

# WORLD DEMOLITION SUMMIT 2019

**Speakers Name: Simon Hebert**

Job title and company: Civils Work Manager, Delsan-AIM

Topic: Montreal Turcot Interchange Project



# MONTREAL TURCOT INTERCHANGE PROJECT

## The Challenges behind the Success



# MONTREAL TURCOT INTERCHANGE PROJECT

## Who is Delsan-AIM?



# MONTREAL TURCOT INTERCHANGE PROJECT



**Delsan AIM Environmental Services Inc. is a fully owned subsidiary of American Iron and Metal Company Inc. (A.I.M.) that was established in 1994.**

**Delsan-AIM has been a leading environmental services company that combines our decommissioning and demolition expertise with the recycling capabilities A.I.M. – an international leader in metal recycling.**

**With more than 300 employees, Delsan-A.I.M. provides turn-key decommissioning and demolition services to the Canadian market, including hazardous waste abatement, scrap metal salvage, asset recovery and environmental remediation.**

# MONTREAL TURCOT INTERCHANGE PROJECT

## What lead us to Turcot?



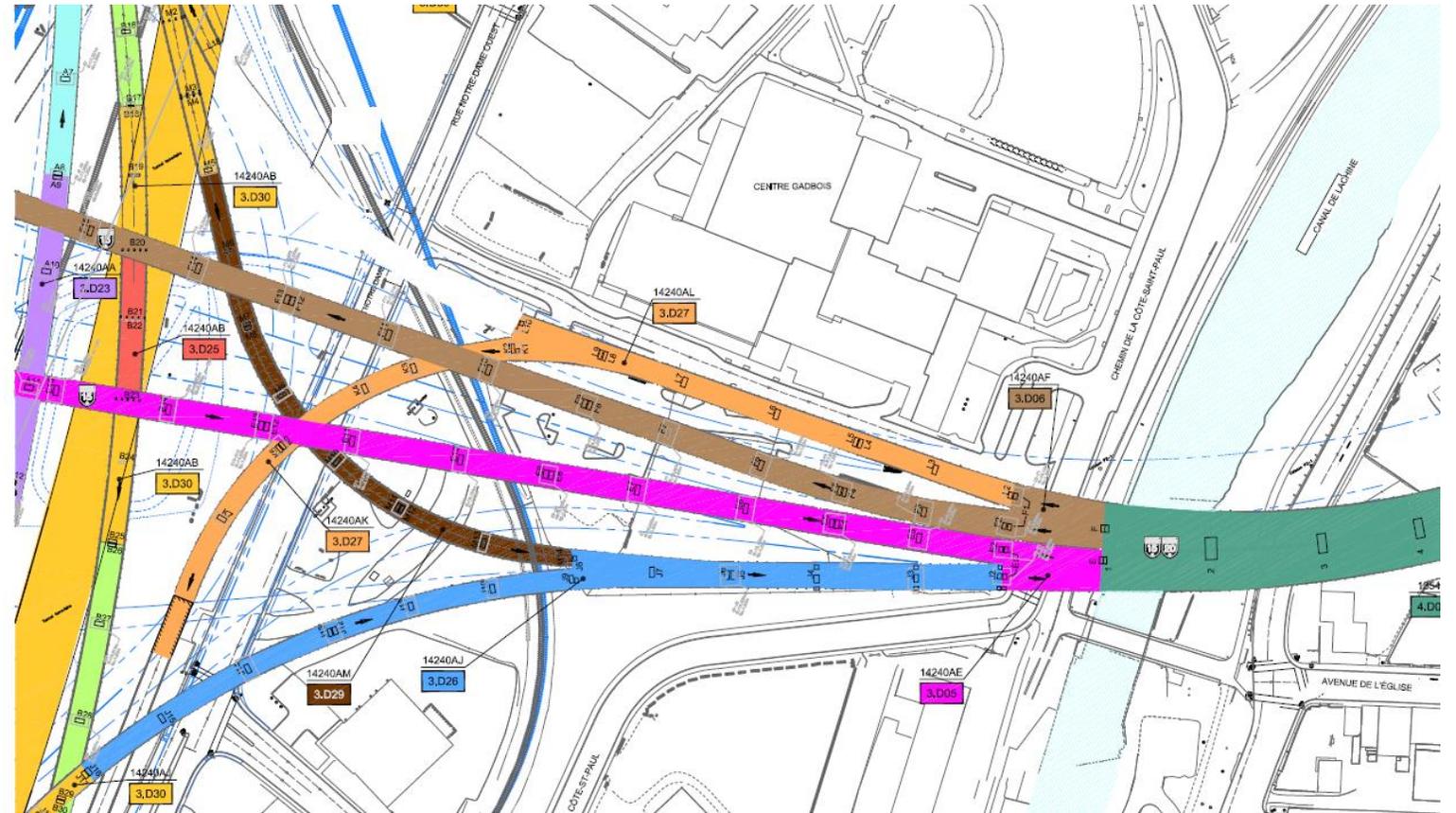
# MONTREAL TURCOT INTERCHANGE PROJECT

## **DELSAN-AIM'S CIVILS WORK DIVISION DEVELOPMENT IN THE LAST 5 YEARS**

**A PART FROM TURCOT, DELSAN PERFORMED IN:**

**MORE THAN 20 CIVIL PROJECTS AND DEMOLISHED MORE THAN 35 STRUCTURES  
(BRIDGES, OVERPASSES, HIGHWAY INTERCHANGE)**

## Project Scope & Contractual Agreement



# PROJECT SCOPE & CONTRACTUAL AGREEMENT



**Owner: M.T.Q (Ministry Transport Quebec)**

**General Contractor: Kiewit/Parsons/Holcim J.V. (KPH)**

**Total Contract value: +/- 2 Billions CAD**

**Schedule: from 2015 to 2020**

**Scope:**

- Reconstruction of the entire interchange including the complete old interchange demolition while maintaining traffic mobility

**Demolition numbers:**

**15 km of highway structure/ramps demolished**

**300,000 m3 of concrete processed and reused on site by the G.C.**

# PROJECT SCOPE & CONTRACTUAL AGREEMENT



**DELSAN**

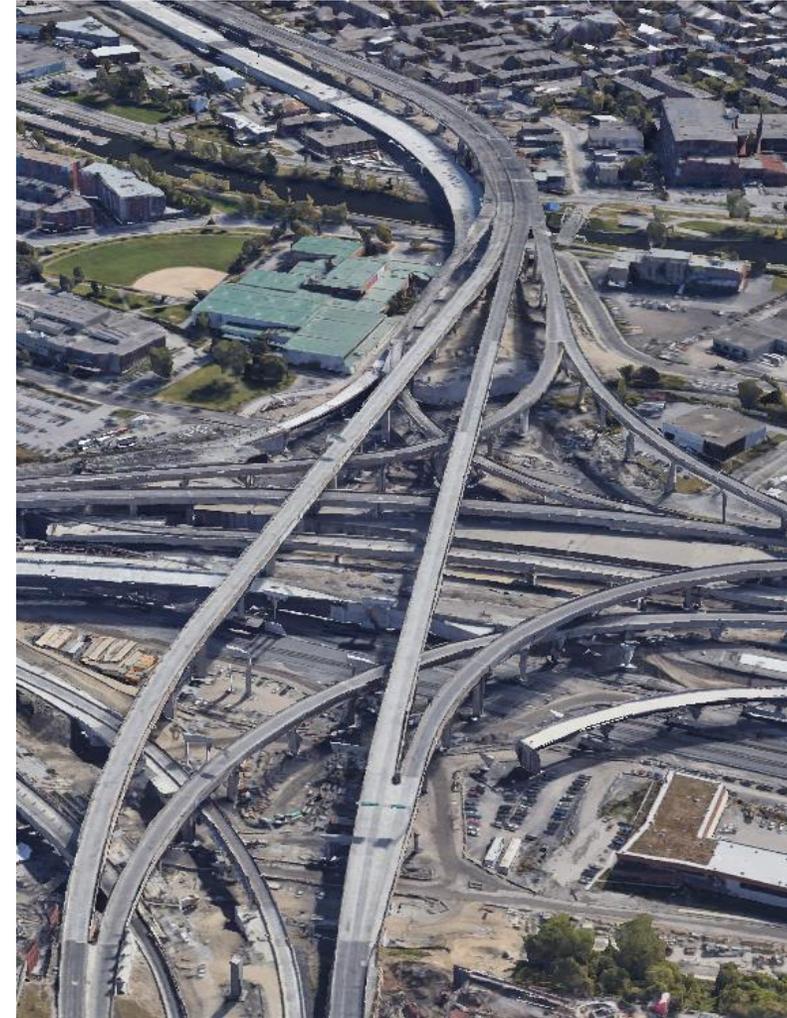
**Delsan –AIM Scope:**

**Schedule: July 2017 to May 2019**

**Contract value: 40 millions CAD**

**15 Civils infrastructures demolished:**

- **6 km of highway ramps**
- **Height from 10 m (35 ft) to 33 m (110 ft)**
- **470 m of railway Tunnel**
- **150,000 m<sup>3</sup> (50% of the entire project)**

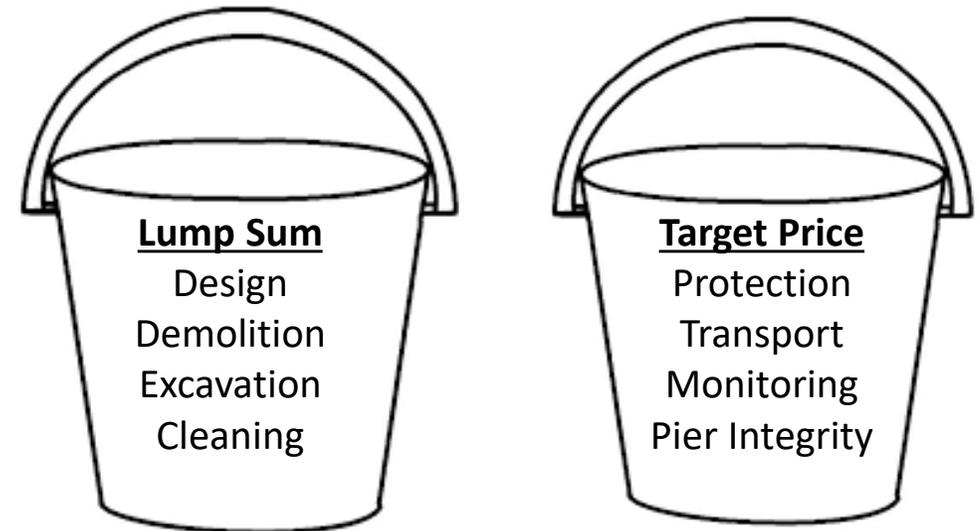


# PROJECT SCOPE & CONTRACTUAL AGREEMENT

## Contractual Agreement and Risk Sharing:

To mitigate the risk from the unknown conditions, Delsan/KPH negotiated a Two ways contract

