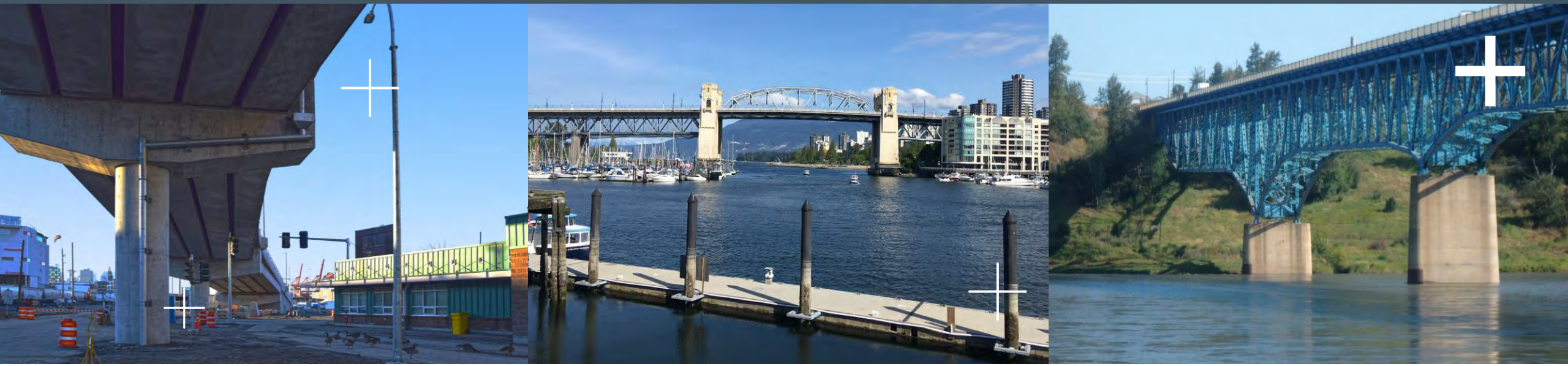
The Role of Utility Engineers on Large Transportation Projects



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Six Pillars of Utility Engineering (plus 1)

UTILITY PROCESS MANAGEMENT

UTILITY CONFLICT MANAGEMENT

UTILITY INVESTIGATIONS

UTILITY DESIGN

UTILITY CONSTRUCTION MANAGEMENT

UTILITY ASSET MANAGEMENT

UTILITY COORDINATION

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Utility Conflict Matrix (UCM)

Why you do it:

- Identity existing utilities, start the conversation
- Utility density “smell test”
- Identify utility companies
- Identify conflicts 2-D
- Identify Early Works
- Identify betterments (if you build it, they will come)
- Identify land requirements
- Develop high level relocation cost estimate
- Provide information into project schedule
- Educate the coordination team
- Give a heads up of potential legal issues

Features:

- Filterable:
    - TPU inventory, list of all their assets
- Not seen as user-friendly
- Read in conjunction with composite utility drawings

TPU Meetings

Early

- Prior to 30%

Often

- Monthly, bi-weekly, weekly (by Contractor)

Minuted

- Attendees
- Conflicts
- Action Items

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TPU Meetings (TPU Comments/ Powner's Comments)

What's impacted?	Who's going to pay for relocations?	When do you need a design?	When will we know more?
Who can speak truth to power?	When will you get a design team together?	What are the shut down periods, schedule constraints?	- Can you share design manual - Relocation costs

