Appendix E

Noise and Vibration Report

City of Ottawa

Ottawa Confederation Line East LRT Extension EA Study – Noise and Vibration Report

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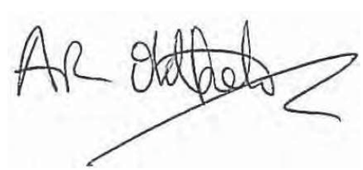

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Executive Summary

As part of the 2013 Transportation Master Plan – Stage 2, the City of Ottawa has proposed the Eastern Light Rail Transit (LRT) Extension (the Extension) along the Ottawa Road 174 road corridor. A Planning and Environmental Assessment (EA) study of the Extension is required. As part of the overall EA study, this report documents the noise and vibration impacts on sensitive receptors surrounding the Extension.

The Extension will extend the Confederation LRT Line from Blair Station to Trim Road. Noise and vibration sensitive receptors surrounding the Extension were identified using aerial photography and zoning maps.

Operational noise and vibration impacts due to the Extension were assessed according to the City of Ottawa's *Environmental Noise Control Guidelines,* and the United States Federal Transit Administration document *Transit Noise and Vibration Impact Assessment*.

Noise mitigation will be required to meet the criteria limits. Recommended noise barriers are summarized in the below table and are further detailed in Section 2.4.2 and Appendix C. Recommended mitigation measures should be reviewed during detailed design. Note that the noise levels are controlled by the road traffic and not the LRT. A widening of Ottawa Road 174 will be occurring as part of a separate project, coordination of the required noise mitigation will occur during the detailed design.

Location ID	Description	Approximate Barrier Length [m]	Barrier Height [m]
A03	East Acres Road wall return	16	3.50
A11	Fortune Drive Residences	655	3.50
A12	St Jovite Ridge Residences	233	3.00
A14	South side of corridor, west of Bilberry Creek	168	2.50
A12a/A15	Taffy Lane and Sugar Creek Way residences	480	3.00
A16/b/d	Du Bois Avenue	680	5.00
A18/a	Pintail Terrace	335	3.00
A19	Centrum Boulevard multi-dwelling mid-rise buildings	285	3.75
A21/A21a	Terra Nova Estates – 3535 St. Joseph Boulevard	325	3.00

Vibration mitigation will be required to meet the criteria limits. Recommended vibration reductions are summarized in the below table and are further detailed in Section 3.4 and Appendix F. Recommended mitigation measures should be reviewed during detailed design.

Vibration Receiver ID	Description	Track Configuration	Minimum Required Insertion Loss (VdB)
V01	Jasmine Park multi-dwelling high-rise buildings	Westbound LRT track at grade, no crossovers	9
		Eastbound LRT track at grade, no crossovers	8
V02	East Acres Road	Westbound LRT track at grade, no crossovers	13
		Eastbound LRT track at grade, no crossovers	11
V03	Shefford Road	Westbound LRT track at grade, with crossovers	21
		Crossover tracks at grade, centred between East/West LRT tracks	20
		Eastbound LRT track at grade, with crossovers	20

Vibration Receiver ID	Description	Track Configuration	Minimum Required Insertion Loss (VdB)
V04	Brilia Private	Westbound LRT track, elevated structure, no crossovers	4
		Eastbound LRT track, elevated structure, no crossovers	1
V05	Burgundy Lane	Westbound LRT track at grade, no crossovers	2
		Eastbound LRT track at grade, no crossovers	1
V06	Fortune Drive	Westbound LRT track at grade, no crossovers	2
		Eastbound LRT track at grade, no crossovers	1
V07	St Jovite Ridge	Westbound LRT track at grade, no crossovers	2
V08	Sugar Creek Way	Westbound LRT track at grade, no crossovers	2
V09	Cholette Crescent	Eastbound LRT track at grade, no crossovers	1
V10	Du Bois Avenue	Westbound LRT track at grade, with crossovers	8
		Crossover tracks at grade, centred between East/West LRT tracks	7
		Eastbound LRT track at grade, with crossovers	7
V11	Elderberry Terrace	Westbound LRT track at grade, no crossovers	1
V12	Parkrose Private	Westbound LRT track at grade, no crossovers	6
		Eastbound LRT track at grade, no crossovers	3

The area surrounding Prestige Circle is currently in development. Development details were not available for inclusion in this study. Areas currently undergoing or slated for eventual development are required by the City to have a noise assessment completed by the developer.

It will be difficult to implement rail vibration mitigation near Prestige Circle once the Extension has been constructed. It is recommended to meet with the developer to address vibration concerns by either:

- Commit to setback distances within their development, such that the future dwellings will not be impacted by vibration from the Extension; or
- Incorporate the developer's subdivision plans during detailed design of the Extension, so that vibration mitigation can be addressed at that time

Noise and vibration during construction of the LRT line may impact nearby sensitive receivers. Construction noise and vibration management plans are recommended to confirm that construction noise and vibration impacts meet acceptable level limits, and construction activities comply with City of Ottawa By-law 2004-253. Guidance for developing construction noise and vibration management plans, and general construction noise and vibration mitigation measures, are provided in Sections 4.2 and 4.3.

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1. Introduction

As part of the 2013 Transportation Master Plan – Stage 2, the City of Ottawa has proposed the Eastern Light Rail Transit (LRT) Extension (the Extension) along the Ottawa Road 174 road corridor. A Planning and Environmental Assessment (EA) Study of the Extension is required. As part of the overall EA study, this report documents the noise and vibration impact on the sensitive receptors surrounding the Extension.

The Extension will extend the Confederation LRT Line from Blair Station to Trim Road. Noise and vibration sensitive receptors surrounding the Extension were identified using aerial photography and zoning maps. The identification of the noise and vibration sensitive receptors was based upon the definitions provided in the City of Ottawa's *Environmental Noise Control Guidelines*; and the United States Federal Transit Administration document *Transit Noise and Vibration Impact Assessment*, which are more stringent or detailed than guidelines from the Ministry of the Environment and Climate Change (MOECC). A widening of Ottawa Road 174 will be occurring as part of a separate project, coordination of required noise mitigation will occur during the detailed design

2. Noise

2.1 Criteria

As with previous Ottawa Region Light Rail Transit Environmental Assessments, noise criteria adopted for this assessment is outlined in the City of Ottawa's Environmental Noise Control Guidelines (reference #3 – the Guideline). The Guideline sets out noise mitigation requirements for capital works projects, including LRT extensions. Similar to the MOECC draft protocols with TTC and GO Transit (the MOECC Draft Protocols, reference #10 and #11) there is a requirement for noise mitigation investigation when there is a 5 dB increase in noise level due to the project. However, the Ottawa Guideline also includes an overall noise level limit of 60 dBA.

