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EXISTING INFRASTRUCTURE REVIEW

1. Drainage & Culvert Review

The existing stormwater infrastructure within the Summer Village is mainly a rural drainage system comprised of open ditches, swales and culverts. There are no underground sewer systems or curb and gutter flow systems presently. There are also areas of undeveloped lands which contain undisturbed natural flow.

The age of the existing infrastructure appears to vary from recent to +50-year-old installations. Culverts along Sunset Drive are more aged than areas upland. Lot approach culverts comprise mainly of 300mm diameter corrugated steel pipes (c.s.p.) and road centerline culverts vary from 500 – 800mm diameter corrugated steel pipes (c.s.p.).

Existing culverts do not include sloped ends or meet current standards for rip rap placement. Most ditches exhibit well grassed flow areas with relatively low to flat grades.

2. Scope of Review

The scope of review for this report is intended to identify issues with the current drainage system through the Summer Village regarding the following:

- Sufficient capacity of flow for a 1 in 25-year precipitation event.
- Proper flow direction that meets the overall drainage plan for the Summer Village.
- Prevents flooding or increase flow rate into adjacent lots.
- Culvert condition.
- Erosion and scour due to drainage.
- Road failures caused by culvert failures.
- Major outfalls into lakes and watercourses.

Upon inspection, the report will:

- Determine replacement and improvement requirements.
- Develop a rating system to quantify the condition of the infrastructure.
- Determine costs of replacements and improvements.
- Provide a scheduled program for these replacements and improvements.

3. Culvert Standards

The design life cycle of C.S.P. culverts are usually in the range of 50 to 75 years. Some may last longer than 75 years, however this is often due to budgeting constraints or culverts that have little to no drainage associated with it.

One of the first strategies to focus on will be to upgrade the minimum size standards of culverts in the Summer Village. Setting a minimum size standard is important as it will provide consistency as well allowing for an ensured flow capacity. It also allows a certain level of accessibility for maintenance such as flushing out silt and/or debris.

Previously, lot approaches used a minimum of 300mm diameter sized culvert. It is desirable to increase this minimum size to 500mm diameter. The following changes in standards is proposed:

	Previous Min.	Proposed Min.
Lot Approach Culverts:	300mm Dia.	500mm Dia.
Road Centerline Culverts:	500mm Dia.	600mm Dia.
Major Flow Culverts:	500mm Dia.	800mm Dia. or 2 – 600mm Dia.
Long Culverts (>20m):		600mm Dia.

Overall, larger diameter culverts require less maintenance and provide better flow dynamics. When considering a replacement program, a cost benefit analysis will indicate that slightly oversizing culverts will always provide better return over the life cycle of the culvert.

4. Inspection

A thorough inspection was completed of the Summer Village's drainage paths and culvert infrastructure. A GPS survey was completed for each culvert providing position, elevation, slope and length. The culverts were inspected for condition, inlet/outlet adequacy and surrounding affects. Photos of the culvert inlet, outlet and inside barrel were taken.

All the inspection survey, notes and photos were compiled onto individual "Culvert Inspection Reports". Each culvert was given a culvert number and drainage flow name.

In summary, a full inventory of the Summer Village's culverts was prepared and documented. See Appendices for these reports.

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5. Culvert Rating System

A Culvert Rating System was developed for this Infrastructure review. A rating system was necessary to determine and categorize the priority of improvements and replacements. The rating of a culvert is based on a 26-point system, where a low score indicates that the culvert is in good condition and will not require replacement for many years. A high score indicates that there are substantial concerns with the culvert and some form of improvement or rehabilitation is needed. Even though the maximum score for any culvert is 26, scores generally 10 and above are considered important and likely should be addressed within a 5-year action plan.

Each culvert was given a unique number along with a unique drainage flow name. Numbers are shown as a 2000 series number. Drainage flow names comprise of an alphabet followed by a number.

The Rating System comprises of four main areas:

- Minimum Diameter Compliance
- Flow Capacity
- Affect on Roadway/Approach
- Barrel Condition
- Inlet/Outlet Characteristics

Each of these areas contains a scoring system as follows:

5.1 Minimum Diameter Compliance

For Centreline Culverts, the culvert needs to be at least 600mm diameter. If not, 1 point is added to rating score.

For Approach Culverts, the culvert needs to be at least 500mm diameter. If not, 1 point is added to rating score.

5.2 Capacity

Culvert Capacities for each culvert location are shown on the "Outlet Flow Paths" Drawings and are categorized as follows:

- Negligible Flow
- Inadequate
- 5 – Year
- 10 – Year

- 25 – Year - This is the design target for the Summer Village
- 100 – Year

The above basically refers to the amount of capacity each culvert has based on the storm modelling of a 5-year to 100-year storm. It should be noted that the capacities are significantly affected by the slope of the culvert since the modelling takes into account the velocity of flow and where restrictions or slowing of flow may occur. The design target used for culverts for the Summer village is a 25-Year storm.

For the rating of culvert capacity, the following scoring was used:

Major Flow Path:	If yes,	add 2 points
Contains Negligible Flow:	If yes,	add 0 points
Contains 25-Year Storm Capacity:	If yes,	add 0 points
Contains 10-Year Storm Capacity:	If yes,	add 1 point
Contains 5-Year Storm Capacity:	If yes,	add 2 points
Contains Inadequate Capacity:	If yes,	add 3 points
Contains Emergency or Caused Past Flooding:	If yes,	add 6 points

Culvert capacity is considered very important in maintaining drainage within the community and hence has the highest potential for adding points to the rating.

5.3 Roadway

This component considers the effects that a culvert may have on other crucial infrastructure elements such as roadways and accesses. In this case, the road condition over the culvert is important since a road closure is not feasible. For this reason, the following items have a high score associated with them:

Contains Severe Cracking due to Sub-Structure:	If yes,	add 3 points
Contains Severe Pot-Holing due to Sub-Structure:	If yes,	add 3 points
Contains Severe Sag/Dip in Road due to Sub-Structure:	If yes,	add 3 points

5.4 Pipe Barrel

This area evaluates the culvert itself in its performance, stability and overall life. Since any type of structure failure of a culvert will lead to imminent failure, the following items have a moderate score associated with each:

Sag or Bowing of the pipe:	If yes,	add 2 points
Out of Round or Caving In:	If yes,	add 2 points
Settlement of the base:	If yes,	add 2 points
Infiltration of water/cracking/joint separation:	If yes,	add 2 points

Severe Corrosion:	If yes,	add 2 points
Moderate Corrosion:	If yes,	add 1 point
Blockage, partial (>50%) or full:	If yes,	add 2 points

5.5 Inlet / Outlet

For inlet and outlet areas of the culvert, the following aspects are inspected and rated as follows:

Inlet/Outlet Damage:	If yes,	add 1 point
No Sloped Ends:	If yes,	add 1 point
Sediment Build Up:	If yes,	add 1 point
Erosion above the Pipe:	If yes,	add 1 point
Scour below the Pipe:	If yes,	add 1 point
Needs Rip Rap:	If yes,	add 1 point
Needs Clearing of Trees/Brush:	If yes,	add 1 point
Needs De-Vegetation at Inverts (disrupts flow):	If yes,	add 1 point

6. Cost Estimates

Cost of improvements and replacements of culverts and drainage systems have been calculated, with some detail, and included within this report. It is important to note that these are preliminary estimates and need further detailed design to better quantify the costs. Also, all costs are calculated to present day values using construction unit prices based on 2017 – 2019 averages. Adjustments for inflation and price fluctuations will be required for all work past 2020. Land acquisition costs, utility relocation costs and traffic accommodation costs, if required, are not included. Drainage improvements to ditches, if necessary, are also not shown (e.g. lowering or widening of ditches).

7. Improvement Strategy

In order to provide a plan for future improvements, it is necessary to use the rating system defined above to determine priorities over a period of time.

The strategy and timing for improvements and rehabilitation is proposed in the following order of priority:

- Emergency Measures and/or Prevention of Past Flooding Events
- Improvements to Re-Direct Flow Paths

- Improvements to Major Flow Paths
- Infrastructure with Remaining Life of <5 Years
- Improvements to Minor Flow Paths
- Rehabilitation/Replacement Program for Centerline Culverts
- Rehabilitation/Replacement Program for Approach Culverts

8. Improvement, Rehabilitation & Maintenance Programming

Due to funding constraints and the timing of when a culvert has reached its design life, it is important to develop an improvement, rehabilitation and maintenance program for the Summer Village.

Using the rating system, the urgency and priority of work required becomes very evident. The order of work is therefore summarized below and is detailed within the Appendices:

List of Major Improvement Projects

Priority #1: **PROJECT #1: Old Railway Embankment & 48A Avenue Drainage Improvements**

Remove existing culverts within the Old Railway Embankment. Construct Drainage Swale/Channel along east side of the embankment, 300m north of 48A Avenue and 300 - 400m south of 48A Avenue. Install a new 800mm Dia. C.S.P. at 48A Avenue to drain the collected flow to cross under the Old Railway Embankment.

Along 48A Avenue and Sunset Drive, Flow Path D will be upgraded by lowering the ditch profile to the lake and culverts under approaches and roads increased in size to ensure unrestricted flow.

Regrading of the ditch along the west side of the Old Railway Embankment, 400m north of 48A Avenue, will also be completed in order to ensure positive flow to 48A Avenue. The ditch will also be re-shaped to construct a higher backslope to restrict flow to the ditch and not into the back of lots.

Recommended Time of Work: 2020 – 2021

Priority #2: **Blocked Culverts, Missing Culverts**

Rehabilitation or improvement to blocked/plugged/ culverts or locations needing culverts that restrict flow.

Recommended Time of Work: 2020 - 2022

Priority #3: **PROJECT #2: Central Drainage Way for the 49A Avenue & 48th Street Area**

Phase 1: Obtain 20m easement within the Christian Camp area, north of the 49A Avenue subdivision, for a drainage ditch from the Old Railway Embankment to Sunset Drive.

Relocate existing drainage ditch within the back of two of lots to the new 20m easement.

Flow Path F, from 49A Avenue to the lake, will be upgraded by lowering the ditch profile and culverts under approaches and roads increased in size to ensure unrestricted flow.

Recommended Time of Work: 2020 - 2023

Phase 2: Construct new drainage ditch within the 20m easement from the Old Railway Embankment to existing drainage ditch location. This work is intended to be necessary to drain the Alberta Beach Golf Course and Future Development areas east of the Christian Camp.

Recommended Time of Work: As required with new development and/or issues with drainage of the golf course.

Phase 3: Within the 49A Avenue and 48th Street subdivision, specific improvements along the Flow Path F will be upgraded by lowering the ditch profile and culverts under approaches and roads increased in size to ensure unrestricted flow. This project is targeted to improve ditch flow in front of lots that are experienced prolonged ponding.

Recommended Time of Work: 2020 - 2023.

Priority #4: **PROJECT #3**: **56 Avenue Drainage Improvements**

Re-Grading of existing ditches. Remove existing 400mm culverts and replace with 800mm CSP. Improve other culverts and end treatments within drainage path. Add or resize culverts along Major Drainage Paths.

Recommended Time of Work: 2022 – 2030

Priority #5: **PROJECT #4**: **Backlot Drainage Swale – 45th Avenue to 48th Avenue**

Construct a new Drainage Swale along the backlots from 45th Avenue to 48th Avenue to ensure flow from south to north. This Drainage Swale will also intercept any flow coming from the future development area to the east. Flow from the Drainage Swale will proceed to a collection area with a sediment bay that will outlet under Sunset Drive to the lake. The existing culverts along this flow path will be upgraded by lowering the ditch profile and culverts under approaches and roads increased in size to ensure unrestricted flow.

Recommended Time of Work: 2022 – 2030

Priority #6: **Poor Culverts**

Replace various culverts that are exhibiting significant issues that will need to be addressed in the next 20 years.

Recommended Time of Work: 2023 – 2030

Priority #7: **Aging Culverts**

Replace various culverts that will reach their design life within the next 20 years and will need rehabilitation or replacement.

Recommended Time of Work: 2030 - 2040

Priority #8: **Other Culverts**

The remainder of the existing culvert infrastructure that will need rehabilitation or replacement due to long-term aging.

Recommended Time of Work: 2040 - 2060

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APPENDIX A

Diagram of Project 2: Phase 1,2,3 Boundaries

Key Map
N.T.S

Summer Village of Sunset Point

W26 54-3-5, NW23 54-3-5 and NE22 54-3-5

Stormwater Management Plan (SWMP)

Legend:

- Improvement Area Boundary
- Summer Village Boundary
- Proposed Right of Way
- Proposed Recreational Trail
- Existing Recreational Trail
- Proposed Drainage Ditch Phase I
- Proposed Drainage Ditch Phase II (Extension)
- Existing Ditch to be Filled
- Proposed Culvert
- Existing Culvert
- Proposed Flow Direction
- Existing Flow Direction

Scale 1:2,000

General Notes:

1. 2019 Cadastral Shown
2. 2019 Aerial Photograph provided by Lac Ste. Anne County

Figure 11
Proposed Central Drainage Way

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Sunset Point Christian Camp

Future Residential Development Area

Alberta Beach Golf Resort

Lac Ste. Anne

Existing Sunset Drive Recreational Trail

Proposed Additional CSP Culvert Crossing Sunset Drive

Proposed Twin CSP Culverts at Trail Crossing

Proposed E-W Drainage Ditch - Phase I (P Ditch-02)

Proposed Recreational Trail

Proposed Right of Way

Tie Drainage Ditch to West Ditch of Railway Embankment

Proposed E-W Drainage Ditch - Phase II

Proposed Ditch Improvements (P Ditch -03)

Remove and Dispose Existing 600mm Culvert (F02)

Existing 600mm Culvert (F01) @ 3.4% Slope

Fill Existing E-W Drainage Ditch

Tie N-S Ditch to Proposed E-W Drainage Ditch

Regrade Existing N-S Drainage Ditch (P Ditch-01)

Tie Proposed Trail to Existing Recreational Trail on Railway Embankment

Optional Phase III (yellow): Lower Ditch Profile by approx. 0.3 - 1.0m. Involves replacing and lowering all approach and centerline culverts and re-grading ditches.

Sunset Drive

49A Avenue

48 Street

Railway Embankment (Existing Recreational Trail)

20.00

5.60

S:\7 - Miscelaneous\Misc-0185 - Sunset Point - SWM Plan\4 Working Drawings\Sunset Point SWMP Figures - APRIL.dwg

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APPENDIX B

Drainage Infrastructure Rehabilitation and Improvement Plan

Culvert Rating System by:

1. Priority
2. Location
3. Priority Location

CULVERT RATING SYSTEM - By Priority
Summer Village of Sunset Point
February 2020

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CULVERT NO.	CULVERT NAME	MEETS MIN. DIAMETER (1 Point per Item)		CAPACITY					ROADWAY (1-3 Points per Item)			PIPE BARREL (2 Points per Item)						INLET / OUTLET (1 Point per Item)								SCORE	PROGRAMING YEAR	ACTION	Improvement/ Replacement Cost
		Aproach Culvert Min. 500mm (Yes = 0 points)	Centreline Road Culvert Min. 600mm (Yes = 0 points)	Major Flow Path (2 Points)	25 Year (0 Points)	10 Year (1 Point)	5 Year (2 Points)	Indequate Now (3 Points) Emergency: (6 points)	Severe Road Cracking	Pot Holing in Road	Sag in Road	Sag/ Bow	Out of Round	Settlement	Infiltration/Cracking/Joint Release	Corrosion 1-Moderate 2-Severe	Blockage	Inlet/Oulet Damage	No Sloped Ends	Sediment Build Up	Erosion above Pipe	Scour below Pipe	Needs Rip Rap	Needs Clearing of Trees/Brush	Needs De-vegetation @ inverts				
YEAR 2020 - 2021																												
PROJECT #1 - Old Railway Embankment & 48A Ave. Drainage Improvements																												
2741	D01		1	2				3	PROJECT #1										1				1			8	2020 - 2021	PROJECT #1: Replace with 2-800mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 35,200.00
2740	D02	1					2		PROJECT #1										1				1			5	2020 - 2021	PROJECT #1: Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 8,300.00
2737	D03	1		2				3	PROJECT #1									1	1				1		1	10	2020 - 2021	Project #1: Replace with 2-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 7,100.00
2736	D09						2		PROJECT #1			2						1	1	1			1			8	2020 - 2021	Project #1: Replace with 8000mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 12,400.00
2690	D04			2			2	3	PROJECT #1										1				1			9	2020 - 2021	Project #1: Add additional 600mm CSP with Sloped Ends & Rip Rap. Upgrade exist. with slope ends & riprap.	$ 10,700.00
2689	D05			2			2	3	PROJECT #1										1				1			9	2020 - 2021	Project #1: Add additional 600mm CSP with Sloped Ends & Rip Rap. Upgrade exist. with slope ends & riprap.	$ 9,800.00
2687	D06			2			2	3	PROJECT #1										1				1			9	2020 - 2021	Project #1: Add additional 600mm CSP with Sloped Ends & Rip Rap. Upgrade exist. with slope ends & riprap.	$ 9,800.00
2685	D07			2			2	3	PROJECT #1										1				1			9	2020 - 2021	Project #1: Add additional 600mm CSP with Sloped Ends & Rip Rap. Upgrade exist. with slope ends & riprap.	$ 13,100.00
2693	D08			2			2	3	PROJECT #1										1				1		1	10	2020 - 2021	Project #1: Install 600mm CSP Sloped Ends. Re-Grade upstream ditch for 150m.	$ 8,900.00
2692	RE02			2				6	PROJECT #1										1			1	1	1	1	13	2020 - 2021	Project #1: Remove existing culvert. Construct Drainage Ditch System along Railway Embankment to the North for 300m.	$ 20,000.00
2692b	RE02b			2				6	PROJECT #1															1	1	10	2020 - 2021	Project #1: Install Manhole Structure with Control Weir at 48A Avenue S. Ditch	$ 25,000.00
2692c	RE02c			2				3	PROJECT #1										1			1	1	1	1	10	2020 - 2021	Project #1: Remove existing culvert. Construct Drainage Ditch System along Railway Embankment to the South for 300m.	$ 20,000.00
																												$ 180,300.00
YEAR 2020 - 2023																												
PROJECT #2 - Central Drainage Way incl. 49A Ave. & 48th Street																												
2713	F01		1	2				3	PROJECT #2 Phase 1										1				1			8	2020 - 2023	PROJECT #2 Ph. 1: Replace with 2-800mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 27,400.00
2712	F02		1	2				3	PROJECT #2 Phase 1										1				1			8	2020 - 2023	PROJECT #2 Ph. 1: Replace with 2-800mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 8,300.00
2658	F07a	1		2					PROJECT #2 Phase 3				2						1				1	1		8	2020 - 2023	Project #2: Approach not paved; Culvert is too small. Replace with 600mm CSP w/ Sloped Ends & Rip Rap.	$ 9,300.00
2659	F07b			2				3	PROJECT #2 Phase 3				2						1				1	1		10	2020 - 2023	Project #2: Approach not paved; Culvert is too small. Replace with 600mm CSP w/ Sloped Ends & Rip Rap.	$ 9,300.00
2661	F05			2					PROJECT #2 Phase 3							1			1							4	2020 - 2023	Project #2: When aged out, replace with 600mm CSP w/ Sloped Ends & Rip Rap. Headwall.	$ 10,100.00
2662	F06			2			2		PROJECT #2 Phase 3																	4	2020 - 2023	Project #2: When aged out, replace with 600mm CSP w/ Sloped Ends & Rip Rap. Headwall.	$ 10,100.00
2663	F03			2		1			PROJECT #2 Phase 3										1							4	2020 - 2023	Project #2: When aged out, replace with 600mm CSP w/ Sloped Ends & Rip Rap.	$ 13,300.00
2664	F04			2		1			PROJECT #2 Phase 3										1							4	2020 - 2023	Project #2: When aged out, replace with 600mm CSP w/ Sloped Ends & Rip Rap.	$ 13,300.00
2679	F14a							3	PROJECT #2 Phase 3								1		1				1		1	7	2020 - 2023	Project #2: Remove 500mm Pipes; Replace with one 600mm CSP with Sloped Ends & Rip Rap. Reset Elev.	$ 14,900.00
2679	F14b							3	PROJECT #2 Phase 3								1		1				1		1	7	2020 - 2023	Project #2: Remove 500mm Pipes; Replace with one 600mm CSP with Sloped Ends & Rip Rap. Reset Elev.	$ 1,700.00
2676	F28	1							PROJECT #2 Phase 3										1				1			3	2020 - 2023	Project #2: Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 11,400.00
2694	F12								PROJECT #2 Phase 3										1				1			2	2020 - 2023	Project #2: When aged out, Replace with 800mm CSP with Sloped Ends & Rip Rap.	$ 13,000.00
2675	F11								PROJECT #2 Phase 3										1				1			2	2020 - 2023	Project #2: When aged out, remove. Culvert 2694/F12 will replace this culvert with 800mm Dia.	$ -
2674	F09								PROJECT #2 Phase 3										1				1			2	2020 - 2023	Project #2: When aged out, Replace with 800mm CSP with Sloped Ends & Rip Rap.	$ 11,300.00
2673	F10								PROJECT #2 Phase 3										1				1			2	2020 - 2023	Project #2: When aged out, remove. Culvert 2674/F09 will replace this culvert with 800mm Dia.	$ -
																												$ 153,400.00
YEAR 2022 - 2030																												
PROJECT #3 - 56th Avenue Drainage Improvements																												
2611	I05		1	2			2		PROJECT #3							1			1				1			8	2022 - 2030	Project #3: Install sloped ends and rip rap. Re-Grade upstream ditch.	$ 5,800.00
2606	I04		1	2			2		PROJECT #3							1			1				1			8	2022 - 2030	Project #3: Install sloped ends and rip rap.	$ 2,900.00
2605	I03		1	2			2		PROJECT #3							1		1	1				1			9	2022 - 2030	Project #3: Replace with 1-800mm CSP with Sloped Ends & Rip Rap.	$ 73,600.00
2604	I02		1	2			2		PROJECT #3							1		1	1				1			9	2022 - 2030	Project #3: Remove existing 400mm Dia. Culvert.	$ 7,200.00
																												$ 89,500.00
YEAR 2022 - 2030																												
PROJECT #4 - Backlot Drainage Swale - 45 Ave. to 48A Ave.																												
2202	C01		1	2					PROJECT #4							1			1				1		1	7	2022 - 2030	PROJECT #4: Add 1-800mm CSP with Sloped Ends, Rip Rap.	$ 23,000.00
2201	C02		1	2				3	PROJECT #4										1				1			8	2022 - 2030	PROJECT #4: Replace with 800mm Dia. CSP with Sloped Ends with Rip Rap	$ 5,900.00
2201a	C02		1	2				3	PROJECT #4										1				1			8	2022 - 2030	PROJECT #4: Replace with 800mm Dia. CSP with Sloped Ends with Rip Rap	$ 4,100.00
																											2022 - 2030		
2203	B05		1					3	PROJECT #4	2							2	1	1	1			1			12	2022 - 2030	PROJECT #4: Clean Culvert out. Extend inlet with sloped end and fix road. Cut-back outlet and install sloped end. Add	$ 36,900.00
2204	B04		1					3	PROJECT #4							1			1	1			1			8	2022 - 2030	PROJECT #4: Replace with 1-800mm CSP with Sloped Ends, Rip Rap.	$ 8,900.00
2205	B03		1						PROJECT #4						2	1		1	1				1			7	2022 - 2030	PROJECT #4: Replace with 1-800mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 15,500.00
2206	B01		1				2		PROJECT #4										1				1			5	2022 - 2030	PROJECT #4: Replace with 1-600mm CSP with Sloped Ends, Rip Rap.	$ 9,900.00
2207	B02		1				2		PROJECT #4										1				1			5	2022 - 2030	PROJECT #4: Replace with 1-600mm CSP with Sloped Ends, Rip Rap.	$ 9,900.00
																												$ 114,100.00
YEAR 2020 - 2022 - Blocked Culverts, No Culverts																												
2655	F20	1															1	1	1				1			5	2020 - 2022	Approach not paved; Blockage on S. End. Replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 6,800.00
2660	F18	1						6									2	1	1				1			12	2020 - 2022	Approach not paved; Culvert is too small & plugged. Replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 7,600.00
2738	D19	1						3								1	2	1	1				1		1	12	2020 - 2022	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,500.00
2739a		1						3									2		1				1		1	9	2020 - 2022	Install New 1-600mm CSP with Sloped Ends, Rip Rap	$ 6,800.00
2210	B07	1														1		1	1				1		1	6	2020 - 2022	Re-Shape ditch and review culvert grade. Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 11,500.00
2238	A11		1	2													2	1	1				1			8	2020 - 2022	Replace with 1-800mm CSP with Sloped Ends, Rip Rap.	$ 16,200.00
2226	A19	1					2										2	1	1	1			1			9	2020 - 2022	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 6,200.00
2636a	H27a	1						6									1		1				1			10	2020 - 2022	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,100.00
2618	I07		1					3				2				1	2	1	1	1			1		1	14	2020 - 2022	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 8,500.00
																												$ 76,200.00
YEAR 2023 - 2030 - Poor Culverts																												
2705	H01		1	2				3								1		1	1				1		1	11	2023 - 2030	Replace with 2-800mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 28,500.00
2701	H33	1					2									2	2	1	1	1		1	1		1	13	2023 - 2030	When aged out, replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 10,000.00
2702	H12	1						3								1			1				1		1	8	2023 - 2030	When aged out, replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 9,300.00
2702	H12	1					2												1	1		1	1		1	8	2023 - 2030	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 10,000.00
2649	H13	1						3							2				1	1			1		1	10	2023 - 2030	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,400.00
2648	H14	1					2	3											1	1			1		1	10	2023 - 2030	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 7,100.00
2647	H15	1					2	3											1	1			1		1	10	2023 - 2030	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,400.00
2644	H17	1						3								1	2		1				1		1	10	2023 - 2030	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 14,100.00
																												$ 91,800.00

CULVERT RATING SYSTEM - By Priority
Summer Village of Sunset Point
February 2020

SE DESIGN AND CONSULTING INC.
ENGINEERS • CONSULTANTS • SURVEYORS

CULVERT NO.	CULVERT NAME	MEETS MIN. DIAMETER (1 Point per Item)		CAPACITY					ROADWAY (1-3 Points per Item)			PIPE BARREL (2 Points per Item)						INLET / OUTLET (1 Point per Item)								SCORE	PROGRAMING YEAR	ACTION	Improvement/ Replacement Cost
		Aproach Culvert Min. 500mm (Yes = 0 points)	Centreline Road Culvert Min. 600mm (Yes = 0 points)	Major Flow Path (2 Points)	25 Year (0 Points)	10 Year (1 Point)	5 Year (2 Points)	Indequate Now (3 Points) Emergency: (6 points)	Severe Road Cracking	Pot Holing in Road	Sag in Road	Sag/ Bow	Out of Round	Settlement	Infiltration/Cracking/Joint Release	Corrosion 1-Moderate 2-Severe	Blockage	Inlet/Oulet Damage	No Sloped Ends	Sediment Build Up	Erosion above Pipe	Scour below Pipe	Needs Rip Rap	Needs Clearing of Trees/Brush	Needs De-vegetation @ inverts				
YEAR 2030 - 2040 - Aging Culverts																													
2735	D10	1					2											1	1				1		1	7	2030 - 2040	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 3,200.00
2672	F27	1																1	1	1			1			5	2030 - 2040	If showing signs of poor drainage or when aged, Replace with 600mm CSP w/ Sloped Ends & Rip Rap.	$ 10,600.00
2670	F24																	1	1	1			1	1		5	2030 - 2040	Approach not paved; schedule to Replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 6,800.00
2656	F25	1															1	1	1	1			1			6	2030 - 2040	Approach not paved. Could be blocked; Replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 8,800.00
2654	F26	1																1	1	1			1			5	2030 - 2040	Approach not paved; Replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 6,800.00
2730	D15	1					2												1				1		1	6	2030 - 2040	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 6,700.00
2668	E07	1		2															1				1			5	2030 - 2040	When aged out, replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 9,300.00
2669	E06	1		2														1	1				1			6	2030 - 2040	When aged out, replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 8,900.00
2725	E05	1															2		1				1		1	6	2030 - 2040	When aged out, replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 10,400.00
2724	E04	1														2			1				1		1	6	2030 - 2040	When aged out, replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 8,100.00
2721	E16	1					2											1	1				1			6	2030 - 2040	Replace with 500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 3,600.00
2722	E03	1					2											1	1				1			6	2030 - 2040	Replace with 500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 3,600.00
2720	D15							3											1				1			5	2030 - 2040	Replace with 1-800mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 12,400.00
2728	E01		1				2												1				1			5	2030 - 2040	Replace with 1-800mm CSP with Sloped Ends or Open Ditch, Rip Rap & make longer by 1m per end.	$ 11,700.00
2727	E08	1						3											1				1			6	2030 - 2040	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 5,200.00
2726	E09	1					2												1				1			5	2030 - 2040	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 5,200.00
2716	E13	1															2		1				1			5	2030 - 2040	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end or eliminate.	$ 4,100.00
2708a	G01		1	2															1				1			5	2030 - 2040	Replace with 2-800mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 27,400.00
2707	H02			2															1				1	1		5	2030 - 2040	Replace with 2-800mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 10,500.00
2708	H03	1											2						1				1		1	6	2030 - 2040	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 5,000.00
2703	H32	1						3											1				1		1	7	2030 - 2040	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 5,800.00
2704	H11	1					2												1	1			1		1	7	2030 - 2040	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 7,900.00
2701	H33	1					2									1			1				1		1	7	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 9,300.00
2645	H16	1														1			1				1		1	5	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 7,100.00
2646	H26		1	2												1			1				1		1	7	2030 - 2040	Replace with 2-800mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 26,300.00
2635	H18		1													1		1	1				1		1	6	2030 - 2040	Replace with 1-800mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 17,000.00
2739	D18	1														1			1	1			1		1	6	2030 - 2040	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 5,000.00
2742	D20	1														1			1	1			1		1	6	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 6,600.00
2744	C03	1														1			1				1		1	5	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 6,200.00
2219	B17	1					2												1				1			5	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 7,700.00
2233	A15	1				1													1	1			1			5	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 5,400.00
2232	A16	1					2											1	1	1			1			7	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 5,400.00
2227	A18	1				1												1	1				1			5	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 5,400.00
2637	H28	1														1		1	1				1			5	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 7,200.00
2626	H30	1															2		1				1	1	1	7	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,400.00
2625	H23	1															2		1				1	1	1	7	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 5,600.00
2624	H22	1																	1				1	1	1	5	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 8,300.00
2620	H25	1																	1				1	1	1	5	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 5,100.00
2627	I24	1																	1				1	1	1	5	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 5,100.00
2629	I21	1															1		1				1		1	5	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 4,100.00
2619	I11		1					3											1				1		1	7	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 9,700.00
2617	I07		1					3											1				1		1	7	2030 - 2040	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 8,400.00
2602	I06		1				2												1	1			1		1	7	2030 - 2040	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 11,900.00
2607	I13	1																	1	1			1		1	5	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,600.00
2613	I17	1																1	1	1			1			5	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,000.00
2614b		1						3									1		1				1			7	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,000.00
2612	I18	1																1	1				1		1	5	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,000.00
2612b		1						3									1		1				1			7	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 7,100.00
																												$ 386,900.00

YEAR 2040 - 2060 - Other Culverts

48A Avenue

2734	D11	1			0													1				1		1	4	2040 - 2060	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 5,600.00
2733	D12	1			0													1				1		1	4	2040 - 2060	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 4,800.00
2732	D13	1			0													1				1		1	4	2040 - 2060	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 8,300.00
2731	D14	1			0													1				1		1	4	2040 - 2060	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 7,900.00
2691	D16	1			0													1				1		1	4	2040 - 2060	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 8,100.00
2688	D17	1			0													1				1		1	4	2040 - 2060	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 6,000.00
2686	F17	1											1					1				1			4	2040 - 2060	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 5,200.00

48 Street

2683	F16	1																1				1			3	2040 - 2060	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 7,600.00
2682	F15	1																1				1			3	2040 - 2060	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 8,300.00
2681	F31	1														1		1				1			4	2040 - 2060	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 8,300.00
2680	F30	1																1	1			1			4	2040 - 2060	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 4,400.00
2678	F29	1																1				1			3	2040 - 2060	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 13,000.00
2677	F13																	1				1			2	2040 - 2060	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 9,500.00
2671	F08			2														1				1			4	2040 - 2060	When aged out, Replace with 800mm CSP with Sloped Ends & Rip Rap.	$ 13,000.00

49A Avenue

2657	F19	1																1				1	1		4	2040 - 2060	Approach not paved; Culvert is too small. Replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 8,400.00
2665	F21	1																1				1			3	2040 - 2060	Approach paved with headwalls; Culvert is too small. Replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 10,800.00
2666	F22	1											1					1				1			4	2040 - 2060	Approach not paved; Culvert is too small. Replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 6,800.00
2667	F23	1																1				1			3	2040 - 2060	When aged out, replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 8,900.00
2775b		1																1				1			3	2040 - 2060	When aged out, replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 8,000.00
2723	E15	1																1	1			1			4	2040 - 2060	When aged out, replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 10,000.00

CULVERT RATING SYSTEM - By Priority
Summer Village of Sunset Point
February 2020

SE DESIGN AND CONSULTING INC.
ENGINEERS • CONSULTANTS • SURVEYORS

CULVERT NO.	CULVERT NAME	MEETS MIN. DIAMETER (1 Point per Item)		CAPACITY					ROADWAY (1-3 Points per Item)			PIPE BARREL (2 Points per Item)						INLET / OUTLET (1 Point per Item)								SCORE	PROGRAMING YEAR	ACTION	Improvement/ Replacement Cost
		Aproach Culvert Min. 500mm (Yes = 0 points)	Centreline Road Culvert Min. 600mm (Yes = 0 points)	Major Flow Path (2 Points)	25 Year (0 Points)	10 Year (1 Point)	5 Year (2 Points)	Indequate Now (3 Points) Emergency: (6 points)	Severe Road Cracking	Pot Holing in Road	Sag in Road	Sag/ Bow	Out of Round	Settlement	Infiltration/Cracking/Joint Release	Corrosion 1-Moderate 2-Severe	Blockage	Inlet/Oulet Damage	No Sloped Ends	Sediment Build Up	Erosion above Pipe	Scour below Pipe	Needs Rip Rap	Needs Clearing of Trees/Brush	Needs De-vegetation @ inverts				
Sunset Drive																													
2729	E02															2			1				1			4	2040 - 2060	Replace with 1-800mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 14,100.00
2719	E10	1																	1				1			3	2040 - 2060	Remove this culvert and approach as it is not being used. Check and coordinate with landowner 1st.	$ 1,000.00
2718	E11	1																	1				1			3	2040 - 2060	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,000.00
2717	E12	1																	1				1			3	2040 - 2060	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,000.00
2715	E14																		1				1			2	2040 - 2060	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 13,200.00
2715a	E14a																									0		Dry Approach - No Culvert needed.	$ -
2714	F32																		1				1			2	2040 - 2060	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 4,700.00
2708b	G02			2															1				1			4	2040 - 2060	Replace with 2-800mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 7,200.00
2634	H19	1																	1				1		1	4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,400.00
2743	C04	1														1			1				1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 5,400.00
2208	B13	1																	1	1			1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 5,400.00
2209	B06	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 6,900.00
2211	B14	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 5,400.00
2212	B08	1																	1	1			1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 8,200.00
2213	B15	1																	1	1			1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 6,900.00
2214	B09	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 7,400.00
2215	B10	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 7,400.00
2216	B16	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 6,900.00
2217	B11	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 9,800.00
2218	B12	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 6,400.00
2220	B18	1				1													1				1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 5,400.00
2221	A24	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 5,800.00
2222	A26	1																	1	1			1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 5,400.00
2223	A23	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 6,600.00
2222	A25	1					2																			3	2040 - 2060	Replace with 1-800mm CSP with Sloped Ends, Rip Rap.	$ 10,100.00
2235	A22	1														1			1				1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 5,400.00
2236	A21	1														1			1				1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 6,200.00
2237	A20	1														1			1				1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 6,900.00
2239	A12	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 5,400.00
2240	A13	1				1													1				1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 5,400.00
2234	A14	1				1													1				1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 5,400.00
2228	A17	1																	1	1			1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 5,800.00
54th Avenue & 49th Street																													
2636	H27	1																	1							2	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 5,600.00
2633	H29	1														1			1				1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 5,600.00
2623	H21	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,400.00
2622	H20	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 5,100.00
2621	H24	1																1	1				1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 5,100.00
2628	I20	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 2,600.00
2630	I22	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 5,300.00
2631	I23	1																	1				1		1	4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 5,300.00
2632	H31	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,000.00
2603	I12		1																1				1		1	4	2040 - 2060	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 10,600.00
56th Avenue & 49th Street																													
2608	I14																		1	1			1			3	2040 - 2060	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,600.00
2609	I15	1																	1	1			1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,000.00
2610	I16	1																	1	1			1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,000.00
2616	I09	1																1	1				1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,000.00
2615	I10	1																1	1				1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,000.00
2614	I19	1																	1				1		1	4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,000.00
																												$ 465,600.00