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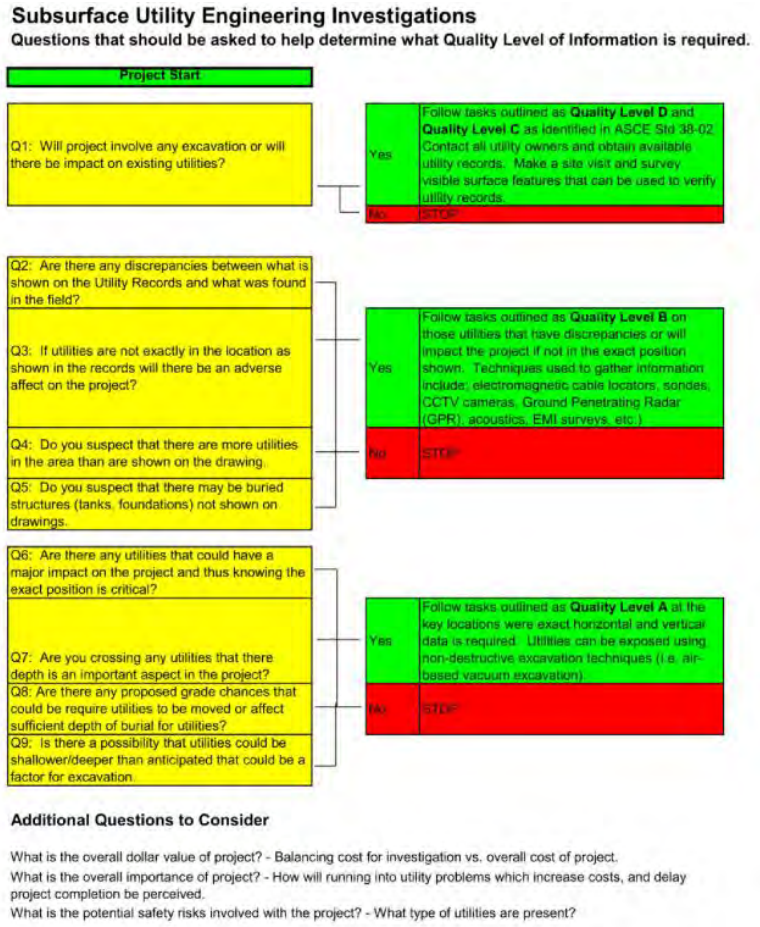
SUE Investigations



Utilities		Baseline Quality Levels				SLS Quality Levels (recommended)			
		QL-D	QL-C	QL-B	QL-A	QL-D	QL-C	QL-B	QL-A
Pipelines (crude, HVP)		R	O	O	O	NA	NA	NA	NA
Water	Water transmission	R		O		D	D	R	
	Water distribution	R				D	D		
	Services	R				ND	R		
Sewer	Sewer Trunks/ Forcemains	R	O	O		D	D	R	
	San Sewer collection	R	O			D	D		
	Laterals	R	O			ND	R		
Gas	Mainline	R	O	O		D	D	R	
	Service Laterals	R				ND	R		
Telcom	Mainline (OH)	R		O		D	D	D	
	Mainline (UG)	-		-		ND	R		
	Service Laterals (OH)	R				D	D		
Electrical	Mainline (OH)	R		O		D	D	D	
	Mainline (UG)	-		-		ND	R		
	Services Laterals (OH)	R		O		D			
	Service Laterals (UG)	R				ND	R		

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Early Works

- Known conflict
- Need to relocate
- Low risk of future conflict
- No additional lands needed
- Long Lead Time
- Regulatory Window
- Geotechnical Favourable
- Data QL: need SUE program?
- Minimum impact to existing operations
- Treatment proscribed

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Utility Coordination Engineer (OE)

Utility Expertise

Design

- Large linear projects
- Utility design standards
- Space Proofing (right of ways, clearances, utility corridors)

Operations

- Maintenance
- Access

Legal Knowledge

- TPU agreements
- Contract Law

Construction Experience

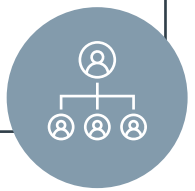
Installation Knowledge

- Footprint
- Timing (for permits, for construction)
- Cost estimates

Management/Leadership Skills

Lead a team and liaison with:

