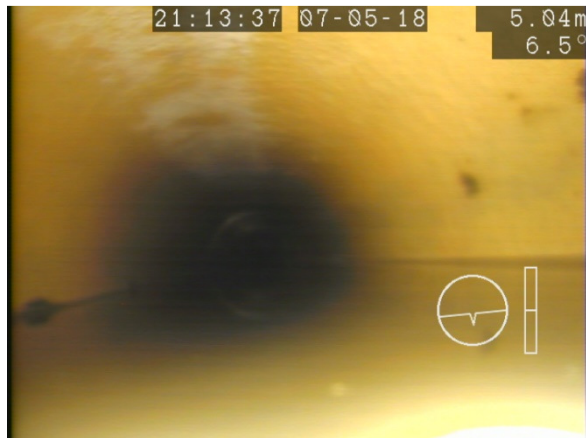


Figure 31: Submerged Section (5m from MH 29)



Figure 32: Calcite Buildup (3.75m from MH 22 towards MH 19)



Figure 33: Calcite Buildup (at MH 26)



Figure 34: Calcium Buildup (2.7m from MH 35 towards MH 31)

**Appendix E: Waterworks System Assessment Report**



**CATTERALL & WRIGHT**  
CONSULTING ENGINEERS

**CATTERALL & WRIGHT | CONSULTING ENGINEERS**

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June 2016



**WATERWORKS SYSTEM ASSESSMENT**

**FINAL REPORT FOR:  
TOWN OF ABERDEEN**

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## **1.0 Background and General Overview**

### **1.1 General**

Aberdeen, Saskatchewan, has a population of 670 persons (estimated by the Town). In April of 2010, the Town began receiving potable water via the SaskWater Saskatoon Northeast Treated Pipeline (surface water from the South Saskatchewan river treated by the City of Saskatoon WTP) and abandoned their treatment system. The Town provides storage and pumping to the distribution system. The previous WSA was completed in 2011.

An addition to the water pumphouse (WPH) was completed in 2012. The addition included an upgrade of the electrical system and replacement of one of the distribution pumps. The Highway 41 Water Utility added two pumps to feed their rural distribution system from the Town reservoirs. The existing filters were removed to create space for the new pumps.

### **1.2 Location**

The reservoirs and pump house are located on Lot 24, Blk/Par 9, Plan 101513078, in the Town of Aberdeen.

### **1.3 Inspection of Waterworks System**

The waterworks system inspection took place on July 23, 2015. The Town foreman and primary waterworks operator, Brad Oleksyn, was interviewed.

### **1.4 Operators and Certification**

The Town has two certified operators, Brad Oleksyn and Mural Hingston. Mr. Oleksyn holds WD2 and WT2 certifications and Mr. Hingston holds WD1 and WT1 certifications. There are no uncertified backup operators.

### **1.5 Previous WSA Report & Upgrades**

#### ***1.5.1 Identified Issues & Risks***

The previous WSA was completed in 2011. It identified the following issues and risks (paraphrased):

1. A chemical feed system is required to pump sodium hypochlorite and ammonium sulphate to allow for boosting of chloramines if required.
2. A double check valve is required on both the pailfill and the truckfill for backflow prevention.
3. A raised curb to 150 mm above the floor and a sealed cable entry are required at the access to Reservoir No. 1.



### **1.5.2 Recommendations**

Recommendations from the previous WSA (paraphrased):

1. Upgrades to the distribution pumps are recommended to suit the projected pumping requirements.
2. Both reservoirs are recommended to be cleaned.

### **1.5.3 Upgrades**

Since the previous WSA, the following upgrades were completed:

1. The pumphouse was expanded in 2012 to accommodate new electrical, a replacement distribution pump and distribution pumps for the Highway 41 Utility.
2. The pail fill has been removed.
3. A double check valve has been added to the truckfill to work with the existing vacuum breaker.
4. The access to Reservoir No. 1 has been upgraded to include an increased curb height to 150 mm as well as removing a control cable that used to pass through the access.
5. Approximately 600 m of distribution mains have been added.

## **2.0 Review of Available Information**

### **2.1 Plans, Reports, and Manuals**

Plans, reports, and manuals that were reviewed are listed in Appendix B. The records are generally complete and well kept.

Reports from the Environmental Project Officer (EPO) were reviewed from 2011-2015. The reports have generally been favourable.

### **2.2 Historic Problems**

There are no reports of historic problems.

## **3.0 Water Usage Analysis**

### **3.1 Population**

Table 3.1 is a summary of population statistics for the Town based on Census data from Statistics Canada, covered population information from Saskatchewan Health (SHSP) and information provided by the Town. SHSP figures are not always an accurate representation of the actual population, but are useful for estimating growth.

The Census data shows a population increase of about 2.7% from 2006 to 2015. SHSP data fluctuates between growth and decline, however long term population changes are approximately 1.4% over the past decade. At the time of the inspection, the Town estimated a current population of 670 and that a growth rate of approximately 1.4% would be reasonable.

For analysis purposes, a reported 2015 population of 670 and a future growth of 1.4% will be used.

**Table 3.1 – Population Summary**

<b>Year</b>	<b>Census</b>	<b>SHSP</b>	<b>Town</b>	<b>Forecast</b>
2006	527	759		
2007		780		
2008		790		
2009		772		
2010		756		
2011	599	979		
2012		984		
2013		1013		
2014			670	
2015				670
2020				718
2025				770
2030				825
2035				884

### 3.2 Consumption and Sizing

A water usage analysis and projection was completed based on data supplied by the Town. The results of the analysis are shown in Table C.1, Appendix C. The average daily per capita water usage for the last five years was approximately 275 Lpcd (litres per capita per day). The Water Security Agency of Saskatchewan (WSASK) statistics (based on Saskatchewan Health Covered Population data) indicate an average of 325-398 Lpcd for a Saskatchewan community of this size. For future projection in this analysis, an average usage of 300 Lpcd will be used. This is consistent with other communities using SaskWater supply pipelines.