CULVERT RATING SYSTEM - By Location

Summer Village of Sunset Point

February 2020

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ENGINEERS • CONSULTANTS • SURVEYORS

CULVERT NO.	CULVERT NAME	MEETS MIN. DIAMETER (1 Point per Item)		CAPACITY					ROADWAY (1-3 Points per Item)			PIPE BARREL (2 Points per Item)						INLET / OUTLET (1 Point per Item)								SCORE	PROGRAMING YEAR	ACTION	Improvement/ Replacement Cost
		Aproach Culvert Min. 500mm (Yes = 0 points)	Centreline Road Culvert Min. 600mm (Yes = 0 points)	Major Flow Path (2 Points)	25 Year (0 Points)	10 Year (1 Point)	5 Year (2 Points)	Indequate Now (3 Points) Emergency: (6 points)	Severe Road Cracking	Pot Holing in Road	Sag in Road	Sag/ Bow	Out of Round	Settlement	Infiltration/Cracking/Joint Release	Corrosion 1-Moderate 2-Severe	Blockage	Inlet/Oulet Damage	No Sloped Ends	Sediment Build Up	Erosion above Pipe	Scour below Pipe	Needs Rip Rap	Needs Clearing of Trees/Brush	Needs De-vegetation @ inverts				
48A Avenue																													
2737	D03	1		2				3	PROJECT #1									1	1				1		1	10	2020 - 2021	**Project #1**: Replace with 2-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 7,100.00
2736	D09						2		PROJECT #1			2						1	1	1			1			8	2020 - 2021	**Project #1**: Replace with 8000mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 12,400.00
2735	D10	1					2											1	1				1		1	7	2030 - 2040	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 3,200.00
2734	D11	1			0														1				1		1	4	2040 - 2060	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 5,600.00
2733	D12	1			0														1				1		1	4	2040 - 2060	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 4,800.00
2732	D13	1			0														1				1		1	4	2040 - 2060	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 8,300.00
2731	D14	1			0														1				1		1	4	2040 - 2060	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 7,900.00
2730	D15	1					2												1				1		1	6	2030 - 2040	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 6,700.00
2691	D16	1			0														1				1		1	4	2040 - 2060	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 8,100.00
2690	D04			2			2	3	PROJECT #1										1				1			9	2020 - 2021	**Project #1**: Add additional 600mm CSP with Sloped Ends & Rip Rap. Upgrade exist. with slope ends & riprap.	$ 10,700.00
2688	D17	1			0														1				1		1	4	2040 - 2060	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 6,000.00
2689	D05			2			2	3	PROJECT #1										1				1			9	2020 - 2021	**Project #1**: Add additional 600mm CSP with Sloped Ends & Rip Rap. Upgrade exist. with slope ends & riprap.	$ 9,800.00
2687	D06			2			2	3	PROJECT #1										1				1			9	2020 - 2021	**Project #1**: Add additional 600mm CSP with Sloped Ends & Rip Rap. Upgrade exist. with slope ends & riprap.	$ 9,800.00
2686	F17	1											1						1				1			4	2040 - 2060	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 5,200.00
2685	D07			2			2	3	PROJECT #1										1				1			9	2020 - 2021	**Project #1**: Add additional 600mm CSP with Sloped Ends & Rip Rap. Upgrade exist. with slope ends & riprap.	$ 13,100.00
2693	D08			2			2	3	PROJECT #1										1				1		1	10	2020 - 2021	**Project #1**: Install 600mm CSP Sloped Ends. Re-Grade upstream ditch for 150m.	$ 8,900.00
Old Railway Embankment																													
2692	RE02			2				6	PROJECT #1										1			1	1	1	1	13	2020 - 2021	**Project #1**: Remove existing culvert. Construct Drainage Ditch System along Railway Embankment to the North for 300m.	$ 20,000.00
2692b	RE02b			2				6	PROJECT #1															1	1	10	2020 - 2021	**Project #1**: Install Manhole Structure with Control Weir at 48A Avenue S. Ditch	$ 25,000.00
2692c	RE02c			2				3	PROJECT #1										1			1	1	1	1	10	2020 - 2021	**Project #1**: Remove existing culvert. Construct Drainage Ditch System along Railway Embankment to the South for 300m.	$ 20,000.00
48 Street																													
2683	F16	1																	1				1			3	2040 - 2060	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 7,600.00
2682	F15	1																	1				1			3	2040 - 2060	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 8,300.00
2681	F31	1														1			1				1			4	2040 - 2060	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 8,300.00
2680	F30	1																	1	1			1			4	2040 - 2060	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 4,400.00
2679	F14a							3	PROJECT #2 Phase 3								1		1				1		1	7	2020 - 2023	**Project #2**: Remove 500mm Pipes; Replace with one 600mm CSP with Sloped Ends & Rip Rap. Reset Elev.	$ 14,900.00
2679	F14b							3	PROJECT #2 Phase 3								1		1				1		1	7	2020 - 2023	**Project #2**: Remove 500mm Pipes; Replace with one 600mm CSP with Sloped Ends & Rip Rap. Reset Elev.	$ 1,700.00
2678	F29	1																	1				1			3	2040 - 2060	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 13,000.00
2677	F13																		1				1			2	2040 - 2060	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 9,500.00
2676	F28	1							PROJECT #2 Phase 3										1				1			3	2020 - 2023	**Project #2**: Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 11,400.00
2694	F12								PROJECT #2 Phase 3										1				1			2	2020 - 2023	**Project #2**: When aged out, Replace with 800mm CSP with Sloped Ends & Rip Rap.	$ 13,000.00
2675	F11								PROJECT #2 Phase 3										1				1			2	2020 - 2023	**Project #2**: When aged out, remove. Culvert 2694/F12 will replace this culvert with 800mm Dia.	$ -
2674	F09								PROJECT #2 Phase 3										1				1			2	2020 - 2023	**Project #2**: When aged out, Replace with 800mm CSP with Sloped Ends & Rip Rap.	$ 11,300.00
2673	F10								PROJECT #2 Phase 3										1				1			2	2020 - 2023	**Project #2**: When aged out, remove. Culvert 2674/F09 will replace this culvert with 800mm Dia.	$ -
2672	F27	1																1	1	1			1			5	2030 - 2040	If showing signs of poor drainage or when aged, Replace with 600mm CSP w/ Sloped Ends & Rip Rap.	$ 10,600.00
2671	F08			2															1				1			4	2040 - 2060	When aged out, Replace with 800mm CSP with Sloped Ends & Rip Rap.	$ 13,000.00
2670	F24																	1	1	1			1	1		5	2030 - 2040	Approach not paved; schedule to Replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 6,800.00
2656	F25	1															1	1	1	1			1			6	2030 - 2040	Approach not paved. Could be blocked; Replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 8,800.00
2654	F26	1																1	1	1			1			5	2030 - 2040	Approach not paved; Replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 6,800.00
2655	F20	1															1	1	1				1			5	**2020 - 2022**	Approach not paved; Blockage on S. End. Replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 6,800.00
49A Avenue																													
2658	F07a	1		2					PROJECT #2 Phase 3			2							1				1	1		8	2020 - 2023	**Project #2**: Approach not paved; Culvert is too small. Replace with 600mm CSP w/ Sloped Ends & Rip Rap.	$ 9,300.00
2659	F07b			2				3	PROJECT #2 Phase 3			2							1				1	1		10	2020 - 2023	**Project #2**: Approach not paved; Culvert is too small. Replace with 600mm CSP w/ Sloped Ends & Rip Rap.	$ 9,300.00
2657	F19	1																	1				1	1		4	2040 - 2060	Approach not paved; Culvert is too small. Replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 8,400.00
2660	F18	1						6									2	1	1				1			12	**2020 - 2022**	Approach not paved; Culvert is too small & plugged. Replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 7,600.00
2661	F05			2					PROJECT #2 Phase 3							1			1							4	2020 - 2023	**Project #2**: When aged out, replace with 600mm CSP w/ Sloped Ends & Rip Rap. Headwall.	$ 10,100.00
2662	F06			2			2		PROJECT #2 Phase 3																	4	2020 - 2023	**Project #2**: When aged out, replace with 600mm CSP w/ Sloped Ends & Rip Rap. Headwall.	$ 10,100.00
2663	F03			2		1			PROJECT #2 Phase 3										1							4	2020 - 2023	**Project #2**: When aged out, replace with 600mm CSP w/ Sloped Ends & Rip Rap.	$ 13,300.00
2664	F04			2		1			PROJECT #2 Phase 3										1							4	2020 - 2023	**Project #2**: When aged out, replace with 600mm CSP w/ Sloped Ends & Rip Rap.	$ 13,300.00
2665	F21	1																	1				1			3	2040 - 2060	Approach paved with headwalls; Culvert is too small. Replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 10,800.00
2666	F22	1											1						1				1			4	2040 - 2060	Approach not paved; Culvert is too small. Replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 6,800.00
2667	F23	1																	1				1			3	2040 - 2060	When aged out, replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 8,900.00
2668	E07	1		2															1				1			5	2030 - 2040	When aged out, replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 9,300.00
2669	E06	1		2														1	1				1			6	2030 - 2040	When aged out, replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 8,900.00
2775b		1																	1				1			3	2040 - 2060	When aged out, replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 8,000.00
2725	E05	1															2		1				1		1	6	2030 - 2040	When aged out, replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 10,400.00
2724	E04	1														2			1				1		1	6	2030 - 2040	When aged out, replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 8,100.00
2723	E15	1																1	1				1			4	2040 - 2060	When aged out, replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 10,000.00
2721	E16	1					2											1	1				1			6	2030 - 2040	Replace with 500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 3,600.00
2722	E03	1					2											1	1				1			6	2030 - 2040	Replace with 500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 3,600.00
2720	D15							3											1				1			5	2030 - 2040	Replace with 1-800mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 12,400.00

CULVERT RATING SYSTEM - By Location
Summer Village of Sunset Point
February 2020

CULVERT NO.	CULVERT NAME	MEETS MIN. DIAMETER (1 Point per Item)		CAPACITY					ROADWAY (1-3 Points per Item)			PIPE BARREL (2 Points per Item)						INLET / OUTLET (1 Point per Item)								SCORE	PROGRAMING YEAR	ACTION	Improvement/ Replacement Cost
		Aproach Culvert Min. 500mm (Yes = 0 points)	Centreline Road Culvert Min. 600mm (Yes = 0 points)	Major Flow Path (2 Points)	25 Year (0 Points)	10 Year (1 Point)	5 Year (2 Points)	Indequate Now (3 Points) Emergency: (6 points)	Severe Road Cracking	Pot Holing in Road	Sag in Road	Sag/ Bow	Out of Round	Settlement	Infiltration/Cracking/Joint Release	Corrosion 1-Moderate 2-Severe	Blockage	Inlet/Oulet Damage	No Sloped Ends	Sediment Build Up	Erosion above Pipe	Scour below Pipe	Needs Rip Rap	Needs Clearing of Trees/Brush	Needs De-vegetation @ inverts				
Sunset Drive																													
2729	E02															2			1				1			4	2040 - 2060	Replace with 1-800mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 14,100.00
2728	E01		1				2												1				1			5	2030 - 2040	Replace with 1-800mm CSP with Sloped Ends or Open Ditch, Rip Rap & make longer by 1m per end.	$ 11,700.00
2727	E08	1						3											1				1			6	2030 - 2040	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 5,200.00
2726	E09	1					2												1				1			5	2030 - 2040	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 5,200.00
2719	E10	1																	1				1			3	2040 - 2060	Remove this culvert and approach as it is not being used. Check and coordinate with landowner 1st.	$ 1,000.00
2718	E11	1																	1				1			3	2040 - 2060	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,000.00
2717	E12	1																	1				1			3	2040 - 2060	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,000.00
2716	E13	1															2		1				1			5	2030 - 2040	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end or eliminate.	$ 4,100.00
2715	E14																		1				1			2	2040 - 2060	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 13,200.00
2715a	E14a																									0		Dry Approach - No Culvert needed.	$ -
2714	F32																		1				1			2	2040 - 2060	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 4,700.00
2713	F01		1	2				3	PROJECT #2 Phase 1										1				1			8	2020 - 2023	**PROJECT #2 Ph. 1:** Replace with 2-800mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 27,400.00
2712	F02		1	2				3	PROJECT #2 Phase 1										1				1			8	2020 - 2023	**PROJECT #2 Ph. 1:** Replace with 2-800mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 8,300.00
2708a	G01		1	2															1				1			5	2030 - 2040	Replace with 2-800mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 27,400.00
2708b	G02			2															1				1			4	2040 - 2060	Replace with 2-800mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 7,200.00
2705	H01		1	2				3								1		1	1				1		1	11	2023 - 2030	Replace with 2-800mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 28,500.00
2707	H02			2															1				1	1		5	2030 - 2040	Replace with 2-800mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 10,500.00
2708	H03	1											2						1				1		1	6	2030 - 2040	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 5,000.00
2701	H33	1					2									2	2	1	1	1		1	1		1	13	2023 - 2030	When aged out, replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 10,000.00
2702	H12	1						3								1			1				1		1	8	2023 - 2030	When aged out, replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 9,300.00
2703	H32	1						3											1				1		1	7	2030 - 2040	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 5,800.00
2704	H11	1					2												1	1			1		1	7	2030 - 2040	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 7,900.00
2702	H12	1					2												1	1			1		1	8	2023 - 2030	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 10,000.00
2701	H33	1					2									1			1				1		1	7	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 9,300.00
2649	H13	1						3							2				1	1			1		1	10	2023 - 2030	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,400.00
2648	H14	1					2	3											1	1			1		1	10	2023 - 2030	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 7,100.00
2647	H15	1					2	3											1	1			1		1	10	2023 - 2030	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,400.00
2645	H16	1														1			1				1		1	5	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 7,100.00
2644	H17	1						3								1	2		1				1		1	10	2023 - 2030	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 14,100.00
2634	H19	1																	1				1		1	4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,400.00
2646	H26		1	2												1			1				1		1	7	2030 - 2040	Replace with 2-800mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 26,300.00
2635	H18		1													1		1	1				1		1	6	2030 - 2040	Replace with 1-800mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 17,000.00
2738	D19	1						3								1	2	1	1	1			1		1	12	2020 - 2022	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,500.00
2739	D18	1														1			1	1			1		1	6	2030 - 2040	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 5,000.00
2739a		1						3									2		1				1		1	9	2020 - 2022	Install New 1-600mm CSP with Sloped Ends, Rip Rap	$ 6,800.00
2741	D01		1	2				3	PROJECT #1										1				1			8	2020 - 2021	**PROJECT #1:** Replace with 2-800mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 35,200.00
2740	D02	1					2		PROJECT #1										1				1			5	2020 - 2021	**PROJECT #1:** Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 8,300.00
2742	D20	1														1			1	1					1	6	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 6,600.00
2743	C04	1														1			1				1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 5,400.00
2744	C03	1														1			1				1		1	5	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 6,200.00
2202	C01		1	2					PROJECT #4							1			1				1		1	7	2022 - 2030	**PROJECT #4:** Add 1-800mm CSP with Sloped Ends, Rip Rap.	$ 23,000.00
2201	C02		1	2				3	PROJECT #4										1				1			8	2022 - 2030	**PROJECT #4:** Replace with 800mm Dia. CSP with Sloped Ends with Rip Rap	$ 5,900.00
2201a	C02		1	2				3	PROJECT #4										1				1			8	2022 - 2030	**PROJECT #4:** Replace with 800mm Dia. CSP with Sloped Ends with Rip Rap	$ 4,100.00
2203	B05		1					3	PROJECT #4	2							2	1	1	1			1			12	2022 - 2030	**PROJECT #4:** Clean Culvert out. Extend inlet with sloped end and fix road. Cut-back outlet and install sloped end. Add	$ 36,900.00
2204	B04		1					3	PROJECT #4							1			1	1			1			8	2022 - 2030	**PROJECT #4:** Replace with 1-800mm CSP with Sloped Ends, Rip Rap.	$ 8,900.00
2205	B03		1						PROJECT #4						2	1		1	1				1			7	2022 - 2030	**PROJECT #4:** Replace with 1-800mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 15,500.00
2206	B01		1				2		PROJECT #4										1				1			5	2022 - 2030	**PROJECT #4:** Replace with 1-600mm CSP with Sloped Ends, Rip Rap.	$ 9,900.00
2207	B02		1				2		PROJECT #4										1				1			5	2022 - 2030	**PROJECT #4:** Replace with 1-600mm CSP with Sloped Ends, Rip Rap.	$ 9,900.00
2208	B13	1																	1	1			1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 5,400.00
2209	B06	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 6,900.00
2210	B07	1														1			1	1			1		1	6	2020 - 2022	Re-Shape ditch and review culvert grade. Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 11,500.00
2211	B14	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 5,400.00
2212	B08	1																	1	1			1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 8,200.00
2213	B15	1																	1	1			1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 6,900.00
2214	B09	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 7,400.00
2215	B10	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 7,400.00
2216	B16	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 6,900.00
2217	B11	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 9,800.00
2218	B12	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 6,400.00
2219	B17	1					2												1				1			5	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 7,700.00
2220	B18	1				1													1				1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 5,400.00
2221	A24	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 5,800.00
2222	A26	1																	1	1			1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 5,400.00
2223	A23	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 6,600.00
2222	A25	1					2																			3	2040 - 2060	Replace with 1-800mm CSP with Sloped Ends, Rip Rap.	$ 10,100.00
2235	A22	1														1			1				1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 5,400.00
2236	A21	1														1			1				1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 6,200.00
2237	A20	1														1			1				1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 6,900.00
2238	A11		1	2													2	1	1				1			8	2020 - 2022	Replace with 1-800mm CSP with Sloped Ends, Rip Rap.	$ 16,200.00
2239	A12	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 5,400.00
2240	A13	1				1													1				1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 5,400.00
2234	A14	1				1													1				1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 5,400.00
2233	A15	1				1													1	1			1			5	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 5,400.00
2232	A16	1					2											1	1	1			1			7	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 5,400.00
2228	A17	1																	1	1			1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 5,800.00
2227	A18	1				1												1	1				1			5	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 5,400.00
2226	A19	1					2										2	1	1	1			1			9	2020 - 2022	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 6,200.00