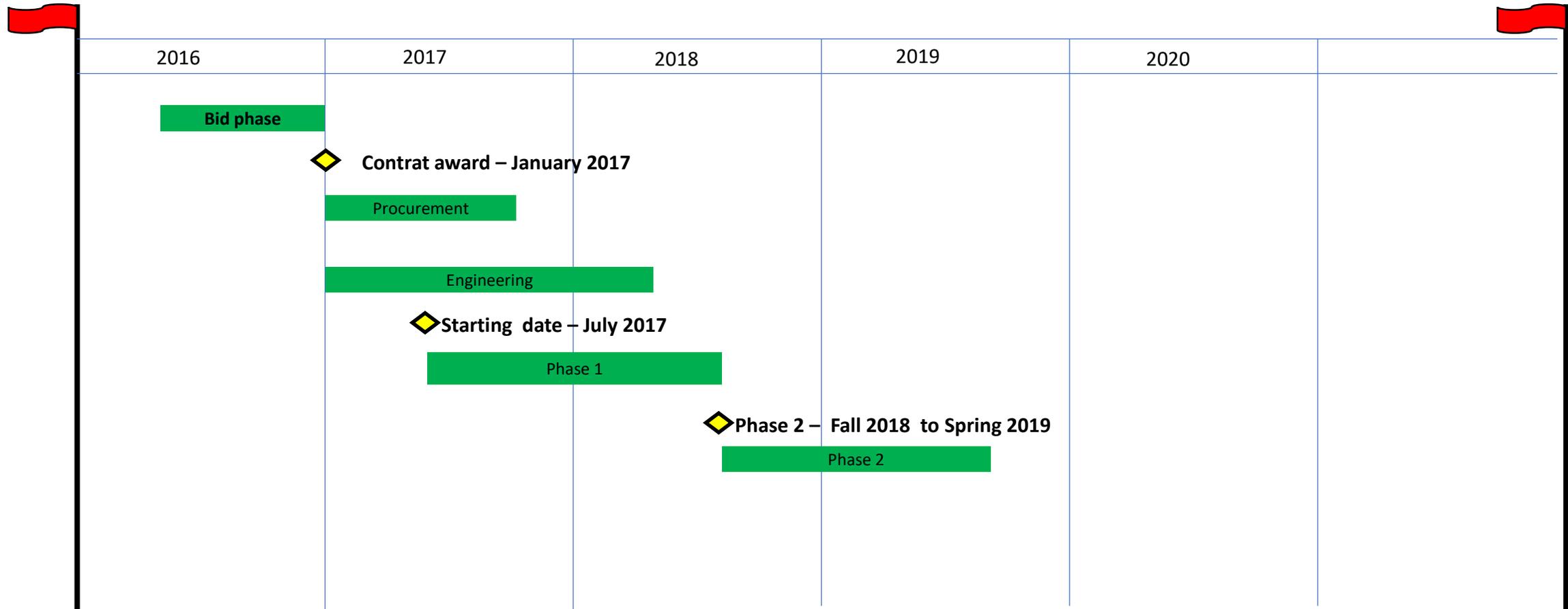
- 1) Lump Sum for known elements
- 2) Target pricing unknown elements



# PROJECT SCOPE & CONTRACTUAL AGREEMENT



## Working Schedule:



# PROJECT SCOPE & CONTRACTUAL AGREEMENT



**DELSAN**

## **Project's Resources:**

- **5 high reach excavators (70' to 120')**
- **20 standard demolition excavators (20T to 70T)**
- **Cranes of variable size**
- **12 hydraulic hammers**
- **15+ demolition attachments**
- **2 front loader**

**Maximum workforce at peak: 50 + Staff & Eng.**



# Project Challenges and Engineering Innovations

## Key Challenges:

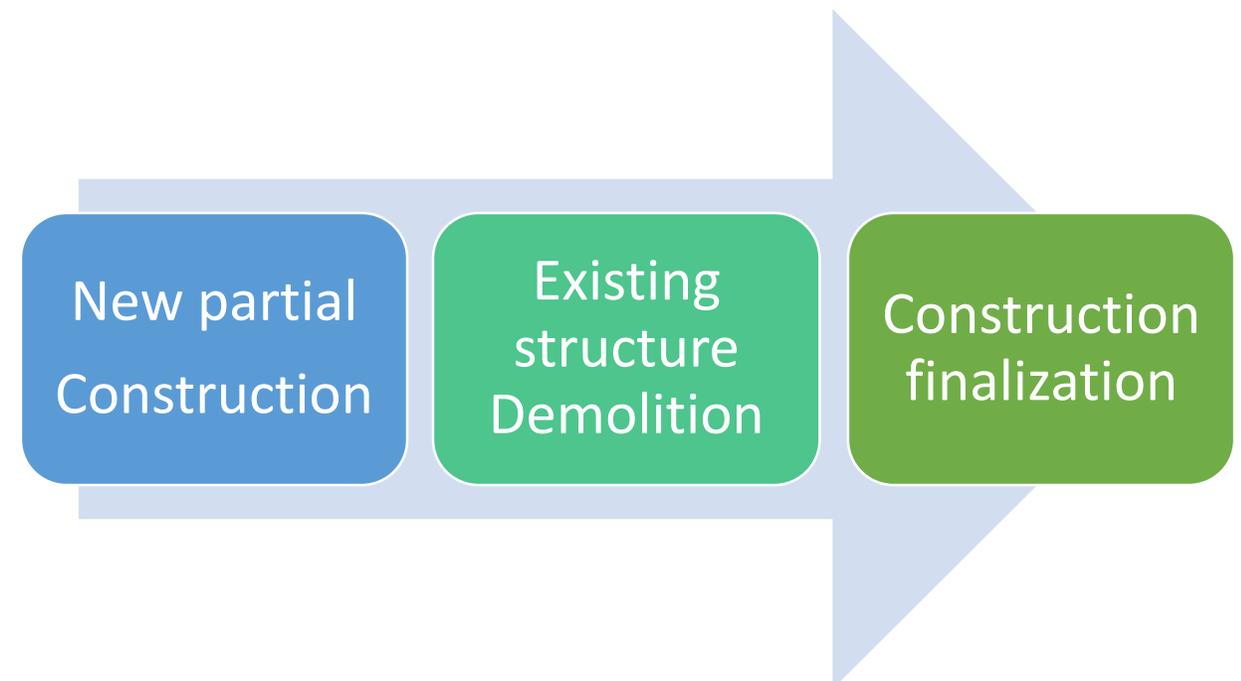
- **Dense urban environment surrounding the project**
- **Traffic Mobility and construction phasing**
- **Major construction conflict between the structure to be removed VS the new structure in construction**
- **Height of the old interchange from 10 m (35 ft) to 33 m (110 ft)**
- **Dust and environmental control**
- **Extreme winter condition**
- **Fast track schedule**

## Traffic Mobility and Construction phasing

### Challenges:

### Contractually, KPH needed to:

- **Keep the habitual level of traffic mobility in the interchange during all phase of construction**

