

Requirements For Design Presentation Meeting and Proposal Submission for
SYSTEMS DESIGN

Assignment of points

B1	Project Management	100
B2	Civil Design	75
B3	Systems Design	75
B4	Construction	100
B5	Maintenance and rehabilitation	75
B6	Operations	75
	Total Points	500

Key to Design Presentation Meeting and Proposal Submissions

G.U.	General Understanding	Demonstrate a general understanding of the requirement
D.U.	Detailed Understanding	Demonstrate that Project Co has a detailed understanding of the requirement and how Project will apply or use the requirement to develop a specific approach
G.A.	General Approach	Presents a general or an example of an approach or solution to a requirement
D.A.	Detailed Approach	Presents a detailed approach to a requirement with specific solutions, products, concept drawings or specification
G.D.	General Demonstration	Presents drawings, specifications, and site specific information that demonstrates Project Co's specific solution to a requirement
S.D.	Specific Demonstration	Presents drawings, specifications, and site specific information to respond to a Specific Issue that demonstrates Project Co's specific solution to that issue
N.A.	Not Applicable	Requirement to be addressed later or in another proposal section
S.I.	Supplemental Information	Project Co to provide any supplemental information or updates to previous information, if required.
NOTE	Note on Submission	A specific note or instruction about a particular item

Requirements For Design Presentation Meeting and Proposal Submission for
SYSTEMS DESIGN

B3	System Design		
B3.0	Holistic Approach to System Design		
	1	Project Co's Holistic Approach to Systems Design	NA
	2	System Engineering Management Plan	Schedule 15-2 Article 1.2 (o)(ix)C
B3.1	System Design Organization and Key Personnel		
	1	System Design Organization for Phase 1 and Phase 2	
	2	Key System Design Personnel	
B3.2	System Design Approach to Phase 1 and Phase 2		Primary Reference
	1	System Design Submittal Reports, Submittal Lists, and Submission Check Lists	Schedule 15-2 Article 1.2(o)(viii)
	2	Engineering and Design Plan, Design Packaging Plan (Systems)	Schedule 15-2 Article 1.2(o)(ix)
	3	System Design Support for Quality Control/Quality Assurance	Schedule 11
	4	System Designer Support for Verification, Testing and Acceptance Program	Schedule 15-2 Article 13
B3.3	Light Rail Vehicle - Basis of Design		Primary Reference
	1	Understanding of LRV design interface requirements	Schedule 15-2 Article 5.1(b) and 5.4
	2	Understanding of LRV fundamental Parameters	Schedule 15-2 Article 5.2(b)
	3	Understanding of Operational and Performance Characteristics	Schedule 15-2 Article 5.5 and 5.6
	4	Understanding of Design Characteristics	Schedule 15-2 Article 5.7
	5	Understanding of Project Co's testing Requirements	Schedule 15-2 Article 5.9
B3.4	Traction Electrification System - Basis of Design		Primary Reference
	1	Understanding of functional requirements	Schedule 15-2 Article 6.3
	2	Traction Power Systems (TPS) Design requirements	Schedule 15-2 Article 6.4
	3	System Voltage Design Requirements	Schedule 15-2 Article 6.5
	4	TPSS Site Access, Grading and Drainage Design Requirements	Schedule 15-2 Article 6.6
	5	Traction Power Feeder System (TPFS) Design Requirements	Schedule 15-2 Article 6.7
	6	Sectioning and Grounding Design Requirements	Schedule 15-2 Article 6.8
	7	Traction Power System Product Requirements	Schedule 15-2 Article 6.9
	8	Overhead contact System (OCS)	Schedule 15-2 Article 6.10
	9	Traction Power Distribution System	Schedule 15-2 Article 6.11
B3.5	Train Control Systems - Basis of Design		Primary Reference
	1	Understanding of functional requirements	Schedule 15-2 Article 8.1 and 8.3
	2	Automatic Train Supervision	Schedule 15-2 Article 8.4
	3	Operational Design requirements	Schedule 15-2 Article 8.5
	4	Electromagnetic Interference (EMI)	Schedule 15-2 Article 8.6
	5	Growth and Expansion	Schedule 15-2 Article 8.7
	6	Signal Circuitry	Schedule 15-2 Article 8.8
	7	Train-to-Wayside Communications (TWC)	Schedule 15-2 Article 8.9 and 8.20
	8	Storage Yard	Schedule 15-2 Article 8.10
	9	Switch Machines	Schedule 15-2 Article 8.11
	10	Signals	Schedule 15-2 Article 8.12

Requirements For Design Presentation Meeting and Proposal Submission for
SYSTEMS DESIGN

11	Crossing Warning Systems	Schedule 15-2 Article 8.13	
12	Traffic Signal Interface	Schedule 15-2 Article 8.14	
13	Track Circuits	Schedule 15-2 Article 8.15	
14	Signal Power	Schedule 15-2 Article 8.16	
15	Houses and Cases	Schedule 15-2 Article 8.17	
16	Signal Equipment and Technologies	Schedule 15-2 Article 8.18	
17	Maintainability Design requirements	Schedule 15-2 Article 8.19	
18	Vehicle Provisions for Project Co ATP, ATS, and TWC Equipment	Schedule 15-2 Article 8.21	

Requirements For Design Presentation Meeting and Proposal Submission for
SYSTEMS DESIGN

B3.6	Intelligent Transportation Systems - Basis of Design		Primary Reference
	1	Intelligent Transportation Systems Architecture	Schedule 15-2 Article 9.3
	2	ITS Systems for the Project	Schedule 15-2 Article 9.4
	3	Transit Management Systems	Schedule 15-2 Article 9.5
	4	Traffic Signal Control/Transit Priority Systems	Schedule 15-2 Article 9.6
	5	Transit Security	Schedule 15-2 Article 9.7
	6	Passenger Assistance Intercom at LRT Stops	Schedule 15-2 Article 9.8
	7	Fare Collection	Schedule 15-2 Article 9.9
	8	Communications System	Schedule 15-2 Article 9.10
	9	Control Centres	Schedule 15-2 Article 9.11
	10	Power Supply System	Schedule 15-2 Article 9.12
	11	Advanced Traveler Information System	Schedule 15-2 Article 9.13
	12	System Design Documentation	Schedule 15-2 Article 9.14
	13	Software Licenses and Escrow	Schedule 15-2 Article 9.15
	14	Testing and Commissioning Requirements	Schedule 15-2 Article 9.16