A summary of the requirements from the Guideline is presented in Table 1 below. Please note:

- The Guideline applies to the Outdoor Living Area (OLA) only.
- The sound level used for assessment is the daytime A weighted equivalent sound level (L_{eq}) between 7 AM and 11 PM
- The objective sound level is the higher of 55 dBA, or the ambient sound level at the start of project construction.
- Mitigation will attempt to achieve sound levels as close to the objective level as is technically, economically, and administratively feasible.
- Mitigation investigation shall be within the right of way and introduce appropriate noise control measures that, where feasible, a minimum attenuation (averaged over the first row of receivers) of 6 dB can be achieved.
- Off right-of way noise control measures are not considered as part of the City Guidelines.

Table 1: Summary of Impact Rating and Noise Mitigation Requirements

Future Sound Level, Leq_{16hr}	Change Above Ambient [dB]	Impact Rating	Mitigation Effort
Greater than 55 dBA and less than or equal to 60 dBA	0-3	Insignificant	None
	3-5	Noticeable	None
	5-10	Significant	Investigate noise control measures and mitigate to achieve retrofit criteria (minimum attenuation is 6 dB)
	10+	Very Significant	

Future Sound Level, Leq_{16hr}	Change Above Ambient [dB]	Impact Rating	Mitigation Effort
Greater than 60 dBA	0-3	Insignificant	Investigate noise control measures and mitigate to achieve retrofit criteria (minimum attenuation is 6 dB)
	3-5	Noticeable	
	5-10	Significant	
	10+	Very Significant	

2.2 Noise Sensitive Areas

Predicted noise levels are assessed at noise sensitive areas. Land uses designated as noise sensitive by the Guideline and the MOECC Draft Protocols, in the context of capital projects, consist of the following land uses with OLAs:

- Private homes such as single family residences (detached residences)
- Townhouses
- Multiple unit buildings, such as apartments with OLAs for use by all occupants
- Hospitals, nursing homes for the aged, where there are OLAs for the patients

OLAs are described as outdoor amenity areas provided for the quiet enjoyment of the outdoor environment. These areas can be on any side of a dwelling. Paved areas for multiple dwelling residential units are specifically excluded. The point of assessment is usually 3 metres from the dwelling façade at a height of 1.5 metres above ground level. Examples of OLAs include, but are not limited to:

- Common OLA associated with multi-story apartment buildings or condominiums
- Balconies, provided they are the only OLA for the occupant and meet the following conditions
    - Minimum depth of 4 metres
    - Outside the exterior façade of the building
    - Unenclosed
- Backyards, front yards, gardens, terraces, or patios
    - Minimum OLA areas requiring protection of approximately:
        - 56 square metres for a detached unit
        - 46 square metres for a semi-detached unit
        - 37 square metres per unit of row housing
        - Otherwise the entire OLA must be protected

There are several noise sensitive land uses surrounding the transit corridor. These areas are located adjacent to the road corridor and outside of the greenbelt area. The noise sensitive land uses generally consist of low density residential housing, with a few mid/high-rise multi dwelling buildings.

Assessed receptor locations were selected based upon requirements provided in the Guideline and input from City of Ottawa Staff regarding OLA locations.

Additional locations have also been included for noise mitigation investigation. Assessed locations are presented in Table 2 and on the plan provided in Appendix A, with zoning plans provided in Appendix B.

In some areas, the setbacks of the first row of housing next to the corridor are very similar and will result in comparable noise levels and noise impacts within each housing block or grouping. As such, for prediction of "overall noise impact", receptors were selected to characterize noise sensitive areas (NSAs). The noise levels at other locations, within each NSA, will fall between the predicted noise levels of the assessed locations. Dwellings further removed from the roadway in each NSA will have lower noise levels due to increased distance and screening attenuation.

Please note that the area surrounding Prestige Circle is currently being developed. Plans for subdivision of the property adjacent to Highway 174 are not yet available. A portion of the development near Jeanne D'Arc indicates that the development will be low rise condo units, which differs from other developments in the area. As sufficient information is not available, an assessment location cannot be reasonably determined at this time.

Table 2: Assessed Noise Sensitive Locations

Assessment Location	Description	Receptors Represented
A01	2084 Beaverhill Drive – House	1
A02	1087 Laporte Street – House – closest residence to Highway 174 on Laporte	1
A03	2148 East Acres Road – House	1
A03a	2150 East Acres Road – House	1
A03b	2152 East Acres Road – House	16
A04	995 Shefford Road – Row House	6
A05	2201 Shefford Road – Multi story, multi dwelling	unknown
A06	1209 Rainbow Street – House	2
A07	1541 St. Joseph Boulevard – Multi dwelling retirement residence	160
A08	1123 Burgundy Lane – House	26
A09	6134 Burgundy Lane – House	15
A10	1707 Harvest Crescent	45
A11	6270 Fortune Drive	32
A11a	6258 Fortune Drive	7
A12	1111 St. Jovite Ridge	13
A12a	1113 Taffy Lane	25
A13	1745 Stoneboat Crescent	10
A13a	1755 Bonaventure Terrace	7
A14	1226 St. Jean Street	4
A14a	1079 Cholette Crescent	1
A14b	1073 Cholette Crescent	1
A15	6452 Sugar Creek Way	7
A16	6908 Du Bois Avenue	7
A16a	~1171 D'Erable Place	6
A16b	6834 Du Bois Avenue	6
A16c	6800 Bilberry Drive	9
A16d	6822 Bilberry Drive	7
A17	278 Elderberry Terrace	20
A18	310 Pintail Terrace	10
A18a	904 Sandpiper Court	10
A18b	280 Tulip Crescent	23

Assessment Location	Description	Receptors Represented
A19	325 Centrum Boulevard – Multi story, multi dwelling	60
A19a	345 Centrum Boulevard – Multi story, multi dwelling	60
A20	180 – Parkrose Private	2
A21	3535 St. Joseph Boulevard – Northeast property	3
A21a	3535 St. Joseph Boulevard – Northwest property	3

2.3 Noise Methodology

2.3.1 Noise Prediction Procedure

As set out in the Guideline, traffic noise levels were calculated using the Ontario Road Noise Analysis Method for Environmental and Transportation (ORNAMENT) method, implemented in the STAMSON (version 5.04) software. STAMSON also includes a noise prediction module for prediction of noise from LRT vehicles.