Peaking factors are used to determine the sizing requirements of various components. The required size is determined by multiplying the average daily consumption by the peaking factors. Peak day demand is used to determine the required supply rate based on a 24 hour day. Calculated peak day usage factors have ranged from 2.11 to 2.54. For a community of this size, the WSASK recommends a peak day factor of 2.75 which is used herein. Distribution pumps are sized to supply the estimated peak hour usage. For a community of this size, the WSASK recommends a peak hour factor of 4.13 which is used herein. Treated water storage equal to 2 times average daily use is recommended for a system with fire protection.

Based on the estimated population of 625 persons and the aforementioned factors, the 2015 water requirements are estimated and summarized in Table 3.1. Further analysis and a 20 year projection, based on the same factors are included in Table C.1.

**Table 3.2 –Water Requirements (2015)**

<b>Estimated Average Day (m<sup>3</sup>)</b>	<b>Estimated Peak Day (m<sup>3</sup>)</b>	<b>Supply Rate (Lps)</b>	<b>Dist. Pumping Rate (Lps)</b>	<b>Storage (m<sup>3</sup>)</b>
201	553	6.4	9.6	402

## **4.0** Water Supply

### **4.1** **SaskWater Supply**

Potable water is supplied to the Town by the SaskWater Saskatoon Northeast Treated Pipeline (from the City of Saskatoon Water Treatment Plant). The supply pipeline adjacent to the building is 150 mm PVC pipeline. Inlet piping at the WPH includes a double check valve assembly, flow rate control valve, turbine water meter and solenoid fill valve (Photo 1).

There has been no change to the SaskWater supply agreement noted in the previous WSA. The details are as follows:

- Average flow rate: 5.6 Lps
- Maximum annual quantity: 176,602 m<sup>3</sup> (with the understanding that additional capacity will be provided, if available)

The contracted supply rate is less than the estimated 2015 peak day requirement but greater than the average.

During extended periods of high usage, it is possible that reservoir levels may be unacceptably low (i.e. less than half full). It is recommended that the Town monitor and record reservoir levels during high usage to determine reservoir levels fall unacceptably low. This can help determine if an increase in the contracted water supply rate is required.

The Highway 41 Utility is also drawing out of the Town's reservoir and their water supply allotment from SaskWater will also flow to the reservoir. The Town reports that a consistent incoming flow rate of 7.0 Lps is observed. This flow accounts for required volumes used by both the Town and the Utility. If stored water levels drop unreasonably low, the water supply agreement allows the Town to temporarily cut off water supply to the Utility. The usage and supply allotment will need to be monitored to ensure there is minimal impact to the Town's water supply.

## **5.0** General Water Pumphouse Facilities

The original WPH was constructed in 1964. The plant was expanded in 1984 and again in 2012. The interior is generally clean and well-kept.

The recently expanded area of the pumphouse houses upgraded electrical (Photo 8) and provides space for a future standby (fire) pump and standby power generator.

The access to the 1984 reservoir is outside and secured with a padlock.

The entrance has a storm door which is equipped with a locking handle. However, the door frame is rotted and the door can be opened without a key (Photo 15). Upgrades are required to this entrance to ensure that the building can be locked and secured.

The WTP is equipped with an autodialler to notify the operator of abnormal conditions.

## **6.0**     **Water Treatment Process**

### **6.1**     **Process Description**

Potable water enters the WPH building and is discharged to Reservoir No. 2 for storage. The water circulates to Reservoir No. 1 and then to the distribution pumps. Chlorine in the supplied water is manually monitored. Distribution pressure is maintained with the use of variable frequency drives (VFD's) on the pumps.

### **6.2**     **Water Treatment Chemicals**

#### **6.2.1**     ***Chlorine and Ammonia***

At the time of the inspection, the Town did not have a chemical feed system and no chemicals were being fed. Since the time of the inspection, the Town has installed a chemical feed system that allows for addition of chemicals (sodium hypochlorite and ammonium sulphate) to boost chloramines in the incoming water. The chemical drums on site are marked with gradations for the Town to record chemical usage.

In 2014, total chlorine residuals at the pumphouse ranged from 0.93 mg/L to 1.64 mg/L. The Town is consistently exceeding the minimum requirement of 0.5 mg/L.

### **6.3**     **Treated Water Quality**

Extensive water quality testing is not necessary because good quality, treated potable water is received from SaskWater (which is treated by the City of Saskatoon). Typical water quality information is available from [www.sask20.com](http://www.sask20.com) under "City of Saskatoon".

In 2014, treated water turbidity ranged from 0.10 NTU to 0.39 NTU. The Town's permit does not have an applied limit for turbidity.

### **6.4**     **Disinfection**

Primary disinfection of the water supplied to the Town is achieved at the City of Saskatoon water treatment plant. Disinfection analysis is not required for the Town. The City of Saskatoon water treatment plant uses monochloramine for secondary disinfection. Total chlorine content must be monitored at the pumphouse. Free chlorine content is very low, if any.

## 7.0 Treated Water Storage

There have been no changes to the treated water capacity since the previous WSA.

Treated water is stored in two below grade reinforced concrete reservoirs. Table 7.1 lists reservoir capacities.

Table 7.1 – Reservoir Characteristics		
Reservoir	Year Constructed	Reservoir Capacity (m <sup>3</sup> )
1	1964	113
2	1984	489
Total = 602		

Incoming water is discharged to the far side Reservoir No. 2 (Photo 2), flows through the reservoir to the connecting pipe to Reservoir No. 1. The water then flows across Reservoir No. 1 to the distribution pumps.

Water storage available is adequate for the projected Town requirements. This has not included any allowance for the water used by the Highway 41 Utility. As mentioned previously, the water supply agreement allows the Town to temporarily cut off water supply to the Utility if stored water levels drop unreasonably low. Regular review of the water use and storage requirements for the actual Utility use is recommended to ensure there is minimal impact on the Town system.