- TPUs
- Other engineering disciplines



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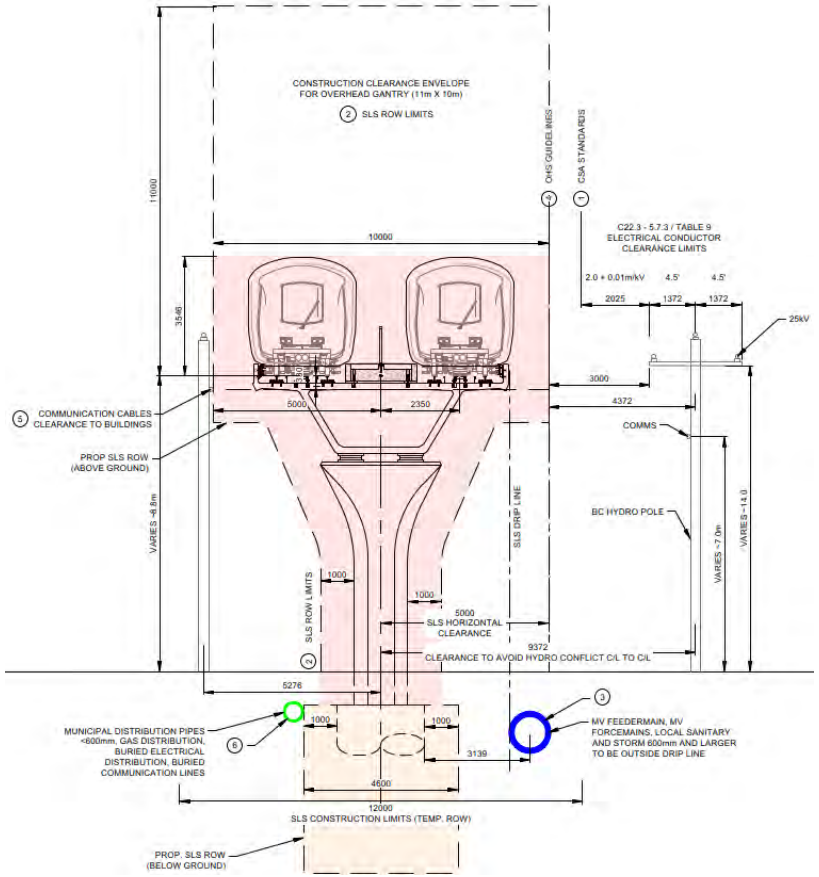
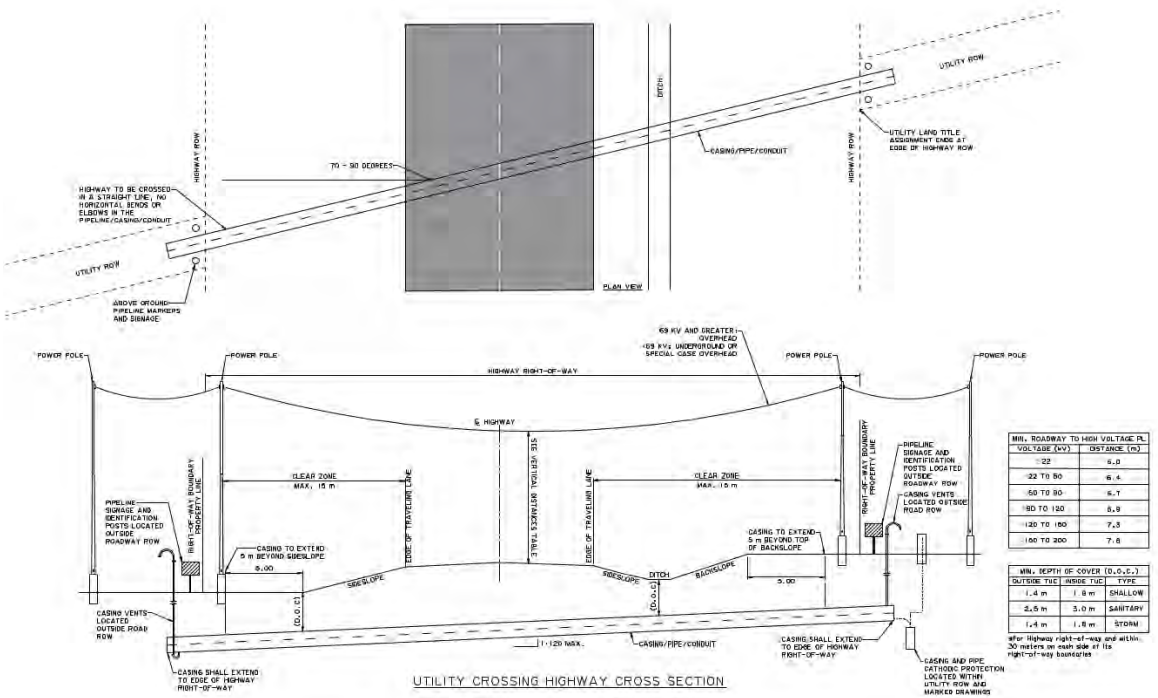
Clearance Sketches: Clear Zones





