BROOKSIDE DRIVE UPGRADE

UNB EST. 1785 UNIVERSITY OF NEW BRUNSWICK | Engineering Design Symposium

Fredericton

COMPLETE STREET DEVELOPEMENTS | BRETT DRISCOLL, AARON MACDONALD, DYLAN MCKENNA, ABDULRAHMAN RAJIH, MIKE STEWART | CLIENT: CITY OF FREDERICTON

PROJECT INFORMATION

The existing watermain located on Brookside Drive requires replacement as it is approaching the end of its service life. The client wishes to complete the watermain installation while using this opportunity to upgrade Brookside Drive to Fredericton's first "complete street." The client also wants an assessment of the Killarney Brook culvert to see if the size should be increased based on their current standards and the changing climate. The Killarney Brook culvert, and other culverts located downstream will be assessed based on residential growth, and climate change. The retaining wall that currently exists will also be considered for replacement. Possible constraints/limitations include: the existing brook, stone staircase located in the right-of-way, existing driveway and retaining walls, the current narrow right-of-way, and existing culverts.

GEOMETRIC ROAD DESIGN

Legend

- Sidewalk
- Bike Lane
- Boulevard
- Curb and Gutter
- Travel Lanes
- Culvert
- Retaining Wall
- Sluice Box
- Catch Basins
- Travel Lane and Pedestrian Light Pole
- Property Buffer
- Guiderail Area
- Bridge Decking
- Next F Beam
- Abutment
- Pedestrian Light Pole
- Existing Power Pole

SCOPE OF WORK

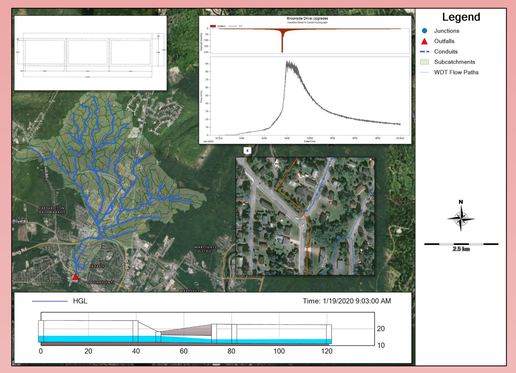
- Culvert Assessment
- Retaining Wall Design
- Geometric Road Design
- Intersection Design
- Watermain Design
- General Road Construction Design
- Environmental Permitting
- Environmental Planning
- Storm Drainage Design
- Signage and Lighting Plan
- Traffic Control Plan
- Detailed Cost Estimate
- Construction Schedule

COST ESTIMATE

The construction estimate encompasses the total cost to construct the complete street upgrade. The life cycle estimate covers the projected cost to upkeep the upgrade is assumed for an 80 year service life.

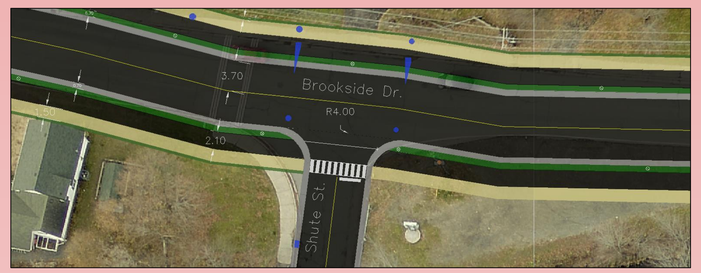
Item	Low Price	Expected Price	High Price
Construction Estimate	$ 3,055,992.00	$ 3,739,952.00	$ 4,956,488.00
Life Cycle Estimate	$ 3,442,006.67	$ 3,442,006.67	$ 3,442,006.67
Total Cost	**$6,497,998.67**	**$7,181,958.67**	**$8,398,494.67**

CULVERT DESIGN

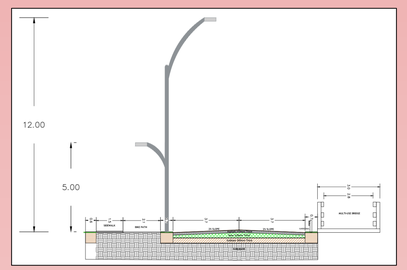


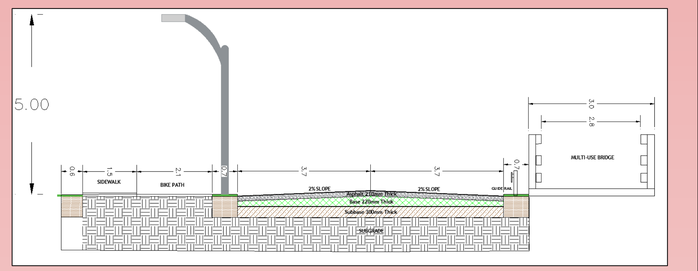
- DRAINAGE AREA: 1650 HA
- RETURN PERIOD: 100 YEAR + 20%
- PEAK FLOW RATE: 88 M^3/S
- DESIGN TRIPLE RUN 3.6 X 2.4 M BOX CULVERTS