B3.7	Communications - Basis of Design		Primary Reference
	1	Light Rail Communication Systems	Schedule 15-2 Article 10.3
	2	Transport System LAN Definitions	Schedule 15-2 Article 10.4
	3	Field Equipment Technical Requirements	Schedule 15-2 Article 10.5
	4	SCADA System Requirements	Schedule 15-2 Article 10.6
	5	Communications Transmission Systems (CTS)	Schedule 15-2 Article 10.7
	6	Telephone/Intercom System	Schedule 15-2 Article 10.8
	7	Closed Circuit Television (CCTV)	Schedule 15-2 Article 10.9
	8	Remote Security Rooms	Schedule 15-2 Article 10.10
	9	Light Rail Vehicle to CCF communications	Schedule 15-2 Article 10.11
	10	Central Control Facility and SCADA	Schedule 15-2 Article 10.12
	11	Central Control Facility and the Fire Alarm System	Schedule 15-2 Article 10.13
	12	Light Rail Transit Radio System	Schedule 15-2 Article 10.14

B3.8	Trackwork - Basis of Design		Primary Reference
	1	General Requirements	Schedule 15-2 Article 12.1
	2	Trackwork Systems	Schedule 15-2 Article 12.3
	3	Track Classification	Schedule 15-2 Article 12.4
	4	Wheel Profile and Wheel Gauge	Schedule 15-2 Article 12.5
	5	Track Gauge and Rail Cant	Schedule 15-2 Article 12.6
	6	Track Electrical Insulation and Vibration Damping	Schedule 15-2 Article 12.7
	7	Track Construction and Maintenance Manuals and Tolerances	Schedule 15-2 Article 12.8
	8	Standard Track Construction Types	Schedule 15-2 Article 12.9
	9	Standard Trackwork	Schedule 15-2 Article 12.10
	10	Special Trackwork	Schedule 15-2 Article 12.11
	11	Highway and Pedestrian Grade Crossing Materials	Schedule 15-2 Article 12.12
	12	Other Track Devices	Schedule 15-2 Article 12.13
	13	System Interfaces Affecting Track Design	Schedule 15-2 Article 12.14

B3.9	Corrosion Control and Grounding - Basis of Design (stray current aspects)		Primary Reference

Requirements For Design Presentation Meeting and Proposal Submission for
SYSTEMS DESIGN

1	General Requirements	Schedule 15-2 Article 17.1	
2	Purpose and Scope	Schedule 15-2 Article 17.2, 17.3	
3	Interfaces, Expansion, and Special Design Provisions	Schedule 15-2 Article 17.4, 17.5, 17.6, 17.8	
4	Stray Current Corrosion Prevention	Schedule 15-2 Article 17.9	
5	Stray Current Corrosion Prevention Systems	Schedule 15-2 Article 17.10 & 17.17	

Requirements For Design Presentation Meeting and Proposal Submission for
SYSTEMS DESIGN

Holistic Approach to System Design items to be addressed in B3.0						The Proponent shall describe the holistic approach for the design of the Systems and shall include the following:
Sub-item	Sub-item description	Primary reference	DPM #1	DPM #2	DPM #3	Holistic Approach to System Design
1	Project Co's Holistic Approach to Systems Design	NA	G.U.	D.U.	G.D.	<p>Provide Project Co's detailed understanding of the system design requirements, its approach to the system design work, experience with the design of systems work, and approach to working as an integrated team. The holistic approach to completing the design of the systems work shall be seamless and continuous.</p> <ul style="list-style-type: none"> - Provide Project Co's approach to ensure that the design of the systems is coordinated with the project schedule and the design work of the non-systems work. - (G.D.) For each subsystem, Provide the firm's experience is design that specific subsystem and the name of the lead person for the design of the subsystem.
2	System Engineering Management Plan	Schedule 15-2 Article 1.2 (o)(ix)C	G.U.	D.U.	S.I.	Provide Project Co's understanding and approach to preparing and implementing the Engineering and Design Plan for the design of the systems.

Requirements For Design Presentation Meeting and Proposal Submission for
SYSTEMS DESIGN

System Design Organization and Key Personnel to be addressed in B3.1						The Proponent shall describe the organization and key personnel for the design of the Systems and shall include the following:
Sub-item	Sub-item description	Primary reference	DPM #1	DPM #2	DPM #3	System Design Organization and Key Personnel
1	System Organization for Phase 1 and Phase 2	NA	G.A.	D.A. G.D.	S.I.	<p>Provide Project Co's approach to the organization of system design resources, firms and key personnel responsible for the design of the various systems.</p> <ul style="list-style-type: none"> - Provide the location where the design work will be performed and firms that will be leading the design of the systems - Provide a description of the role and responsibilities, qualifications, and authority of the Project Co Key Individuals for the design of systems. - Provide a description of the organizational interfaces between those responsible for the design of systems and those responsible for the design of the non-system components and those responsible for construction. - (G.D.) Provide a detailed organizational chart, for Phase 1 and Phase 2, indicating the key personnel, their role, firm association, and reporting lines within the Systems Design organization and beyond the System Design organization where applicable. The organization chart shall identify all Key System Design Personnel
2	Key System Design Personnel	NA	G.A.	G.D	S.I.	<p>(G.D.) For the DPM process provide a brief bio for each of Project Co's Key System Design Personnel, as cited in Schedule 9 of the RFP, and other significant design positions including the following positions or equivalent positions with similar responsibilities. If a specific person has not been determined for a particular position, provide the minimum qualifications that Project Co will set for that position. Resumes or minimum qualifications shall be provide in the final submission:</p> <ul style="list-style-type: none"> - Chief Systems Engineer (Key Person) - Lead Vehicle Integration Engineer (Key Person) - Lead Train Control Signals Engineer - Lead Traction Power Equipment Engineer - Lead Overhead Contact Systems Engineer - Lead Communications Engineer - Lead Corrosion Control Engineer (stray current) <p>For each key person or significant position, indicate if they are full time or part time positions, when they will be assuming their role on the project, whether they will be stationed in the Region of Waterloo or Greater Toronto Area and when they are scheduled for redeployment.</p>

Requirements For Design Presentation Meeting and Proposal Submission for
SYSTEMS DESIGN