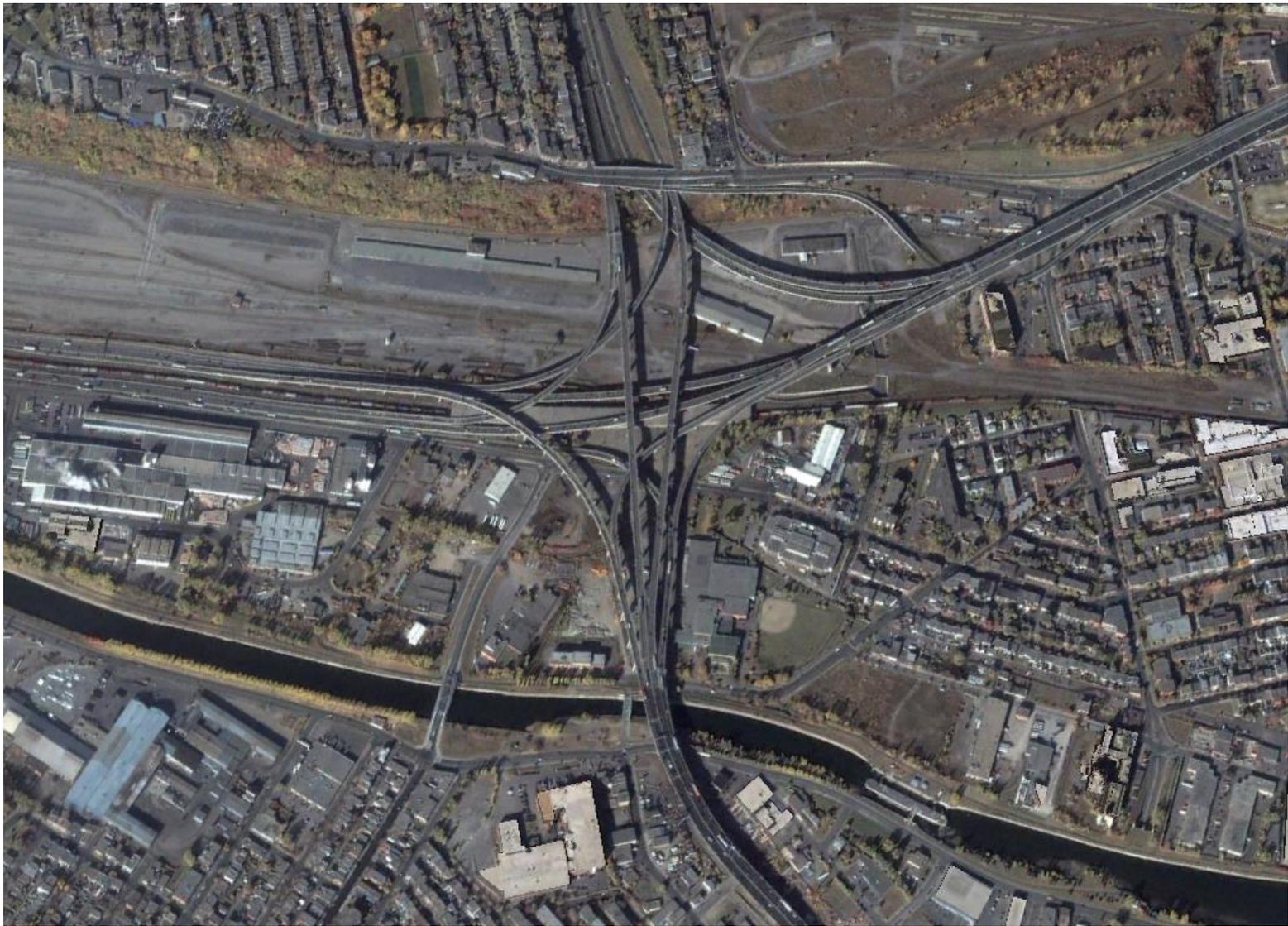


# PROJECT CHALLENGES & ENGINEERING INNOVATIONS



**DELSAN**

## INITIAL CONDITION





# PROJECT CHALLENGES & ENGINEERING INNOVATIONS



- Existing
- Prep Work
- Existing
- CN Rail
- Proposed

## **Solutions:**

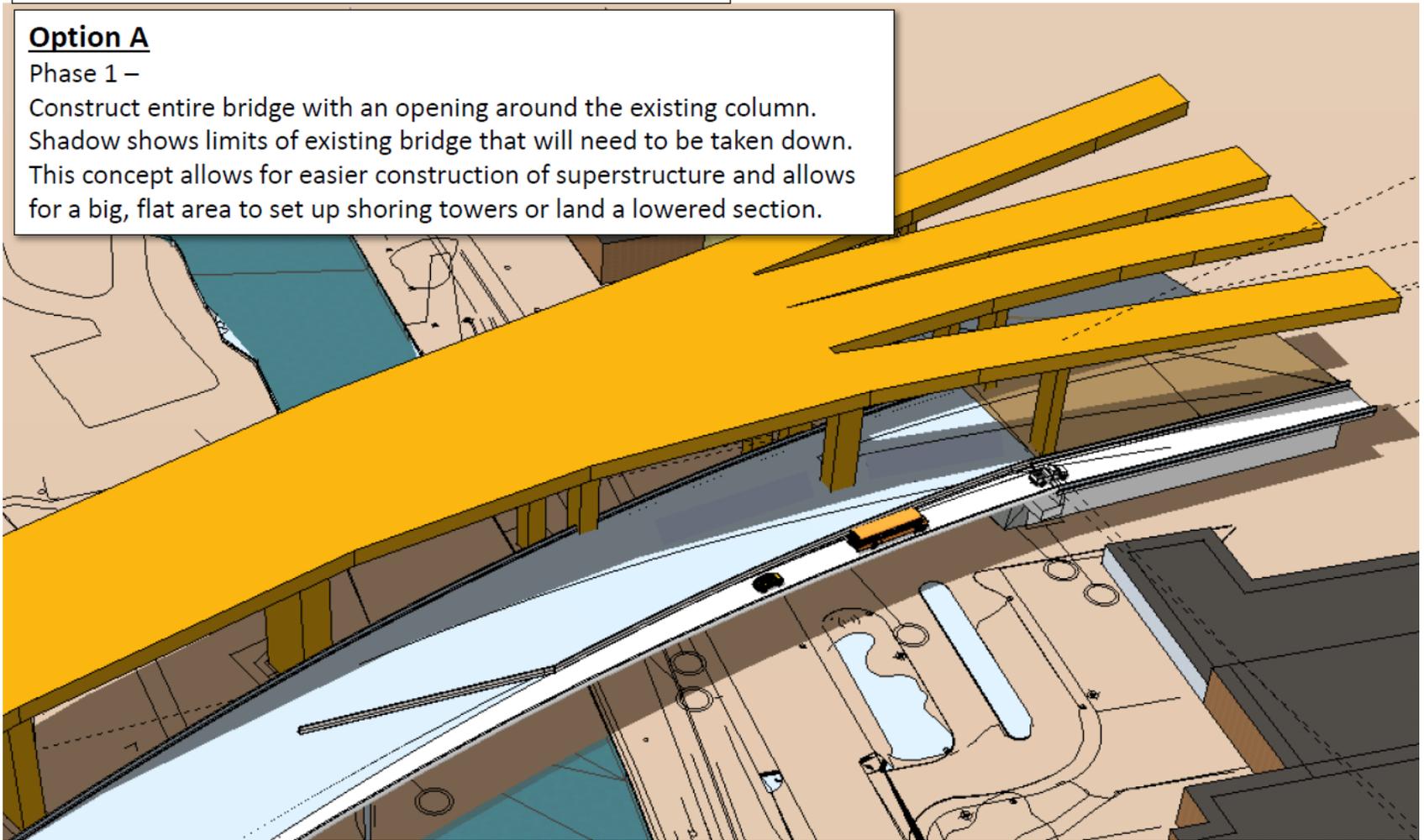
- **Staging of the work to allow partial opening of new traffic lanes**
- **Closing of the old lanes**
- **Demolition work during lanes closure at night or week end**
- **Design of custom protection devise**
- **Final Construction**

# PROJECT CHALLENGES & ENGINEERING INNOVATIONS



## Lachine Canal Bridge Phasing – Demo Concept

**Option A**  
Phase 1 –  
Construct entire bridge with an opening around the existing column.  
Shadow shows limits of existing bridge that will need to be taken down.  
This concept allows for easier construction of superstructure and allows for a big, flat area to set up shoring towers or land a lowered section.

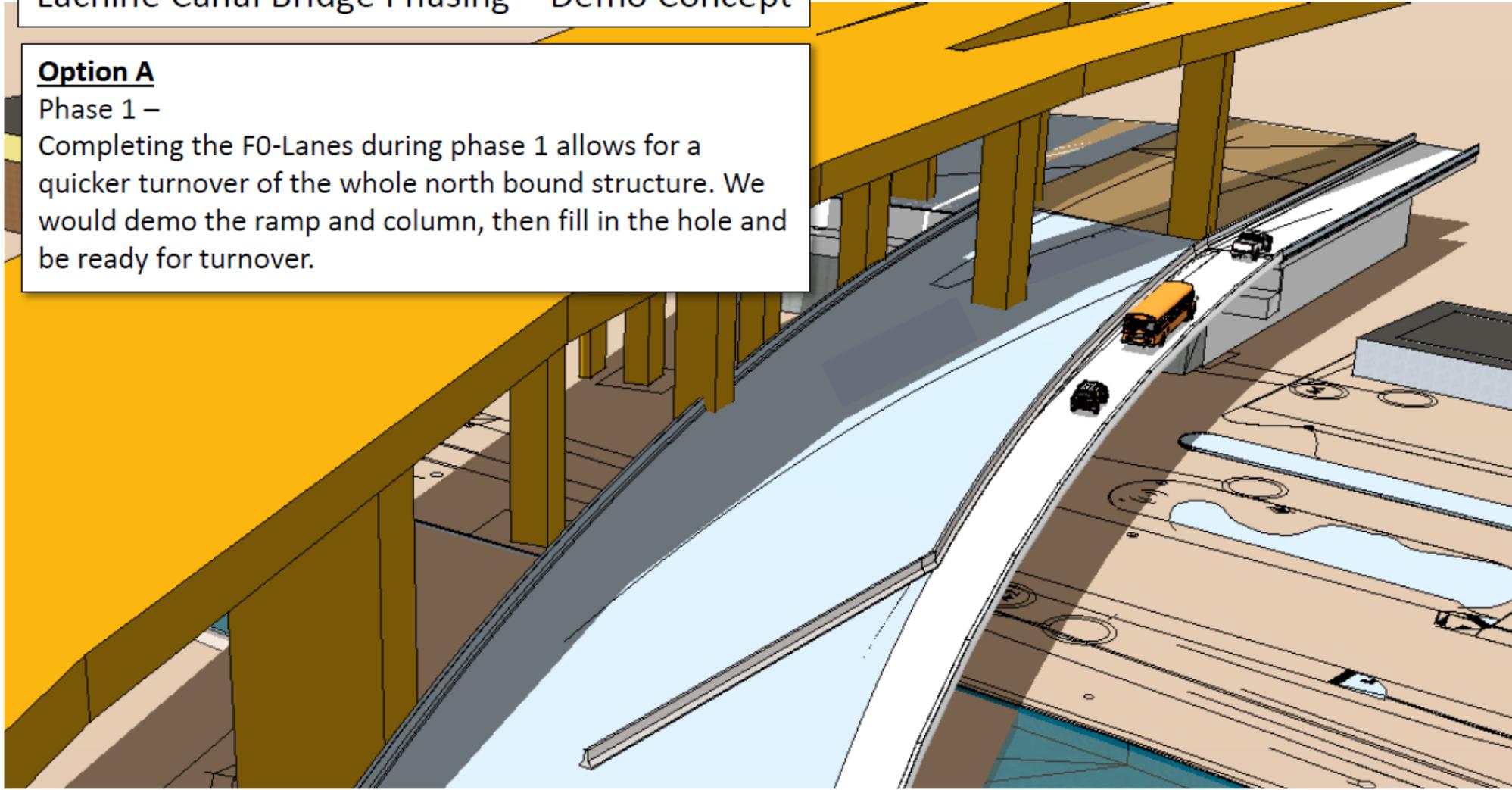


# PROJECT CHALLENGES & ENGINEERING INNOVATIONS



## Lachine Canal Bridge Phasing – Demo Concept

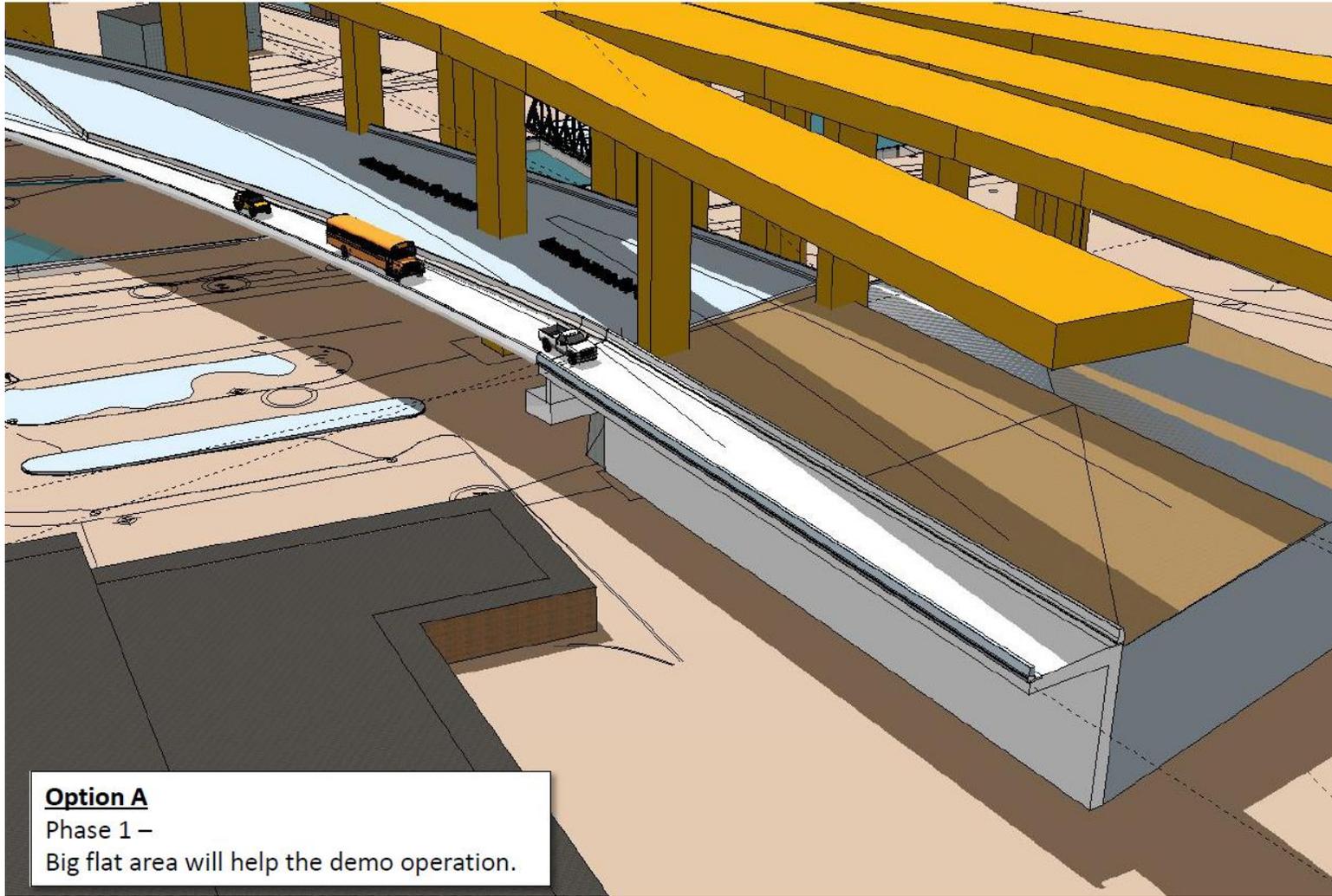
**Option A**  
Phase 1 –  
Completing the F0-Lanes during phase 1 allows for a quicker turnover of the whole north bound structure. We would demo the ramp and column, then fill in the hole and be ready for turnover.