CULVERT RATING SYSTEM - By Location
Summer Village of Sunset Point
February 2020

CULVERT NO.	CULVERT NAME	MEETS MIN. DIAMETER (1 Point per Item)		CAPACITY					ROADWAY (1-3 Points per Item)			PIPE BARREL (2 Points per Item)						INLET / OUTLET (1 Point per Item)								SCORE	PROGRAMING YEAR	ACTION	Improvement/ Replacement Cost
		Aproach Culvert Min. 500mm (Yes = 0 points)	Centreline Road Culvert Min. 600mm (Yes = 0 points)	Major Flow Path (2 Points)	25 Year (0 Points)	10 Year (1 Point)	5 Year (2 Points)	Indequate Now (3 Points) Emergency: (6 points)	Severe Road Cracking	Pot Holing in Road	Sag in Road	Sag/ Bow	Out of Round	Settlement	Infiltration/Cracking/Joint Release	Corrosion 1-Moderate 2-Severe	Blockage	Inlet/Oulet Damage	No Sloped Ends	Sediment Build Up	Erosion above Pipe	Scour below Pipe	Needs Rip Rap	Needs Clearing of Trees/Brush	Needs De-vegetation @ inverts				
54th Avenue & 49th Street																												
2636a	H27a	1						6									1		1				1			10	2020 - 2022	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,100.00
2636	H27	1																	1							2	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 5,600.00
2637	H28	1														1		1	1				1			5	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 7,200.00
2633	H29	1														1			1				1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 5,600.00
2626	H30	1															2		1				1	1	1	7	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,400.00
2625	H23	1															2		1				1	1	1	7	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 5,600.00
2624	H22	1																	1				1	1	1	5	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 8,300.00
2623	H21	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,400.00
2622	H20	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 5,100.00
2621	H24	1																1	1				1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 5,100.00
2620	H25	1																	1				1	1	1	5	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 5,100.00
2627	I24	1																	1				1	1	1	5	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 5,100.00
2628	I20	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 2,600.00
2629	I21	1															1		1				1		1	5	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 4,100.00
2630	I22	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 5,300.00
2631	I23	1																	1				1		1	4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 5,300.00
2632	H31	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,000.00
2619	I11		1					3											1				1		1	7	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 9,700.00
2617	I07		1					3											1				1		1	7	2030 - 2040	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 8,400.00
2603	I12		1																1				1		1	4	2040 - 2060	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 10,600.00
2602	I06		1				2												1	1			1		1	7	2030 - 2040	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 11,900.00
56th Avenue & 49th Street																												
2607	I13	1																	1	1			1		1	5	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,600.00
2608	I14																		1	1			1			3	2040 - 2060	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,600.00
2609	I15	1																	1	1			1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,000.00
2610	I16	1																	1	1			1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,000.00
2613	I17	1																1	1	1			1			5	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,000.00
2616	I09	1															1		1				1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,000.00
2615	I10	1															1		1				1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,000.00
2614	I19	1																	1				1		1	4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,000.00
2614b		1						3									1		1				1			7	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,000.00
2612	I18	1																1	1				1		1	5	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,000.00
2612b		1						3									1		1				1			7	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 7,100.00
2618	I07		1					3					2			1	2	1	1	1			1		1	14	2020 - 2022	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 8,500.00
2611	I05		1	2			2		PROJECT #3							1			1				1			8	2022 - 2030	**Project #3**: Install sloped ends and rip rap. Re-Grade upstream ditch.	$ 5,800.00
2606	I04		1	2			2		PROJECT #3							1			1				1			8	2022 - 2030	**Project #3**: Install sloped ends and rip rap.	$ 2,900.00
2605	I03		1	2			2		PROJECT #3							1		1	1				1			9	2022 - 2030	**Project #3**: Replace with 1-800mm CSP with Sloped Ends & Rip Rap.	$ 73,600.00
2604	I02		1	2			2		PROJECT #3							1		1	1				1			9	2022 - 2030	**Project #3**: Remove existing 400mm Dia. Culvert.	$ 7,200.00

CULVERT RATING SYSTEM - By Priority Location

Summer Village of Sunset Point

February 2020

SE DESIGN AND CONSULTING INC.
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CULVERT NO.	CULVERT NAME	MEETS MIN. DIAMETER (1 Point per Item)		CAPACITY					ROADWAY (1-3 Points per Item)			PIPE BARREL (2 Points per Item)						INLET / OUTLET (1 Point per Item)								SCORE	PROGRAMING YEAR	ACTION	Improvement/ Replacement Cost
		Aproach Culvert Min. 500mm (Yes = 0 points)	Centreline Road Culvert Min. 600mm (Yes = 0 points)	Major Flow Path (2 Points)	25 Year (0 Points)	10 Year (1 Point)	5 Year (2 Points)	Indequate Now (3 Points) Emergency: (6 points)	Severe Road Cracking	Pot Holing in Road	Sag in Road	Sag/ Bow	Out of Round	Settlement	Infiltration/Cracking/Joint Release	Corrosion 1-Moderate 2-Severe	Blockage	Inlet/Oulet Damage	No Sloped Ends	Sediment Build Up	Erosion above Pipe	Scour below Pipe	Needs Rip Rap	Needs Clearing of Trees/Brush	Needs De-vegetation @ inverts				
YEAR 2020 - 2021																												
		PROJECT #1 - Old Railway Embankment & 48A Ave. Drainage Improvements																												
2741	D01		1	2				3	PROJECT #1										1				1			8	2020 - 2021	PROJECT #1: Replace with 2-800mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 35,200.00
2740	D02	1					2		PROJECT #1										1				1			5	2020 - 2021	PROJECT #1: Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 8,300.00
2737	D03	1		2				3	PROJECT #1									1	1				1		1	10	2020 - 2021	Project #1: Replace with 2-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 7,100.00
2736	D09						2		PROJECT #1			2						1	1	1			1			8	2020 - 2021	Project #1: Replace with 8000mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 12,400.00
2690	D04			2			2	3	PROJECT #1										1				1			9	2020 - 2021	Project #1: Add additional 600mm CSP with Sloped Ends & Rip Rap. Upgrade exist. with slope ends & riprap.	$ 10,700.00
2689	D05			2			2	3	PROJECT #1										1				1			9	2020 - 2021	Project #1: Add additional 600mm CSP with Sloped Ends & Rip Rap. Upgrade exist. with slope ends & riprap.	$ 9,800.00
2687	D06			2			2	3	PROJECT #1										1				1			9	2020 - 2021	Project #1: Add additional 600mm CSP with Sloped Ends & Rip Rap. Upgrade exist. with slope ends & riprap.	$ 9,800.00
2685	D07			2			2	3	PROJECT #1										1				1			9	2020 - 2021	Project #1: Add additional 600mm CSP with Sloped Ends & Rip Rap. Upgrade exist. with slope ends & riprap.	$ 13,100.00
2693	D08			2			2	3	PROJECT #1										1				1		1	10	2020 - 2021	Project #1: Install 600mm CSP Sloped Ends. Re-Grade upstream ditch for 150m.	$ 8,900.00
2692	RE02			2				6	PROJECT #1										1			1	1	1	1	13	2020 - 2021	Project #1: Remove existing culvert. Construct Drainage Ditch System along Railway Embankment to the North for 300m.	$ 20,000.00
2692b	RE02b			2				6	PROJECT #1															1	1	10	2020 - 2021	Project #1: Install Manhole Structure with Control Weir at 48A Avenue S. Ditch	$ 25,000.00
2692c	RE02c			2				3	PROJECT #1										1			1	1	1	1	10	2020 - 2021	Project #1: Remove existing culvert. Construct Drainage Ditch System along Railway Embankment to the South for 300m.	$ 20,000.00
YEAR 2020 - 2023																												
		PROJECT #2 - Central Drainage Way incl. 49A Ave. & 48th Street																												
2713	F01		1	2				3	PROJECT #2 Phase 1										1				1			8	2020 - 2023	PROJECT #2 Ph. 1: Replace with 2-800mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 27,400.00
2712	F02		1	2				3	PROJECT #2 Phase 1										1				1			8	2020 - 2023	PROJECT #2 Ph. 1: Replace with 2-800mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 8,300.00
2658	F07a	1		2					PROJECT #2 Phase 3				2						1				1	1		8	2020 - 2023	Project #2: Approach not paved; Culvert is too small. Replace with 600mm CSP w/ Sloped Ends & Rip Rap.	$ 9,300.00
2659	F07b			2				3	PROJECT #2 Phase 3				2						1				1	1		10	2020 - 2023	Project #2: Approach not paved; Culvert is too small. Replace with 600mm CSP w/ Sloped Ends & Rip Rap.	$ 9,300.00
2661	F05			2					PROJECT #2 Phase 3							1			1				1			4	2020 - 2023	Project #2: When aged out, replace with 600mm CSP w/ Sloped Ends & Rip Rap. Headwall.	$ 10,100.00
2662	F06			2			2		PROJECT #2 Phase 3																	4	2020 - 2023	Project #2: When aged out, replace with 600mm CSP w/ Sloped Ends & Rip Rap. Headwall.	$ 10,100.00
2663	F03			2		1			PROJECT #2 Phase 3										1							4	2020 - 2023	Project #2: When aged out, replace with 600mm CSP w/ Sloped Ends & Rip Rap.	$ 13,300.00
2664	F04			2		1			PROJECT #2 Phase 3										1							4	2020 - 2023	Project #2: When aged out, replace with 600mm CSP w/ Sloped Ends & Rip Rap.	$ 13,300.00
2679	F14a							3	PROJECT #2 Phase 3								1		1				1		1	7	2020 - 2023	Project #2: Remove 500mm Pipes; Replace with one 600mm CSP with Sloped Ends & Rip Rap. Reset Elev.	$ 14,900.00
2679	F14b							3	PROJECT #2 Phase 3								1		1				1		1	7	2020 - 2023	Project #2: Remove 500mm Pipes; Replace with one 600mm CSP with Sloped Ends & Rip Rap. Reset Elev.	$ 1,700.00
2676	F28	1							PROJECT #2 Phase 3										1				1			3	2020 - 2023	Project #2: Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 11,400.00
2694	F12								PROJECT #2 Phase 3										1				1			2	2020 - 2023	Project #2: When aged out, Replace with 800mm CSP with Sloped Ends & Rip Rap.	$ 13,000.00
2675	F11								PROJECT #2 Phase 3										1				1			2	2020 - 2023	Project #2: When aged out, remove. Culvert 2694/F12 will replace this culvert with 800mm Dia.	$ -
2674	F09								PROJECT #2 Phase 3										1				1			2	2020 - 2023	Project #2: When aged out, Replace with 800mm CSP with Sloped Ends & Rip Rap.	$ 11,300.00
2673	F10								PROJECT #2 Phase 3										1				1			2	2020 - 2023	Project #2: When aged out, remove. Culvert 2674/F09 will replace this culvert with 800mm Dia.	$ -
YEAR 2022 - 2030																												
		PROJECT #3 - 56th Avenue Drainage Improvements																												
2611	I05		1	2			2		PROJECT #3							1			1				1			8	2022 - 2030	Project #3: Install sloped ends and rip rap. Re-Grade upstream ditch.	$ 5,800.00
2606	I04		1	2			2		PROJECT #3							1			1				1			8	2022 - 2030	Project #3: Install sloped ends and rip rap.	$ 2,900.00
2605	I03		1	2			2		PROJECT #3							1		1	1				1			9	2022 - 2030	Project #3: Replace with 1-800mm CSP with Sloped Ends & Rip Rap.	$ 73,600.00
2604	I02		1	2			2		PROJECT #3							1		1	1				1			9	2022 - 2030	Project #3: Remove existing 400mm Dia. Culvert.	$ 7,200.00
YEAR 2022 - 2030																												
		PROJECT #4 - Backlot Drainage Swale - 45 Ave. to 48A Ave.																												
2202	C01		1	2					PROJECT #4							1			1				1		1	7	2022 - 2030	PROJECT #4: Add 1-800mm CSP with Sloped Ends, Rip Rap.	$ 23,000.00
2201	C02		1	2				3	PROJECT #4										1				1			8	2022 - 2030	PROJECT #4: Replace with 800mm Dia. CSP with Sloped Ends with Rip Rap	$ 5,900.00
2201a	C02		1	2				3	PROJECT #4										1				1			8	2022 - 2030	PROJECT #4: Replace with 800mm Dia. CSP with Sloped Ends with Rip Rap	$ 4,100.00
																											2022 - 2030		
2203	B05		1					3	PROJECT #4	2							2	1	1	1			1			12	2022 - 2030	PROJECT #4: Clean Culvert out. Extend inlet with sloped end and fix road. Cut-back outlet and install sloped end. Add r	$ 36,900.00
2204	B04		1					3	PROJECT #4							1			1	1			1			8	2022 - 2030	PROJECT #4: Replace with 1-800mm CSP with Sloped Ends, Rip Rap.	$ 8,900.00
2205	B03		1						PROJECT #4						2	1		1	1				1			7	2022 - 2030	PROJECT #4: Replace with 1-800mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 15,500.00
2206	B01		1				2		PROJECT #4										1				1			5	2022 - 2030	PROJECT #4: Replace with 1-600mm CSP with Sloped Ends, Rip Rap.	$ 9,900.00
2207	B02		1				2		PROJECT #4										1				1			5	2022 - 2030	PROJECT #4: Replace with 1-600mm CSP with Sloped Ends, Rip Rap.	$ 9,900.00
YEAR 2020 - 2022 - Blocked Culverts, No Culverts																												
YEAR 2023 - 2030 - Poor Culverts																												
YEAR 2030 - 2040 - Aging Culverts																												
YEAR 2040 - 2060 - Other Culverts																												
48A Avenue																												
2737	D03	1		2				3	PROJECT #1									1	1				1		1	10	2020 - 2021	Project #1: Replace with 2-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 7,100.00
2736	D09						2		PROJECT #1			2						1	1	1			1			8	2020 - 2021	Project #1: Replace with 8000mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 12,400.00
2735	D10	1					2											1	1				1		1	7	2030 - 2040	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 3,200.00
2734	D11	1			0														1				1		1	4	2040 - 2060	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 5,600.00
2733	D12	1			0														1				1		1	4	2040 - 2060	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 4,800.00
2732	D13	1			0														1				1		1	4	2040 - 2060	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 8,300.00
2731	D14	1			0														1				1		1	4	2040 - 2060	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 7,900.00
2730	D15	1					2												1				1		1	6	2030 - 2040	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 6,700.00
2691	D16	1			0														1				1		1	4	2040 - 2060	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 8,100.00
2690	D04			2			2	3	PROJECT #1										1				1			9	2020 - 2021	Project #1: Add additional 600mm CSP with Sloped Ends & Rip Rap. Upgrade exist. with slope ends & riprap.	$ 10,700.00
2688	D17	1			0														1				1		1	4	2040 - 2060	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 6,000.00
2689	D05			2			2	3	PROJECT #1										1				1			9	2020 - 2021	Project #1: Add additional 600mm CSP with Sloped Ends & Rip Rap. Upgrade exist. with slope ends & riprap.	$ 9,800.00
2687	D06			2			2	3	PROJECT #1										1				1			9	2020 - 2021	Project #1: Add additional 600mm CSP with Sloped Ends & Rip Rap. Upgrade exist. with slope ends & riprap.	$ 9,800.00
2686	F17	1											1						1				1			4	2040 - 2060	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 5,200.00
2685	D07			2			2	3	PROJECT #1										1				1			9	2020 - 2021	Project #1: Add additional 600mm CSP with Sloped Ends & Rip Rap. Upgrade exist. with slope ends & riprap.	$ 13,100.00
2693	D08			2			2	3	PROJECT #1										1				1		1	10	2020 - 2021	Project #1: Install 600mm CSP Sloped Ends. Re-Grade upstream ditch for 150m.	$ 8,900.00