The reservoirs can be isolated for maintenance and inspection. The reservoirs have not been cleaned since the previous WSA. Recent EPO reports have indicated that the plant was quite dirty during the recent upgrade. Given that the plant was dirty and the reservoirs have not been cleaned for a while, it is recommended that both reservoirs be cleaned. Temporary distribution pumping may be required to facilitate cleaning of Reservoir No. 1.

The previous WSA noted that the steel curb for the access to Reservoir No. 1 was only 38mm high. The access was also not properly sealed as it had a control cable passing through the opening. Since the previous WSA, the curb has been raised to 150 mm and the control cable has been removed from the access (Photo 5).

The steel cover for the access to Reservoir No. 2 is outside and set on a concrete curb, which is approximately 150 mm above the adjacent grade. The most recent EPO report indicated that the gasket at the access hatch required replacement. The Town must ensure that the access is properly sealed. The exterior reservoir access is locked, and the reservoir vent is protected with an insect screen (Photo 6).

Reservoir No. 1 has an overflow pipe to the sanitary sewer. This overflow pipe does not have backflow prevention. The discharge space does not have adequate room to install a backflow preventer. It is recommended that this overflow be removed and the wall grouted and properly sealed. An allowance for temporary pumping may be required.

## 8.0 Distribution System

The WPH is equipped with two distribution pumps. There are also two distribution pumps that supply the Highway 41 Utility (Photo 9) which are owned and operated by the Utility. These two pumps do not supply water to the Town. A summary of the pumps available to the Town's distribution system are shown in Table 8.1.

**Table 8.1 – Pump Descriptions**

Pump No.	Type	Manufacturer/ Model	Installed	hp	Flow (Lps)	Head (m)
1	Primary	Goulds VIT-CT	2012	10	12.1	42.7
2	Secondary, Electric Driven	Johnston	1964	10	6.3	31.6
	Secondary, Natural Gas Engine Driven	Johnston	1964	---	27.8	31.6

Pump No. 1 (Photo 3) was installed with the recent upgrades. Both pumps received new 10 hp motors at the same time.

Pump No. 2 (Photo 4) can be driven by either electric motor or by a natural gas engine. When needed, the engine drive is manually operated at a greater RPM than the electric motor to supply more water. SaskPower conducted a review of the natural gas engine and placed an "Unsatisfactory Condition Report" tag on the engine. It notes that the engine is not CSA approved, exhaust piping is leaking CO<sub>2</sub> at 32 ppm, parts are obsolete, and replacement is recommended.

The motor driven pumps are speed controlled by variable frequency drives (VFD's) to provide near constant pressure. Pumps are brought into service by a fixed roster in the VFD programming; this involves Pump No. 1 always acting as the lead pump and Pump No. 2 being added when pressure drops below 45 psi.

The Town currently does not have a backup generator to mitigate a power outage; rather, the operators start the engine driven pump as quickly as they can. This leads to distribution system pressure reductions when relying on operator response time to resume pumping. The current state of the engine driven pump indicates that an alternative backup power source is required for power outages. The Town is planning to install a backup generator and an electric standby pump (for fire flows) in the newest portion of the building. Initial generator sizing is estimated at 150 kW and would allow for operation of the electric standby pump as well as the main distribution pumps. The electric standby pump is estimated to be a 60 hp pump with a capacity of 75.7 Lps (1200 USgpm). It is possible that the generator size could be reduced if standby pump capacity is reduced or other process equipment is locked out from operation, however further consultation is required with the Town.

Additional upgrades would be required to accommodate this upgrade (e.g. building revisions for air intake, controls, etc.), however they are beyond the scope of this report.

The distribution pumping capacity is sufficient to provide the estimated distribution pumping requirements for approximately 17 years. The distribution pumps do not have 100% redundancy, however the Town's requirements can be managed with Pump No. 1 operating on its own. Pump No. 2 is recommended to be upgraded to



match the capacity of Pump No. 1 when the future generator is installed. Discharge pressure at the plant is 45 psi to 50 psi.

The distribution header has a pressure relief valve which is intended to limit the maximum pressure in the distribution system. The current pressure relief valve is insufficient to function with the current and future pumps. The pressure relief valve must be replaced when pump upgrades are completed.

The WPH has an exterior, coin operated truck fill on the east side of the building (Photos 10-12). Water is supplied to the truck fill by a dedicated pump, capable of providing 7.0 Lps at 9.8 m of TDH. The truck fill is equipped with a double check valve and a vacuum breaker. The WPH was also previously equipped with an exterior pail fill facility, however it has been removed.

New services on the distribution system are required to be provided with backflow prevention. Commercial service connections as well as some residential service connections are required to be equipped with backflow prevention.

The distribution system consists of approximately 7,800 m of A.C. and PVC pipe (primarily 150 mm) plus services. Approximately 600 m of the aforementioned total length has been added since the previous WSA.

## 9.0 Water System Capacities

Table 9.1 is a summary of the capacity and remaining service life of major components within the waterworks system. The table makes reference to the 20-year design population of 884.

**Table 9.1 – Capacity and Remaining Service Life of Waterworks Components**

	Item	Year Installed	Existing Capacity	Serviceable Population	Typical Service Life (years)	Estimated Remaining Service Life (years)
<b>Storage</b>	Reservoir Storage	1964-1984	602 m <sup>3</sup>	> 884	50	10-20
<b>Distribution</b>	Distribution Pumps	1964 to 2012	12.1 <sup>①</sup>	845	30	5-25
	Engine Driven Standby Pump	1964	27.8 Lps	---	30	5-15
	Distribution Piping	1960's-2014	---	---	50	5-50

<sup>①</sup> Distribution pumping capacity with the largest pump (Pump No. 2 out of service)

Reservoir storage volume is sufficient for the 20-year design population. Highway 41 Utility usage should be closely monitored to determine if it is negatively affecting the water supply to the Town.

The distribution pumps are adequate for approximately 17 years with Pump No. 2 out of service. Pump No. 2 is recommended to be upgraded to match the capacity of Pump No. 1 when the future generator is installed.