# PROJECT CHALLENGES & ENGINEERING INNOVATIONS



Lachine Canal Bridge Phasing – Demo Concept



**Option A**  
Phase 1 –  
Big flat area will help the demo operation.

## **Old Structure stability and new/existing structure integrity:**

### **Challenges:**

- **Ensure the new infrastructure integrity**
- **Ensure the structural stability during the demolition process**
- **Protect the existing elements in the vicinity of the work**
- **Major time constraints related to the Traffic Mobility requirement**
- **Demolition work over live railroad and water navigation channel**

**Existing Structure stability and new structure integrity:**

**[Photo Album 1.pptx](#)**

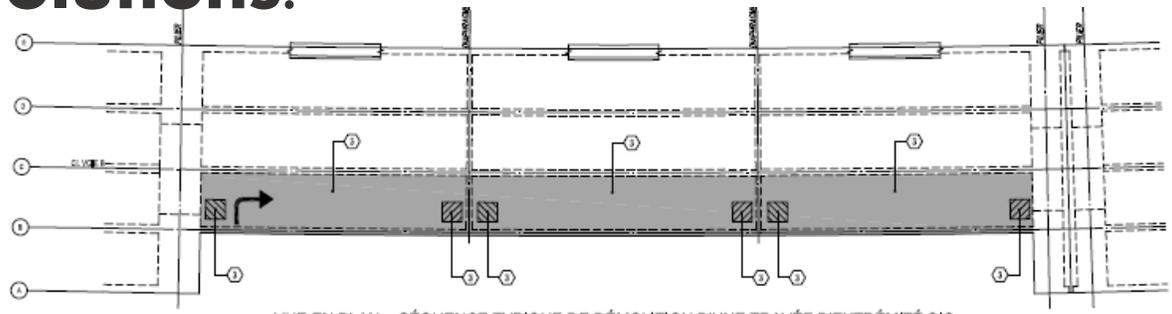
**Existing Structure stability and new structure integrity:**

**Solutions:**

- **Engineered sequence of work**
- **Custom made protection and protection equipment**
- **Modular Pier stabilization system**
- **Modular Overhead steel support beam**

## Existing Structure stability and new structure integrity:

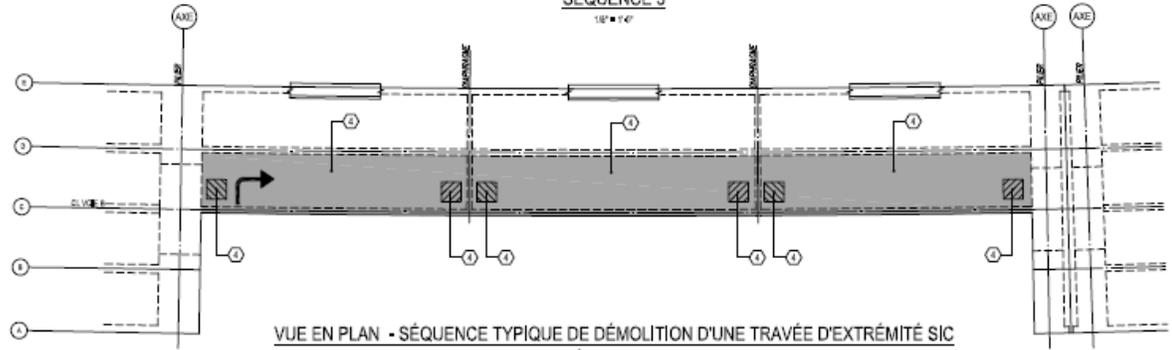
### Solutions:



VUE EN PLAN - SÉQUENCE TYPIQUE DE DÉMOLITION D'UNE TRAVÉE D'EXTRÉMITÉ SIC

SÉQUENCE 3

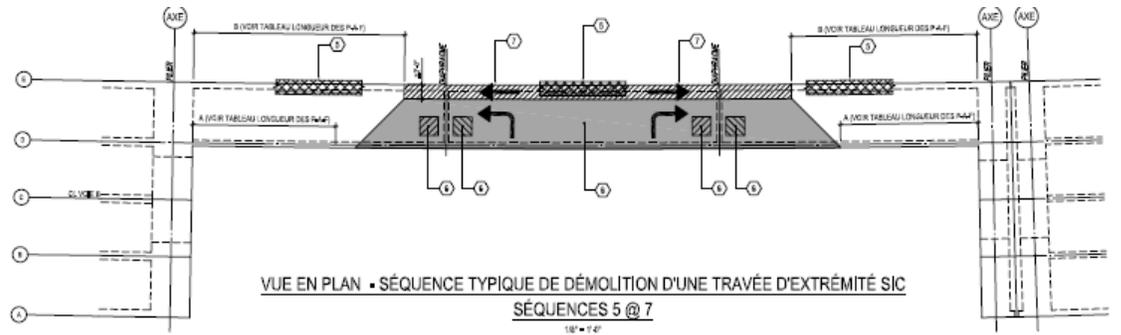
1/8" = 1" 4"



VUE EN PLAN - SÉQUENCE TYPIQUE DE DÉMOLITION D'UNE TRAVÉE D'EXTRÉMITÉ SIC

SÉQUENCE 4

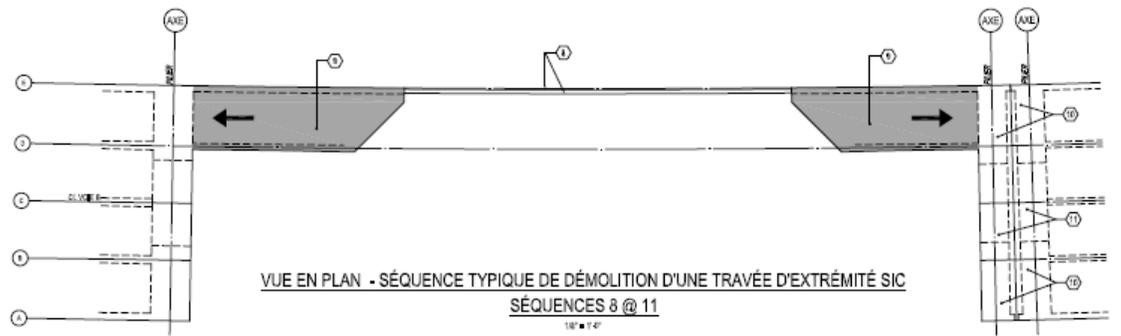
1/8" = 1" 4"



VUE EN PLAN - SÉQUENCE TYPIQUE DE DÉMOLITION D'UNE TRAVÉE D'EXTRÉMITÉ SIC

SÉQUENCES 5 @ 7

1/8" = 1" 4"



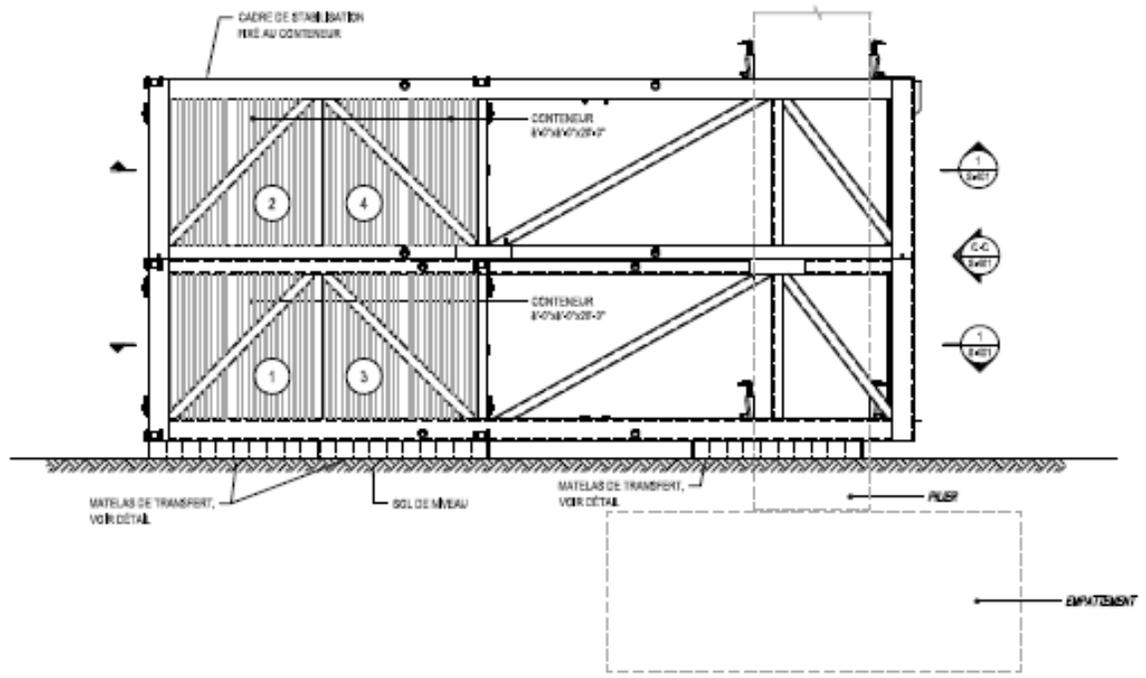
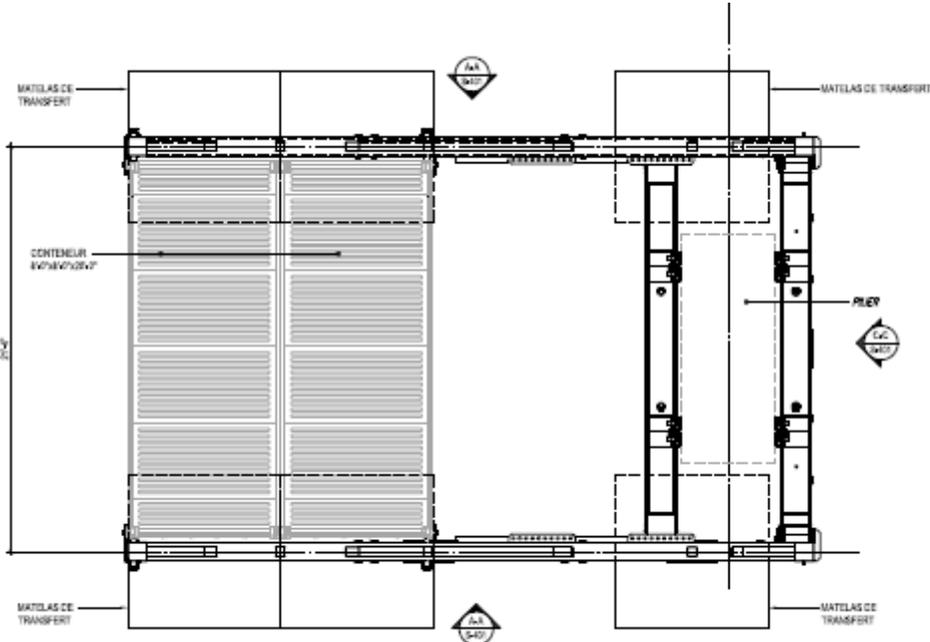
VUE EN PLAN - SÉQUENCE TYPIQUE DE DÉMOLITION D'UNE TRAVÉE D'EXTRÉMITÉ SIC

SÉQUENCES 8 @ 11

1/8" = 1" 4"