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CULVERT NO.	CULVERT NAME	MEETS MIN. DIAMETER (1 Point per Item)		CAPACITY					ROADWAY (1-3 Points per Item)			PIPE BARREL (2 Points per Item)						INLET / OUTLET (1 Point per Item)								SCORE	PROGRAMING YEAR	ACTION	Improvement/ Replacement Cost
		Aproach Culvert Min. 500mm (Yes = 0 points)	Centreline Road Culvert Min. 600mm (Yes = 0 points)	Major Flow Path (2 Points)	25 Year (0 Points)	10 Year (1 Point)	5 Year (2 Points)	Indequate Now (3 Points) Emergency: (6 points)	Severe Road Cracking	Pot Holing in Road	Sag in Road	Sag/ Bow	Out of Round	Settlement	Infiltration/Cracking/Joint Release	Corrosion 1-Moderate 2-Severe	Blockage	Inlet/Oulet Damage	No Sloped Ends	Sediment Build Up	Erosion above Pipe	Scour below Pipe	Needs Rip Rap	Needs Clearing of Trees/Brush	Needs De-vegetation @ inverts				
Old Railway Embankment																													
2692	RE02			2				6	PROJECT #1										1			1	1	1	1	13	2020 - 2021	**Project #1**: Remove existing culvert. Construct Drainage Ditch System along Railway Embankment to the North for 300m.	$ 20,000.00
2692b	RE02b			2				6	PROJECT #1															1	1	10	2020 - 2021	**Project #1**: Install Manhole Structure with Control Weir at 48A Avenue S. Ditch	$ 25,000.00
2692c	RE02c			2				3	PROJECT #1										1			1	1	1	1	10	2020 - 2021	**Project #1**: Remove existing culvert. Construct Drainage Ditch System along Railway Embankment to the South for 300m.	$ 20,000.00
48 Street																													
2683	F16	1																	1				1			3	2040 - 2060	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 7,600.00
2682	F15	1																	1				1			3	2040 - 2060	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 8,300.00
2681	F31	1														1			1				1			4	2040 - 2060	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 8,300.00
2680	F30	1																	1	1			1			4	2040 - 2060	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 4,400.00
2679	F14a							3	PROJECT #2 Phase 3								1		1				1		1	7	2020 - 2023	**Project #2**: Remove 500mm Pipes; Replace with one 600mm CSP with Sloped Ends & Rip Rap. Reset Elev.	$ 14,900.00
2679	F14b							3	PROJECT #2 Phase 3								1		1				1		1	7	2020 - 2023	**Project #2**: Remove 500mm Pipes; Replace with one 600mm CSP with Sloped Ends & Rip Rap. Reset Elev.	$ 1,700.00
2678	F29	1																	1				1			3	2040 - 2060	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 13,000.00
2677	F13																		1				1			2	2040 - 2060	Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 9,500.00
2676	F28	1							PROJECT #2 Phase 3										1				1			3	2020 - 2023	**Project #2**: Replace with 500mm CSP with Sloped Ends & Rip Rap.	$ 11,400.00
2694	F12								PROJECT #2 Phase 3										1				1			2	2020 - 2023	**Project #2**: When aged out, Replace with 800mm CSP with Sloped Ends & Rip Rap.	$ 13,000.00
2675	F11								PROJECT #2 Phase 3										1				1			2	2020 - 2023	**Project #2**: When aged out, remove. Culvert 2694/F12 will replace this culvert with 800mm Dia.	$ -
2674	F09								PROJECT #2 Phase 3										1				1			2	2020 - 2023	**Project #2**: When aged out, Replace with 800mm CSP with Sloped Ends & Rip Rap.	$ 11,300.00
2673	F10								PROJECT #2 Phase 3										1				1			2	2020 - 2023	**Project #2**: When aged out, remove. Culvert 2674/F09 will replace this culvert with 800mm Dia.	$ -
2672	F27	1																1	1	1			1			5	2030 - 2040	If showing signs of poor drainage or when aged, Replace with 600mm CSP w/ Sloped Ends & Rip Rap.	$ 10,600.00
2671	F08			2															1				1			4	2040 - 2060	When aged out, Replace with 800mm CSP with Sloped Ends & Rip Rap.	$ 13,000.00
2670	F24																	1	1	1			1	1		5	2030 - 2040	Approach not paved; schedule to Replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 6,800.00
2656	F25	1															1	1	1	1			1			6	2030 - 2040	Approach not paved. Could be blocked; Replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 8,800.00
2654	F26	1																1	1	1			1			5	2030 - 2040	Approach not paved; Replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 6,800.00
2655	F20	1															1	1	1				1			5	2020 - 2022	Approach not paved; Blockage on S. End. Replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 6,800.00
49A Avenue																													
2658	F07a	1		2					PROJECT #2 Phase 3				2						1				1	1		8	2020 - 2023	**Project #2**: Approach not paved; Culvert is too small. Replace with 600mm CSP w/ Sloped Ends & Rip Rap.	$ 9,300.00
2659	F07b			2				3	PROJECT #2 Phase 3				2						1				1	1		10	2020 - 2023	**Project #2**: Approach not paved; Culvert is too small. Replace with 600mm CSP w/ Sloped Ends & Rip Rap.	$ 9,300.00
2657	F19	1																	1				1	1		4	2040 - 2060	Approach not paved; Culvert is too small. Replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 8,400.00
2660	F18	1						6									2	1	1				1			12	2020 - 2022	Approach not paved; Culvert is too small & plugged. Replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 7,600.00
2661	F05			2					PROJECT #2 Phase 3							1			1							4	2020 - 2023	**Project #2**: When aged out, replace with 600mm CSP w/ Sloped Ends & Rip Rap. Headwall.	$ 10,100.00
2662	F06			2			2		PROJECT #2 Phase 3																	4	2020 - 2023	**Project #2**: When aged out, replace with 600mm CSP w/ Sloped Ends & Rip Rap. Headwall.	$ 10,100.00
2663	F03			2		1			PROJECT #2 Phase 3										1							4	2020 - 2023	**Project #2**: When aged out, replace with 600mm CSP w/ Sloped Ends & Rip Rap.	$ 13,300.00
2664	F04			2		1			PROJECT #2 Phase 3										1							4	2020 - 2023	**Project #2**: When aged out, replace with 600mm CSP w/ Sloped Ends & Rip Rap.	$ 13,300.00
2665	F21	1																	1					1		3	2040 - 2060	Approach paved with headwalls; Culvert is too small. Replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 10,800.00
2666	F22	1											1						1				1			4	2040 - 2060	Approach not paved; Culvert is too small. Replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 6,800.00
2667	F23	1																	1				1			3	2040 - 2060	When aged out, replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 8,900.00
2668	E07	1		2															1				1			5	2030 - 2040	When aged out, replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 9,300.00
2669	E06	1		2														1	1				1			6	2030 - 2040	When aged out, replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 8,900.00
2775b		1																	1				1			3	2040 - 2060	When aged out, replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 8,000.00
2725	E05	1															2		1				1		1	6	2030 - 2040	When aged out, replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 10,400.00
2724	E04	1														2			1				1		1	6	2030 - 2040	When aged out, replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 8,100.00
2723	E15	1																1	1				1			4	2040 - 2060	When aged out, replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 10,000.00
2721	E16	1					2											1	1				1			6	2030 - 2040	Replace with 500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 3,600.00
2722	E03	1					2											1	1				1			6	2030 - 2040	Replace with 500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 3,600.00
2720	D15							3											1				1			5	2030 - 2040	Replace with 1-800mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 12,400.00
Sunset Drive																													
2729	E02															2			1				1			4	2040 - 2060	Replace with 1-800mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 14,100.00
2728	E01		1				2												1				1			5	2030 - 2040	Replace with 1-800mm CSP with Sloped Ends or Open Ditch, Rip Rap & make longer by 1m per end.	$ 11,700.00
2727	E08	1						3											1				1			6	2030 - 2040	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 5,200.00
2726	E09	1					2												1				1			5	2030 - 2040	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 5,200.00
2719	E10	1																	1				1			3	2040 - 2060	Remove this culvert and approach as it is not being used. Check and coordinate with landowner 1st.	$ 1,000.00
2718	E11	1																	1				1			3	2040 - 2060	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,000.00
2717	E12	1																	1				1			3	2040 - 2060	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,000.00
2716	E13	1															2		1				1			5	2030 - 2040	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end or eliminate.	$ 4,100.00
2715	E14																		1				1			2	2040 - 2060	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 13,200.00
2715a	E14a																									0		Dry Approach - No Culvert needed.	$ -
2714	F32																		1				1			2	2040 - 2060	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 4,700.00
2713	F01		1	2				3	PROJECT #2 Phase 1										1				1			8	2020 - 2023	**PROJECT #2 Ph. 1**: Replace with 2-800mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 27,400.00
2712	F02		1	2				3	PROJECT #2 Phase 1										1				1			8	2020 - 2023	**PROJECT #2 Ph. 1**: Replace with 2-800mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 8,300.00
2708a	G01		1	2															1				1			5	2030 - 2040	Replace with 2-800mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 27,400.00
2708b	G02			2															1				1			4	2040 - 2060	Replace with 2-800mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 7,200.00
2705	H01		1	2				3								1		1	1				1		1	11	2023 - 2030	Replace with 2-800mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 28,500.00
2707	H02			2															1				1	1		5	2030 - 2040	Replace with 2-800mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 10,500.00
2708	H03	1											2						1				1		1	6	2030 - 2040	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 5,000.00
2701	H33	1					2									2	2	1	1	1		1	1		1	13	2023 - 2030	When aged out, replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 10,000.00
2702	H12	1						3								1			1				1		1	8	2023 - 2030	When aged out, replace with 500mm CSP w/ Sloped Ends & Rip Rap.	$ 9,300.00
2703	H32	1						3											1				1		1	7	2030 - 2040	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 5,800.00
2704	H11	1					2												1	1			1		1	7	2030 - 2040	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 7,900.00
2702	H12	1					2												1	1		1	1		1	8	2023 - 2030	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 10,000.00
2701	H33	1					2									1			1				1		1	7	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 9,300.00
2649	H13	1						3							2				1	1			1		1	10	2023 - 2030	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,400.00
2648	H14	1					2	3											1	1			1		1	10	2023 - 2030	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 7,100.00
2647	H15	1					2	3											1	1			1		1	10	2023 - 2030	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,400.00
2645	H16	1														1			1				1		1	5	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 7,100.00
2644	H17	1						3								1	2		1				1		1	10	2023 - 2030	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 14,100.00
2634	H19	1																	1				1		1	4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,400.00
2646	H26		1	2												1			1				1		1	7	2030 - 2040	Replace with 2-800mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 26,300.00
2635	H18		1													1		1	1				1		1	6	2030 - 2040	Replace with 1-800mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 17,000.00
2738	D19	1						3								1	2	1	1	1			1		1	12	2020 - 2022	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,500.00
2739	D18	1														1			1	1			1		1	6	2030 - 2040	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 5,000.00
2739a		1						3									2		1				1		1	9	2020 - 2022	Install New 1-600mm CSP with Sloped Ends, Rip Rap	$ 6,800.00

CULVERT RATING SYSTEM - By Priority Location

Summer Village of Sunset Point

February 2020

SE DESIGN AND CONSULTING INC.
ENGINEERS • CONSULTANTS • SURVEYORS

CULVERT NO.	CULVERT NAME	MEETS MIN. DIAMETER (1 Point per Item)		CAPACITY					ROADWAY (1-3 Points per Item)			PIPE BARREL (2 Points per Item)						INLET / OUTLET (1 Point per Item)								SCORE	PROGRAMING YEAR	ACTION	Improvement/ Replacement Cost
		Aproach Culvert Min. 500mm (Yes = 0 points)	Centreline Road Culvert Min. 600mm (Yes = 0 points)	Major Flow Path (2 Points)	25 Year (0 Points)	10 Year (1 Point)	5 Year (2 Points)	Indequate Now (3 Points) Emergency: (6 points)	Severe Road Cracking	Pot Holing in Road	Sag in Road	Sag/ Bow	Out of Round	Settlement	Infiltration/Cracking/Joint Release	Corrosion 1-Moderate 2-Severe	Blockage	Inlet/Oulet Damage	No Sloped Ends	Sediment Build Up	Erosion above Pipe	Scour below Pipe	Needs Rip Rap	Needs Clearing of Trees/Brush	Needs De-vegetation @ inverts				
2741	D01		1	2				3	PROJECT #1										1				1			8	2020 - 2021	PROJECT #1: Replace with 2-800mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 35,200.00
2740	D02	1					2		PROJECT #1										1				1			5	2020 - 2021	PROJECT #1: Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 8,300.00
2742	D20	1														1			1	1			1		1	6	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 6,600.00
2743	C04	1														1			1				1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 5,400.00
2744	C03	1														1			1				1		1	5	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 6,200.00
2202	C01		1	2					PROJECT #4							1			1				1		1	7	2022 - 2030	PROJECT #4: Add 1-800mm CSP with Sloped Ends, Rip Rap.	$ 23,000.00
2201	C02		1	2				3	PROJECT #4										1				1			8	2022 - 2030	PROJECT #4: Replace with 800mm Dia. CSP with Sloped Ends with Rip Rap	$ 5,900.00
2201a	C02		1	2				3	PROJECT #4										1				1			8	2022 - 2030	PROJECT #4: Replace with 800mm Dia. CSP with Sloped Ends with Rip Rap	$ 4,100.00
2203	B05		1					3	PROJECT #4	2							2	1	1	1			1			12	2022 - 2030	PROJECT #4: Clean Culvert out. Extend inlet with sloped end and fix road. Cut-back outlet and install sloped end. Add	$ 36,900.00
2204	B04		1					3	PROJECT #4							1			1	1			1			8	2022 - 2030	PROJECT #4: Replace with 1-800mm CSP with Sloped Ends, Rip Rap.	$ 8,900.00
2205	B03		1						PROJECT #4						2	1		1	1				1			7	2022 - 2030	PROJECT #4: Replace with 1-800mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 15,500.00
2206	B01		1				2		PROJECT #4										1				1			5	2022 - 2030	PROJECT #4: Replace with 1-600mm CSP with Sloped Ends, Rip Rap.	$ 9,900.00
2207	B02		1				2		PROJECT #4										1				1			5	2022 - 2030	PROJECT #4: Replace with 1-600mm CSP with Sloped Ends, Rip Rap.	$ 9,900.00
2208	B13	1																	1	1			1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 5,400.00
2209	B06	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 6,900.00
2210	B07	1														1			1	1			1		1	6	2020 - 2022	Re-Shape ditch and review culvert grade. Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 11,500.00
2211	B14	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 5,400.00
2212	B08	1																	1	1			1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 8,200.00
2213	B15	1																	1	1			1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 6,900.00
2214	B09	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 7,400.00
2215	B10	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 7,400.00
2216	B16	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 6,900.00
2217	B11	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 9,800.00
2218	B12	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 6,400.00
2219	B17	1					2												1				1			5	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 7,700.00
2220	B18	1				1													1				1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 5,400.00
2221	A24	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 5,800.00
2222	A26	1																	1	1			1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 5,400.00
2223	A23	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 6,600.00
2222	A25	1					2																			3	2040 - 2060	Replace with 1-800mm CSP with Sloped Ends, Rip Rap.	$ 10,100.00
2235	A22	1														1			1				1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 5,400.00
2236	A21	1														1			1				1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 6,200.00
2237	A20	1														1			1				1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 6,900.00
2238	A11		1	2													2	1	1				1			8	2020 - 2022	Replace with 1-800mm CSP with Sloped Ends, Rip Rap.	$ 16,200.00
2239	A12	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 5,400.00
2240	A13	1				1													1				1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 5,400.00
2234	A14	1				1													1				1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 5,400.00
2233	A15	1				1													1	1			1			5	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 5,400.00
2232	A16	1					2											1	1	1			1			7	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 5,400.00
2228	A17	1																	1	1			1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 5,800.00
2227	A18	1				1												1	1				1			5	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 5,400.00
2226	A19	1					2										2	1	1	1			1			9	2020 - 2022	Replace with 1-500mm CSP with Sloped Ends, Rip Rap.	$ 6,200.00

54th Avenue & 49th Street

2636a	H27a	1						6									1		1				1			10	2020 - 2022	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,100.00
2636	H27	1																	1							2	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 5,600.00
2637	H28	1														1		1	1				1			5	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 7,200.00
2633	H29	1														1			1				1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 5,600.00
2626	H30	1															2		1				1	1	1	7	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,400.00
2625	H23	1															2		1				1	1	1	7	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 5,600.00
2624	H22	1																	1				1	1	1	5	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 8,300.00
2623	H21	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,400.00
2622	H20	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 5,100.00
2621	H24	1																1	1				1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 5,100.00
2620	H25	1																	1				1	1	1	5	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 5,100.00
2627	I24	1																	1				1	1	1	5	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 5,100.00
2628	I20	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 2,600.00
2629	I21	1															1		1				1		1	5	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 4,100.00
2630	I22	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 5,300.00
2631	I23	1																	1				1		1	4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 5,300.00
2632	H31	1																	1				1			3	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,000.00
2619	I11		1					3											1				1		1	7	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 9,700.00
2617	I07		1					3											1				1		1	7	2030 - 2040	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 8,400.00
2603	I12		1																1				1		1	4	2040 - 2060	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 10,600.00
2602	I06		1				2												1	1			1		1	7	2030 - 2040	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 11,900.00

56th Avenue & 49th Street

2607	I13	1																	1	1			1		1	5	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,600.00
2608	I14																		1	1			1			3	2040 - 2060	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,600.00
2609	I15	1																	1	1			1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,000.00
2610	I16	1																	1	1			1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,000.00
2613	I17	1																1	1	1			1			5	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,000.00
2616	I09	1															1		1				1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,000.00
2615	I10	1															1		1				1			4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,000.00
2614	I19	1																	1				1		1	4	2040 - 2060	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,000.00
2614b		1						3									1		1				1			7	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,000.00
2612	I18	1																1	1				1		1	5	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 6,000.00
2612b		1						3									1		1				1			7	2030 - 2040	Replace with 1-500mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 7,100.00
2618	I07		1					3					2			1	2	1	1	1			1		1	14	2020 - 2022	Replace with 1-600mm CSP with Sloped Ends, Rip Rap & make longer by 1m per end.	$ 8,500.00
2611	I05		1	2			2		PROJECT #3							1			1				1			8	2022 - 2030	Project #3: Install sloped ends and rip rap. Re-Grade upstream ditch.	$ 5,800.00
2606	I04		1	2			2		PROJECT #3							1			1				1			8	2022 - 2030	Project #3: Install sloped ends and rip rap.	$ 2,900.00
2605	I03		1	2			2		PROJECT #3							1		1	1				1			9	2022 - 2030	Project #3: Replace with 1-800mm CSP with Sloped Ends & Rip Rap.	$ 73,600.00
2604	I02		1	2			2		PROJECT #3							1		1	1				1			9	2022 - 2030	Project #3: Remove existing 400mm Dia. Culvert.	$ 7,200.00