A new generator is recommended to provide backup power and to eliminate reliance on the existing engine driven pump during power outages. A new, larger electric

standby pump is recommended to be installed at the time of the new generator installation to provide fire capacity to the Town.

Some of the older distribution piping has reached the end of its normal service life and the Town should consider a long term plan for main replacement.

## 10.0 Testing Procedures and Records

The Town has a Hach Pocket Colorimeter II (total and free chlorine) and a Hach 2100P Turbidimeter (Photo 13). Both pieces of equipment are in good condition and calibration checks are done regularly. The Town tests regularly for both chlorine and turbidity. Work bench space within the plant is minimal (Photo 14).

The Town samples weekly for bacteriological quality and quarterly for trihalomethanes (THMs) as outlined in the Town's Permit to Operate. Bacteriological testing results have been acceptable and all repeat samples of positive samples have been negative. THM results, as shown in Appendix A, have all been well below the MAC.

The Town now has provision to boost chloramines in the incoming treated water if necessary. The Town is required to record chemical usage.

Daily testing records are maintained at the WPH. The records appear to be complete.

## 11.0 Operation and Maintenance

Daily plant operation includes chlorine residual testing, turbidity testing, meter readings, general plant review and maintenance as necessary.

The WPH is maintained in good condition. The maintenance performed is adequate and records are well kept and appear to be complete.

The Town reports that the distribution system hydrants and valves are exercised annually in the fall during directional flushing of the water mains.

O&M manuals were not available for review.

## 12.0 Metering and Water Usage Reporting

Table 12.1 lists the meters that are present in the water pumphouse:

Table 12.1 – Water Pumphouse Meters			
Meter Location	Type	Registers	Reported to WSASK
Supply*	Turbine	m <sup>3</sup>	Yes
Truckfill	Turbine	lgal	No
Hwy 41 Distribution <sup>+</sup>	Turbine	m <sup>3</sup>	No

\*Owned by SaskWater

<sup>+</sup>Owned by Hwy 41

### 13.0 Wastewater

This system does not generate process waste water. Wastewater (floor drainage, etc.) is directed to the sanitary sewer system.

### 14.0 Waterworks Cost Analysis

A waterworks cost analysis was completed to assist the Town in identifying water rates that will support the financial sustainability of the waterworks. This analysis provides a basis for full-cost pricing. Full-cost pricing is intended to generate sufficient revenue to recover all waterworks related expenses. It also heightens the value of the resource to consumers, and can affect consumers' usage habits.

The process of setting water rates can be complex with many variables. Some of these variables include the age of waterworks components (older systems tend to have a higher frequency of failure), previous debts incurred, and providing predictable rate increases for consumers. For the purposes of analysis, the following is intended to provide a screening level review to help assess the Town's ability to recoup its waterworks related expenses.

The waterworks cost analysis has been completed based on the following information supplied by the Town:

- A summary of annual operations and maintenance costs from the previous five years;
- Estimated unaccounted (non-billed) water usage; and
- The current water rate structure for the Town.

This analysis looks at operations and maintenance costs, capital replacement costs over the lifetime of the waterworks, and provides a comparison of recommended water rates with the current water rates provided by the Town.

#### 14.1 **Operations and Maintenance Costs**

Waterworks operations and maintenance (O&M) costs consist of items such as chemicals, electricity, personnel, sampling/monitoring and routine maintenance. Routine maintenance consists of expected, planned or repeated maintenance items (ie: water main repair, water pumphouse maintenance and supplies, and meter replacements). O&M costs can either be fixed (ie: building heating, salaries, professional development) or variable (ie: bulk water purchase, chemical usage) with respect to water consumption.

Non-billed (non-metered) water is considered as a variable O&M cost. Non-billed water usage includes water that is unaccounted for through water main breaks, distribution system leaks, distribution system flushing and swabbing, firefighting/training, unmetered facilities and meter discrepancies. This usage is determined by comparing metered volumes of treated water leaving the water treatment plant with metered volumes from utility billings. The Town provided records of their volumes billed to consumers and bulk purchases from SaskWater for

the past three years. These records indicate that approximately 8% of incoming water is not billed to consumer. Non-billed water is typically in the range of 10-30%.

The Town provided O&M costs for the previous five years. Refer to Appendix F. Table 14.1 and Table 14.2 break these O&M costs into fixed and variable costs respectively. Variable costs have been adjusted to account for non-billed water. The Annual Operations and Maintenance Costs provided by the Town include the costs of non-routine (unplanned) maintenance over the past five years.

**Table 14.1 – Fixed Operation and Maintenance Costs**

Year	Fixed Annual O&M Cost
2010	\$108,326.71
2011	\$129,808.09
2012	\$138,772.49
2013	\$147,124.20
2014	\$155,291.06

<b>Fixed Average Annual O&amp;M Costs</b>	<b>\$135,864.51</b>
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### Table 14.2 – Variable Operation and Maintenance Costs

Year	Annual O&M Cost	Annual Water Use (m³)	O&M Cost Per m³	O&M Cost Per 1000 gal
2010	\$172,010.35	37,907	\$4.54	20.63
2011	\$207,320.37	54,686	\$3.79	17.23
2012	\$173,827.52	61,119	\$2.84	12.93
2013	\$203,912.72	65,007	\$3.14	14.26
2014	\$196,165.56	67,241	\$2.92	13.26

<b>Average</b>	\$190,647.30	57,192	\$3.45	\$15.66
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<b>Unaccounted Water Use</b>	8%	8%
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<b>Variable O&amp;M Costs per Metered Volume</b>	<b>\$3.72</b>	<b>\$16.92</b>
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## 14.2 Capital Replacement Costs

Capital replacement costs are fixed costs to the Town. Although they may not be required today, a proportion of this cost must be allocated annually to ensure that waterworks infrastructure is sustainable in the long term. An estimate of capital replacement costs for major waterworks system components is shown in Table 14.3. The total estimated annual replacement cost represents the average amount that should be placed in reserves annually. The table identifies major system components, each with its associated current estimated replacement cost and estimated average service life.