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Other Tasks

Project Agreement SME

- Author / Gap analysis
- Interpreter

Right of Way SME

- “keeper of the corridor”
- Look for and encourage good right of way management
- Future proofing
  - Build utility corridors
  - Enforce owner’s crossing requirements

Meetings, Minutes, and Memos

- Attend TPU, Local Authority Meetings
- Take Minutes (critical)
- Author and/or provide other SMEs to answer client’s pressing questions

Technical Support

- KMZ files
- Roll plans

Utility Expertise

Electrical Power supply and distribution

- Transmission Assets
- Distribution Assets

Natural Gas Supply

- Transmission Assets
- Distribution Assets

Crude Oil/ NGL Pipelines

Products:

- Liquid (crude oil, HVP), H2S

Asset types:

- Sending/receiving traps, tankage, pump stations

Communication Systems

- Fiber Optics
- Cable
- Cell Towers

Municipalities

Storm:

- Pipes and ponds

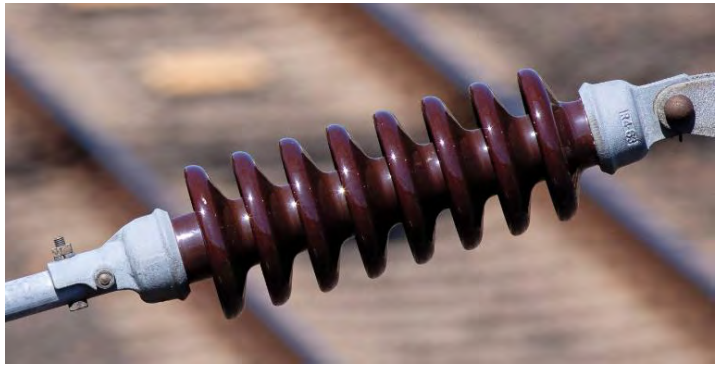
Sanitary:

- Trunks, local

Water:

- Feedermains, local distribution

Erosion and sediment control



Current Risks: “hearing the guns in the distance”

- **Local Authority Tire Kicking**
  - Set reasonable deadlines for betterments in the corridor
- **Contractor requests variance from relocation solution**
  - - Review request from POV of published manuals and constructability
- **TPU’s slow with designs**
  - Bi-weekly meetings (minuted)
- **TPU Assets in Poor Shape**
  - Boots on the ground suggest some utilities in poor shape

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Case Study: Green Line Utility Conflicts Resolution Program- South Segment City of Calgary

As part of the Green Line Enabling Works, the City initiated a utility conflicts resolution program.

- Abandon, relocate, protect in place, leave for main contract.

What were the challenges?

What went well?