SE DESIGN AND CONSULTING INC.
ENGINEERS • CONSULTANTS • SURVEYORS

APPENDIX C

Design Specifications for Culverts: Detail Drawings and Specifications

Detail Drawings:

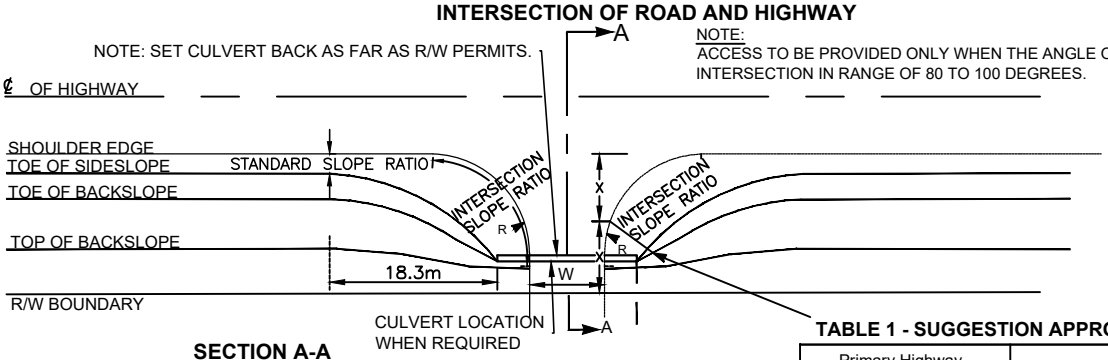
1. Approach Treatment for Minor Intersecting Roadway (Intersection of Road and Highway)
2. Corrugated Metal Pipe Culvert Installation
3. Hand Laid Rock Riprap
4. Slope End Installations for Round Section Corrugated Metal Pipe

Detail Drawings:

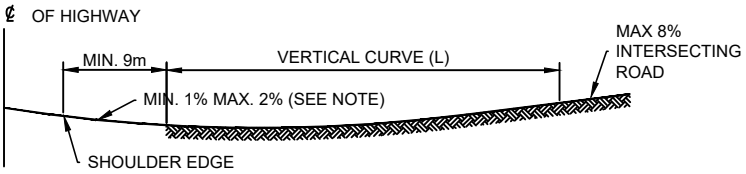
1. Section 02315 Trenching and Backfilling
2. Section 02434 Pipe Culverts
3. Section 02371 Riprap

APPROACH TREATMENT FOR MINOR INTERSECTING ROADWAY

INTERSECTION OF ROAD AND HIGHWAY



SECTION A-A
INTERSECTING ROAD IN CUT



SECTION A-A
INTERSECTING ROAD IN FILL

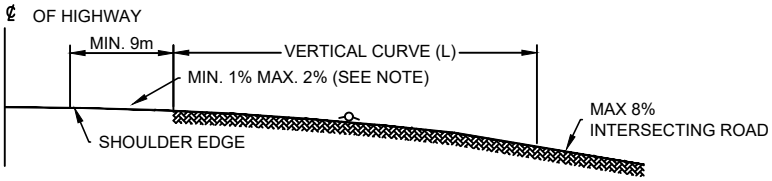


TABLE 1 - SUGGESTION APPROACH SIDESLOPES *

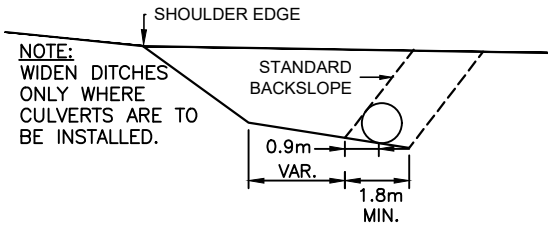
Primary Highway Posted>= 100km/h	Fill Height	Desirable Slope on New Approach
Undivided Highway AADT <1,000	<4m fill >4m fill	7:1 4:1
Undivided Highway 1,000<AADT<3,000	<4m fill >4m fill	7:1 5:1
Undivided Highway AADT >3,000	<4m fill >4m fill	7:1 6:1
Divided Highway AADT <6,000	<4m fill >4m fill	7:1 7:1
Divided Highway 6,000<AADT<15,000	<4m fill >4m fill	8:1 7:1
Divided Highway AADT>15,000	<4m fill >4m fill	10:1 7:1

* APPROACH TO SLOPE TO BE MEASURED AT A POINT MIDWAY BETWEEN THE HIGHWAY SHOULDER AND BASIC RIGHT-OF-WAY BOUNDARY AS ILLUSTRATED ON FIGURES D-33a AND D-33b

MINIMUM LENGTH OF VERTICAL CURVE

ALGEBRAIC DIFF IN GRADIENT (%)	LENGTH (m)	
	CREST	SAG
1	6	8
2	12	15
3	18	23
4	24	30
5	30	38
6	37	46
7	/	46
8	/	46
9	/	46

NOTE:
WHERE THE MINOR INTERSECTING ROADWAY HAS A LARGE NUMBER OF WB-15 VEHICLES TURNING, THE APPROACH TREATMENT SHOWN IN FIGURE D-3.3a SHOULD BE USED.



DETAIL OF DITCH AND CULVERT LOCATION

NOTE:
DESIRABLE MINIMUM 1% IS TO PREVENT PONDING AND SUBSEQUENT ICING AT THE INTERSECTION.

DESIRABLE MAXIMUM 2% IS FOR EASE OF OPERATION IN ALL WEATHER CONDITIONS.

APPROACH GRADES BETWEEN 0.5 % AND 3%, ABSOLUTE MAXIMUM 6% ARE CONSIDERED ACCEPTABLE. APPROACH ROAD GRADES UP TO 1% SLOPING DOWN TOWARD THE HIGHWAY MAY BE USED TO MATCH SUPERELEVATION ON THE HIGHWAY, IF DESIRABLE FOR ENGINEERING REASONS.

TABLE FOR DETERMINATION OF ROADWAY WIDTH			RADIUS OF INTERSECTION EDGE OF SHOULDER (R)
USE	ROADWAY WIDTH, W * (m)		
	SINGLE	JOINT	SINGLE OR JOINT ACCESS
RESIDENTIAL	8	10	10
AGRICULTURAL	10	10.5	15
UTILITY MAINTENANCE	8		15
PUBLIC ROAD ALLOWANCE	8		15

* ENGINEERING DISCRETION SHOULD BE USED IN SELECTING A ROADWAY WIDTH TO SUIT THE NEEDS OF THE ACCESS.

SUMMER VILLAGE OF Sunset Point

MINIMUM CULVERT REQUIRED

APPROACH: 500mm

CENTERLINE: 600mm

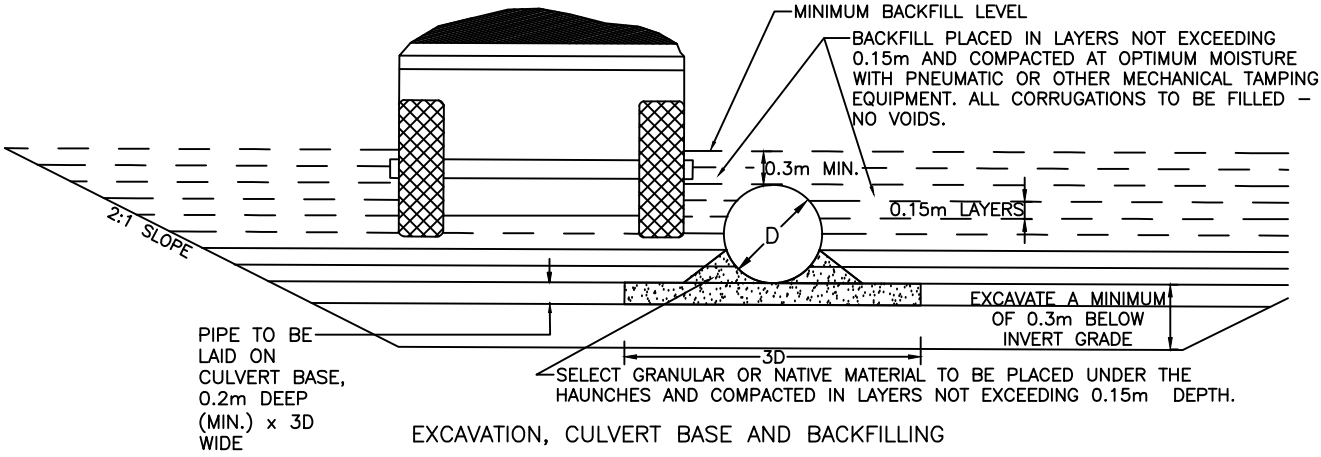
Scale: N.T.S.

Date: JUNE 24, 2020

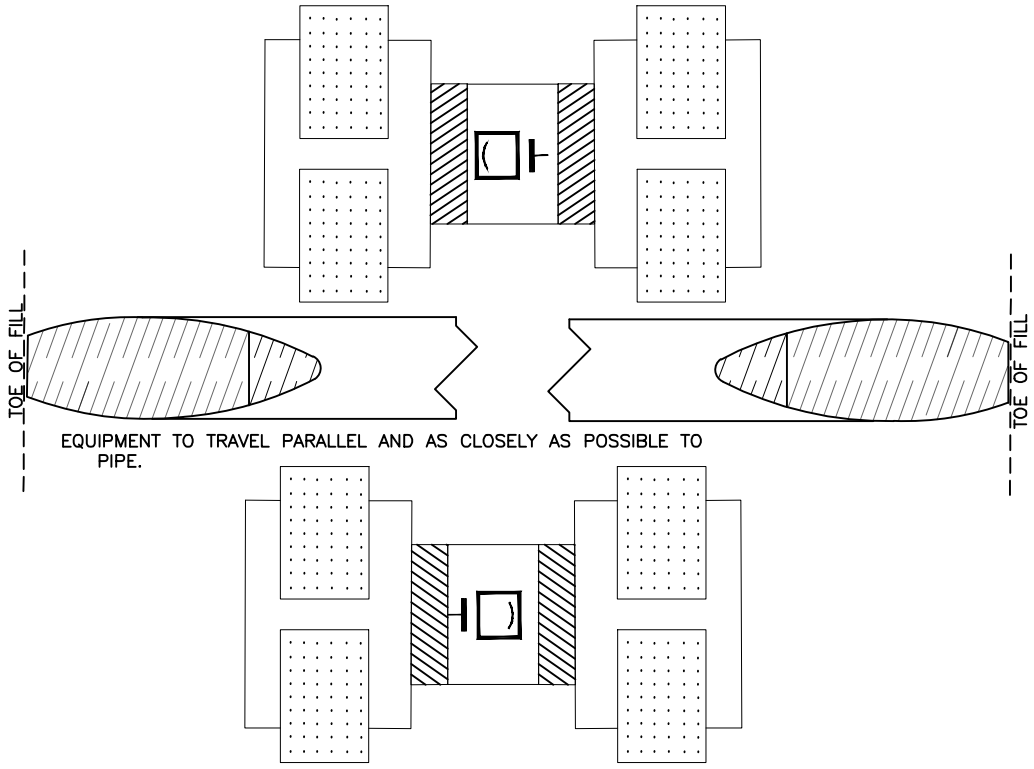
Drawn By: SE Design

DESIGN SPECIFICATIONS FOR CULVERTS

CORRUGATED METAL PIPE CULVERT INSTALLATION

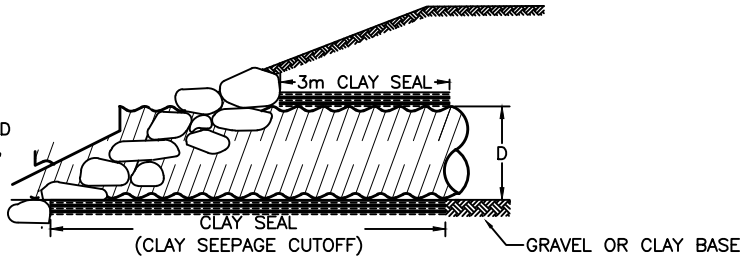


EXCAVATION, CULVERT BASE AND BACKFILLING



COMPACTION (PLAN VIEW)

CLAY SEAL FOR SEEPAGE TO BE PLACED AT BOTH ENDS, FOR A LENGTH OF 3m, AND TO THE TOP OF THE PIPE



CLAY SEAL DETAIL

SUMMER VILLAGE OF Sunset Point

MINIMUM CULVERT REQUIRED

APPROACH: 500mm

CENTERLINE: 600mm

Scale: N.T.S.

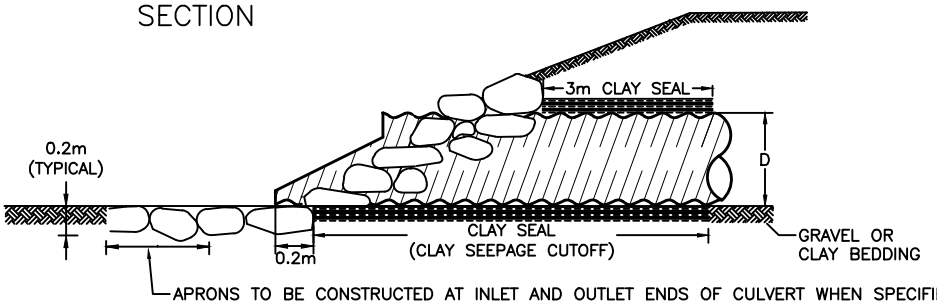
Date: JUNE 25, 2020

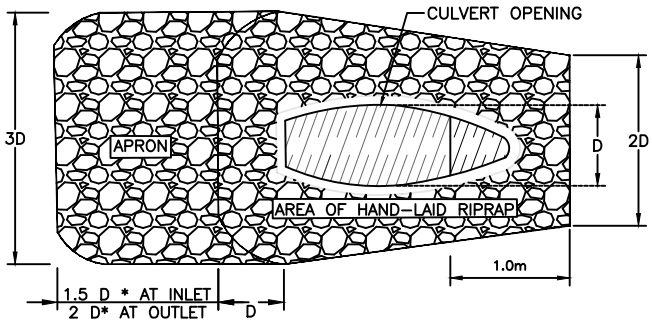
Drawn By: SE Design

DESIGN SPECIFICATIONS FOR CULVERTS

HAND LAID ROCK RIPRAP

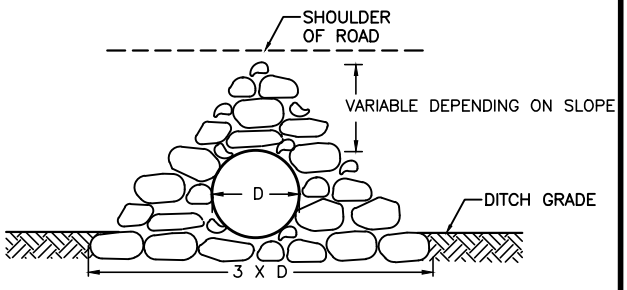
SECTION





* THESE ARE THE TYPICAL MINIMUM DIMENSIONS.

PLAN VIEW



ELEVATION

NOTES:

1. ROCKS AND BOULDERS SHALL BE SELECTED AS NEARLY CUBICAL IN FORM AS PRACTICAL AND SHALL HAVE AT LEAST A MINIMUM DIMENSION OF 200mm. THE STONES SHALL BE PLACED WITH THEIR BEDS AT RIGHT ANGLES TO THE SLOPE, THE LARGER STONES BEING USED IN THE BOTTOM COURSES AND THE SMALLER STONES AT TOP. THEY SHALL BE LAID IN CLOSE CONTACT SO AS TO BREAK JOINTS AND IN SUCH MANNER THAT THE WEIGHT OF THE STONE IS CARRIED BY THE EARTH AND NOT BY THE ADJACENT STONES. THE FINISHED WORK SHALL PRESENT AN EVEN TIGHT, AND REASONABLY PLANE SURFACE, VARYING NOT MORE THAN 75mm FROM THE REQUIRED CONTOUR.
2. WHERE NO SPECIAL TREATMENT IS REQUIRED CULVERT INVERT ELEVATIONS ARE TYPICALLY SET ABOUT 0.15 X DIAMETER BELOW THE DRAINAGE COURSE ELEVATION.
3. A CLAY SEAL IS TO BE PLACED AT BOTH ENDS OF THE CULVERT FOR A LENGTH OF 3m TO CUT OFF SEEPAGE. THE CLAY SEAL SHALL EXTEND FROM THE BOTTOM OF THE EXCAVATION TO 300mm ABOVE THE CROWN OF THE PIPE AND FOR THE FULL WIDTH OF THE EXCAVATION.
4. WHERE APRONS ARE REQUIRED DUE TO HIGH VELOCITY FLOW OR EROSION PRONE SOIL, TYPICALLY THE MINIMUM INLET APRON IS 1.5x DIAMETER LONG WHILE THE MINIMUM OUTLET APRON (WHERE WATER VELOCITY IS HIGHER IS HIGHER) IS TWO DIAMETERS LONG.