**Table 14.3 – Capital Replacement Costs**

	<b>Current Estimated Replacement Cost</b>	<b>Estimated Average Service Life</b>	<b>Annualized Cost<sup>①</sup></b>
<b>Water Plant Facilities</b>			
Building	\$100,000.00	30	\$3,206.04
Mechanical (less distribution pumps)	\$50,000.00	30	\$1,603.02
Electrical (less generator)	\$100,000.00	20	\$4,870.11
<b>Storage</b>			
Reservoir Storage	\$800,000.00	50	\$15,003.29
<b>Distribution</b>			
Pumps	\$100,000.00	30	\$3,206.04
Distribution System <sup>③</sup>	\$2,350,000.00	50	\$44,072.15
Truckfill Facilities	\$20,000.00	20	\$974.02

**Fixed Annual Capital Replacement Cost** **\$72,934.68**

<sup>①</sup>Annualized Cost based on an assume interest rate of 0.25% over the estimated average service life of the waterworks component

## 14.3 Suggested Water Rates

Based on the foregoing cost summaries, the following water rates are provided for comparison to the current water rates. These rates are suggested to meet the waterworks costs outlined in Sections 14.1 and 14.2 to ensure a financially self-sustaining system. These rates have been generated on the basis of a fixed base cost plus an incremental cost per volume used, and then adjusted to model the current water rate structure for the purpose of comparison.

**Table 14.4 – Fixed Monthly Cost per Meter**

Operations and Maintenance	\$135,864.51
Capital Replacement	\$72,934.68
<b>Total Average Annual Fixed Costs</b>	<b>\$208,799.19</b>
Total Average Monthly Fixed Costs	\$17,399.93
Number of Meters (for billing purposes)*	273
<b>Fixed Monthly Cost per Meter</b>	<b>\$63.74</b>

\*Number of meters provided by Town

**Table 14.5 – Variable Cost per Metered Volume**

	<b>Variable Cost per m<sup>3</sup></b>	<b>Variable Cost Per 1000 lgal</b>
Variable Operations and Maintenance Costs	<b>\$3.72</b>	<b>\$16.92</b>

A base rate of **\$63.74** plus an additional **\$16.92 per 1000 lgal** (\$3.72 per cubic meter) is suggested for a full-cost recovery of waterworks related expenses. The recommended water rates do not account for inflation, and an appropriate inflation rate will need to be applied.

#### 14.4 Waterworks Sustainability

Table 14.7 compares the Town's current rate structure to the suggested water rates for full cost recovery of waterworks related expenses. Both rates are compared based on a 2014 average consumption of 20.5 m<sup>3</sup> (4,500 lgal) per meter per month.

**Table 14.7 – Reported 2015 Water Rates vs. Suggested Water Rates**

<b>2015 Aberdeen Monthly Water Rates</b>		
Usage Rate	\$4.41 / m <sup>3</sup>	\$20.00 /1000 lgal
Infrastructure Fee	\$35.00	\$35.00
Average Monthly Usage per Meter	20.5 m <sup>3</sup>	4500 lgal
<b>Average Monthly Revenue per Meter</b>		<b>\$125.00</b>
*Water rates and fees provided by Town		
<b>Suggested Water Rates</b>		
Base Rate (including infrastructure fee)	\$63.74	\$63.74
Usage Rate (each unit of usage)	\$3.72 / m <sup>3</sup>	\$16.92 / 1000 lgal
Average Monthly Usage per Meter	20.5 m <sup>3</sup>	4500 lgal
<b>Average Monthly Cost per Meter</b>		<b>\$139.89</b>

The Town's 2015 expected water related revenue is less than the revenue expected from the recommended water rates. This analysis suggests that the Town is recouping approximately 89% of their waterworks related expenses. It is recommended that the Town review their current water rates to determine if a rate increase is required.

The Town has kept detailed, consistent records of all waterworks related cost components over the past five years. It is important for the Town to continue these good record keeping practices to help review and establish future water rates.

The foregoing analysis has been generated based on variable assumptions, and is intended to provide a limited basis to establish appropriate water rates. The Town should continue to monitor long term utility revenues, expenditures and reserve funding to see if water rates need to be revised.



## **15.0** Recommendations

Issues & Risks are those items which have potential to adversely affect the ability to supply safe drinking water. Recommendations are items of system improvement.

### **15.1** **Issues & Risks**

Issues & Risks are those items which have potential to adversely affect the ability to supply safe drinking water. Recommendations are items of system improvement.

#### **15.1.1** ***Exterior Storm Door***

Upgrades are required to the storm door and lock at the entrance to the original portion of the WPH to ensure that the building can be properly secured. The estimated cost is \$3,000.

#### **15.1.2** ***Reservoir No. 2 Access***

EPO reports indicate that the gasket at the access to Reservoir No. 2 requires replacement. The Town must ensure that the access is properly sealed.

#### **15.1.3** ***Reservoir Overflow Backflow Prevention***

The overflow from Reservoir No. 1 to the sanitary sewer is required to be removed to eliminate a contamination hazard. The estimated cost is \$1,000 (allowance for temporary pumping may be required). This can be coordinated with reservoir cleaning (see Section 15.2.3).

### **15.2** **Recommended System Improvements**

#### **15.2.1** ***Standby Generator and Electric Standby Pump***

A backup generator and a new electric standby pump are recommended to be installed in the expanded portion of the building.

The estimated cost for a 150 kW generator is \$130,000. The estimated cost of a 60 hp electric standby pump (75.7 Lps, 1200 USgpm) is \$50,000.

Additional upgrades would be required to accommodate this upgrade (e.g. building revisions for air intake, controls, etc.), however they are beyond the scope of this report.