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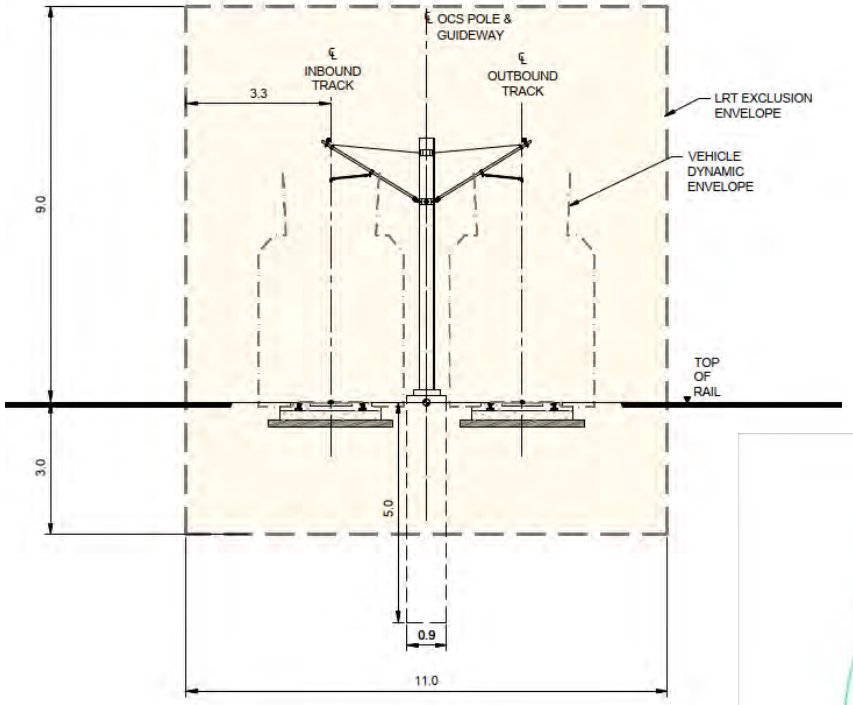
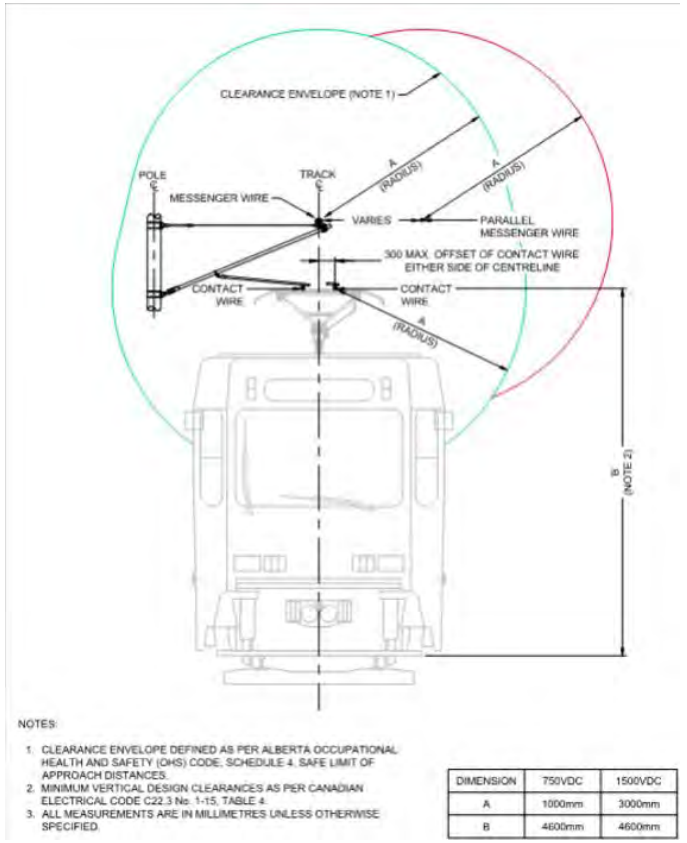
Exclusion Envelope

Challenges:

- Unknown design vehicle.
- Extents of at-grade, trench, tunnel and elevated segments was a reference concept.
- Potential rework by future contractor.