## Existing Structure stability and new structure integrity:

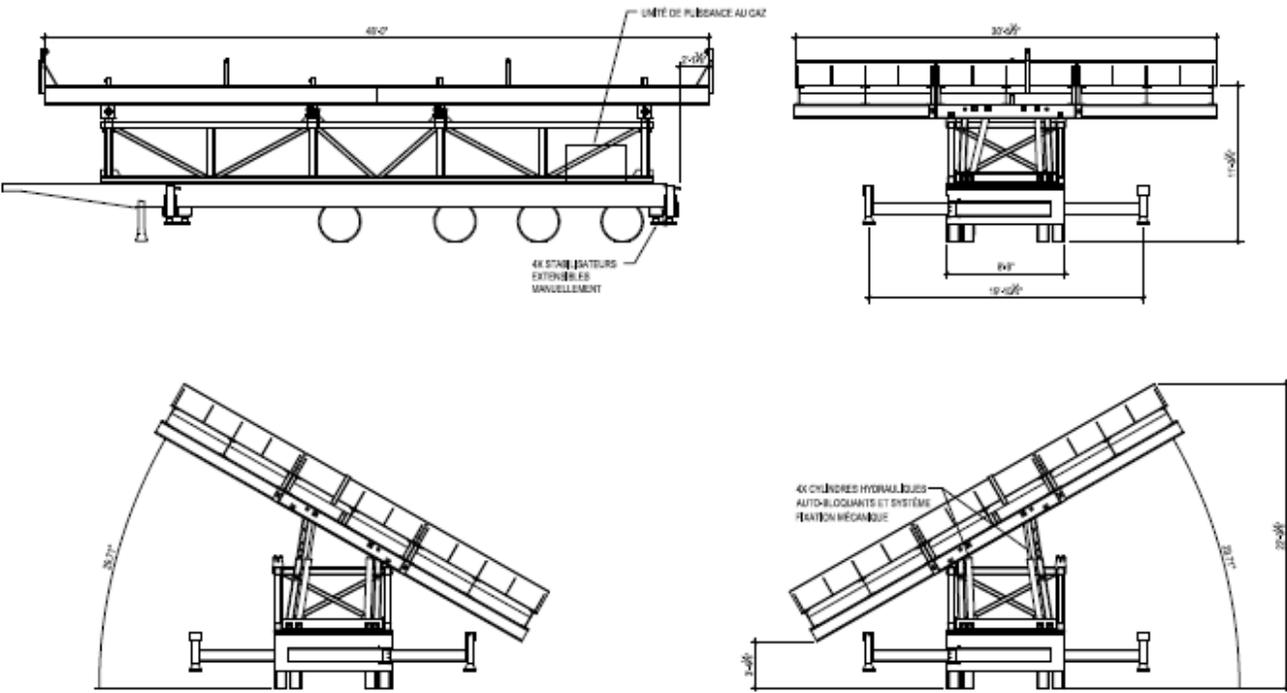
### Solutions:



# PROJECT CHALLENGES & ENGINEERING INNOVATIONS

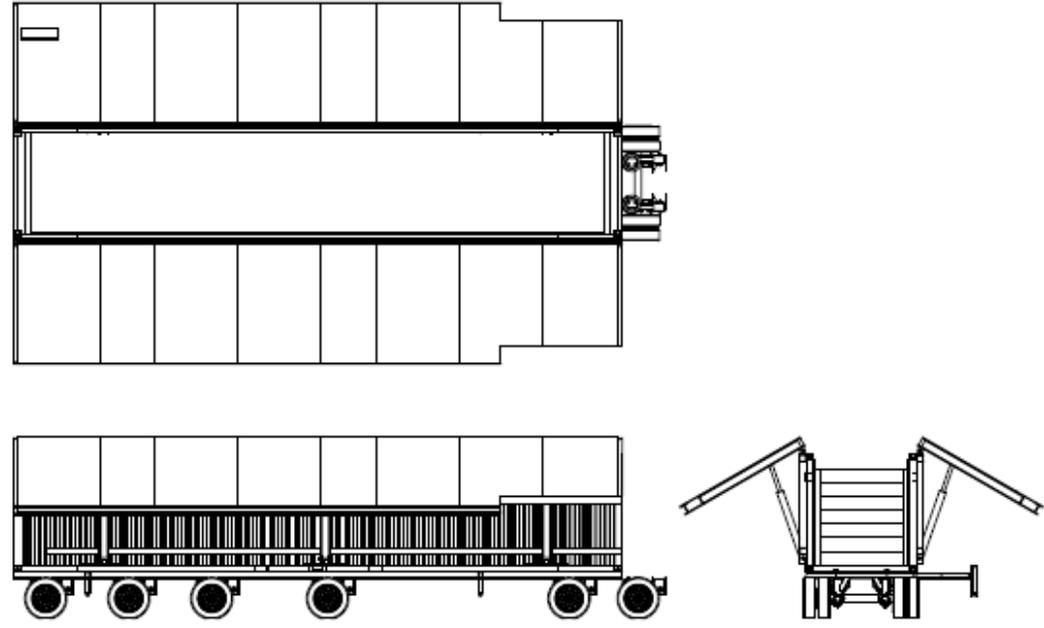


## Existing Structure stability and new structure integrity:



POUR DÉTAILS VOIR DESSEINS DE CONSULTANTS F, DRAPIEU

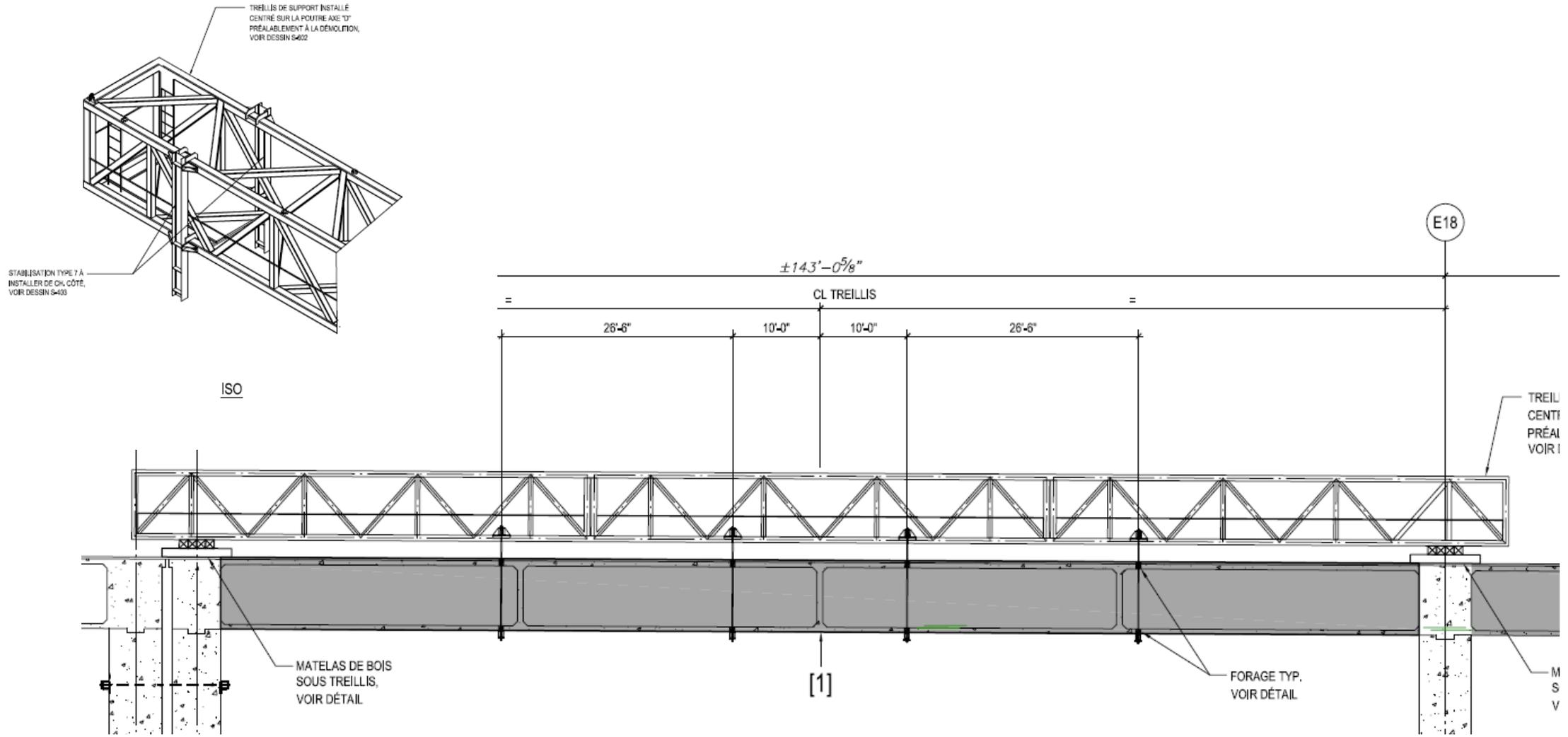
DÉTAIL TYPIQUE - PARE-PIERRE



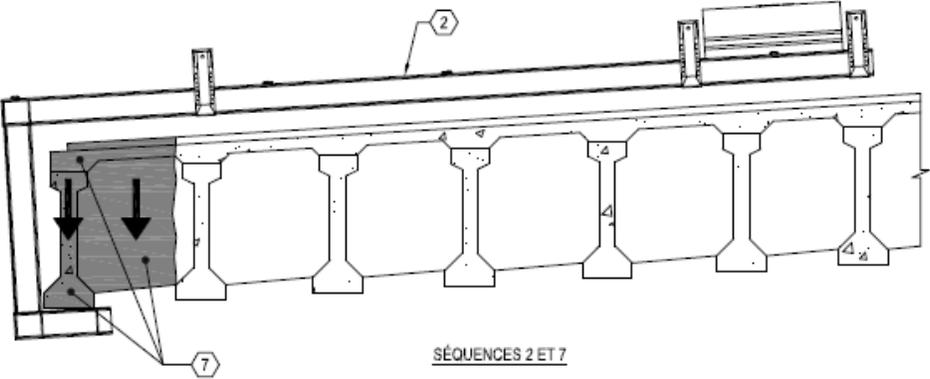
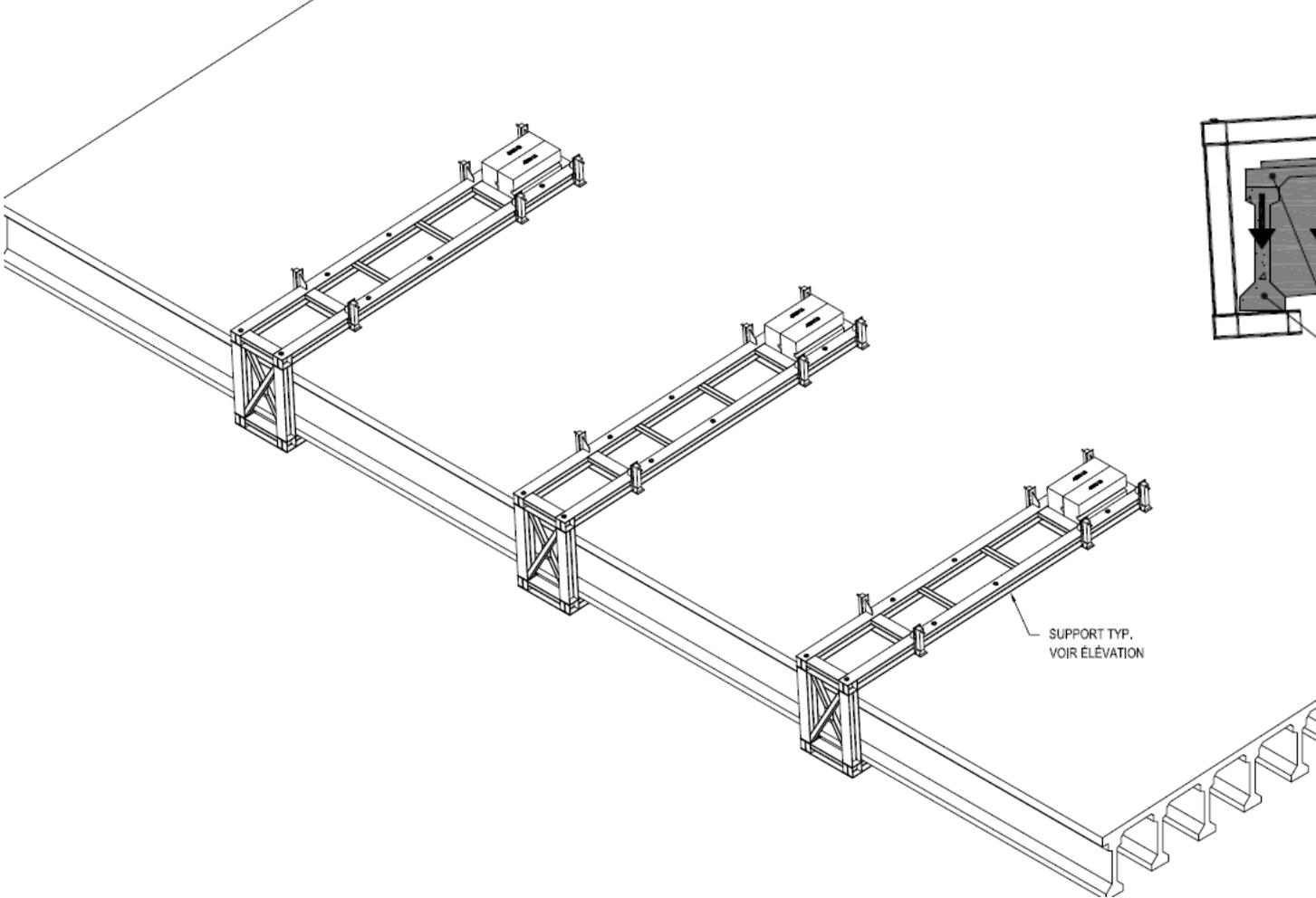
POUR DÉTAILS VOIR DESSEINS DE CONSULTANTS F, DRAPIEU