System Design Approach to Phase 1 and Phase 2 to be addressed in B3.2						The Proponent must address the overall system design approach at an appropriate level of detail, as set out in or otherwise referenced in Schedule 15-2 of the Project Agreement, and shall include the following:
Sub-item	Sub-item description	Primary reference	DPM #1	DPM #2	DPM #3	System Design Approach to Phase 1 and Phase 2
1	System Design Submittal Reports, Submittal Lists, and Submission Check Lists	Schedule 15-2 Article 1.2(o)(viii)	G.A.	D.A.	G.D.	Project Co shall provide their approach for preparing the Submittal Report, Submittal List, and Submittal checklist for System design packages. (GD) Project Co shall provide a preliminary list of system design related submittals for the system design packages (GD) Project Co shall provide an example of a system submittal checklist reflecting the quality of the system submittal checklist to be provided by Project Co for the design work.
2	Engineering and Design Plan, Design Packaging Plan (Systems)	Schedule 15-2 Article 1.2(o)(ix)	G.A.	G.D.	S.I.	Project Co shall provide their approach to prepare the Packaging Plan for the systems design packages. (GD) Project Co shall provide a preliminary list of system design packages
3	System Design Support for Quality Control/Quality Assurance	Schedule 11	G.A.	D.U.	G.A.	Provide Project Co's approach to ensuring that the quality of the system design(s) is implemented during the construction of the systems in the field and whether Project Co's Engineer of Record for the systems design has a meaningful role in the construction QA/QC process.
4	System Designer Support for Verification, Testing and Acceptance Program	Schedule 15-2 Article 13	G.A.	D.A.	G.D.	Provide Project Co's approach to ensuring that the Verification, Testing and Acceptance Program for system design elements includes Project Co's Engineer of Record for the system design as part of the program - (G.D.) List of test and inspection procedures for system design that will be performed as part of the Verification, Testing, and Acceptance Plan.

Requirements For Design Presentation Meeting and Proposal Submission for
SYSTEMS DESIGN

Light Rail Vehicle items to be addressed in Part B3.3						The Proponent must address the Light Rail Vehicle requirements at an appropriate level of detail, as set out in or otherwise referenced in Article 5 of Schedule 15-2 of the Project Agreement, and shall include the following:
Sub-item	Sub-item description	Primary reference	DPM #1	DPM #2	DPM #3	Proposal Submission for Light Rail Vehicle
1	Understanding of LRV design interface requirements	Schedule 15-2 Article 5.1(b) & 5.4	G.U.	D.U.	S.I.	Provide Project Co's understanding of the design interface requirements attributable to the Light Rail Vehicle and how those interfaces will be handled by Project Co during the design process.
2	Understanding of LRV fundamental Parameters	Schedule 15-2 Article 5.2(b)	G.U.	D.U.	S.I.	Provide Project Co's understanding of the LRT Vehicle's design parameters and how those parameters will be incorporated into the design process.
3	Understanding of Operational and Performance Characteristics	Schedule 15-2 Article 5.5 & 5.6	G.U.	S.I.	S.I.	Provide Project Co's understanding of the LRT Vehicle's Operational and Performance Characteristics and how Project Co will use these characteristics during the design process.
4	Understanding of Design Characteristics	Schedule 15-2 Article 5.7	G.U.	D.U.	S.I.	Provide Project Co's understanding of the LRT Vehicle's Design Characteristics and identifying what elements may impact or involve on-board equipment provided by Project Co.
5	Understanding of Project Co's testing Requirements	Schedule 15-2 Article 5.9	G.U.	D.U.	S.I.	Provide Project Co's understanding of the Project Co's involvement in the Region's testing program prior to the vehicle handover to Project Co and Project Co's program for testing Project Co's on-board installations.

Requirements For Design Presentation Meeting and Proposal Submission for
SYSTEMS DESIGN

Traction Electrification System items to be addressed in Part B3.4						The Proponent must address the Traction Electrification System design at an appropriate level of detail, as set out in or otherwise referenced in Article 6 of Schedule 15-2 of the Project Agreement, and shall include the following:
Sub-item	Sub-item description	Primary reference	DPM #1	DPM #2	DPM #3	Proposal Submission for Basis of Design - Traction Electrification System
1	Understanding of functional requirements	Schedule 15-2 Article 6.1 and 6.3	D.U.	G.A.	D.A.	Provide Project Co's understanding of the functional requirements for the design of the traction electrification system and identification of special issues that will be addressed during the design process.
2	Traction Power Systems (TPS) Design requirements	Schedule 15-2 Article 6.4	D.U.	G.A.	S.D.	<p>Provide Project Co's understanding and approach to Traction Power Systems design requirements</p> <ul style="list-style-type: none"> - Understanding of substation spacing and identification of issues - Understanding of service connections to substations and design approach for making the service connections - Approach to maintenance facility substations. - Approach to traction power simulation - Identify the type or supplier proposed for the major components of the TES and provide a general description of the equipment. If Project Co has not selected a specific supplier for the TES equipment, Project Co may submit information for more than one supplier or provide the performance specifications for the TES and Project Co's approach to selecting the supplier. Please note that if a specific supplier is not identified, the evaluation of the quality of the TES equipment provided by Project Co will be based on the assumption that the equipment will only comply with the minimum requirements. - (S.D.) presentation of initial traction power simulation results.
3	System Voltage Design Requirements	Schedule 15-2 Article 6.5	G.U.	D.U.	S.I.	Provide Project Co's understanding of voltage design requirements and utilization of these requirements during the design process.
4	TPSS Site Access, Grading and Drainage Design Requirements	Schedule 15-2 Article 6.6	G.U.	D.A.	G.D. S.D.	<p>Provide Project Co's understanding and approach to site requirements</p> <ul style="list-style-type: none"> - (G.D.) provide a Directive Drawing depicting the general solution for meeting TPSS site requirements - (S.D.) provide a site specific concept level drawing for the TPSS at Conestoga Mall. - (G.D.) for each type of TPSS enclosure provide architectural typical elevation views. - (S.D.) Show on Project Co's plan and profile alignment drawings showing the location of each TPSS