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Standardized Design

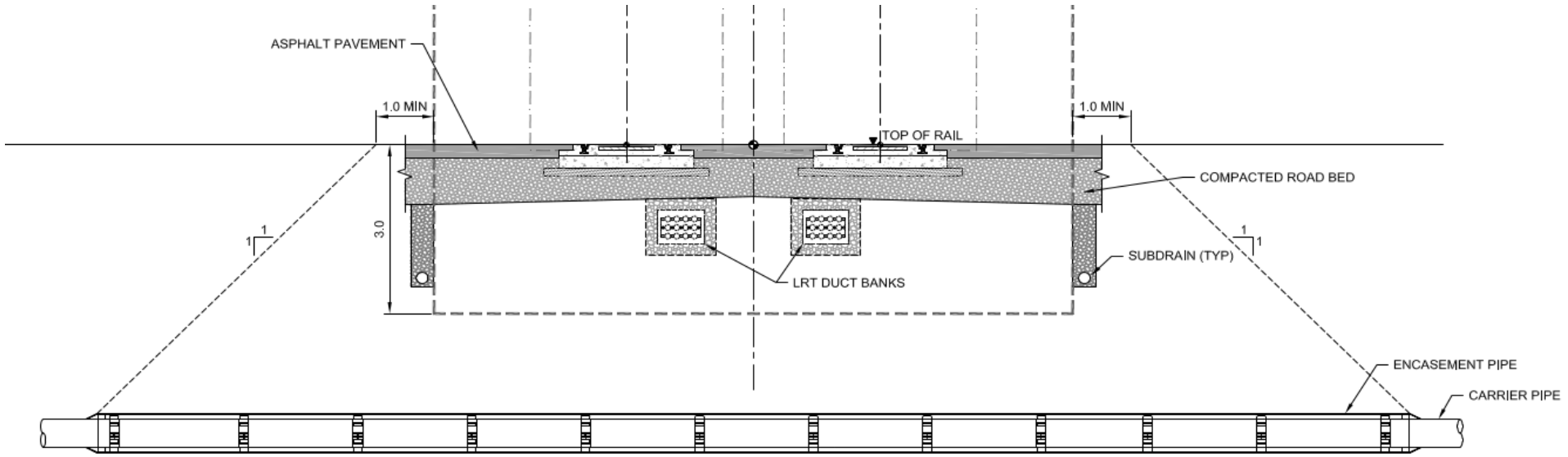
Utility Crossings:

- Standardized carrier pipe and encasement pipe requirements for crossings.

TABLE 2 – PREFERRED CARRIER AND ENCASEMENT PIPE FOR LRT CROSSINGS

Carrier					Encasement		
FM[1]	WM[2]	Sewer	Existing	Replacement	Steel	Concrete	None
X			CPP[3]	CPP[3]/Steel	Y	N	N
X			Steel	Steel	Y	N	N
X	X		PVC/PE	PVC/PE	Y	N	N
	X		DI/CI	PVC	Y	N	N
		X	Concrete < 900mm	PVC/PE	Y	Y[4]	N
		X	Concrete > 900mm	Concrete	N	N	Y
		X	PVC/PE	PVC	Y	Y[4]	N

Notes: 1 - Feedermains
2 - Watermains or forcemains
3 – Concrete Pressure Pipe
4 - Steel encasement preferred