The noise prediction model inputs include the following:

- Road traffic data
  - Volumes
  - Speed limit
  - Vehicle composition (percentage Medium and Heavy Trucks)
- LRT information
  - Vehicle volumes
  - Source height above ground
  - Maximum pass-by sound level
- Ground characteristics
  - Roadway surface type (e.g. Asphalt, concrete)
  - Ground topography
  - Ground type between assessment locations and roadways
  - Roadway layout
- Shielding effects
  - Berms
  - Barriers
  - Housing

To assess the noise impact, the predicted "No Project" noise levels (existing road and traffic) were compared to those of the future predicted "With Project" noise levels (2031). Noise levels in the OLA of a noise sensitive land use were calculated to determine if a noise mitigation investigation would be required.

2.3.2 Traffic Data

Road traffic data referenced below are provided in Appendix D. The road traffic data is summarized in Table 3. Note that the Guideline requires that the basis of assessment being the sound levels as close to the start of construction as possible.

Table 3: Traffic Data[1]

Source	No Project Volume		With Project Volume		Vehicle Characteristics			General Characteristics		
	Year	AADT	Year	AADT	%M.T.	%H.T.	Speed Limit (kph)	Grade %	Pavement Type	Day/Night Split
OR174-417-blairEB	2013	40460	2031	38450	1.5	0.2	100	<2	1	66/33
OR174-417-blairWB	2013	42940	2031	38450	1.5	0.2	100	<2	1	66/33
OR174-Blair-MontrealEB	2013	37790	2031	33615	1.5	0.2	100	<2	1	66/33
OR174-Blair-MontrealWB	2013	38050	2031	33615	1.5	0.2	100	<2	1	66/33
OR174-Montreal-JeanEB	2013	40090	2031	34810	1.5	0.2	100	<2	1	66/33
OR174-Montreal-JeanWB	2013	38650	2031	34810	1.5	0.2	100	<2	1	66/33
OR174-Jean-ChampEB	2013	33490	2031	26445	1.7	0.2	100	<2	1	66/33
OR174-Jean-ChampWB	2013	30920	2031	26445	1.7	0.2	100	<2	1	66/33
OR174-Champ-10thEB	2013	30350	2031	22690	1.7	0.2	100	<2	1	66/33
OR174-Champ-10thWB	2013	29830	2031	22690	1.7	0.2	100	<2	1	66/33
OR174-10th-trimEB	2013	18390	2031	18235	1.7	0.2	100	<2	1	66/33
OR174-10th-trimWB	2013	18900	2031	18235	1.7	0.2	100	<2	1	66/33
OR174-trim-endEB	2013	12320	2031	13305	3.4	0.5	100	<2	1	66/33
OR174-trim-endWB	2013	14000	2031	13305	3.4	0.5	100	<2	1	66/33
Montreal	2013	36127	2031	23320	1.5	0.2	70	4	1	90/10
StJo-174-cartier	2013	19482	2031	23730	1.5	0.2	70	<2	1	90/10
Orleans-N174	2013	9350	2031	4260	1.7	0.2	50	<2	1	90/10
Orleans-S174	2013	10715	2031	6770	1.7	0.2	50	<2	1	90/10
Jean-N174	2013	13717	2031	6250	1.7	0.2	50	<2	1	90/10
Jean-S174	2013	18075	2031	11420	1.7	0.2	60	<2	1	90/10
10th-N174	2013	19004	2031	16550	1.7	0.2	60	<2	1	90/10
10th-S174	2013		2031		1.7	0.2	60	<2	1	90/10

LRT vehicle characteristics were obtained from the City of Ottawa for modeling purposes (using STAMSON). The relevant information follows below:

- Maximum of 78 dBA traveling at 100 km/h (input is max sound level at 15 metres as per STAMSON guide)
- Main source of noise while moving is the wheel rail interaction, 178mm above grade
- Total day trips of 318
- Total evening/night trips of 63

[1] *AADT – Annual Average Daily Traffic*
%M.T. – Medium Truck Percentage
%H.T. – Heavy Truck Percentage

2.4 Traffic Noise Results and Recommendations

2.4.1 Results

Table 4 shows the predicted future “No Project” and “With Project” noise levels, as well as the resulting noise impact. Also shown in Table 4 is the requirement for noise mitigation investigation. Calculation inputs are provided in Appendix E.

As noted above, the area surrounding Prestige Circle is currently under development. Plans for subdivision of the property are not yet available. The building type (low rise condo) is different than other developments in the area; therefore an assessment location cannot be assumed at this time.

Table 4: Noise Assessment Results – Most Exposed Side

Location	Overall Traffic Noise $L_{eq,16hr}$ (dBA)		Projected Noise Impact	Noise Mitigation Investigation Requirement	
	No Project	With Project	Change (dB)	> 60 dBA	≥5 dB impact and between 55 and 60 dBA
A01	59.14	58.71	-	No	No
A02	61.93	61.52	-	Yes	No
A03	64.55	63.69	-	Yes	No
A03a	59.46	56.19	-	No	No
A03b	62.30	60.89	-	Yes	No
A04	55.85	55.55	-	No	No
A05	70.88	69.03	-	Yes	No
A06	57.87	57.35	-	No	No
A07	62.77	62.29	-	Yes	No
A08	56.58	56.11	-	No	No
A09	57.34	56.72	-	No	No
A10	57.80	57.17	-	No	No
A11	62.09	61.36	-	Yes	No
A11a	61.20	60.48	-	Yes	No
A12	63.06	62.17	-	Yes	No
A12a	62.11	61.22	-	Yes	No
A13	58.87	57.89	-	No	No
A13a	58.48	57.60	-	No	No
A14	63.64	62.81	-	Yes	No
A14a	64.66	63.82	-	Yes	No
A14b	57.64	56.81	-	No	No
A15	60.89	60.17	-	Yes	No
A16	63.14	62.40	-	Yes	No
A16a	62.39	61.64	-	Yes	No
A16b	63.26	62.53	-	Yes	No
A16c	59.00	58.25	-	No	No
A16d	60.82	60.08	-	Yes	No
A17	59.28	58.65	-	No	No
A18	63.06	61.88	-	Yes	No

Location	Overall Traffic Noise $L_{eq,16hr}$ (dBA)		Projected Noise Impact	Noise Mitigation Investigation Requirement	
	No Project	With Project	Change (dB)	> 60 dBA	≥5 dB impact and between 55 and 60 dBA
A18a	61.30	60.12	-	Yes	No
A18b	60.26	59.10	-	No	No
A19	62.47	61.32	-	Yes	No
A19a	62.40	61.27	-	Yes	No
A20	55.75	54.42	-	No	No
A21	60.07	60.10	0.03	Yes	No
A21a	60.36	60.39	0.03	Yes	No

According to the Guideline all noise impacts will be insignificant, and in most cases the noise level will decrease due to lower road traffic volume. However, the overall noise levels in several locations trigger noise mitigation investigation as levels are above 60 dBA. Note that the noise levels are controlled by the road traffic and not the LRT. A widening of Ottawa Road 174 will be occurring as part of a separate project, coordination of the required noise mitigation will occur during the detailed design.