Traction Electrification System items to be addressed in Part B3.4						The Proponent must address the Traction Electrification System design at an appropriate level of detail, as set out in or otherwise referenced in Article 6 of Schedule 15-2 of the Project Agreement, and shall include the following:
Sub-item	Sub-item description	Primary reference	DPM #1	DPM #2	DPM #3	Proposal Submission for Basis of Design - Traction Electrification System
5	Traction Power Feeder System (TPFS) Design Requirements	Schedule 15-2 Article 6.7	D.U.	D.A.	G.D. S.D.	Provide Project Co's understanding and approach to traction power feeder system requirements - (G.D.) provide a Preliminary Directive Drawing depicting the general arrangement of the traction power feeder system - (S.D.) provide a site specific concept level drawing for the TPSS at Conestoga Mall.
6	Sectioning and Grounding Design Requirements	Schedule 15-2 Article 6.8	D.U.	D.A.	G.D. S.D.	Provide Project Co's understanding and approach to traction power feeder sectioning and grounding requirements - Detailed approach to sectioning of the TES - (G.D.) provide a Preliminary Directive Drawing depicting the general arrangement of the TPSS installations for sectioning. - (S.D.) Show on Project Co's plan and profile alignment drawings or on a stand alone schematic/track chart illustration, the TPSS sectioning limits, by stationing, for each track and the OMSF for the entire system.
7	Traction Power System Product Requirements	Schedule 15-2 Article 6.9	D.A.	G.D.	S.I.	Provide Project Co's approach to meeting the traction power system product requirements - (G.D.) provide a one line diagram depicting the general arrangement of the TPSS based on initial assessment of TPSS capacity.
8	Overhead Contact System (OCS)	Schedule 15-2 Article 6.10	D.A.	S.D.	S.I.	Provide Project Co's approach to meeting the Overhead Contact System (OCS) requirements - (S.D.) Show on Project Co's plan and profile alignment drawings the preliminary OCS pole locations along the alignment, for each track, and the general limits for each type of OCS configuration (simple catenary, low profile, or single wire) for the entire system and the approximate location of any underground Traction Power Ductbanks with supplemental dc feeders.
9	Traction Power Distribution System	Schedule 15-2 Article 6.11	D.U.	D.A.	G.D.	Provide Project Co's approach to the traction power distribution system. - Understanding of the geotechnical conditions of the project and approach to the design of the foundations for the OCS - (G.D.) The concept or preliminary directive drawings for the OCS indicating all basic dimensions, materials for OCS including type of OCS poles, wire sizes, pole spacing limitations, underground ductbank for parallel feeders, if required, and type of foundation and anticipated foundation dimensions. The directive drawings shall also address freight railroad as well as LRT spatial relationships to the OCS.

Requirements For Design Presentation Meeting and Proposal Submission for
SYSTEMS DESIGN

Train Control Systems items to be addressed in Part B3.5						The Proponent must address the Train Control Systems design at an appropriate level of detail, as set out in or otherwise referenced in Article 8 of Schedule 15-2 of the Project Agreement, and shall include the following:
Sub-item	Sub-item description	Primary reference	DPM #1	DPM #2	DPM #3	Proposal Submission for Basis of Design - Train Control Systems
1	Understanding of functional requirements	Schedule 15-2 Article 1.7(f), 8.1 & 8.3	D.U.	D.A.	S.I.	Provide Project Co's understanding of the functional requirements for the design of the train control systems and identification of the approach to special train control issues that will be applied during the design process. - Provide Project Co's approach to developing the computer model for train simulations and on time performance analysis. - Provide Project Co's detailed initial model results with Proposal Submission
2	Automatic Train Supervision	Schedule 15-2 Article 8.4	D.U.	D.A.	S.I.	Provide Project Co's understanding and approach to Automatic Train Supervision requirements
3	Operational Design requirements	Schedule 15-2 Article 8.5	G.U.	D.A.	S.I.	Provide Project Co's understanding and approach to Operational Design requirements
4	Electromagnetic Interference (EMI)	Schedule 15-2 Article 8.6	G.U.	G.A.	S.I.	Provide Project Co's understanding and approach to Electromagnetic Interference requirements
5	Growth and Expansion	Schedule 15-2 Article 8.7	G.U.	G.A.	S.I.	Provide Project Co's understanding and approach to Growth and Expansion requirements
6	Signal Circuitry	Schedule 15-2 Article 8.8	D.U.	D.A.	S.I.	Provide Project Co's understanding and approach to Signal Circuitry requirements
7	Train-to-Wayside Communications (TWC)	15-2 Art 8.9 and 8.20	G.U.	D.A.	S.I.	Provide Project Co's understanding and approach to meeting Train to Wayside Communication requirements
8	Storage Yard	Schedule 15-2 Article 8.10	G.U.	D.A.	S.I.	Provide Project Co's understanding and approach to Train Control Systems to be used in the OMSF
9	Switch Machines	Schedule 15-2 Article 8.11	G.U.	D.A.	S.I.	Provide Project Co's understanding and approach to providing switch machines
10	Signals	1Schedule 15-2 Article 8.12	G.A.	S.D.	S.I.	Provide Project Co's approach to signals that will be used on the LRT system. - (S.D.) Preliminary Directive Drawings for each type of signal including the aspects and associated indication that will be used by Project Co.
11	Crossing Warning Systems	Schedule 15-2 Article 8.5, 8.13	D.U.	D.A.	G.D.	Provide Project Co's understanding and approach to highway and pedestrian crossing warning systems - Identification of five specific highway crossing conditions that will require special attention and the approach that Project Co will implement for those crossings. - Approach to highway crossing warning systems when LRT tracks are shared with freight railroad trains. - Approach to highway crossing warning systems when LRT tracks are adjacent to freight railroad tracks. - (G.D.) Preliminary Directive Drawings for a typical LRT highway crossing and LRT pedestrian crossing.
12	Traffic Signal Interface	Schedule 15-2 Article 8.14	G.A.	D.A.	S.I.	Provide Project Co's understanding and approach to Traffic Signal Interface issues - Identify each location where train operations transition from the proposed ATP system to the traffic signal system and Project Co's understanding of the transition process. - Identify each location where the AHCW system will interact with adjacent traffic signal systems. - Identify each location where the ATP system will interact with adjacent traffic signal systems. - Approach to addressing Traffic Signal Interface Issues
13	Track Circuits	Schedule 15-2 Article 8.15	G.A.	D.A.	S.I.	Provide Project Co's understanding and approach to track circuits
14	Signal Power	Schedule 15-2 Article 8.16	G.U.	G.A.	S.I.	Provide Project Co's understanding and approach to signal power

Requirements For Design Presentation Meeting and Proposal Submission for
SYSTEMS DESIGN