INTERSECTION DESIGN

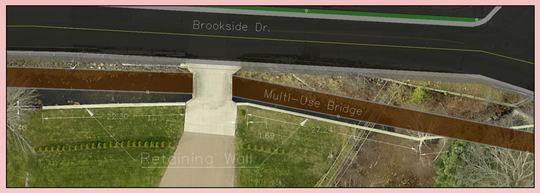


GENERAL ROAD DESIGN





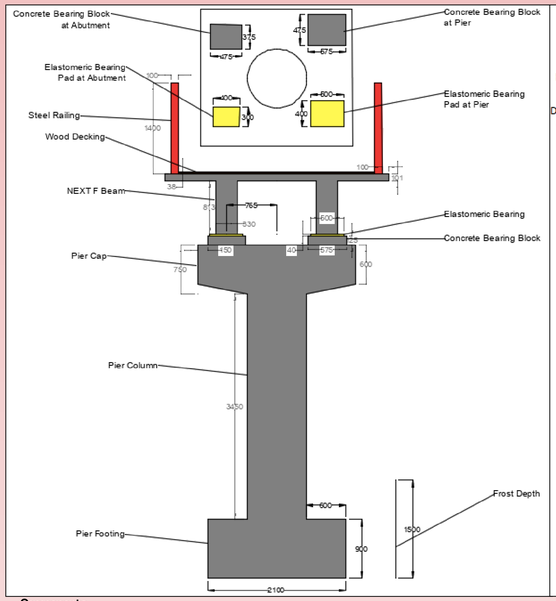
RETAINING WALL

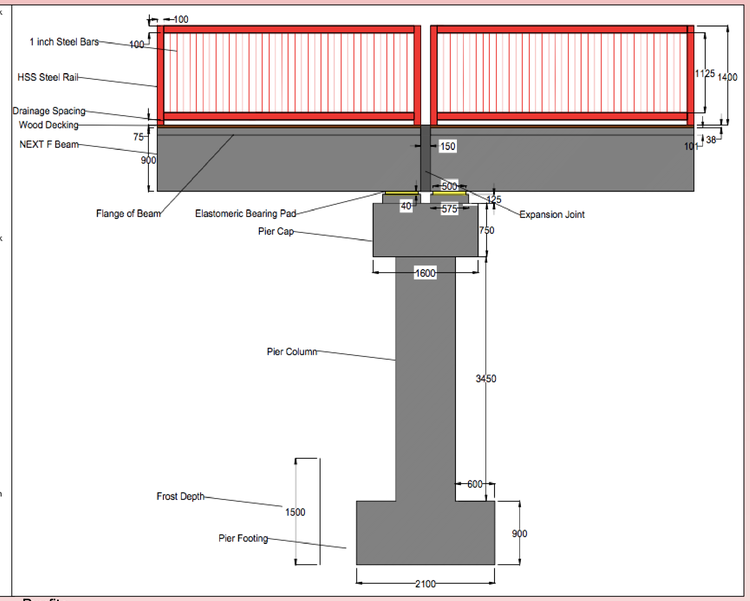


RECOMMENDATIONS

Design Object	Classification	CSD Design Value	Comments
Travel Lanes	Truck Route Curbside Lane	3.7 m	
Asphalt Concrete Thickness		200 mm	
Base Thickness		210 mm	
Subbase Thickness		300 mm	
Gutter	Gutter curb extruded width. (0.45m of concrete on travel lane)	0.25 m	
Boulevard	Assumed as the bike lane buffer zone	0.7 m	
Bike Lane	Protected bike lane	2.1 m	
Sidewalk	Collector street, Seperated sidewalk. *Can be reduced to 1.5 in constrained areas	1.5 m	
Land Buffer	Required buffer from property line	0.3 m	
Guiderail	CSD assumed required area	265 m	
Multi-Use Trail	Shared-use path	3.4 m	
Intersection Corner Radii		4 m	
Pedestrian Light Spacing		30 m	
Travel Lane Light Spacing		60 m	
Pedestrian Light Mounting Height		5 m	
Travel Lane Light Mounting Height		12 m	
Luminaire	Type III, 88 LED	30 Luminaires	
Cross-Culvert	Triple-run of 3.6 x 2.4 m box culvert	20 m	
Storm Drainage	4 Standard sluice boxes connected to existing catchbasins.	4	
Environmental Planning	230 m of silt fencing, 40 straw bales for runoff control, stream diversion by means of pump and storm pipe.		
Watermain Length	Diameter of 250 mm or 300 mm	330 m	
Construction Schedule	Start: May 23, 2022 End: October 7, 2022	99 Days	

MULTI-USE BRIDGE DESIGN





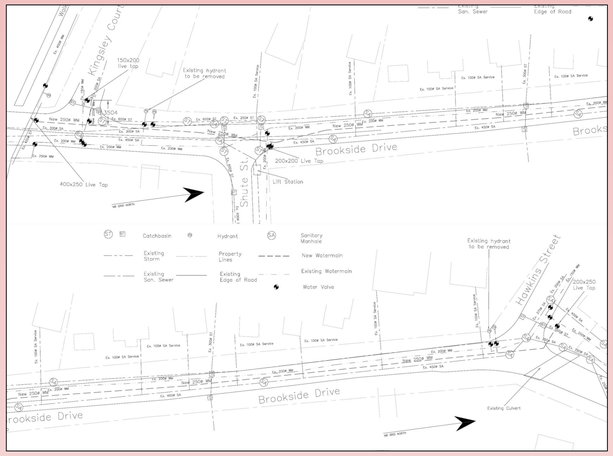
Components

- 5 NEXT F Beams – Prestressed Concrete
- 2 Abutments With Associated Components
- 5 Piers With Associated Components
- Steel Railing
- Wood Decking
- Elastomeric Bearing Pads
- 3.0m Width for Cyclists and Pedestrians
- Steel Expansion Joints

Benefits

- 1.4m Steel Rail Increases Safety for Cyclists and Pedestrians
- Provides Safe Connection to Existing North Side Walking Trail Without Crossing Brookside Drive
- Unique to Fredericton Providing Unique Experience Increasing Social Activity

WATERMAIN



CSD