ESTIMATED RIPRAP SURFACE AREAS*

PIPE DIAMETER (mm)	AREA OF ONE END EXCLUDING APRON (m^2)	AREA OF ONE END INCLUDING INLET APRON (m^2)	AREA OF ONE END INCLUDING OUTLET APRON (m^2)
500	2	3	4
600	3	5	6
700	4	6	7
800	5	8	9
900	6	10	11
1000	7	12	13
1100	9	14	16
1200	10	16	19
1400	13	22	25

* THE ESTIMATED RIPRAP SURFACE AREAS SHOWN IN THIS TABLE ARE BASED ON A 4:1 SIDESLOPE

SUMMER VILLAGE OF Sunset Point

MINIMUM CULVERT REQUIRED

APPROACH: 500mm

CENTERLINE: 600mm

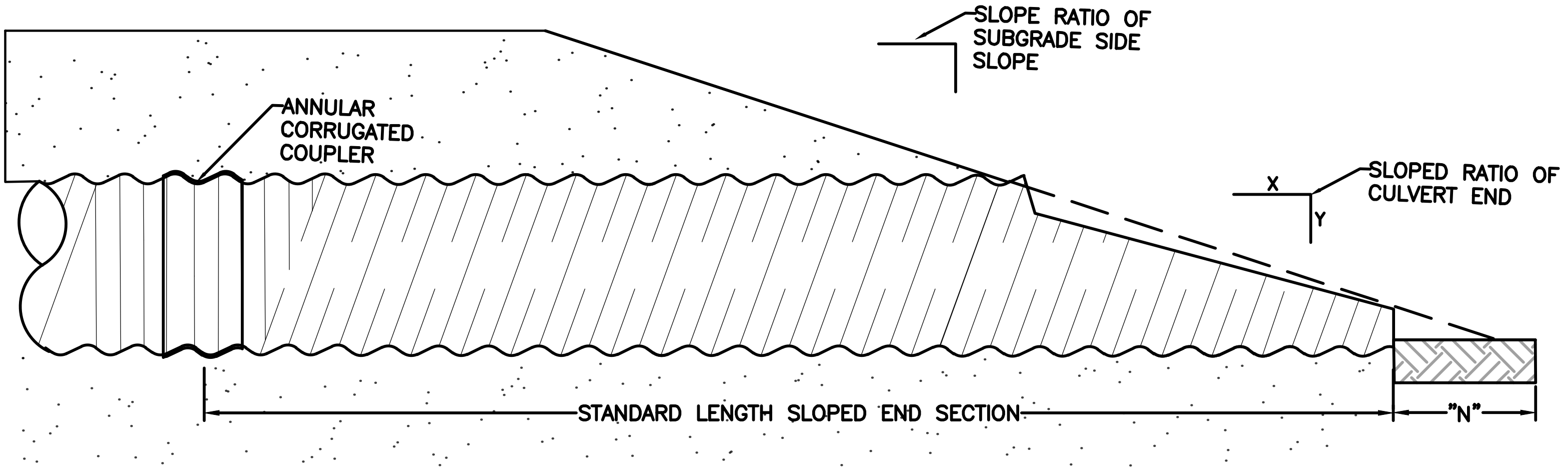
Scale: N.T.S.

Date: JUNE 25, 2020

Drawn By: SE Design

DESIGN SPECIFICATIONS FOR CULVERTS

SLOPED END INSTALLATIONS FOR ROUND SECTION CORRUGATED METAL PIPE



<u>SELECTION OF SLOPE RATIO FOR SLOPED END SECTION:</u>

A 4 : 1 SLOPED END SECTION SHALL BE USED IN CONJUNCTION WITH ALL SUBGRADE SIDE SLOPES WITH THE EXCEPTION OF 1200mm DIA. AND LARGER WHERE APPLICABLE.

C.S.P. DIAMETER – D mm	SLOPE RATIO OF CULVERT END X:Y	"N" – m				INVERT LENGTH OF SLOPE END SEC. METRE
		WITH 3:1 SUBGRADE SLOPE RATIO	WITH 4:1 SUBGRADE SLOPE RATIO	WITH 5:1 SUBGRADE SLOPE RATIO	WITH 6:1 SUBGRADE SLOPE RATIO	
400	4 : 1	0.3	0.5	0.8	1.2	6.0
500	4 : 1	0.3	0.6	0.9	1.5	6.0
600	4 : 1	0.3	0.6	1.0	1.6	6.0
700	4 : 1	0.3	0.8	1.2	2.0	6.0
800	4 : 1	0.4	0.9	1.4	2.3	6.0
900	4 : 1	0.5	1.0	1.6	2.5	6.0
1000	4 : 1	0.5	1.2	1.8	2.8	6.0
1200	3 : 1 4 : 1	0.5 0.5	1.7 1.4	2.4 2.2	3.7 3.5	6.0
1400	3 : 1 4 : 1	0.5 0.5	1.9 1.6	2.8 2.5	4.3 3.9	6.0

<u>DETERMINING INSTALLATION LENGTH</u>

THE LENGTH OF PIPE CULVERT TO BE INSTALLED SHALL BE DETERMINED AS FOLLOWS:

1) ESTABLISH THE THEORETICAL LENGTH BASED ON SLOPE STAKE REQUIREMENTS. WHERE NO SPECIAL TREATMENT IS REQUIRED, CULVERT INVERT ELEVATIONS ARE TYPICALLY SET ABOUT 0.15 X DIAMETER BELOW THE DRAINAGE COURSE ELEVATION.
2) ADJUST THE THEORETICAL LENGTH BY APPLYING THE END CORRECTION N AS DETERMINED FROM THE TABLE TO EACH END OF THE CULVERT.
3) INSTALLATION LENGTH SHALL BE THE LENGTH DETERMINED IN "2" ABOVE, ROUNDED OFF TO THE NEAREST METRE.

SUMMER VILLAGE OF Sunset Point

MINIMUM CULVERT REQUIRED

APPROACH: 500mm

CENTERLINE: 600mm

Scale:	N.T.S.
Date:	JUNE 25, 2020
Drawn By:	SE Design

DESIGN SPECIFICATIONS FOR CULVERTS

1.0 GENERAL

1.1 Definitions

.1 Common Excavation:

.1 Refer to special provision 2000.

.2 Rock Excavation:

.1 The excavation of rock, concrete or masonry exceeding 1.0m^3 in volume; and solid ledge rock, concrete or masonry which requires for its removal drilling, blasting, wedging, sledging, barring or breaking with a power operated hand tool shall be classified as rock excavation. Soft or disintegrated rock, concrete or masonry which can be removed with a hand pick, power operated excavator or shovel; and loose, shaken or previously blasted rock will not be classified as rock excavation.

.3 Class 1 Backfill:

.1 Class I backfilling shall consist of backfilling the trench with sand or gravel compacted in even layers not exceeding 300mm in depth so that there is no subsequent subsidence in the trench. Backfill shall be compacted to a minimum of 100% Standard Proctor Density. Fillcrete may be used in lieu of Class 1 backfill.

.4 Class 2 Backfill:

.1 Class 2 backfilling shall consist of replacing the excavated material in even layers not exceeding 300 mm in depth, and compacting each layer by mechanical means to 95% Standard Proctor Density in landscaped areas and 98% - 100% Standard Proctor Density within the road carriage way. Specify Standard Proctor Compaction will be indicated on the tender form or directed by the Engineer.

.5 Topsoil:

.1 The top layer of soil containing organic material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.

1.2 Protection of Existing Features

.1 Existing buried utilities and structures:

.1 Prior to commencing any excavation work, notify applicable owner or authorities; establish location and state of use of buried utilities and structures. Clearly mark such locations to prevent disturbance during work.

.2 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered. All damage incurred shall be repaired by the contractor at his expense.

.2 Existing buildings and surface features:

.1 Maintain and protect from damage existing buildings, trees and other plants, lawns, fencing, service poles, wires, rail tracks, paving, survey bench marks and monuments which may be affected by work. All damage incurred shall be repaired by the Contractor at his expense.

1.3 Safety Requirements

.1 The Contractor shall be required to observe all applicable sections of the Alberta Regulations made under the Occupational Health and Safety Act Part 32 covering worker safety in trenches and excavations.

.2 Open cut trenches shall be sheeted and braced as required by the Accident Prevention Regulations of the Occupational Health and Safety Division of the Department of Labour and Municipal Ordinances, and as may be necessary to protect life, property and the work.

.3 Prefabricated cages or shields, provided they conform with all applicable safety requirements, may be used to supplement or replace conventional shoring.

1.4 Samples

.1 At least 2 weeks prior to commencing work, inform of proposed source of granular materials.

.2 The Contractor shall provide a sieve analysis of the material for approval.

.3 Sand and gravel shall be approved before being used.

1.5 Measurement for Payment

.1 Except as provided elsewhere, trenching, backfilling and compaction will be measured as indicated on the tender form for each depth category and type of backfill used on the following basis:

.1 Horizontal measurement shall be measured along the centerline of the trench between manhole centres, fittings to fittings for watermain and from main to the property line for the house service trenches.

.2 Measurement between any two manholes or structures for gravity sewers shall be included in one depth category.

.3 The depth category between any two manholes or structures for gravity sewers will be calculated by taking the sum of the depths of the pipe at each manhole or structure and dividing by two.

.4 The depth of the pipe shall be the depth from the top of the frame to the invert of the pipe in the trench being measured.

.2 Rock excavation will be measured as indicated on the tender form in its original place. Boulders exceeding 1.0m^3 in volume shall be measured complete, as removed from the trench. Ledge rock shall be measured by actual length and actual width of the trench. A greater width than the approved width will not be paid for. Depth shall be measured by the distance from the surface of the rock to the level to which the Engineer orders the rock to be excavated. Any over excavation will not be paid for. Payment for rock excavation shall include hauling and disposing of the material excavated at a location approved, and replacement with suitable material.

.3 Imported granular material used for stabilizing trench bases and replacement of unsuitable material will be incidental to the trenching price and pipe installation. No extra payment will be made for granular material.

.4 Filter fabric used for wrapping trench stabilizing gravel will be measured as indicated on the tender form installed. Payment shall be compensation in full for supply and hauling the material to the site, placing, sewing, welding, cutting and all other incidentals necessary to complete the work prescribed.

.5 The cost of supplying, placing, maintaining and removal of shoring, bracing, cofferdams, underpinning and dewatering will be incidental to the trenching price and pipe installation. No extra payment will be made.

2.0 PRODUCTS

2.1 Stabilizing Base Gravel

.1 Stabilizing base gravel shall be well graded gravel consisting of hard durable particles free from clay lumps, cementation, organic material, frozen material and other deleterious materials.

.2 The material shall meet one of the following gradations depending on the native foundation material encountered:

Screened Rock-Washed (Not Crushed)		Crushed Gravel	
Sieve Size (10^{-6} m)	Percent Passing (by weight)	Sieve Size (10^{-6} m)	Percent Passing (by weight)
25,000	100	25,000	100
10,000	30-55	20,000	35-60
2,000	5-25	5,000	15-40
400	0-5	400	5-15
		63	0-5

.3 The liquid limit shall not exceed 25 and the plasticity index shall not exceed 6.

2.2 Filter Fabric

.1 The synthetic filter fabric shall consist of a durable, permeable, woven, polypropylene fabric composed of continuous synthetic filaments with typical properties as follows:

Tensile Grab Strength — ASTM D4632	890 N
Trapezoid Tear Strength — ASTM D4533	330 N
Mullen Burst Strength — ASTM D3786	2,750 kPa
Puncture—ASTM	400 N

Filter fabric shall be woven Propex 2002, Layfield LP200 or approved equal.

2.3 Bedding and Backfill Material

.1 Material for Class 1 backfill shall consist of sound, hard, durable, uniformly graded crushed gravel and shall not contain organic or soft materials, materials that break up when alternately frozen and thawed or wetted and dried, or other deleterious materials. When compacted near the optimum moisture content to not less than 100% of the maximum dry density corrected for the stone content as determined by ASTM D698, the material shall have a minimum bearing ratio as defined ASTM D1 883, of fifteen percent (15%).

.2 Material for Class 2 backfill shall consist of sound, hard, crushed rock or crushed gravel free from organic or soft material that would disintegrate through decay or weathering, well graded throughout confirming to the grading requirement of table below. Class 2 material is to have 100% crush content and be well graded throughout.

.3 Sand is to be clean and free running conforming to the grading requirements of table below.

.4 Class 1& 2 material is to have a loss of not more than 35% when subjected to abrasion testing in accordance with Grading B of ASTM C131.

.5 Imported clay material is to be low to medium plastic clays with liquid limit <50 or mixtures of clay and sand suitable for compaction and is use to be free of silt, rock, concrete rubble and organic materials. Material is to be approved by Engineer before placing in excavation.

TABLE: GRADING REQUIREMENTS FOR IMPORTED BACKFILL

Canadian Metric Sieve Size	Percent of Total Dry Weight Passing Each Sieve		
	Class 1	Class 2	Sand
75,000	90%-100%		
28,000	80%-100%		
20,000		100%	
10,000			100%
5,000	40% - 80%	40% - 70%	90% - 100%
2,500		25% - 60%	
630			25% - 60%
315	10% - 35%	8% - 25%	

2.4 Fillcrete

.1 Non-shrinking fill made up of a mixture of portland cement, sand, water and admixtures conforming to the following:

.1 Minimum 28 day compressive strength	1.00 to 2.00 MPa
.2 Slump	100 mm ±25 mm
.3Portland Cement	Type 10
.4 Air entrainment	5% ±1%

3.0 EXECUTION

3.1 Site Preparation

.1 Strip organic material, clear and grub, remove weeds and grasses as specified or as required prior to excavation. Avoid intermixing of subsoil fill materials with organic material and from other forms of contamination.

3.2 Trenching

.1 Trench width:

.1 The minimum trench width below the crown of the pipe shall be not less than the nominal diameter of the pipe plus 400mm. The maximum width of the trench below the crown of the pipe including shoring shall not be more than the nominal diameter of the pipe plus 600mm or not more than a total width of 900mm, whichever is larger. Where the maximum trench width

is exceeded, the Contractor shall, at his own expense, provide special bedding or take other precautions as directed by the Engineer.

.2 The contractor shall confine his activities to the immediate area of the trench. All activities outside the trench boundaries shall be performed so as not to damage other existing features. The Contractor shall generally have the option of using either vertical shored trenches or Vee trenches. Every effort shall be made to restrict the trench widths to minimize the area disturbed.

.2 All excavated material shall be piled at least 1.0m clear of the trench top to prevent material from falling back into the excavation. The material shall be piled in such a manner that it will not endanger the work, or obstruct other work or rights-of-way. Sufficient clear space must be left on one side of the trench to accommodate the surveyor's stakes.

.3 The trench shall be excavated so that the pipe can be laid to the alignment, grade and depth required.

.4 When the walls of an open excavation are cut back, the contractor must ensure that:

1. If the soil is classified as "hard and compact soil", the walls are sloped to within 1.5 meters of the bottom of the excavation at an angle of not less than 30 degrees measured from the vertical.

2. If the soil is classified as "likely to crack or crumble soil" the walls are sloped to within 1.5 meters of the bottom of the excavation at an angle of not less than 45 degrees measured from the vertical, and

3. If the soil is classified as "soft, sandy or loose soil" the walls are sloped from the bottom of the excavation at an angle of not less than 45 degrees measured from the vertical.

.4 Trench Rock Excavation:

.1 Where excavation is made in rock or where excavation is made in a material which cannot provide an even, uniform and smooth surface; or where large stones are encountered in the trench, such material shall be removed to provide a clear distance between any part or projection of such material and the surface of all pipe and fittings of not less than 150mm for 600mm outside diameter pipe or less, and 200mm for pipe having an outside diameter greater than 600mm. The subgrade shall then be made by backfilling with an approved sand compacted in 75mm layers at the Contractors expense. Excavated rock shall not be used for backfill. The finished

subgrade surface shall be shaped by hand tools to provide a uniform and continuous support for the pipe.

.2 Blasting for excavation will be permitted only with the approval of the Engineer and only when proper precautions are taken for the protection of persons or property. The Contractor's method of procedure in blasting shall conform to provincial statutes and municipal ordinances.

.5 The subgrade shall provide an uniform and continuous support for the pipe and fittings on solid undisturbed ground. Any over excavation by the Contractor below the required grade shall be backfilled at his expense with an approved compacted sand.

3.3 Classification of Soil Type

.1 Soil is classified as "hard and Compact" if it closely exhibits most of the following characteristics:

.1 it is hard in consistency and can be penetrated only with difficulty by a small, sharp object;

.2 it is very dense;

.3 it appears to be dry;

.4 it has no signs of water seepage;

.5 it is extremely difficult to excavate with hand tools;

.6 if has not been excavated before.

.2 Soil is classified as "likely to crack or crumble" if:

.1 it has been excavated before but does not exhibit any of the characteristics of "soft, sandy or loose" soil, or

.2 it closely exhibits most of the following characteristics:

.1 it is stiff in consistency and compacted;

.2 it can be penetrated with moderate difficulty with a small, sharp object;

.3 it is moderately difficult to excavate with hand tools;

.4 it has a low to medium natural moisture content and a damp appearance after it is excavated;

.5 it exhibits signs of surface cracking;

.6 it exhibits signs of localized water seepage

.3 Soil is classified as "soft, sandy or loose" if it closely exhibits most of the following characteristics:

.1 it is firm to very soft in consistency, loose to very loose;

.2 it is easy to excavate with hand tools;

.3 it is solid in appearance but flows or becomes unstable when disturbed;

.4 it runs easily into a well-defined conical pile whe dry;

.5 it appears to be wet;

.6 it is granular below the water table, unless water has been removed from it;

.7 it exerts substantial hydraulic pressure when a support system is used.

.4 if an excavation contains soil or more than one soil type, the contractor must operate as if all of it is the soil type with the least stability.

3.4 Unstable Subgrade

.1 Where the subgrade of the trench is unstable or will not properly support the pipe, or where it contains materials harmful to the pipe such as ashes, cinders, refuse, vegetable or organic material, the Contractor shall excavate such material to the width, depth and length as directed and dispose of the material. The subgrade shall then be made by backfilling with an approved stabilizing gravel compacted in 75mm layers. The finished subgrade surface shall be shaped by hand tools to provide an uniform and continuous support for the pipe.

.2 The stabilization gravel may be completely wrapped in the filter fabric as specified. The fabric shall be overlapped a minimum of 500 mm at all joints to provide a full, continuous wrap and shall be smooth and free of tension, stress, folds, wrinkles or creases.

.3 Where the subgrade cannot be made to properly support the pipe by replacing unsound material with stabilizing gravel, the Contractor shall construct a foundation for the pipe in accordance with a drawing prepared at the time. Payment for this work shall be made in accordance with the provisions for extra work unless specified otherwise.

3.5 Shoring

.1 When close sheeting is required, it shall be so driven as to prevent adjacent soil from entering the trench either below or through such sheeting. When directed, the sheeting shall be driven to the full depth of the trench or to such additional depths as may be required for the protection of the work.

.2 Trench bracing may be removed when the backfilling has reached the respective level of such bracing. Sheeting shall be removed as the backfilling proceeds. Backfilling of holes left by sheeting below the trench bottom shall be carefully compacted, and thereafter backfilling and withdrawal of sheeting shall proceed together. No voids shall be left in the backfill by the withdrawal of the sheeting.