Train Control Systems items to be addressed in Part B3.5						The Proponent must address the Train Control Systems design at an appropriate level of detail, as set out in or otherwise referenced in Article 8 of Schedule 15-2 of the Project Agreement, and shall include the following:
Sub-item	Sub-item description	Primary reference	DPM #1	DPM #2	DPM #3	Proposal Submission for Basis of Design - Train Control Systems
15	Houses and Cases	Schedule 15-2 Article 8.17	G.A.	S.D.	S.I.	Provide Project Co's approach to houses, cases, and rooms for the signal system - (S.D.) Show on Project Co's plan and profile alignment drawings, the preliminary location and sizes of all wayside houses or cases for the signal and crossing warning system.
16	Signal Equipment and Technologies	Schedule 15-2 Article 8.18	G.A.	D.A.	S.D.	Provide Project Co's understanding and approach to signal equipment - (S.D.) Identify the supplier proposed for the major components of the train control systems and provide a general description of the equipment. If Project Co has not selected a specific supplier for the train control systems' equipment, Project Co may submit information for more than one supplier or provide the performance specifications for the train control system equipment and Project Co's approach to selecting the train control systems' equipments supplier. Please note that if a specific supplier is not identified, the evaluation of the quality of the train control systems' equipment provided by Project Co will be based on the assumption that the equipment will only comply with the minimum requirements.
17	Maintainability Design requirements	Schedule 15-2 Article 8.19	G.U.	G.A.	S.I.	Provide Project Co's understanding and approach to maintainability design requirements
18	Vehicle Provisions for Project Co ATP, ATS, and TWC Equipment	Schedule 15-2 Article 8.21 and Schedule 35	D.U.	G.A.	D.A.	Provide Project Co's understanding and approach to Vehicle provisions for ATP, ATS, and TWC equipment

Requirements For Design Presentation Meeting and Proposal Submission for
SYSTEMS DESIGN

Intelligent Transportation Systems items to be addressed in Part B3.6						The Proponent must address the Intelligent Transportation Systems design at an appropriate level of detail, as set out in or otherwise referenced in Article 9 of Schedule 15-2 of the Project Agreement, and shall include the following:
Sub-item	Sub-item description	Primary reference	DPM #1	DPM #2	DPM #3	Proposal Submission for Basis of Design - Intelligent Transportation Systems
1	Intelligent Transportation Systems Architecture	Schedule 15-2 Article 9.3	D.U.	D.A.	S.I.	Provide Project Co's understanding and approach to adhere to Canadian ITS architecture and the System engineering process during the design process and through start up of operations.
2	ITS Systems for the Project	Schedule 15-2 Article 9.4	D.U.	D.A.	S.I.	Provide Project Co's understanding and approach to the implementing the ITS Systems for the Project
3	Transit Management Systems	Schedule 15-2 Article 9.5	D.U.	D.A. G.D.	S.D.	Provide Project Co's understanding and approach to Transit Management Systems Design requirements - (G.D.) Preliminary Directive drawings depicting the off-board TSM components being provided by Project Co at a typical LRT Stop - (S.D.) Identify the type or supplier proposed for the major components of the TMS and provide a general description of the TMS equipment. If Project Co has not selected a specific supplier for the TMS equipment, Project Co may submit information for more than one TMS supplier or provide the performance specifications for the TMS and Project Co's approach to selecting the TMS supplier. Please note that if a specific supplier is not identified, the evaluation of the quality of the TMS equipment provided by Project Co will be based on the assumption that the equipment will only comply with the minimum requirements.
4	Traffic Signal Control/Transit Priority Systems	Schedule 15-2 Article 9.6	D.U.	D.A. G.D.	S.D.	Provide Project Co's understanding and approach to Traffic Signal Control/Transit Priority Design requirements - Approach for temporary ITS systems to maintain existing operations and to provide traffic management tools during construction. - Approach for the selection and integration of TSP technology on board the trains. - Approach for the enhancement of the Region's existing traffic signal control system. - Approach for the design and implementation of the advanced network based TSP system function. - (G.D.) Preliminary Directive Drawings depicting the arrangement and components being provided by Project Co at a typical intersection. - (S.D.) Show on Project Co's plan and profile alignment drawings each of the signalized intersections and provide, and provide Project Co's approach to traffic signalization at each intersection. - PHM-125 drawings at the intersections of Erb St. / Caroline St.; and Ottawa St. / Charles St. - Approach to developing computer model for train simulations and performance analysis. - (S.D.) Identify the type or supplier proposed for the major components of the Traffic Signal Control/Transit Priority Systems and provide a general description of this equipment. If Project Co has not selected a specific supplier for the Traffic Signal Control/Transit Priority Systems equipment, Project Co may submit information for more than one Traffic Signal Control/Transit Priority Systems supplier or provide the performance specifications for the Traffic Signal Control/Transit Priority Systems equipment and Project Co's approach to selecting the Traffic Signal Control/Transit Priority Systems suppliers. Please note that if a specific supplier(s) is not identified, the evaluation of the quality of the Traffic Signal Control/Transit Priority Systems equipment provided by Project Co will be based on the assumption that the equipment will only comply with the minimum requirements.
5	Transit Security	Schedule 15-2 Article 9.7	G.U.	G.A.	D.A.	Provide Project Co's understanding and approach to transit security requirements

Requirements For Design Presentation Meeting and Proposal Submission for
SYSTEMS DESIGN