DÉTAIL TYPIQUE - CHAUDRONNE

# PROJECT CHALLENGES & ENGINEERING INNOVATIONS

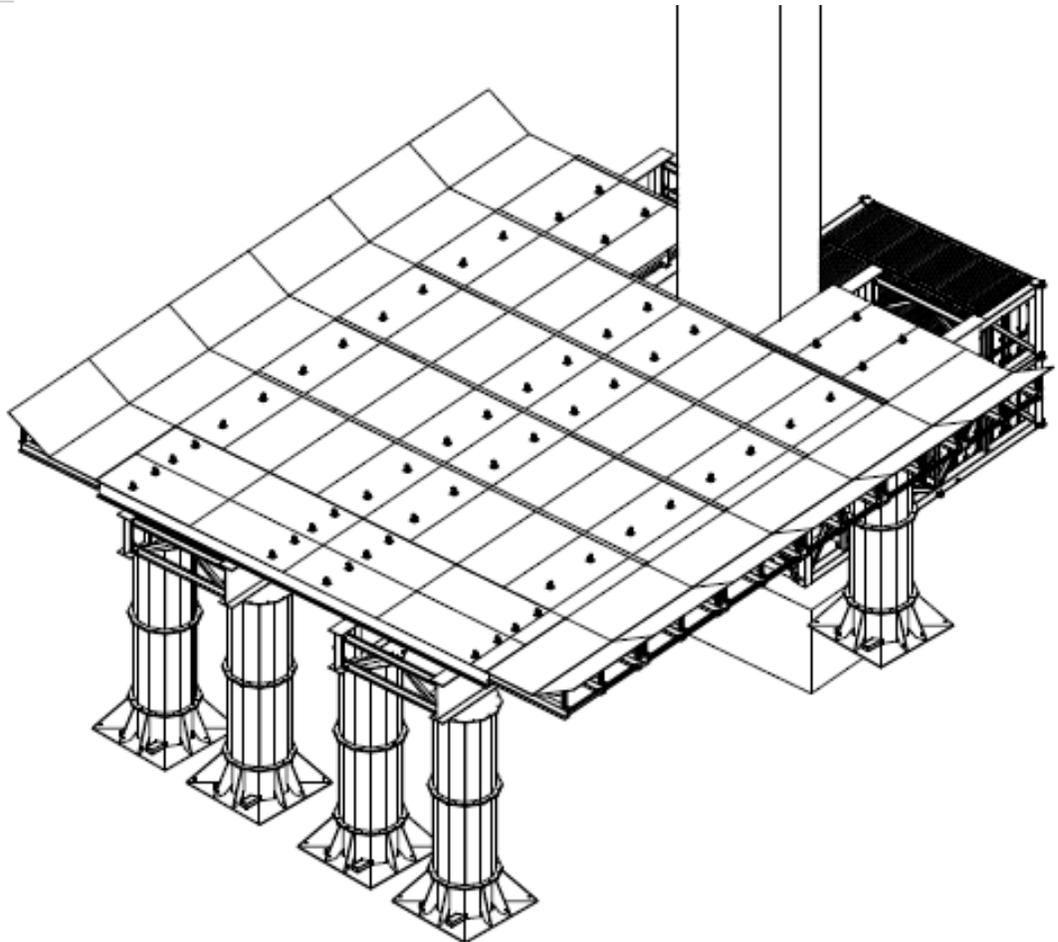
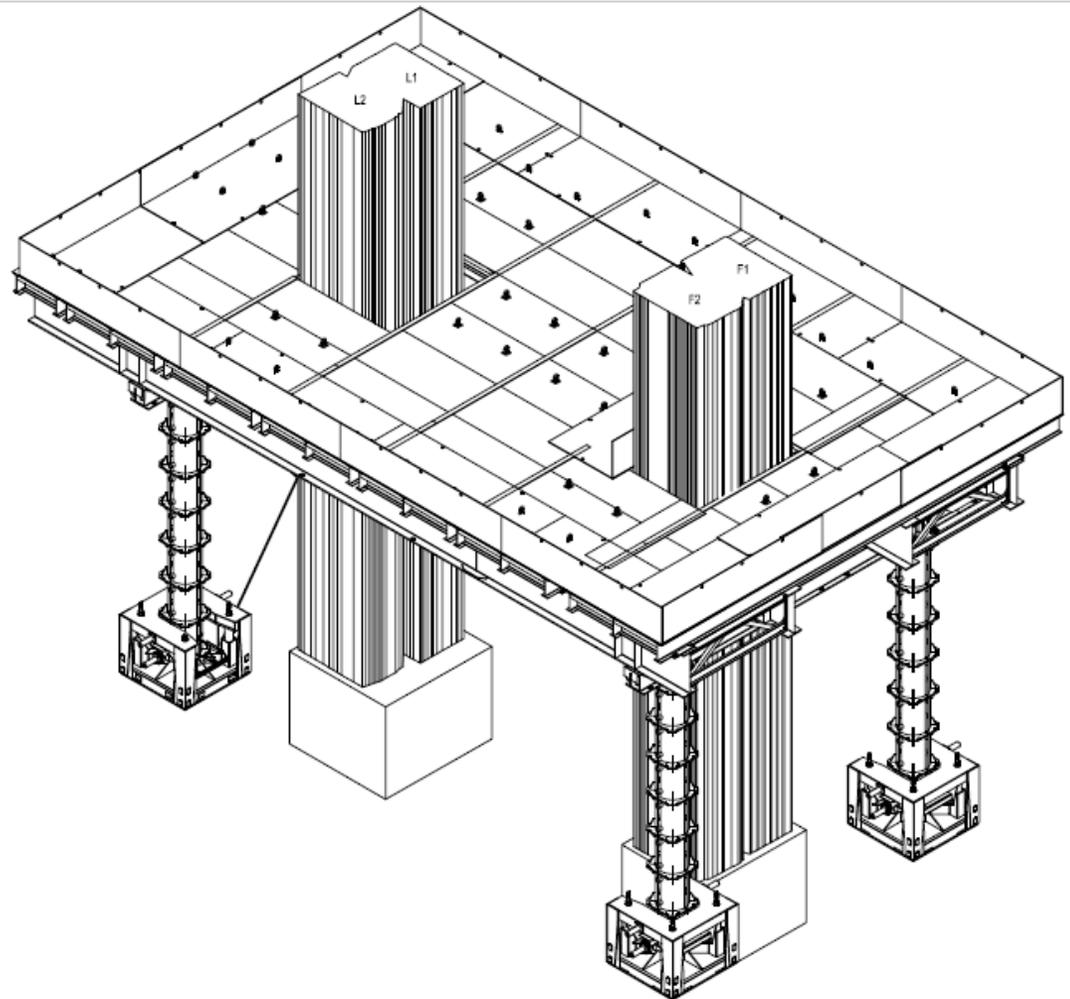