2.4.2 Noise Mitigation

As noted in Table 4 above, the 60 dBA limit has been exceeded at several locations. An investigation has been conducted to determine the feasibility of mitigating noise at these receivers. As per the Guideline, noise mitigation must provide an average of at least 6 dB of attenuation over the first row of receptors. In line with past road projects, noise barriers with heights greater than 5 metres are generally considered not cost effective or practical from a constructability standpoint. A summary of noise barrier performance is provided in Table 5 below. Only receptors requiring noise mitigation investigation were reviewed in this section.

Note that the noise levels at A05 are controlled by traffic noise from Montreal Road (off right-of-way of project). As such, noise control measures are considered not feasible (administratively) for this location, and have therefore not been reviewed further.

Noise mitigation for location A19 and A19a was not investigated as mitigation for these locations have been deemed administratively not feasible by the City of Ottawa.

It is recommended that the developer of Prestige Circle conduct a noise assessment for their property as part of the building approval application and incorporate required noise mitigation.

New berms were not considered as part of this assessment due to spatial restrictions, specifically the limited space available between the highway and the right of way, and other geographical features (i.e. storm water ponds and wet lands).

Table 5: Predicted Noise Reduction – Receptors Requiring Mitigation Investigation

Assessment Location (see Table 4 for Investigation Requirement)	Predicted Noise Levels [dBA]		Noise Reduction [dB]	Achieve 6 dB Reduction
	Unmitigated	Mitigated		
A02	61.52	54.69	6.83	Yes
A03	63.69	57.39	6.30	Yes

Assessment Location (see Table 4 for Investigation Requirement)	Predicted Noise Levels [dBA]		Noise Reduction [dB]	Achieve 6 dB Reduction
	Unmitigated	Mitigated		
A03b	60.89	56.19	4.70	No
A07	62.29	56.66	5.63	No
A11	61.36	55.12	6.24	Yes
A11a	60.48	54.06	6.42	Yes
A12	62.17	55.99	6.18	Yes
A12a	61.22	54.96	6.26	Yes
A14	62.81	56.46	6.35	Yes
A14a	63.82	57.67	6.15	Yes
A15	60.17	54.01	6.16	Yes
A16	62.40	56.23	6.17	Yes
A16a	61.64	56.78	4.86	No
A16b	62.53	56.21	6.32	Yes
A16d	60.08	53.93	6.15	Yes
A18	61.88	55.57	6.31	Yes
A18a	60.12	54.03	6.09	Yes
A21	60.10	54.07	6.03	Yes
A21a	60.39	54.23	6.16	Yes

The above results indicate that a noise barrier with a height limit of 5 metres will not meet the minimum noise reduction requirement at the following locations:

- R03b – 2152 East Acres Road
- R07 – 1541 St. Joseph Boulevard
- A16a – ~1171 D'Erable Place

Noise barriers providing the minimum 6 dB reduction requirement were consolidated to produce final recommendations and approximate costing. This is summarized in Table 6 below.

Table 6: Resultant Noise Barriers and Approximate Costing

Description	Residences with 6 dB Reduction	Approximate Barrier Length [m]	Barrier Height [m]	Approx. Cost [$][2]	Approx. Cost/Residence [$]	Considered Economically Feasible
A02	1	720	4.00	1,440,000	1,440,000	No
A03	1	16	3.50	28,000	28,000	Yes
A11	37	655	3.50	1,146,250	30,980	Yes
A12	14	233	3.00	349,500	24,964	Yes
A14	5	168	2.50	210,000	42,000	Yes
A12a/A15	30	480	3.00	720,000	24,000	Yes
A16/b/d	13	680	5.00	1,700,000	130,769	Yes
A18/a	17	335	3.00	502,500	29,559	Yes
A21/A21a	6	325	3.00	487,500	81,250	Yes

[2] *Based upon a rough estimated installed cost of $500/m²*

Costing estimates in Table 6 shows that the approximate cost per receptor A02 is not considered economically feasible. Therefore a noise barrier for this location is not recommended.

Recommended noise barriers for the attenuation of traffic noise levels, with locations, heights, and extents, are presented in Appendix C. A widening of Ottawa Road 174 will be occurring as part of a separate project, coordination of the required noise mitigation will occur during the detailed design.

3. Vibration

3.1 Criteria

Vibration assessments, with respect to Environmental Compliance Approvals, were formerly addressed using the Ontario Ministry of the Environment and Climate Change (MOECC) Publication NPC-207 (reference #7). NPC-207 provides Root Mean Square Velocity (RMSV) vibration limits for frequent events (more than 20 impulses in the observation period); vibration limits are not provided for infrequent impulse events and are to be established on an individual basis. Other publications (reference #8) indicate that vibration limits for infrequent events are generally higher. The vibration limits as per table 207-2 from NPC-207 are presented in Table 7.

Table 7: Vibration Limits for Frequent Impulses – NPC-207

Observation Period	RMSV Vibration Limit (mm/s)	
	Daytime (07:00 to 23:00)	Night-Time (23:00 to 07:00)
Period ≤ 20 minutes	0.15	0.10
20 minutes < Period ≤ 60 minutes	0.30	0.10
60 minutes < Period ≤ 120 minutes	0.50	0.10

The night time vibration limit from NPC-207 is the same as the vibration limit from the MOECC draft protocol with TTC (reference #10) of 0.1 mm/s RMSV. The MOECC draft protocol with GO Transit (reference #11) has a vibration limit of 25% above their objective limit which is defined as the higher of the existing vibration levels or 0.14 mm/s RMSV (thus higher than NPC-207 and MOECC-TTC protocol). However, as the MOECC-GO Transit protocol was written in 1993, when GO Transit rail service was mainly just during the peak hours (fewer impulses). Thus the MOECC-GO Transit protocol vibration limits are not considered applicable to this project.