Intelligent Transportation Systems items to be addressed in Part B3.6						The Proponent must address the Intelligent Transportation Systems design at an appropriate level of detail, as set out in or otherwise referenced in Article 9 of Schedule 15-2 of the Project Agreement, and shall include the following:
Sub-item	Sub-item description	Primary reference	DPM #1	DPM #2	DPM #3	Proposal Submission for Basis of Design - Intelligent Transportation Systems
6	Passenger Assistance Intercom at LRT Stops	Schedule 15-2 Article 9.8	G.U.	G.A.	G.D.	Provide Project Co's understanding and approach to Passenger Assistance Intercoms at LRT Stops - (G.D.) Provide Preliminary Directive Drawings showing the typical location of the passenger assistance intercom and its configuration.
7	Fare Collection	Schedule 15-2 Article 9.9	G.U.	D.U.	S.I.	Provide Project Co's understanding of Project Co's role with respect to supporting the fare collection system
8	Communications System	Schedule 15-2 Article 9.10	G.U.	S.I. (NOTE)	S.I. (NOTE)	Provide Project Co's general understanding of the requirements for the Communication System as needed to support ITS - (NOTE) additional information on communication elements is required as part of B3.7 and does not have to be repeated.
9	Control Centres	Schedule 15-2 Article 9.11	D.U. G.A.	D.A. G.D.	S.I.	Provide Project Co's understanding and general approach to meeting the functional requirements for each of the Control Centres - Understanding and detailed approach to the Fleet Management System and Driver Management System and interface with Region's existing system. - (G.D.) Provide concept drawing(s) of the CCF at the OMSF with the emphasize on presenting the approach to meeting all of the functional requirements - (G.D.) Provide concept drawing(s) for the Traffic Control Centre enhancements to the Region's existing traffic control centre - (G.D.) Provide concept drawing(s) for enhancements and interfaces with the Region of Waterloo Transit Control Centre at Strasburg - (G.D.) Provide concept drawings(s) for enhancements and interfaces with the Region of Waterloo Security Control Centre at Strasburg
10	Power Supply System	Schedule 15-2 Article 9.12	G.U.	G.A.	S.I.	Provide Project Co's understanding and approach for providing electrical power to ITS elements for the LRT system.
11	Advanced Traveler Information System	Schedule 15-2 Article 9.13	G.U.	G.A.	S.I.	Provide Project Co's understanding and approach for providing information to a ATIS system
12	System Design Documentation	Schedule 15-2 Article 9.14	G.U.	S.I.	S.I.	Provide Project Co's understanding of the requirements for System Design Documentation
13	Software Licenses and Escrow	Schedule 15-2 Article 9.15	G.U.	D.U.	G.A.	Provide Project Co's understanding and approach to software licenses and escrow
14	Testing and Commissioning Requirements	Schedule 15-2 Article 9.16	G.U. NOTE	S.I.	S.I.	Provide Project Co's general understanding of testing and commissioning requirements for ITS (NOTE this item will also be addressed in other evaluation sections)

Requirements For Design Presentation Meeting and Proposal Submission for
SYSTEMS DESIGN

Communications items to be addressed in Part B3.7						The Proponent must address the Communication design at an appropriate level of detail, as set out in or otherwise referenced in Article 10 of Schedule 15-2 of the Project Agreement, and shall include the following:
Sub-item	Sub-item description	Primary reference	DPM #1	DPM #2	DPM #3	Proposal Submission for Basis of Design - Communications
1	Light Rail Communication Systems	Schedule 15-2 Article 10.3	GU	G.A. G.D.	S.D.	Provide Project Co's understanding and approach for complying with the general requirements for the design of the track alignment and wayside clearances - Provide Project Co's understanding of the physical characteristics of the LRV being provided by the Region and the factors that need to be considered when designing the horizontal and vertical alignments suitable for the LRV. - Identify areas which may require a variance and the rationale for the variance. - Provide Project Co's approach to track alignment and wayside clearances in greater detail and in a site specific manner
2	Transport System LAN Definitions	Schedule 15-2 Article 10.4	GU	G.A. G.D.	S.D.	Provide Project Co's understanding and approach to meeting the requirements for each of the Transport System LANs. - (G.D.) Provide block diagram, schematics and directive drawings for each of the Transport System LANs. - (S.D.) Show on Project Co's plan and profile alignment drawings the preliminary locations of the Transport System LANs.
3	Field Equipment Technical Requirements	Schedule 15-2 Article 10.5	GU	G.A. G.D.	S.D.	Provide Project Co's understanding and approach for providing communication cabinets or rooms. - (G.D.) Provide schematics and directive drawings for the communication cabinets or rooms. - (S.D.) Show on Project Co's plan and profile alignment drawings the preliminary location of the communication cabinets or rooms.
4	SCADA System Requirements	Schedule 15-2 Article 10.6	D.U.	DA	S.D.	Provide Project Co's understanding and approach for meeting the SCADA System Design requirements - Describe provisions to ensure that the SCADA system does not cause EMI issues and is not susceptible to EMI conditions especially EMI conditions attributable to the LRT system - (S.D.) Identify the type or supplier proposed for the major components of the SCADA System and provide a general description of this equipment. If Project Co has not selected a specific supplier for the SCADA System equipment, Project Co may submit information for more than one SCADA System supplier or provide the performance specifications for the SCADA System equipment and Project Co's approach to selecting the SCADA System suppliers. Please note that if a specific supplier(s) is not identified, the evaluation of the quality of the SCADA System equipment provided by Project Co will be based on the assumption that the equipment will only comply with the minimum requirements.
5	Communications Transmission Systems (CTS)	Schedule 15-2 Article 10.7	D.U.	DA	S.D.	Provide Project Co's understanding and approach for meeting the CTS System design requirements - (S.D.) Identify the type or supplier proposed for the major components of the CTS System and provide a general description of this equipment. If Project Co has not selected a specific supplier for the CTS System equipment, Project Co may submit information for more than one CTS System supplier or provide the performance specifications for the CTS System equipment and Project Co's approach to selecting the CTS System suppliers. Please note that if a specific supplier(s) is not identified, the evaluation of the quality of the CTS System equipment provided by Project Co will be based on the assumption that the equipment will only comply with the minimum requirements.

Requirements For Design Presentation Meeting and Proposal Submission for
SYSTEMS DESIGN