#### **15.2.2** ***Distribution Pump and Pressure Relief Upgrades***

Pump No. 2 is recommended to be upgraded to match the capacity of Pump No. 1 when the generator is installed. The pressure relief valve must be upgraded at the same time. The estimated cost for both of these upgrades is \$50,000.

#### **15.2.3** ***Reservoir Cleaning***

It is recommended that both reservoirs be cleaned. The estimated cost is \$5,000 (allowance for temporary pumping may be required).

## 16.0 Conclusion

The Aberdeen WPH is generally in good condition however, there are a few upgrades/revisions required. The Town has been doing a good job of general pumphouse operation.

We trust that the foregoing report fulfills the requirements for this assessment. If you require further information, please contact our office.

"I, the undersigned, declare that the information contained within this submission is, to the best of my knowledge, complete and accurate, and has been prepared in accordance with the standard for this submission as published by the Saskatchewan Water Security Agency."

Respectfully submitted,

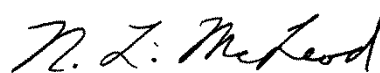
Catterall and Wright

Per:



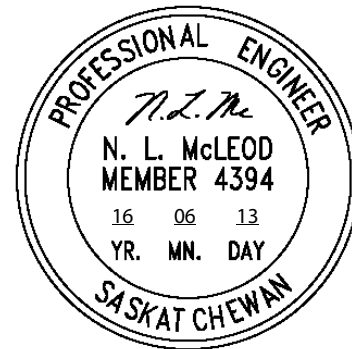
David Fong, P.Eng.

Reviewed:



Lyle McLeod, P.Eng.

Association of Professional Engineers & Geoscientists of Saskatchewan		
CERTIFICATE OF AUTHORIZATION		
CATTERALL & WRIGHT		
Number C848		
Permission to Consult held by:		
Discipline	Sk. Reg. No.	Signature
CIVIL	04394	<i>N. L. McLeod</i>



# Appendix A

## Water Quality Data

### Contents:

Table A.1 – Water Quality Data

Page 1

Table A.1 - Town of Aberdeen - Water Quality Analysis Results

	Units	Total THM	Annual Average
SDWQS MAC	mg/L		100
Date:			
	mg/L		
13-Jul-15	mg/L	48.1	47.3
22-Apr-15	mg/L	54.3	
19-Jan-15	mg/L	39.5	
15-Oct-14	mg/L	48.1	41.3
14-Apr-14	mg/L	32.1	
07-Jan-14	mg/L	43.6	
29-Oct-13	mg/L	47.7	47.0
23-Jul-13	mg/L	59.0	
22-Apr-13	mg/L	34.3	

Water quality data from [www.saskh2o.ca](http://www.saskh2o.ca), accessed October 23, 2015

SDWQS - Saskatchewan Drinking Water Quality Standards

MAC - Maximum Acceptable Concentration

For more detailed water quality info, refer to tests for City of Saskatoon

## **Appendix B**

### **List of Plans, Reports and Manuals**

#### Contents:

Table B.1 – List of Plans, Reports and Manuals

Page B2

**Table B.1 – List of Plans, Reports, and Manuals**

<b>Title</b>	<b>Consultant</b>	<b>Date</b>	<b>Comments/Description</b>
Town of Aberdeen WTP Upgrade 1984	Catterall & Wright	1984	Reservoir expansion and plant upgrade
Town of Aberdeen Waterworks System Assessment	SAL Engineering Ltd.	2004	
WSA – Round 2	Catterall & Wright	2011	
EPO Reports		2010-2014	



## **Appendix C**

### **Tables, Figures and Drawings**

#### Contents:

Table C.1 – Water Usage Analysis	Page C2
Figure C.1 – Reservoir Piping Plan	Page C3

Table C.1 - Town of Aberdeen - Water Usage

	Year	Estimated Population	Data		Calculated			Design Capacities <sup>†</sup>		
			Annual Water Use(m <sup>3</sup> )	Peak Day (m <sup>3</sup> )*	Average Day (m <sup>3</sup> )	Peak Day Factor	Average Usage Per capita per day (Lpcd)	Supply Rate (Lps)	Distribution Pumping Rate (Lps)	Storage (m <sup>3</sup> )
RECORDED DATA	2010	585	60,910	376	167	2.25	285	4.3	8	334
	2011	599	54,686	338	150	2.25	250	3.9	7.2	300
	2012	617	60,986	353	167	2.11	271	4.1	8	334
	2013	635	65,587	423	180	2.35	283	4.9	8.6	360
	2014	652	66,794	464	183	2.54	281	5.4	8.7	366
FORECAST/ ESTIMATE	2015	670	73,365	553	201	2.75	300	6.4	9.6	402
	2020	718	78,621	592	215	2.75	300	6.9	10.3	431
	2025	770	84,315	635	231	2.75	300	7.4	11	462
	2030	825	90,338	681	248	2.75	300	7.9	11.8	495
	2035	884	96,798	729	265	2.75	300	8.4	12.7	530
Current								5.6	12.1	602

Estimated population based on Census Data from Statistics Canada and 1.4% future growth rate