The most current publication of NPC-207 is a 1988 draft version, which has been withdrawn from the MOECC's internet resources. Also withdrawn from the MOECC's internet resources is the most recent MOECC-TTC protocol (1993). As these documents are no longer available from the MOECC's web resources, the vibration limits above have been compared to a more recent guideline, the United States Federal Transit Administration's *Transit Noise and Vibration Impact Assessment* document (FTA guide, reference #8). Applicable ground borne vibration limits from the FTA document are presented in Table 8.

Table 8: Ground Borne Vibration Limits at Residences for Frequent Events – FTA

Applicable Condition	RMSV Vibration Limits	
	Vibration Velocity Level (VdB, ref 1 micro inch)	Vibration Velocity Level (mm/s)
Residences – occasional events (30-70/day)	75	0.14
Residences – frequent events (>70/day)	72	0.10
Approximate Human Perception – for reference	65	0.05

As shown above, the night-time vibration limits presented in NPC-207 are the same as the FTA guide vibration limits for residential locations (for frequent events). However, the FTA guide vibration limits do not distinguish between day and night-time periods. As well, the FTA vibration limit for residences (for frequent events) is more stringent than the NPC-207 daytime vibration limits shown in Table 7. Therefore, the FTA vibration limits have been used for this assessment.

3.2 Vibration Sensitive Areas

Predicted vibration levels are assessed at sensitive land uses. The FTA guide defines vibration sensitive land uses in terms of the following three categories:

- **Vibration Category 1 – High Sensitivity**
  This category includes buildings where vibration would interfere with operations within the building, including levels that may be below those associated with human annoyance. Land-use examples in this category include vibration-sensitive research and manufacturing, hospitals with vibration-sensitive equipment and university research operations.

- **Vibration Category 2 – Residential**
  This category covers all residential land uses and any buildings where people sleep, such as hotels and hospitals. No differentiation is made between different types of residential areas.

- **Vibration Category 3 – Institutional**
  This category includes schools, churches, quiet offices and other institutions that do not have vibration-sensitive equipment, but still have the potential for activity interference. It is generally appropriate to include office buildings in this category. Buildings primarily used for industrial use, even though they may include some office space, are not intended to be used in this category.

A review of the area surrounding the Extension indicates that there are several areas containing existing vibration sensitive land uses. These areas generally consist of residential dwellings, commercial buildings and industrial buildings. No High Sensitivity (Category 1) buildings were identified adjacent to the corridor.

Table 9 presents the FTA vibration limits (for frequent events) for the land use categories described above.

Table 9: Ground Borne Vibration Limits for Frequent Events by Land Use Category – FTA

Land Use Category	Vibration Limits	
	Vibration Velocity Level (VdB, ref 1 micro inch)	Vibration Velocity Level (mm/s)
Category 1 (High Sensitivity)	65	0.05
Category 2 (Residential)	72	0.10
Category 3 (Institutional)	75	0.14

3.3 Vibration Methodology

3.3.1 Vibration Prediction Procedure

Vibration levels from the LRT line are due to the operation of Light Rail Transit Vehicles (LRVs) travelling along tracks and passing over crossover tracks, also known as frogs or switches. As the LRVs for this project have not been selected, vibration levels due to the LRT line were predicted using the *General Vibration Assessment* method from the FTA guide. This method incorporates a reference ground surface vibration curve for LRVs traveling at 50 mph (80 kph). Adjustments were applied to the reference vibration levels to account for the following project-specific parameters:

- LRV speed of 100 km/h
- Special track work (crossovers and frogs)
- Efficient vibration propagation in soil
- Tracks sections at grade for the majority of the rail corridor
- Elevated LRT track (overpass) near the Montreal Road/Highway 174 interchange

The project geotechnical report (reference #9) indicated that the soils in the study area are composed of silty clay and other clay-type soils. Although the study area is not uniformly composed of clay soils, the vibration assessment used a conservative approach and incorporated efficient vibration propagation. Localized vibration propagation mechanisms in the study area may vary, and should be reviewed during detailed design. Vibration transfer mobility testing[3] is recommended to determine localized vibration propagation characteristics, particularly in areas where vibration mitigation measures have been recommended.

3.3.2 Vibration Screening Procedure

The City of Ottawa Guideline (reference #3) recommends that vibration assessments of LRT lines should consider sensitive receivers within a minimum distance of 75 metres (measured from the corridor right-of-way). For this assessment, critical setback distances along the entire LRT line were determined. The critical setback distance is where the predicted LRT line vibration levels meet the criteria limits.

The critical setback distance for a given track section was based on the vibration limits from Section 3.2; and the parameters (listed in Section 3.3.1) specific to that track section. Receivers located further than the critical setback distances will be below vibration criteria, and will not require mitigation. Receivers located closer than the critical setback distances will exceed vibration criteria, and will require mitigation.

3.3.3 Assessed Vibration Receivers

The sensitive receivers predicted to exceed criteria, and require vibration mitigation, were determined. The most impacted receivers (i.e. the receivers located nearest to the LRT tracks) were assessed in greater detail to determine vibration mitigation requirements.

The assessed vibration receivers are summarized in Table 10. The receiver locations are presented in Appendix A.

[3] *A test procedure that consists of dropping a heavy weight on the ground and measuring the force into the ground and the response at several distances from the impact. The goal of the test is to create vibration pulses that travel from the source to the receiver using the same path that will be taken by the transit system (FTA Guide, Section 11.3).*

Table 10: Assessed Vibration Receivers

Vibration Receiver ID	FTA Land Use Category	Track Configuration	Vibration Velocity Limit (VdB)	Critical Setback Distance (m)
V01	Category 2 (Residential)	Track at grade, no crossovers	72	64
V02	Category 2 (Residential)	Track at grade, no crossovers	72	64
V03	Category 2 (Residential)	Track at grade, with crossovers	72	107
V04	Category 2 (Residential)	Track at grade, with crossovers	72	107
V05	Category 2 (Residential)	Elevated track, no crossovers	72	23
V06	Category 2 (Residential)	Track at grade, no crossovers	72	64
V07	Category 2 (Residential)	Track at grade, no crossovers	72	64
V08	Category 2 (Residential)	Track at grade, no crossovers	72	64
V09	Category 2 (Residential)	Track at grade, no crossovers	72	64
V10	Category 2 (Residential)	Track at grade, no crossovers	72	64
V11	Category 2 (Residential)	Track at grade, no crossovers	72	107
V12	Category 2 (Residential)	Track at grade, with crossovers	72	107

It will be difficult to implement rail vibration mitigation near Prestige Circle once the Extension has been constructed. It is recommended to meet with the developer and address vibration concerns by either:

- Committing to setback distances within their development, such that the future dwellings will not be impacted by vibration from the Extension; or
- Incorporating the developer's subdivision plans during detailed design of the Extension, so that vibration mitigation can be addressed at that time

3.4 LRT Line Vibration Assessment Results and Recommendations

Table 11 summarizes the vibration assessment results at each assessed receiver, including the minimum required vibration reductions (insertion losses).