Communications items to be addressed in Part B3.7						The Proponent must address the Communication design at an appropriate level of detail, as set out in or otherwise referenced in Article 10 of Schedule 15-2 of the Project Agreement, and shall include the following:
Sub-item	Sub-item description	Primary reference	DPM #1	DPM #2	DPM #3	Proposal Submission for Basis of Design - Communications
6	Telephone/Intercom System	Schedule 15-2 Article 10.8	G.U. NOTE	G.A.	G.D.	Provide Project Co's understanding and approach to providing Blue Lights Telephones and LRT telephone system - (NOTE) Passenger Assistance Intercoms at LRT Stops to be addressed in the response to the requirements for Article 9. - (G.D.) Provide Preliminary Directive Drawings showing the typical location of the Blue Lights Telephones and LRT telephone systems and their configuration.
7	Closed Circuit Television (CCTV)	Schedule 15-2 Article 10.9	G.U.	D.U.	G.D.	Provide Project Co's understanding of Project Co's role with respect to providing CCTV - (G.D.) concept level drawings showing the typical placement of CCTV cameras at each type of LRT Stop, exterior areas of the OMSF, and any other exterior CCTV locations.
8	Remote Security Rooms	Schedule 15-2 Article 10.10	G.U.	S.I.	S.I.	Provide Project Co's understanding of the requirements for the remote security rooms and their location if provided
9	Light Rail Vehicle to CCF communications	Schedule 15-2 Article 10.11	N.A NOTE	N.A.	N.A.	(NOTE) Project Co's understanding and general approach to TWC shall be addressed in Articles 8 and 9
10	Central Control Facility and SCADA	Schedule 15-2 Article 10.12	G.U.	S.I.	S.I.	Provide Project Co's understanding of the interface of the requirements for the SCADA system at the CCF
11	Central Control Facility and the Fire Alarm System	Schedule 15-2 Article 10.13	G.U.	G.A.	S.I.	Provide Project Co's understanding of the interface of the requirements for the fire alarm system at the CCF and the approach for providing this system. - Identify the preliminary locations of Fire Alarm Control Panels in the field.
12	Light Rail Transit Radio System	Schedule 15-2 Article 10.14	G.U.	G.A.	S.D. D.A.	Provide Project Co's understanding and approach of the requirements for the Radio System including the on-board LRV radio equipment. - (S.D.) Identify the type or supplier proposed for the major components of the radio system and provide a general description of this equipment. If Project Co has not selected a specific supplier for the radio system equipment, Project Co may submit information for more than one radio system supplier or provide the performance specifications for the radio system equipment and Project Co's approach to selecting the radio system suppliers. Please note that if a specific supplier(s) is not identified, the evaluation of the quality of the radio system equipment provided by Project Co will be based on the assumption that the equipment will only comply with the minimum requirements. - Provide detailed approach to the future upgrade to the P25 standard.

Requirements For Design Presentation Meeting and Proposal Submission for
SYSTEMS DESIGN

Trackwork items to be addressed in Part B3.8						The Proponent must address the Trackwork System design at an appropriate level of detail, as set out in or otherwise referenced in Article 12 of Schedule 15-2 of the Project Agreement, and shall include the following:
Sub-item	Sub-item description	Primary reference	DPM #1	DPM #2	DPM #3	Proposal Submission for Basis of Design - Trackwork
1	General Requirements	Schedule 15-2 Article 12.1	D.U.	G.A.	D.A.	Provide Project Co's understanding and approach to meeting the general requirements for the design of the trackwork
2	Trackwork Systems	Schedule 15-2 Article 12.3	G.U.	D.U.	G.A.	Provide Project Co's understanding and approach to Trackwork Systems
3	Track Classification	Schedule 15-2 Article 12.4	G.U.	S.I.	S.I.	Provide Project Co's understanding of Trackwork Classifications
4	Wheel Profile and Wheel Gauge	Schedule 15-2 Article 12.5	G.U.	D.U.	S.I.	Provide Project Co's understanding of Wheel Profile and Wheel Gauge requirements
5	Track Gauge and Rail Cant	Schedule 15-2 Article 12.6	G.U.	D.U.	S.I.	Provide Project Co's understanding of Track Gauge and Rail Cant requirements
6	Track Electrical Insulation and Vibration Damping	Schedule 15-2 Article 12.1, 12.7	D.A.	S.D.	S.I.	<p>Provide Project Co's approach and demonstration of Project Co's trackwork solutions to electrical isolation and vibration damping.</p> <ul style="list-style-type: none"> - Identify the suppliers proposed for these components and provide a general description of the components materials and installation procedures. If Project Co has not selected a specific supplier for these components, Project Co may submit information for more than one supplier or provide the performance specifications for these components and Project Co's approach to selecting the suppliers. Please note that if a specific supplier is not identified, the evaluation of the quality of the components provided by Project Co will be based on the assumption that the components will only comply with the minimum requirements. - (SD) Preliminary Directive drawings and electrical isolation performance specifications for rubber boot or similar solution for standard embedded track and special trackwork - (SD) Preliminary Directive drawings and noise and vibration performance specifications for standard ballasted and embedded trackwork - (SD) Preliminary Directive drawings and noise and vibration performance specification for each sensitive area identified in the EPR.
7	Track Construction and Maintenance Manuals and Tolerances	Schedule 15-2 Article 12.8	G.U.	D.A.	G.D.	<p>Provide Project Co's understanding and approach for Project Co's development of a WLRT Trackwork Construction and Maintenance Manual.</p> <ul style="list-style-type: none"> - (GD) Outline or example of Trackwork Construction and Maintenance Manual that will be the basis of the WLRT Track and Trackway Manual.

Requirements For Design Presentation Meeting and Proposal Submission for
SYSTEMS DESIGN

Trackwork items to be addressed in Part B3.8						The Proponent must address the Trackwork System design at an appropriate level of detail, as set out in or otherwise referenced in Article 12 of Schedule 15-2 of the Project Agreement, and shall include the following:
Sub-item	Sub-item description	Primary reference	DPM #1	DPM #2	DPM #3	Proposal Submission for Basis of Design - Trackwork
8	Standard Track Construction Types	Schedule 15-2 Article 12.9	D.A.	G.D. S.D.	S.I.	<p>Provide Project Co's approach and demonstration of Project Co's trackwork solutions to standard embedded, ballasted, Direct Fixation and Shop track.</p> <ul style="list-style-type: none"> - Approach to key design issues and features that relate to design, construction and maintenance of standard trackwork - (GD) Directive drawings indicating materials, general arrangement, and application of the standard embedded, ballasted (yard and mainline), Direct Fixation and Shop track. - (GD) Directive drawings for transition sections - (SD) Show on Project Co's plan and profile alignment drawings or a stand alone schematic/track chart showing the limits, by stationing, for each standard type of track construction (ballasted, embedded etc).
9	Standard Trackwork Components	Schedule 15-2 Article 12.10	G.A.	D.A.	S.I. (NOTE)	<p>Provide Project Co's approach and demonstration of Project Co's standard trackwork components.</p> <ul style="list-style-type: none"> - Approach to the standard trackwork components and identify specific components to be used in the design of standard trackwork including, rail, rail joining, restraining rail, emergency guard rail, rail fastening systems, cross and switch ties, embedded components, and potential sources of ballast (NOTE elastomers and isolating materials to be addressed in item 6 above)
10	Special Trackwork	Schedule 15-2 Article 12.1, 12.11	D.A.	G.D. S.D.	S.I.	<p>Provide Project Co's approach and demonstration of Project Co's special trackwork solutions.</p> <ul style="list-style-type: none"> - Approach to key design issues and features that relate to the design, construction and maintenance of special trackwork - (GD) Preliminary Directive drawings indicating materials, general arrangement and geometry of the special trackwork. - (SD) Preliminary Standard drawings depicting the basic dimensions for all types of switch points, turnout frogs and crossing frogs proposed for the project including guard rails, flangeways and frog details related to transition from the wing rail to/from the frog point including the profile of the LRT wheels and where applicable the profile of the freight railroad wheels. - (SD) Identify each installation of special trackwork and provide a general description of the installation, key features and where applicable the approach to resolve the compatibility issues where railroad and LRT interface at special trackwork locations. If Project Co has not selected a specific supplier for these components, Project Co may submit information for more than one supplier or provide the performance specifications for the special trackwork and Project Co's approach to selecting the supplier. Please note that if a specific supplier is not identified, the evaluation of the quality of the special trackwork provided by Project Co will be based on the assumption that the special trackwork will only comply with the minimum requirements.