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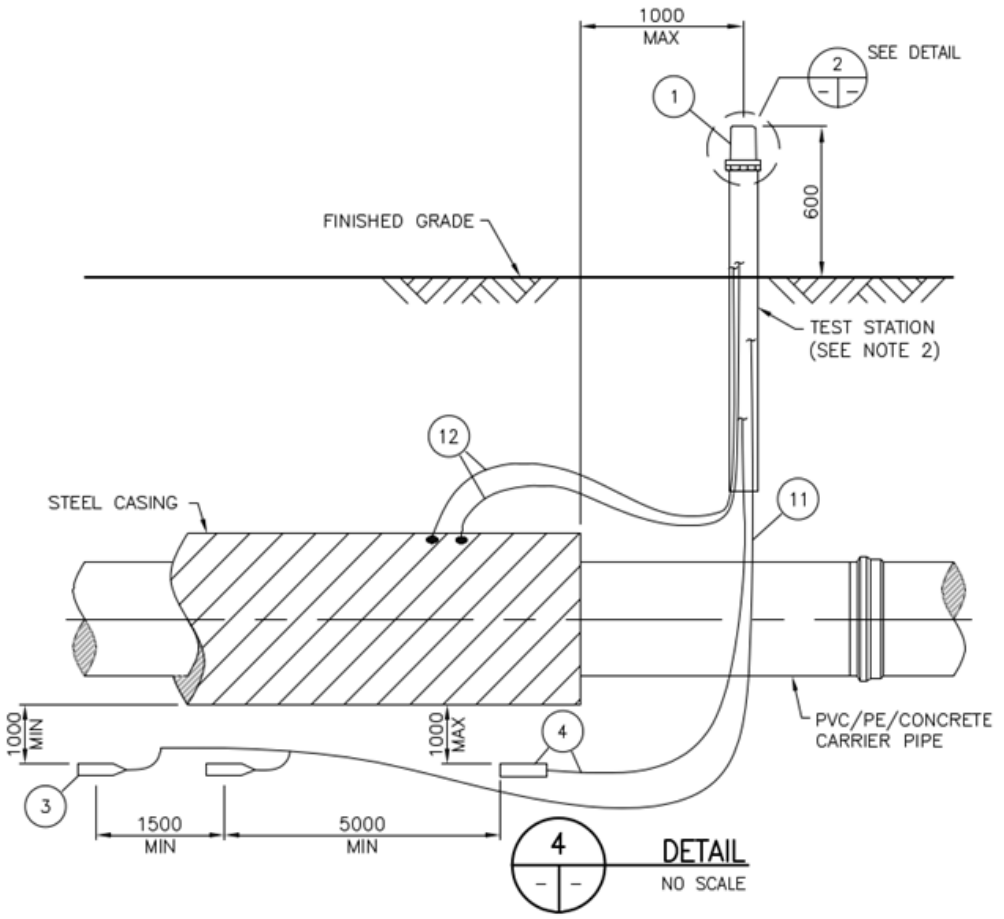
Standardized Design

Cathodic Protection:

- Basic cathodic protection that can be upgraded (if necessary) during the main contract following thorough analysis of stray currents, soil corrosivity and soil conductivity.



Contracting Strategies

Third Party Utilities – Self Perform

Municipal Utilities (Sanitary, Water, Storm)

RFSO

- 3 contractors prequalified under master agreement
- Statement of Requirements

City Self-perform

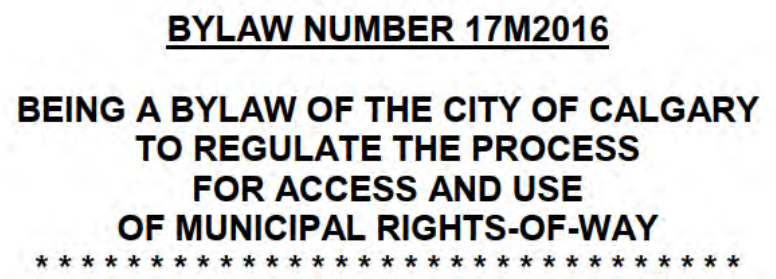
- Water Resources Construction Group

RFT

- Utility Relocation Works completed in conjunction with other Enabling Works scope (i.e. roadworks modifications, landfill removal, CN Highfield Tunnel).

Third Party Utility Coordination – Technical Working Groups: being well papered

- Alberta Utilities Commission
  - Review of facility applications – process has many steps and can take up to a year depending on the complexity of the application.
  - Public consultations
  - AUC Rule 007
    - Applications for Power Plants, Substations, Transmission Lines, Industrial System Designations, Hydro Developments and Gas Utility Pipelines
- MCAA and Bylaw Agreements
  - Can be problematic when applied to mega projects.
  - Vendor's annual budgets / resourcing.
- Schedules / process Regulatory Requirements.
- Joint Use
- URWs and ULAs
- CROWM: allows utility providers to issue information (JUMP)
- Capital Works Coordination Committee: knock on impacts of other projects (City of Calgary)



BYLAW NUMBER 17M2016

BEING A BYLAW OF THE CITY OF CALGARY TO REGULATE THE PROCESS FOR ACCESS AND USE OF MUNICIPAL RIGHTS-OF-WAY

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Thank you.

Questions?

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