Table 11: Vibration Assessment Results

Vibration Receiver ID	Track Configuration	Track-Receiver Distance (m)	Critical Setback Distance (m)	Predicted RMSV Vibration Level (VdB)	RMSV Vibration Limit (VdB)	Minimum Required Insertion Loss (VdB)
V01	Westbound LRT track at grade, no crossovers	27	64	80	72	9
	Eastbound LRT track at grade, no crossovers	31	64	79	72	8
V02	Westbound LRT track at grade, no crossovers	17	64	84	72	13
	Eastbound LRT track at grade, no crossovers	21	64	82	72	11

Vibration Receiver ID	Track Configuration	Track-Receiver Distance (m)	Critical Setback Distance (m)	Predicted RMSV Vibration Level (VdB)	RMSV Vibration Limit (VdB)	Minimum Required Insertion Loss (VdB)
V03	Westbound LRT track at grade, with crossovers	20	107	93	72	21
	Crossover tracks at grade, centred between East/West LRT tracks	23	107	92	72	20
	Eastbound LRT track at grade, with crossovers	24	107	91	72	20
V04	Westbound LRT track, elevated structure, no crossovers	14	23	76	72	4
	Eastbound LRT track, elevated structure, no crossovers	22	23	72	72	1
V05	Westbound LRT track at grade, no crossovers	57	64	73	72	2
	Eastbound LRT track at grade, no crossovers	61	64	72	72	1
V06	Westbound LRT track at grade, no crossovers	58	64	73	72	2
	Eastbound LRT track at grade, no crossovers	63	64	72	72	1
V07	Westbound LRT track at grade, no crossovers	54	64	74	72	2
V08	Westbound LRT track at grade, no crossovers	57	64	73	72	2
V09	Eastbound LRT track at grade, no crossovers	61	64	72	72	1
V10	Westbound LRT track at grade, with crossovers	81	107	79	72	8
	Crossover tracks at grade, centred between East/West LRT tracks	85	107	79	72	7
	Eastbound LRT track at grade, with crossovers	86	107	79	72	7
V11	Westbound LRT track at grade, no crossovers	60	64	73	72	1
V12	Westbound LRT track at grade, no crossovers	40	64	77	72	6
	Eastbound LRT track at grade, no crossovers	53	64	74	72	3

The locations of the recommended vibration mitigation and recommended insertion losses are provided in Appendix F. Example mitigation options and their typical vibration reduction performances are provided in Table 12.

Table 12: Rail Vibration Mitigation Examples and Typical Performance

Mitigation Measure	Frequency	Reduction/Insertion Loss
Ballast Mats	above 25 to 30 Hz	10 to 15 dB
Resilient Rail Fasteners	above 30 to 40 Hz	4 to 8 dB
Resilient Supported Sleepers/Ties	above 30 to 40 Hz	10 dB
Booted Sleepers/Ties	above 20 to 30 Hz	10 dB
Tire-derived Aggregate	above 40 Hz	8 to 14 dB
Floating Slab Track with Continuous Elastomer Layer	above 16 to 20 Hz	6 to 12 dB
Floating Slab Track With Discrete Elastomer Bearing	above 5 to 10 Hz	15 to 18 dB

It should be noted that the recommended vibration mitigation areas and performance are preliminary. The vibration mitigation areas shown in Appendix F do not include transition zones. Recommended vibration mitigation areas and insertion losses should be reviewed during detailed design. Vibration transfer mobility testing is also recommended during detailed design to determine localized vibration propagation characteristics, particularly in areas where vibration mitigation measures have been recommended.

4. Construction Noise and Vibration

4.1 Municipal Noise Control By-laws

The City of Ottawa sets out noise restrictions within the City Limits with City By-law 2004-253. As with most municipal By-laws, the By-law is directed mainly at typical residential and commercial concerns. Relevant portions of the By-law are as follows:

- No person shall, between 22:00 hours of one day, and 07:00 hours of the next day operate or cause to be operated, any construction vehicle or construction equipment in connection with the construction of any building or structure, highway, motor car, steam boiler or other engine or machine.
- Despite the above, no person shall operate or cause to be operated any construction vehicle or construction equipment before 09:00 hours on any Sunday or statutory or public holiday.
- No person shall discharge into the open air, on any property other than a highway, the exhaust of any motor vehicle except through a muffler or other device which prevents loud or explosive noises.

Applicants may be granted exemptions from the By-law, for some construction activities. The process for seeking an exemption is explained in section 23 of the By-law, and relates to both noise and vibration during construction.

4.2 Construction Noise Control Recommendations

Due to the proximity of some possible construction areas to noise sensitive locations, a construction noise management plan is required to address the construction noise from this project. The construction noise management plan is required to:

- Detail a construction noise complaint process and action plan to address construction noise complaints
- Detail how construction equipment will meet guideline limits documented in MOECC Publication NPC-115 and NPC-118
- Detail what measures are being taken to be compliant with City of Ottawa noise by-laws
- Detail what noise mitigation measures are being implemented
- Detail what actions are being taken to minimize the potential for noise complaints and noise impact on surrounding noise sensitive receivers

- Develop a monitoring/verification plan to demonstrate that the mitigation measures above are appropriate, functioning correctly, and that acceptable noise levels at noise sensitive receivers are maintained for the duration of construction

The severity of construction noise impact at Noise Sensitive Areas is dependent on various factors such as time and location of operation, size and concurrent use of equipment, and staging of construction. As equipment information is only available from the contractor awarded the construction contract, the following general guidance is provided to aid in the development of a construction noise management plan:

- Abide by all local noise by-laws and policies, unless a permit for exemption is obtained
- Use equipment compliant with MOECC Publication NPC-115 and NPC-118
- Limit construction noise levels outside of construction areas (public areas) to a maximum 85 dBA to be compliant with Occupational Health and Safety requirements
- Take advantage of shielding from existing buildings to shield residential locations from construction equipment
- Avoid construction activity during the night time, where not required, to reduce the potential impact of construction noise
- Maximize distance between construction equipment operations and noise sensitive receivers
- Ensure all internal combustion engines are fitted with appropriate muffler systems
- Keep equipment in good maintenance
- Limit equipment idling time to the minimum time necessary to complete specified tasks
- Provide occupants of buildings in the vicinity of planned construction activity with the contact details of a person who can assist them with resolving issues related to construction noise
- Advise nearby residents of significant noise generating activities to minimize disruption
- Consult with likely affected persons prior to commencement of works
- Set construction noise level limits appropriate to project acceptable community response
    - Guidance is available in ISO R1996 and the FTA guide. Construction noise levels less than 5 dB above the pre-construction background are typically acceptable.