Requirements For Design Presentation Meeting and Proposal Submission for
SYSTEMS DESIGN

Trackwork items to be addressed in Part B3.8						The Proponent must address the Trackwork System design at an appropriate level of detail, as set out in or otherwise referenced in Article 12 of Schedule 15-2 of the Project Agreement, and shall include the following:
Sub-item	Sub-item description	Primary reference	DPM #1	DPM #2	DPM #3	Proposal Submission for Basis of Design - Trackwork
11	Highway and Pedestrian Grade Crossing Materials	Schedule 15-2 Article 12.12	G.A.	D.A.	G.D. S.D.	<p>Provide Project Co's approach and demonstration of Project Co's solution for Highway and Pedestrian Grade Crossings.</p> <ul style="list-style-type: none"> - Approach to key design issues and features that relate to design, construction and maintenance of grade crossings - (SD) Identify (on a list or annotation on drawings or schematic) each grade crossing and provide a general description of the grade crossing installation. - Identify supplier proposed for grade crossings and provide a general description of the grade crossing materials and installation. If Project Co has not selected a specific supplier for grade crossing materials, Project Co may submit information for more than one supplier or provide the performance specifications for grade crossing installation and Project Co's approach to selecting the supplier. Please note that if a specific supplier is not identified, the evaluation of the quality of the grade crossing installation provided by Project Co will be based on the assumption that the grade crossing installation will only comply with the minimum requirements. - (GD) Preliminary Directive drawings indicating materials and general arrangement and geometry for each type of grade crossing installation.
12	Other Track Devices	Schedule 15-2 Article 12.13	G.A.	D.A.	S.D.	<p>Provide Project Co's approach and demonstration of Project Co's solutions for other track devices.</p> <ul style="list-style-type: none"> - Approach to key design issues and features that relate to design, construction and maintenance of other track devices - Identify the type or supplier proposed for Other Track Devices and provide a general description of the device. If Project Co has not selected a specific supplier for the specific device, Project Co may submit information for more than one device or provide the performance specifications for these devices. Please note that the evaluation of the quality of the Other Track Devices will be based on the potential that the lower quality materials may be provided. - (SD) Preliminary Directive drawings indicating materials and general arrangement of the Other Track Devices.
13	System Interfaces Affecting Track Design	Schedule 15-2 Article 12.14	G.U.	D.U.	G.A.	Provide Project Co's understanding and approach to System interfaces affecting track design.

Requirements For Design Presentation Meeting and Proposal Submission for
SYSTEMS DESIGN

Corrosion Control items to be addressed in Part B3.9						The Proponent must address the requirements for corrosion control at an appropriate level of detail, as set out in or otherwise referenced in Article 17 of Schedule 15-2 of the Project Agreement, and shall include the following:
Sub-item	Sub-item description	Primary reference	DPM #1	DPM #2	DPM #3	Proposal Submission for Corrosion Control
1	General Requirements	Schedule 15-2 Article 17.1	G.U. NOTE	D.U.	S.I.	Provide Project Co's understanding of the general requirements for controlling and mitigating corrosion from the stray currents attributable to the traction electrification system - (NOTE) corrosion control requirements due to soil and atmospheric conditions shall be addressed as part of B2
2	Purpose and Scope	Schedule 15-2 Article 17.2, 17.3	G.U.	G.A.	S.I.	Provide Project Co's understanding and approach to the corrosion control design efforts needed to achieve the design life of the LRT System components and to other non-LRT installations - Describe the program for measuring existing stray currents before commencing construction work.
3	Interfaces, Expansion, and Special Design Provisions	Schedule 15-2 Article 17.4, 17.5, 17.6, 17.8	G.U.	S.I.	S.I.	Provide Project Co's understanding of the Corrosion Control Engineer's role in the design and review of the design for the other LRT systems and design review for non-LRT installations. - Identify existing installations that will be investigated by Project Co's corrosion control engineer with respect for the need to provide mitigation measures or special monitoring in order to address potential stray current conditions. - Identify proposed installations by others that will be investigated by Project Co's corrosion control engineer with respect to providing mitigation measures or special monitoring in order to address stray current conditions.
4	Stray Current Corrosion Prevention	Schedule 15-2 Article 17.9	G.U.	D.U.	S.I.	Provide Project Co's understanding of the issues related to preventing corrosion due to stray currents. - Identify stray current issues encountered on previous projects and approach to mitigate those issues on the Stage 1 LRT Project
5	Stray Current Corrosion Prevention Systems	Schedule 15-2 Article 12.1, 17.10 & 17.17	G.A.	D.A.	S.I.	Provide Project Co's understanding and design approach for stray current prevention systems. - Describe the approaches that ensure a reliable negative return circuit and measures that isolate the negative return from earth ground - Describe the input into the design of the Traction Electrification System that the corrosion engineer will provide. - Describe the input into the design of the Trackwork Systems that the corrosion engineer will provide. - Describe the input into the design of the ITS, Communications, and Train Control Systems that the corrosion engineer will provide. - Describe the input into the design of the structural elements that the corrosion engineer will provide. - Describe the tests procedures in some detail and the acceptance limits to be used by the corrosion control engineer to accept new track construction by track type. - Describe the tests procedures in some detail and the acceptance limits to be used after revenue service by the corrosion control engineer to determine that remedial action is needed to restore electrical isolation of the track construction to an acceptable in-service level and the outline of the Corrosion Control Operation and Maintenance Manual. - Describe the input into the design for underground utilities that the corrosion engineer will provide.