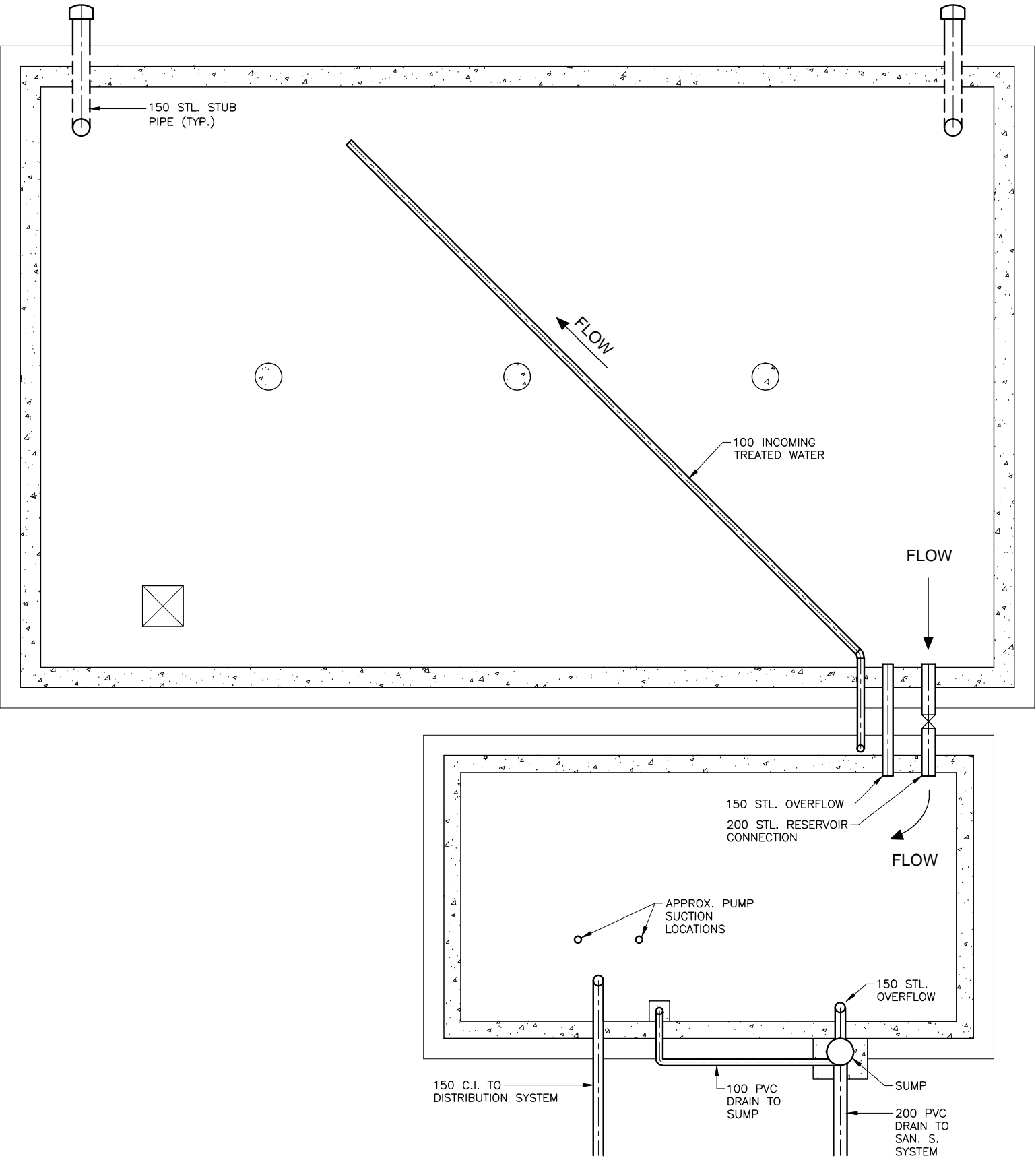
† As suggested by Saskatchewan Watershed Authority Community Water Use Records Report No. 27

Supply rate based on peak day use and 24 hour production day

Distribution pumping rate based on 4.13 times average day use

Storage based on 2 times average day use

Peak day unavailable for 2010-2011. Estimated using a peak day factor of 2.25



CATTERALL & WRIGHT  
CONSULTING ENGINEERS

1221 - 8th Street East  
SASKATOON SK S7H 0S5  
Tel: (306) 343-7280, Fax: (306) 956-3199

SCALE VERIFICATION  
WHEN DRAWING IS PLOTTED FULL SIZE  
THIS LINE IS 30mm IN LENGTH.

DATE

REVISION

OWNER

TOWN OF  
ABERDEEN

LOCATION

ABERDEEN, SK

PROJECT

WATERWORKS SYSTEM  
ASSESSMENT ROUND 3

SHEET TITLE

RESERVOIR PIPING PLAN

SCALE

1:75

DESIGNED

DRAWN

D.F.

CHECKED

S.M.

DATE

SHEET

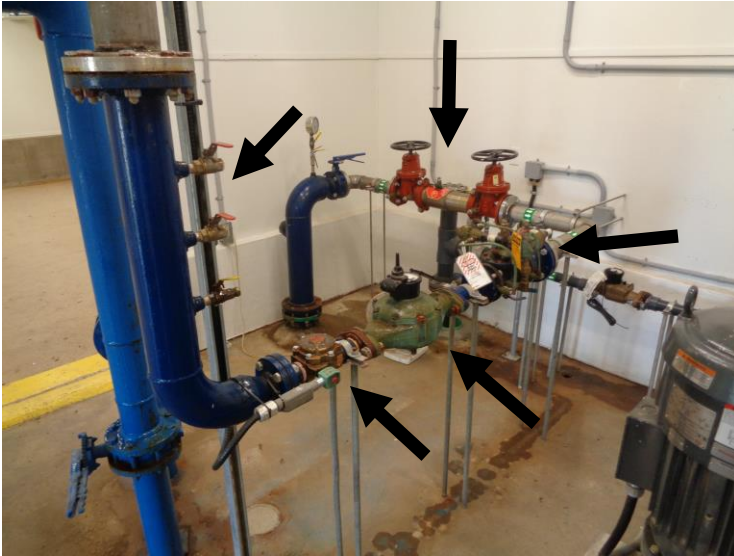
1 of 1

DRAWING  
NUMBER

FIG. C.1

## **Appendix D**

### **Pictures**



**Photo 1**

Water Supply Influent  
(Clockwise from back:  
backflow preventer, flow  
control valve, flow meter,  
solenoid fill valve, future  
chemical points of  
application)



**Photo 2**

Discharge to reservoirs



**Photo 3**

Distribution Pump No. 1  
(left) and hydro  
pneumatic tank (right)



**Photo 4**

Pump No. 2 (electric and engine driven standby)