A review of the City of Ottawa By-law 2004-253 has been completed for sections relevant to this project. As with most municipal guidelines and By-laws, these By-laws are directed mainly at typical residential and commercial concerns. The amalgamated relevant portions of the By-laws are as follows:

- No person shall, between 22:00 hours of one day, and 07:00 hours of the next day operate or cause to be operated, any construction vehicle or construction equipment in connection with the construction of any building or structure, highway, motor car, steam boiler or other engine or machine.
- Despite the above, no person shall operate or cause to be operated any construction vehicle or construction equipment before 09:00 hours on any Sunday or statutory or public holiday.
- No person shall discharge into the open air, on any property other than a highway, the exhaust of any motor vehicle except through a muffler or other device which prevents loud or explosive noises.

Construction occurring outside of the allowable hours noted above will require an exemption to the local noise By-laws.

An example noise complaint process is provided below:

- Any initial complaint from the public will require verification that all noise control measures to be applied are in effect. Investigate any noise concerns, and implement noise control as required.
- Notwithstanding compliance with any noise control measures identified in the contract documents, a persistent complaint will require a field investigation to determine noise level emissions. Where noise level emissions, for that construction equipment in use, exceed the sound level criteria for construction equipment contained in the MOECC Model Municipal Noise Control By-law, the contractor shall comply with the sound level criteria where quieter alternative equipment is reasonably available. Where a quieter alternative is not reasonably available, the equipment in use will be accepted.

4.3 Construction Vibration Control Recommendations

The equipment and activities proposed during the construction phase are not currently known. As the proposed LRT tracks will be in close proximity to some of the existing residential dwellings, vibration due to construction of the LRT line may impact nearby sensitive receivers. As such, a construction vibration management plan is required and should detail the following items:

- Actions that are being taken to minimize the perceptible vibration impacts on surrounding sensitive receivers
- Vibration mitigation measures that will be implemented
- Construction vibration complaint process and action plan to address perceptible vibration complaints
- Monitoring/verification plan to demonstrate that the mitigation measures are appropriate, functioning correctly, and that acceptable vibration levels at sensitive receivers are maintained for the duration of construction

General options for minimizing annoyance and the potential for building damage due to construction vibration include:

- Avoid impact or vibratory methods for installation of foundation piles
- Conduct pre-construction and post-construction building condition inspections
- Use lower vibration equipment where feasible
- Use lower vibration processes where feasible
- Operate construction equipment during periods where nearby structures are unoccupied, when feasible
- Avoid use of vibration generating equipment during the night time in residential areas, when feasible
- Limit speed of vehicles entering and driving within the site
- Provide smooth surfaces for vehicle movements, when feasible
- Inform occupants of buildings in the vicinity of planned construction activity a reasonable amount of time before construction begins
- Provide occupants of buildings in the vicinity of planned construction activity with the contact details of a person who can assist them with resolving issues related to vibration generated by construction
- Operate construction vehicles under lower vibration settings

When actual construction equipment and activities are known, construction vibration impacts should be reviewed during detailed design.

5. Conclusions/Recommendations

Mitigation measures will be required to meet the applicable noise and vibration criteria limits. Recommended noise and vibration mitigation measures are discussed in Sections 2.4.2 and 3.4. Note that the noise levels are controlled by the road traffic and not the LRT. A widening of Ottawa Road 174 will be occurring as part of a separate project, coordination of the required noise mitigation will occur during the detailed design. Recommended mitigation measures should be reviewed during detailed design of the Extension. Vibration transfer mobility testing is also recommended during detailed design to determine localized vibration propagation characteristics, particularly in

areas where vibration mitigation measures have been recommended. Areas where noise and vibration mitigation measures have been recommended are presented in Appendix C and Appendix F.

The area surrounding Prestige Circle is currently being developed. Development details were not available for inclusion in this study. Areas currently undergoing or slated for eventual development are required by the City to have a noise assessment completed by the developer.

It will be difficult to implement rail vibration mitigation near Prestige Circle once the Extension has been constructed. It is recommended to meet with the developer and address vibration concerns by either:

- Committing to setback distances within their development, such that the future dwellings will not be impacted by vibration from the Extension; or
- Incorporating the developer's subdivision plans during detailed design of the Extension, so that vibration mitigation can be addressed at that time

Noise and vibration due to construction of the LRT line may impact nearby sensitive receivers. Construction noise and vibration management plans are recommended to confirm that construction noise and vibration impacts meet acceptable level limits; and construction activities comply with City of Ottawa By-law 2004-253. Guidance for developing construction noise and vibration management plans, and general construction noise and vibration mitigation measures, are provided in Sections 4.2 and 4.3.