# PROJECT CHALLENGES & ENGINEERING INNOVATIONS

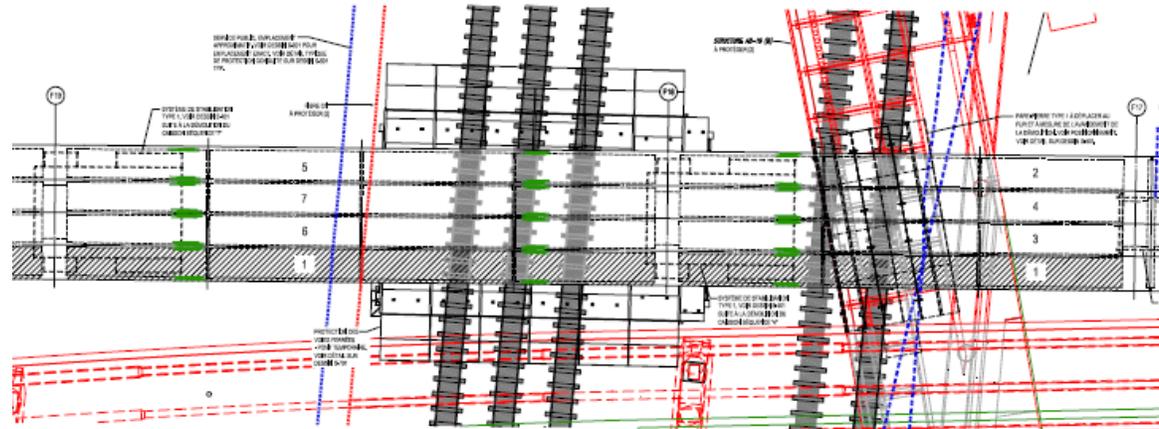


SÉQUENCES 2 ET 7  
COUPE 1

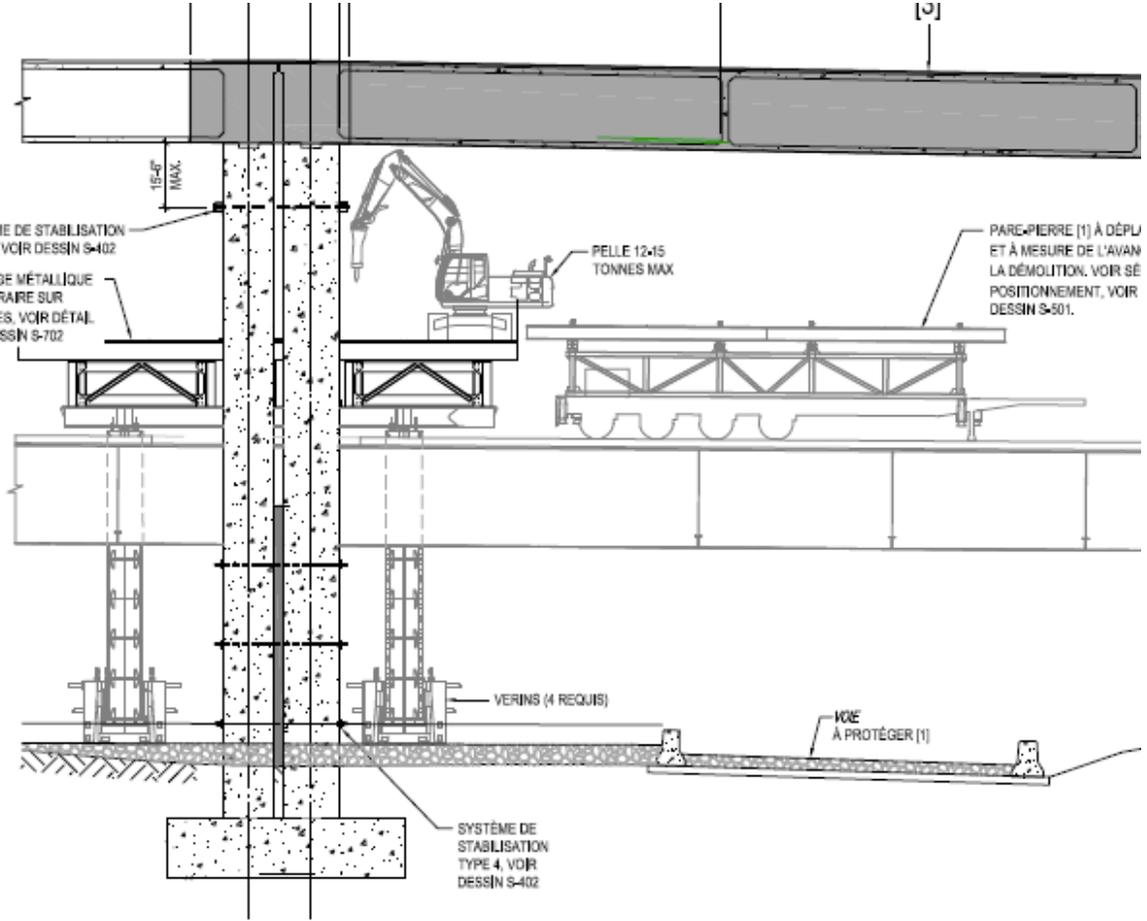
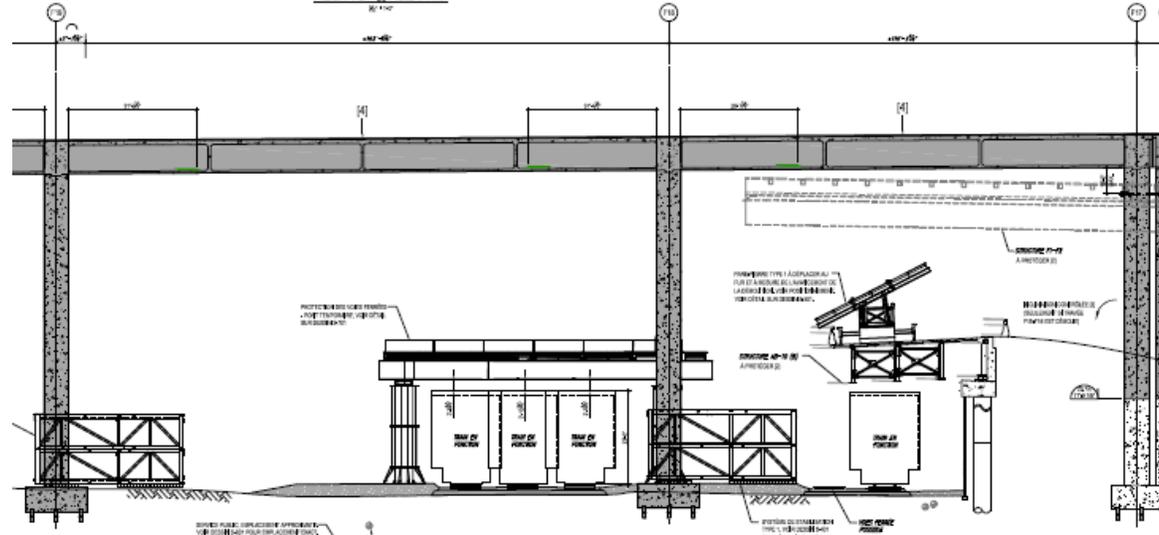
# PROJECT CHALLENGES & ENGINEERING INNOVATIONS



# PROJECT CHALLENGES & ENGINEERING INNOVATIONS



VUE EN PLAN - CONDITION EXISTANTE VOIE 7<sup>ME</sup>  
FILIERE T21<sup>ME</sup> & FILIERE F16





## [Photo Album 2.pptx](#)

## Unknown and Change Management:

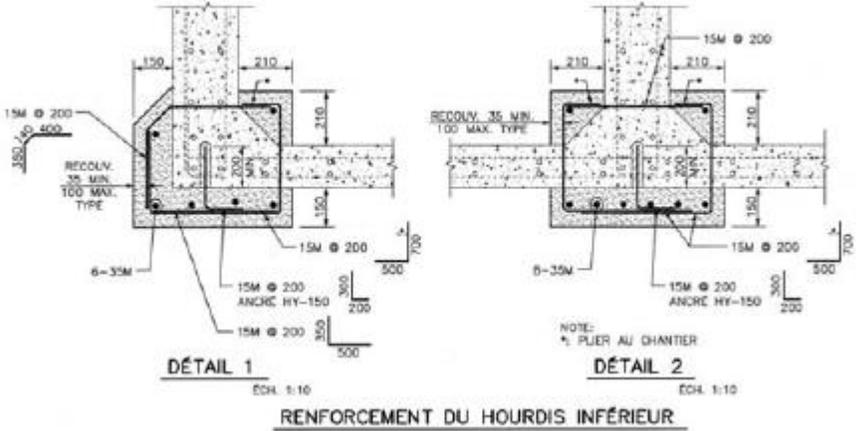
### Challenges:

- **Unknown site condition during the bidding process**
- **Multiple modification/repairs on the existing structure**

# PROJECT CHALLENGES & ENGINEERING INNOVATIONS



## Unknown and Change Management:



## **Unknown and Change Management:**

## **Solutions:**

- **Development of Target pricing with the G.C.**
- **Survey of the repair inside the box girder**
- **Engineered new sequence of demolition**

## Unknown and Change Management:

### Solutions:

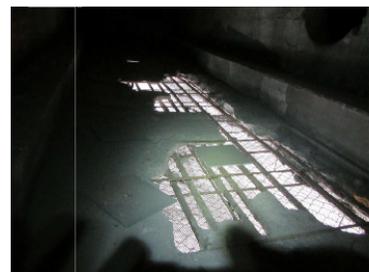
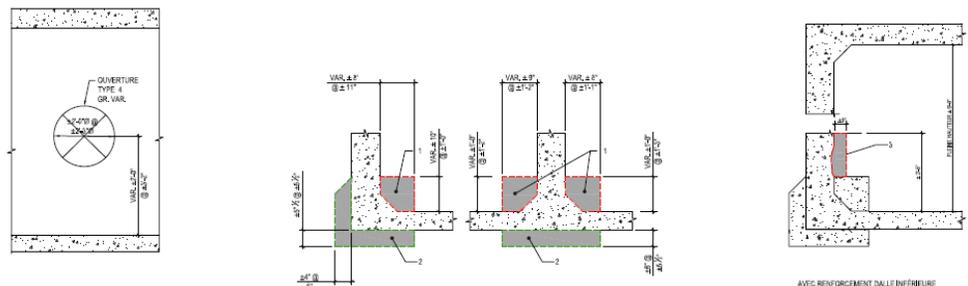
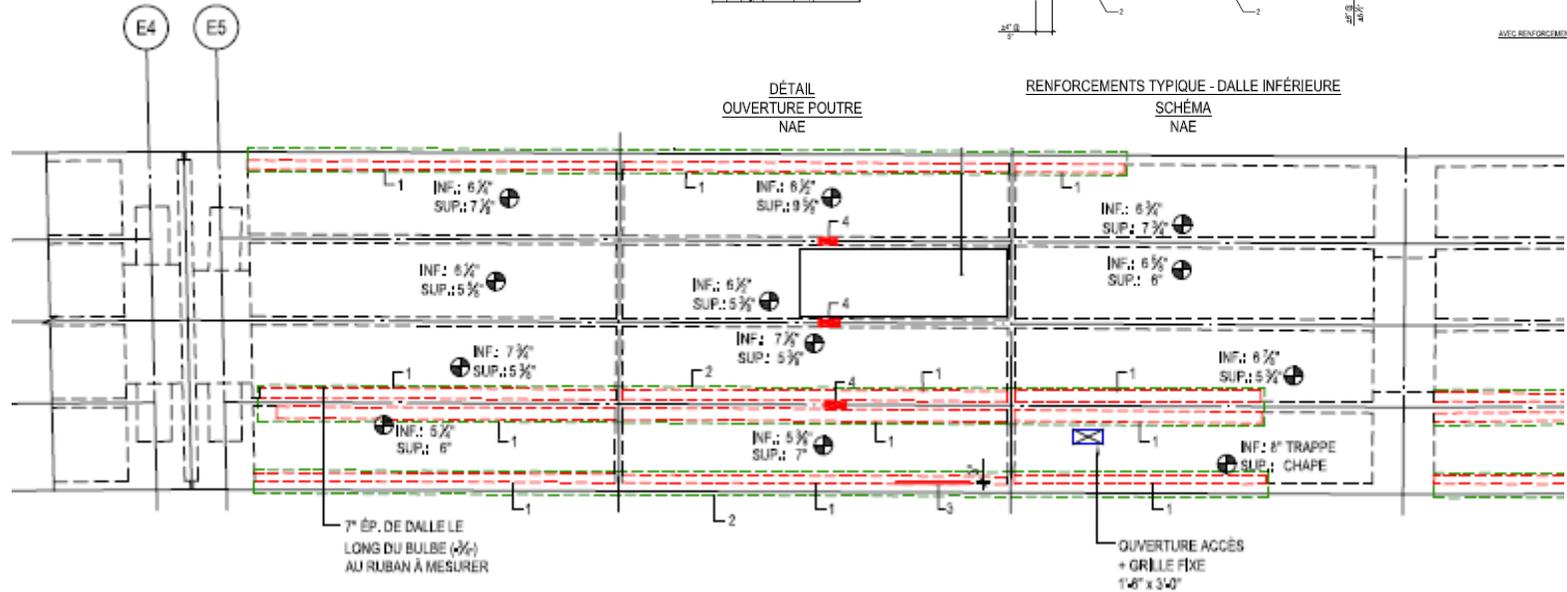


PHOTO A-A



## **Stakeholder and Community Management:**

### **Challenges:**

- **Proximity with the Community**
- **Multiple Stakeholder**



## **Stakeholder and Community Management:**

### **Solutions:**

- **Neighborhoods comity and 'Table Ronde'**
- **Communication effort in collaboration with the Owner**
- **Mitigation measure locally**



## **Health & Safety and Environmental Management:**

### **Challenges:**

- **Work at height**
- **Dust Control**
- **Debris Projection**
- **Extreme winter condition**
- **Noise**
- **Proximity with the Community**