.3 When a cage or shield is used in the trench instead of shoring, special care shall be taken to ensure that there is no lateral or longitudinal movement of the pipe when the cage is moved. The cage shall be raised vertically so that the bottom member is clear of the crown of the pipe before the cage is pulled forward in the trench.

3.6 Trench Drainage and Stormwater Management

.1 Gutters and natural drainage channels shall not be obstructed. Satisfactory provisions shall be made for alternate drainage where this is impractical.

.2 The trench shall be so drained that the workmen may work safely and effectively. All water encountered in trenches whether caused by high water table, rain or surface runoff shall be pumped or bailed out, and in no case shall the pipe be used as a drain for such water. It is essential that the discharge of the trench dewatering pumps be conducted away from the site of the work and into natural drainage channels, drains or storm sewers.

.3 Keep excavations free of water while work is in progress.

.4 Protect open excavations against flooding and damage due to surface run-off.

.5 Manage flows in active storm sewer during construction.

.6 Dispose of water in a manner not detrimental to public and private property, or any portion of work completed or under construction.

.7 Submit details of proposed surface and stormwater management methods to Engineer for approval prior to start of work.

.8 All surface run-off, trench drainage and Stormwater Management activities are the responsibility of the contractor. Contractor is to familiarize himself with the geotechnical report (if available) and determine the amount of dewatering effort that will be required to do the work in a safe and efficient manner. No separate payment will be made for dewatering.

3.7 Backfilling

.1 Bedding and initial backfilling shall be as specified for the particular pipe installed.

.2 General backfilling:

.1 Class 1 backfill as defined in Section 1.1 - Definitions shall be used underneath all existing asphalt road or concrete areas. Class 2 backfill as defined in Section 1.1 - Definitions shall be used in all other areas including future roads, boulevards and open areas

.2 No boulders, rock, ice, snow, organic material or debris shall be permitted in the trench. These unsuitable materials shall be hauled away.

.3 All surplus excavated material shall also be hauled away, or disposed of as directed. In the event of deficiency of backfill material, suitable material shall be supplied by the Contractor at his expense.

.4 All trenches shall be backfilled as the work proceeds and no more than 30 m shall be left open at the end of a days work.

3.8 Backfill Compaction

.1 The Contractor shall be responsible for adequate compaction of the trenches and for the correction of settlement during the maintenance period of the Contract. Mechanical compaction equipment shall not be used until there is sufficient cover to prevent damage to the pipe.

.2 The type of compaction equipment shall be chosen with regard to minimizing the vibration effect on nearby buildings and utilities. The Contractor shall inspect the condition of buildings prior to construction. The Contractor is responsible for any damage caused to buildings due to construction.

3.9 Testing Backfill Compaction

.1 Compaction results shall be based on a minimum of one density test per 100 metres of trench for each 1.0 meter of compacted vertical backfill. Additional tests may be called for by the Engineer as deemed necessary.

.2 If a density test indicates insufficient compaction at any depth, then two more densities, where are proportionally representative of trench length, shall be taken at that depth. If the average of these tests is below the required density, the trench shall be re-excavated and re-compacted to meet the specified density.

.3 This testing in no way relieves the Contractor of his maintenance responsibilities with respect to settlements as specified. The Contractor shall repair any settlement and damaged surface improvements due to the settlement which occurs during the maintenance period.

.4 The cost of all initial testing will be borne by the Contractor. Non-conformity with the specified density or moisture content shall constitute sufficient grounds for rejection of the work.

3.10 Augered/Bored Crossings

.1 The augering/boring machine shall be aligned and set to the required grade. If the hole deflects from desired course, another hole shall be bored in a location specified. Minimum allowable grades and maximum allowable bends shall be as specified by water mains laid in an open trench.

.2 The bored hole shall be of sufficient size to allow the carrier pipe or casing pipe, as specified, to pass through unrestricted. After installation of the pipe, the bored hole void shall be backfilled with pneumatically blown free running sand or sealed with 5 MPa pressure grouting.

.3 Highway crossings shall be cased as shown on the drawings. Casing pipe joints shall be welded. Each joint shall be coated and wrapped with primer and tape.

.4 Anodes and warning signs shall be installed as specified.

3.11 Fences and Gates

.1 Maintain gates and fences along and crossing the right-of-way and on access roads.

.2 Do not open fences crossing the construction right-of-way unless installing the pipe underneath the fence is not feasible.

.3 Notify landowners and tenants if a fence must be opened. Install temporary gates in accordance with the wishes of the landowners and tenants.

.4 Return fences to original condition as soon as fence openings or alterations are no longer required for construction.

END OF SECTION

1.0 GENERAL

1.1 Related Work

.1 Trenching, Backfilling and Compaction: Section 02315.

1.2 Measurement for Payment

.1 Excavation and backfill for culverts will not be measured separately.

.2 Supply and installation of pipe culvert including trenching, backfilling ,compaction, geotech fabric, riprap and culvert markers will be measured as indicated on the tender form in place for each size, type and class of pipe.

2.0 PRODUCTS

2.1 Corrugated Steel Pipe

.1 Corrugated steel pipe: to CSPI-501-78 metric (interim). Corrugated steel pipe. Note: CSPI specifications may be obtained from Corrugated Steel Pipe Institute, Suite 207, Crestview Plaza, 1640 Crestview Avenue, Mississauga, Ontario, L5G 3P9 or affiliated member.

3.0 EXECUTION

3.1 Excavation and Preparation of Base

.1 Excavation for the culvert base shall be to a depth of not less than 0.3m below the invert grade, and shall be of sufficient width to permit assembly of the pipe and the operation of compaction equipment on either side of the pipe. All soft, yielding, or unsuitable material at this level shall be removed to a depth as directed by the Engineer, and replaced with gravel or other suitable material to provide a firm foundation of uniform density throughout the entire length of the pipe.

.2 On completion of excavation for the culvert base and the removal and replacement of any soft, yielding or unsuitable material the Contractor shall compact the exposed surface to uniform density. The Contractor shall then construct the culvert bed to the established elevation using gravel material or other material acceptable to the Consultant. The culvert bed shall be compacted in accordance with Section 02315. The width of the culvert bed shall be 3 times the culvert diameter.

.3 Contractor to ensure sufficient clay “cap” compacted around the culvert to prevent erosion on the sides of the culvert.

.4 When the culvert installation is in rock, excavation for the culvert base shall be carried out to a depth of not less than 0.2m below the invert grade. The width of the culvert bed shall be a minimum of 1.5 times the diameter of the pipe.

.5 Where gravel bedding or backfill is used, impervious, compacted clay cut-offs shall be constructed at both ends of the culvert.

.6 Do trenching and backfill work to Section 02315.

.7 Do not backfill until pipe grade and alignment checked and accepted by the Engineer.

4.0 INSTALLATION

4.1 General

.1 The culvert shall be installed on the prepared base, true to the designed lines and grades unless otherwise established by the Engineer. Separate sections shall be securely joined in accordance with the manufacturer's instructions. Coupler bands shall be used for metal and polyethylene pipe unless otherwise specified, rubber gasket type joints shall be prepared and made between sections or reinforced concrete pipe. At all coupling and joint areas and at areas of concrete pipe that have external bells, depressions shall be constructed in the culvert bed so that the pipe is uniformly supported along its entire length.

.2 Contractor to install culvert markers as per detail on page 5. Approved supplier for culvert markers: Canada Culvert Steelcor CSP or similar acceptable product to be approved by Engineer.

.3 The Contractor shall use due care when installing pipe to avoid damaging the pipe. Damaged pipe shall be removed and replaced by the Contractor at his expense.

4.2 Installation of Corrugated Metal Pipe and Pipe Arches

.1 When required, elbows shall be installed to accommodate sharp changes in gradient or direction of the pipe.

.2 Pipe shall be carefully handled to prevent damage to the protective coating. Any damage to coatings shall be repaired by the Contractor at his own expense.

.3 Ensure bottom of pipe is in contact with shaped bed or compacted fill throughout its length. Ensure proper clay "cap" surrounding the pipe to prevent erosion.

.4 Lay pipe with outside circumferential laps facing upstream.

.5 Do not allow water to flow through pipes during construction except as permitted by Engineer.

4.3 Joints: Corrugated Steel Culverts

.1 Corrugated steel pipe:

.1 Match corrugations or identifications of coupler with pipe sections before tightening.

.2 Tap couplers firmly as they are being tightened, to take up slack and ensure a snug fit.

.3 Insert and tighten bolts.

4.4 Installation of Reinforced Concrete Pipe

.1 Reinforced Concrete Pipe shall be placed beginning at the downstream or lower end of the culvert. The pipes shall be placed with the bell or grooved ends facing upstream.

.2 Pipe shall be joined using either a wedge and block or mechanical pipe pullers to bring the pipe to the homed position. Joints shall not be deflected beyond the manufacturer's recommended maximum.

.3 End sections shall be anchored to adjacent sections by tie bars, where provided. Lifting holes and holes for engaging bars shall be filled with mortar and finished flush with the pipe surface.

4.5 Installation of Polyethylene Pipe

.1 The culvert bed shall be shaped to the curvature of the pipe to a depth of 75mm using a template.

.2 Blocking shall not be used to bring the pipe to grade. The pipe shall be placed on the prepared base to the lines and grades established by the Engineer, with the separate sections securely joined with the applicable welds and gasket joints.

.3 Temporary hold downs shall be used to maintain the position of the pipe during installation.

.4 Section of pipe with a minimum length of 6m shall be used on each end of each culvert.

4.6 Extension of Existing Culvert

.1 Extensions to existing culverts will be considered as new installations. Where an existing culvert is to be extended, the removal, salvage and reinstallation of the existing sloped end sections may be required as directed by the Engineer.

.2 Where the existing pipe was manufactured to imperial dimensions and the new pipe is manufactured to metric dimensions and a mismatch occurs at the joint, the Contractor shall caulk the joint with oakum or fillcrete to obtain a water resistant joint.

5.0 BACKFILLING

5.1 General

.1 Backfill under the haunches and immediately adjacent to the pipe extending from the culvert base up to an elevation of 30 percent of the vertical height of the pipe shall be comprised of select gravel or soil material, as directed by the Engineer. Backfill immediately adjacent to the pipe above this level shall be comprised of select soil material. All backfill material shall be free from frozen lumps and organic material. Backfill with 300mm of the pipe wall shall be free from stones of diameter larger than 80mm.

.2 All backfill material shall be placed in layers not exceeding 0.15m in depth. Each layer shall be thoroughly compacted at optimum moisture content by means of pneumatic or other mechanical tamping equipment. Backfill and compaction layers shall be brought up simultaneously and evenly on both sides of the pipe filling all corrugations and ensuring firm contact with the entire bottom surface of the pipe. This compaction procedure shall be continued until the backfill reaches a minimum elevation of 0.3m above the top of the pipe, or greater if necessary to carry the weight of construction equipment without damage to the pipe.

.3 The Contractor is to ensure a proper seal around the culvert ends at both ends of the culvert. This can be achieved with suitable material such as Clay to ensure the water does not erodes the sides and underside of the culverts eventually rendering the culvert ineffective possibly causing a washout of the road. The “clay” cap should be a minimum of 1.0m in length.

.4 If during the warranty period, it is determine by the Engineer that the culvert is rendered ineffective due to improper seal at both ends of the culvert, the Contractor will be responsible at his own cost to repair all the damages which may include but not limited to installing a new culvert, bringing new borrow material for proper culvert installation,

geotech fabric, riprap, and for the road restauration: subgrade preparation, gravel, asphalt, line painting as detailed in the contract) that may have been caused by the poor workmanship. Contractor responsible to carry-out the repairs to the approval of the Engineer. Contractor to refer to Special Provision 2000 with regards to Emergency Repairs.

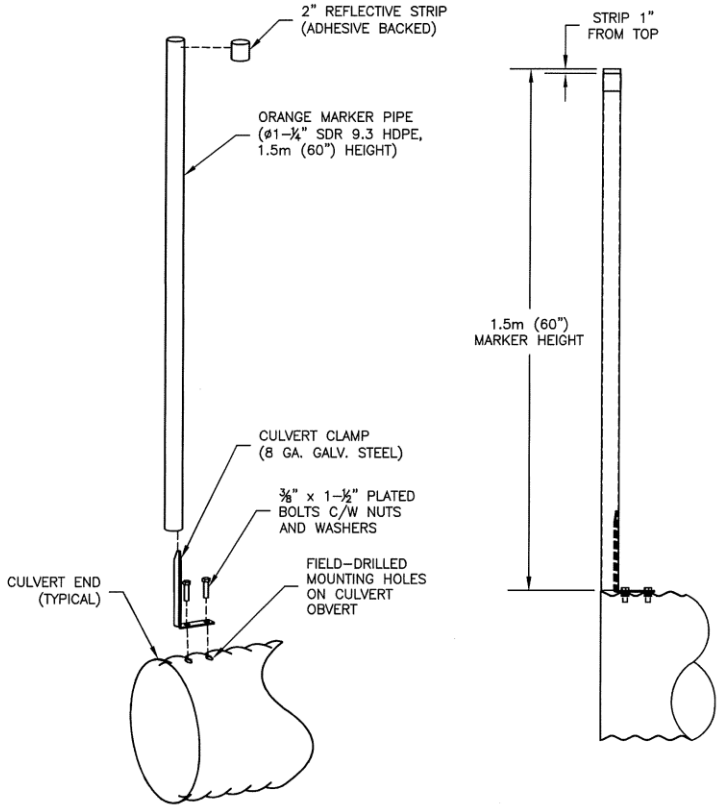
.5 Backfilling of the remainder of the culvert excavation, beyond the immediate region of the pipe, shall be carried out in accordance with section 2315. Compacting equipment shall be operated parallel to the longitudinal axis of the culvert, until sufficient acceptable fill has been placed to proceed with construction of the embankment in the normal manner.

5.2 Backfilling Polyethylene Pipe

.1 The minimum height of fill above the top of the pipe is 0.6m rather than 0.3m. Immediately after backfill is completed, the Contractor shall saw cut the sloped ends at a ratio of 4:1.

5.3 Culvert Markers

.1 Contractor to submit shop drawings to the engineer for approval the culvert marker selected. Culvert marker is to be bright color (orange or red) similar to orange tubing of the SteelCor CSP Culvert Markers. Culvert Marker to be affix with spring loaded tubing so it does not brake if accidently hit (refer to detail in this specification section.



END OF SECTION

1.0 GENERAL

1.1 Measurement for Payment

.1 Riprap will be measured as indicated on the tender form to the top of finished surface for the quantity of rock riprap acceptably supplied and placed within the dimensions indicated on the drawings or as required by the Engineer.

.2 Where indicated on the tender form, payment for riprap on culverts will be included as part of the culvert installation.

.3 Materials placed outside the specific areas will not be measured. Payment shall be compensation in full for transportation, excavation, bedding, backfilling and all other incidentals necessary to complete the work prescribed. Unless otherwise indicated no direct measurement will be made for the supply and placement of the synthetic filter fabric which shall be considered incidental to work.

.4 Measurement for geotextile fabric will be included as part of the culvert installation.

2.0 PRODUCTS

2.1 Rock Riprap

.1 Materials for rock riprap shall be sound and durable field stone, or rough unhewn quarry stone as nearly rectangular as practicable, conforming to the following graduation and weight range:

.1 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered. All damage incurred shall be repaired by the contractor at his expense.

Sieve Size [mm]	Weight [kg]	Percent Passing [by weight]
300	21	100% smaller
200	11	20% larger
150	5	50% larger
100	2	80% larger

.2 The rock riprap shall be graded between the weights specified.

2.2 Filter Fabric (Geotextile)

.1 The synthetic filter fabric shall consist of a durable, permeable, woven, polypropylene fabric composed of continuous synthetic filaments with typical properties as follows:

Tensile Grab Strength — ASTM D4632	890 N
Trapezoid Tear Strength — ASTM D4533	330 N
Mullen Burst Strength — ASTM D3786	2,750 kPa
Puncture—ASTM	400 N

Filter fabric shall be woven Propex 2002, Layfield LP200 or approved equal.

3.0 EXECUTION

3.1 Placing

.1 The hand laid rock riprap erosion protection shall be placed in the areas indicated on the Drawings or as designated by the Engineer

.2 Placement of Filter Fabric

.1 The surface to receive the riprap shall be smooth, well dressed and prepared with the synthetic filter fabric.

.2 The areas to be covered by the synthetic filter fabric shall be trimmed and dressed to the lines and grades shown on the Drawings or as required by the Engineer.

.3 The synthetic filter fabric shall be placed on the dressed surfaces to cover the areas that are the rock riprap erosion protection. The fabric shall be overlapped a minimum of 500 mm at all joints to provide a full, continuous mat and shall be laid smooth and free of tension, stress, folds, wrinkles, or creases. Securing pins and washers shall be inserted through both strips of overlapped fabric at no greater than 1 m intervals along a line through the midpoint of the overlap, and at intervals necessary to prevent slippage of the fabric on the downslopes. Each securing pin shall be pushed through the fabric until the washer bears against the fabric firmly and secures it to the foundation. The indicated filter fabric may also be overlapped as specified and welded at the seams.

.4 The fabric placed on the inlet and outlet aprons shall be laid perpendicular to the centre line of the culvert and shall be laid so that the upslope strip of fabric will overlap the downslope strip

.3 Riprap Placement:

.1 Nominal size 150 mm riprap, as defined in Section 2.0- Products shall be used.

.2 The riprap stones shall be placed on the surface to be covered as shown by the plans or as directed by the Engineer, on slopes not exceeding 1 1/2H:1V starting with the larger stones on the bottom row. Each stone shall be placed with the broad flat surface resting on a horizontal earth bed prepared for it such that the weight of the stone is carried by the earth and not by the underlying stones. Stones shall be laid in successive rows, or layers, proceeding upward with the joints staggering those of the adjacent rows as so to secure a ‘shingled’ effect, evenly stepped. Voids between stones shall be filled wit6hspalls rammed into place.

.3 Care shall be taken not to puncture the synthetic filter fabric when placing the riprap. Any damaged filter fabric shall be repaired or replaced at the contractor’s expense as directed by the Engineer.

END OF SECTION

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APPENDIX D

Culvert Inspection Reports – Sorted By Location