**Photo 5**

Reservoir No. 1 access – curb height extended to 150 mm



**Photo 6**

Reservoir No. 2 – exterior access





**Photo 7**  
WPH exterior and  
exterior Reservoir No. 2



**Photo 8**  
Upgraded electrical



**Photo 9**  
Highway 41 Utility  
distribution pumps





**Photo 10**  
Truck fill pump



**Photo 11**  
Clockwise from bottom:  
Truck fill backflow  
preventor, extension for  
air release (air release not  
shown), flow meter



**Photo 12**  
Truck fill exterior



**Photo 13**  
Water testing equipment



**Photo 14**  
Work bench space



**Photo 15**  
Building access to  
original portion of  
building  
- Rotten door  
frame (right)

## **Appendix E**

### **C\*t Calculation – Not Required**

## **Appendix F**

### **Waterworks Cost Analysis**

#### Contents:

Table F.1	-	Operations and Maintenance Expenses 2010-2014	Page F2
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Table F.1 - Operational and Maintenance Costs

	Fixed/ Variable	2010	2011	2012	2013	2014
Personnel						
Wages and Benefits	F	\$95,438.62	\$119,417.96	\$130,659.60	\$142,912.97	\$149,150.02
		\$95,438.62	\$119,417.96	\$130,659.60	\$142,912.97	\$149,150.02
Professional/Contractual Services						
Street Water Repairs	V	\$5,710.10	\$30,789.69	\$4,536.35	\$9,148.19	\$1,495.00
Lab Testing	F	\$3,063.40	\$3,672.99	\$2,631.25	\$1,583.01	\$2,241.41
		\$8,773.50	\$34,462.68	\$7,167.60	\$10,731.20	\$3,736.41
Utilities						
Heat	F	\$677.92	\$686.73	\$764.30	\$733.71	\$1,054.01
Power	V	\$1,752.88	\$6,200.00	\$1,733.05	\$7,199.86	\$5,883.19
Telephone	F	\$0.00	\$0.00	\$664.08	\$377.50	\$437.89
SaskWater Annual Connection Fee	V	\$29,348.78	\$40,625.00	\$37,500.00	\$37,500.00	\$34,375.00
SaskWater Monthly Water Charges	V	\$72,819.36	\$105,051.80	\$123,722.76	\$141,127.14	\$145,413.26
		\$104,598.94	\$152,563.53	\$164,384.19	\$186,938.21	\$187,163.35
Maintenance, Materials and Supplies						
Repairs, Equipment and Meters	V	\$28,147.86	\$1,279.66	\$6,154.36	\$8,783.23	\$8,312.01
Small Tools and Equipment	F	\$327.46	\$3,600.00	\$90.00	\$244.21	\$152.38
WTP Repairs	F	\$8,144.23	\$459.69	\$2,801.23	\$325.14	\$167.09
Chemicals	V	\$2,129.80	\$253.42	\$110.00	\$154.30	\$687.10
		\$38,749.35	\$5,592.77	\$9,155.59	\$9,506.88	\$9,318.58
Administration						
Conference Fees/Memberships	F	\$675.08	\$746.94	\$1,162.03	\$947.66	\$2,088.26
Sask Water Project Costs	V	\$53.78	\$13,500.00	\$0.00	\$0.00	\$0.00
Other Misc.	V	\$32,002.79	\$4,895.20	\$71.00	\$0.00	\$0.00
WSA Reporting	V	\$45.00	\$4,725.60	\$0.00	\$0.00	\$0.00
Utility Billing Software	F	\$0.00	\$1,223.78	\$0.00	\$0.00	\$0.00
		\$32,776.65	\$25,091.52	\$1,233.03	\$947.66	\$2,088.26
Total Fixed Costs		\$108,326.71	\$129,808.09	\$138,772.49	\$147,124.20	\$155,291.06
Total Variable Costs		\$172,010.35	\$207,320.37	\$173,827.52	\$203,912.72	\$196,165.56
Total Annual O&M Costs		\$280,337.06	\$337,128.46	\$312,600.01	\$351,036.92	\$351,456.62

## **Appendix G**

### **Waterworks System Assessment Checklist**

Round 3 Waterworks System Assessment Summary

Waterworks: 

Aberdeen Waterworks

Owner(s): 

Town of Aberdeen

Env. Project Officer: 

Lee Reinhart

Summary Completion Date: 

20-Apr-16

Population:    Full Time: 

670

    Seasonal:

Source:    Groundwater: ☐    Surface Water: ☐    GUDI (groundwater under direct influence): ☐  
Treated Groundwater: ☐    Treated Surface Water: ☒    Treated GUDI: ☐

Sourcewater Protection Concerns: 

N/A

Source/Raw Water Quality Issues that May Affect Treatment/Treated Water Quality:

Parameter:	Level:	Parameter:	Level:

Raw water capacity/allocation:

Treated/Distributed Water Quality Issues (any that exceed Standards and Objectives after treatment):

Parameter:	Level:	Parameter:	Level:

List of Chemicals Used:

Description of Treatment Processes in Place:

The Town receives treated water from SaskWater and distributes to the community.

Treatment Processes with existing issues (including capacity issues):

Other issues identified within the waterworks:

- Building exterior door and lock require upgrades to ensure that building can be adequately secured.
- Reservoir No. 2 *may* require a replacement gasket at the access. Town to confirm if completed.
- The Reservoir No. 1 overflow to the sanitary sewer requires removal.
- Pump No. 2 and pressure relief valve are recommended to be upgraded at the time of the generator installation.
- Reservoir cleaning is recommended.

Major Recommendations:

- New backup generator and standby pump are recommended.

Any Recommendations that may pose an Immediate Health Concern:

- The Reservoir No. 1 overflow to the sanitary sewer requires removal.

Total Cost of Recommended Upgrades: 

\$240,000.00

Other Comments: 

- Total Cost of Recommended Upgrades does not include an allowance for temporary pumping. Generator and standby pump costs are included, however any further costs related to the proposed upgrades are not included as they are beyond the scope of this report.

\*Please submit electronic copy to WSA. If more space is required, a longer summary sheet may be requested.