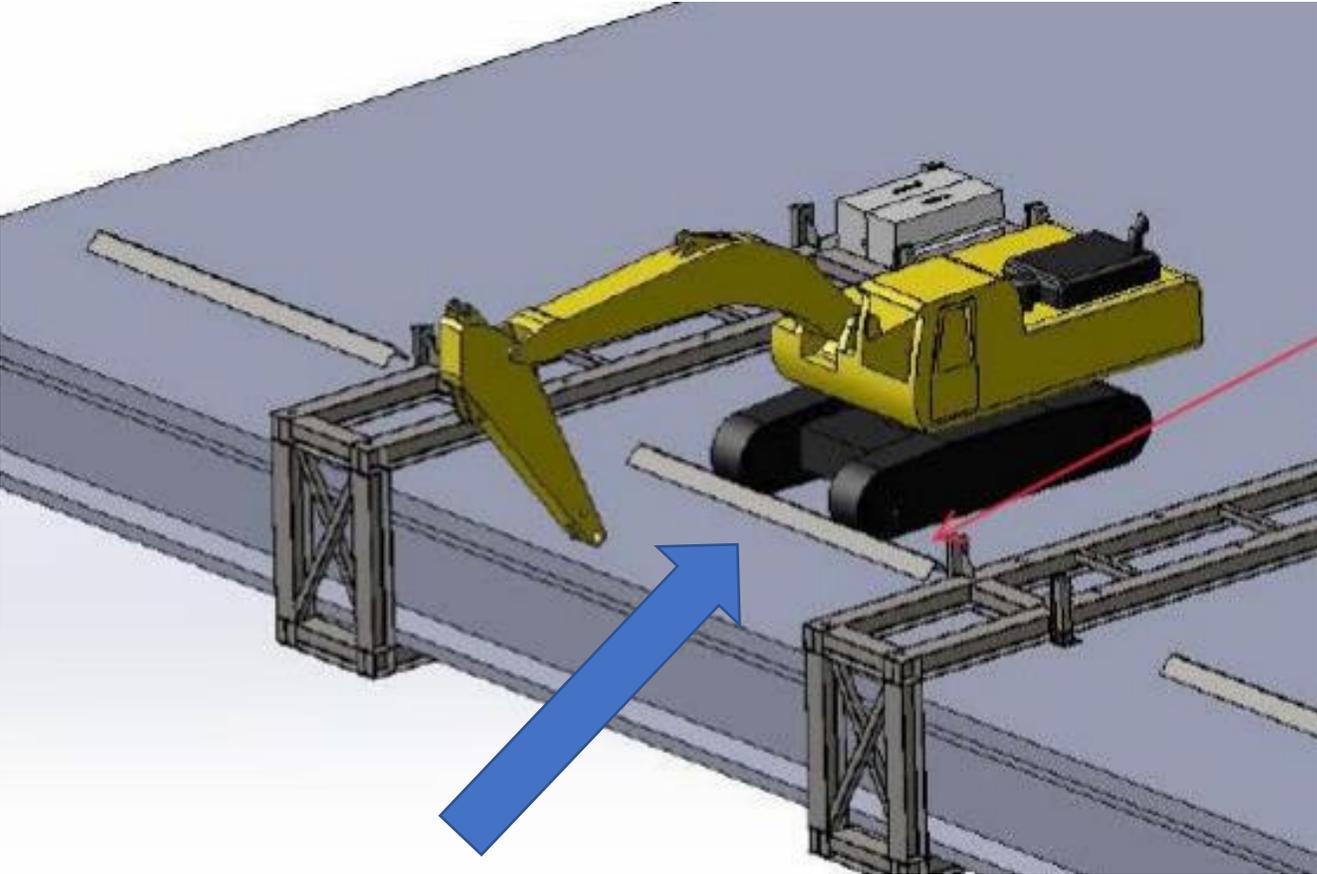
## **Health & Safety and Environmental Management:**

### **Solutions:**

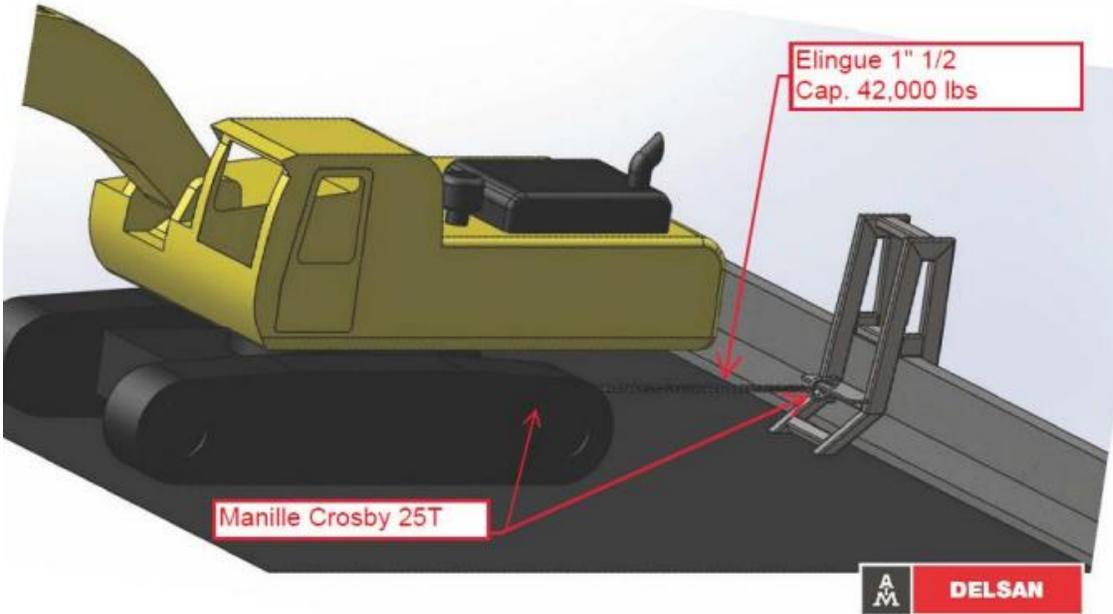
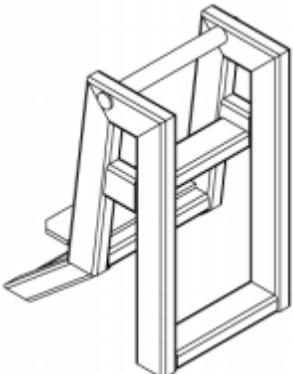
- **Development of fall protection for demolition equipment**
- **Development of alternative Dust Control measure and control plan**
- **Development of multiple screen for debris projection**
- **Mitigation measure and technique to deal with the winter condition**
- **Temporary Noise Wall**

## Health & Safety and Environmental Management:

## Solutions:



## Health & Safety and Environmental Management:



## Health & Safety and Environmental Management:

### Solutions:



# PROJECT CHALLENGES & ENGINEERING INNOVATIONS



## Health & Safety and Environmental Management:



## Health & Safety and Environmental Management:

### Dust control plan implementation

**PLAN DE CONTRÔLE DES POUSSIÈRES CADRE (PCPC)**

**DELSAN**

Date complétée: 21 février 2019  
 Maître d'oeuvre: MTQ (KPH Turcot)  
 Chargé de projet: Simon Hébert      Contact:  
 Projet: KPH Turcot      Adresse: Turcot  
 Contremaître au chantier: Christian Sauriol, Marc Frappier, Stéphan Desjardins, Carl Desjardins et Charles Thivierge  
 Travailleur(s):

Objetif : maximiser le contrôle des émissions de poussières.  
 Travaux: Travée 4D.08 axe 1 à 4  
 Début des travaux: 22 au 25 février 2019      Durée:  Jours  Mois  Année

Sous-traitant:  
 Travailleur(s) responsable(s)

IDENTIFICATION DES DANGERS (autres que la silice)	MESURES(S) DE CONTRÔLES
<input type="checkbox"/> Chute en hauteur	N/A
<input checked="" type="checkbox"/> Chute de même niveau	Garder les voies de circulations dégagées, abraisés au sol.
<input checked="" type="checkbox"/> Silice	Arrosage et protection respiratoire au besoin
<input checked="" type="checkbox"/> Risque de travaux superposés	Périmètre d'exclusion
<input checked="" type="checkbox"/> Interfaça homme/machine (ligne de tire)	La zone active de démolition sera restreinte à la machinerie et communication radio
<input checked="" type="checkbox"/> Strut	Porter des bouchons auditifs à pied d'oeuvre près des zones en opération.
<input checked="" type="checkbox"/> Electrique	Energie zéro sur la structure (voir lettre de KPH)

Quelle est la pire chose qui pourrait arriver ? Chute de débris sur travailleurs, écrasement d'un travailleur par machine.  
 Quelle la blessure la plus susceptible de survenir ? chute de même niveau, coincement de membres.

Travailleur(s) sont informés sur la bonne utilisation de :

Silice	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Contrôles administratifs	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Contrôles ingénierie (ex: canon "Dust buster")	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> EPI	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Evacuation des débris	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Protection contre les chutes	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

Protection respiratoire  
 Requis:     si requis      Disponible:          Fil-filtre:

EPI requis pour les travaux (autre que la protection respiratoire)  
 Survêtement     Gants     Bottes d'eau avec protection     Protection oculaire     Veste réfléchissante     Protection auditive  
 Documents à annexer ( si applicable)  
 Procédure Ing     Programme de protection respiratoire     Preuve de formation     AST applicables  
 Nom/Signature      Position: directeur de projet      Date: 22 février 2019

Commentaires : **Seulement des rafales importantes d'une vitesse de 57 km/h sont à prévoir pour dimanche dans la journée. Pour le reste les vents changeront de direction au cours de la fin de semaine mais sans trop de vitesse.**

**PLAN DE CONTRÔLE DES POUSSIÈRES CADRE (PCPC)**

**DELSAN**

CHECKLIST INSPECTION (Préparatoire)

Contrôle ingénierie	
Canon à l'eau (DustBuster) 3	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Arrosage manuelle	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Buses sur pelles	<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Filtet	<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Points d'eau suffisants pour fournir la demande (une borne sur Eddie)	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Contrôle administratif	
Affichage du danger	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
A.S.T.	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Permis de travail sécuritaire	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Procédure de démolition	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Permis bornes fontaines	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Formulaire de contrôle des poussières quotidien	
Mesures d'hygiène	
Station de lavage main/visage	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Aspirateur HEPA pour vêtement	<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Toilette	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

TABLEAU 1 (Matrice de mesures préventives pour les tâches/risques)

Contrôle ingénierie		Contrôle administratif		EPI	
1 Ventilateur / air négatif	1 Arrosage	1	1	1	1 Protection respiratoire
2 Canon à eau et/ou buses	2 Travaux de soir ou nuit	2	2	2	2 Gants
3 Arrosage manuelle	3 Pelles	3	3	3	3 Survêtement
4 Confinement totale	4 AST	4	4	4	4 Protection auditive
5 Confinement complet	5 Permis sécuritaires	5	5	5	5 Protection des yeux
6 Aspirateur à la source	6 Procédure	6	6	6	6 Veste réfléchissante
7 Filtet		7	7	7	7 Boîte de caoutchouc (CSA)
		8	8	8	8 Protection contre les chutes
		9	9	9	9 Lunettes arrêtées

## Health & Safety and Environmental Management:

### Dust control plan implementation

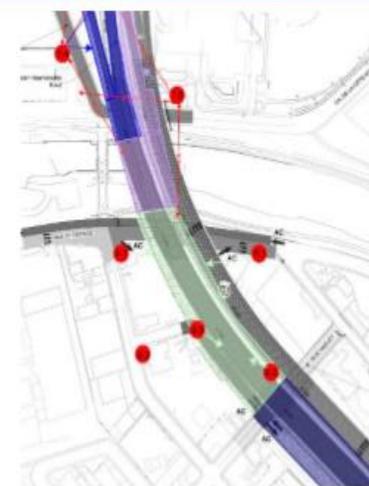


## Health & Safety and Environmental Management:

### Dust control plan implementation



Emplacement des BF dans ce secteur



Il est à noter que l'état de la chaussée de la SS est à la responsabilité du maître d'œuvre. Si de la glace ou de la neige s'y accumule le déglacage et la maintenance n'appartient pas à Delstan

# MONTREAL TURCOT INTERCHANGE PROJECT

## Closing statement

# The best accomplishment of the project?

**Zero Lost Time – No Injuries**

**More than 90,000 man hours**

**Project Number:**

**360,000 Tons of concrete crushed and reused on site**

**Average of 20,000 tons per month**

**15,000 Tons of steel (rebar) extracted and recycled**

# Special Thanks



# MONTREAL TURCOT INTERCHANGE PROJECT



**DELSAN**

## **Team Effort was the key of our Success!**