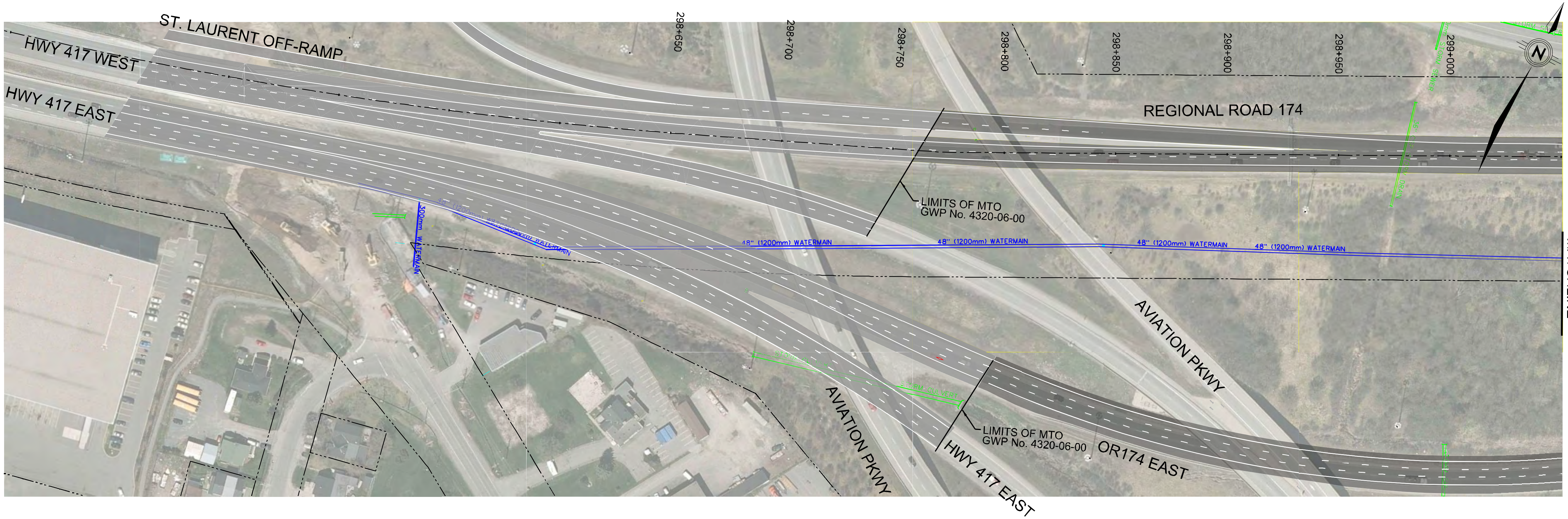
6. References

1. MTO Provincial Highways Directive A-1 (QST A-1)
2. MTO/MOECC, "A Protocol for Dealing with Noise Concerns during the Preparation, Review and Evaluation of Provincial Highways Environmental Assessments", February 1996.
3. City of Ottawa Planning and Growth Management Department, *Environmental Noise Control Guidelines*, May 10, 2006
4. ITE Journal, *Traffic Volume Adjustments for Impact Analysis*, James A. Bonneson, April 1987.
5. Ontario Ministry of the Environment and Climate Change, *Ontario Road noise Analysis Method for Environment and Transportation (ORNAMENT)*. Queen's Printer for Ontario, 1990.
6. Ontario Ministry of the Environment and Climate Change, "Noise Assessment Criteria in Land Use Planning Publication LU-131", October 1997.
7. Ontario Ministry of the Environment and Climate Change, "Impulse Vibration in Residential Buildings Publication NPC-207", January 14, 1988.
8. United States Federal Transit Administration, "Transit Noise and Vibration Impact Assessment", May 2006.
9. Houle Chevrier Engineering Ltd., "Geotechnical Inventory Environmental Assessment Study, Eastern Light Rail Transit Facility, Blair Station to Trim Road", October 31, 2014.
10. Ministry of Environment and Energy(now Ministry of Environment and Climate Change)/Toronto Transit Commission, "Draft Protocol for Noise and Vibration Assessment for the Proposed Scarborough Rapid Transit Extension", May 1993
11. Ministry of Environment and Energy (now Ministry of Environment and Climate Change)/ GO Transit (now Metrolinx), "Draft Protocol for Noise and Vibration Assessment", January 1995.

Appendices

Appendix A

Appendix A: Assessed Locations Layout



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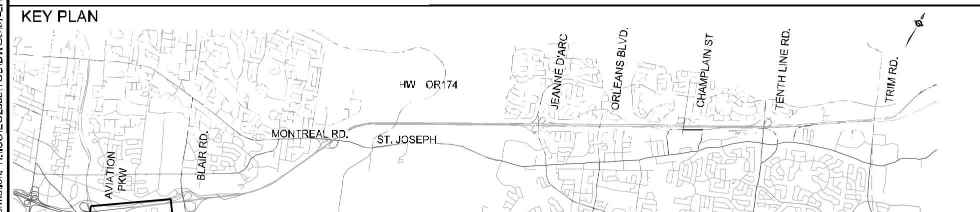

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HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 298+450 to STA 299+800

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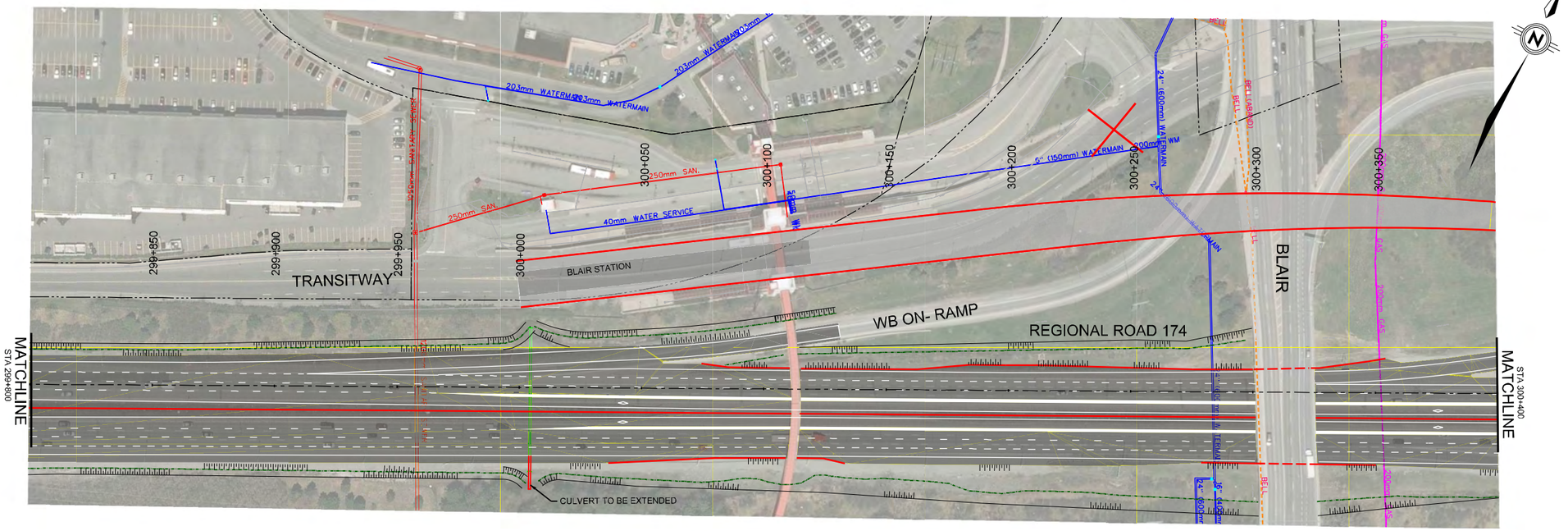

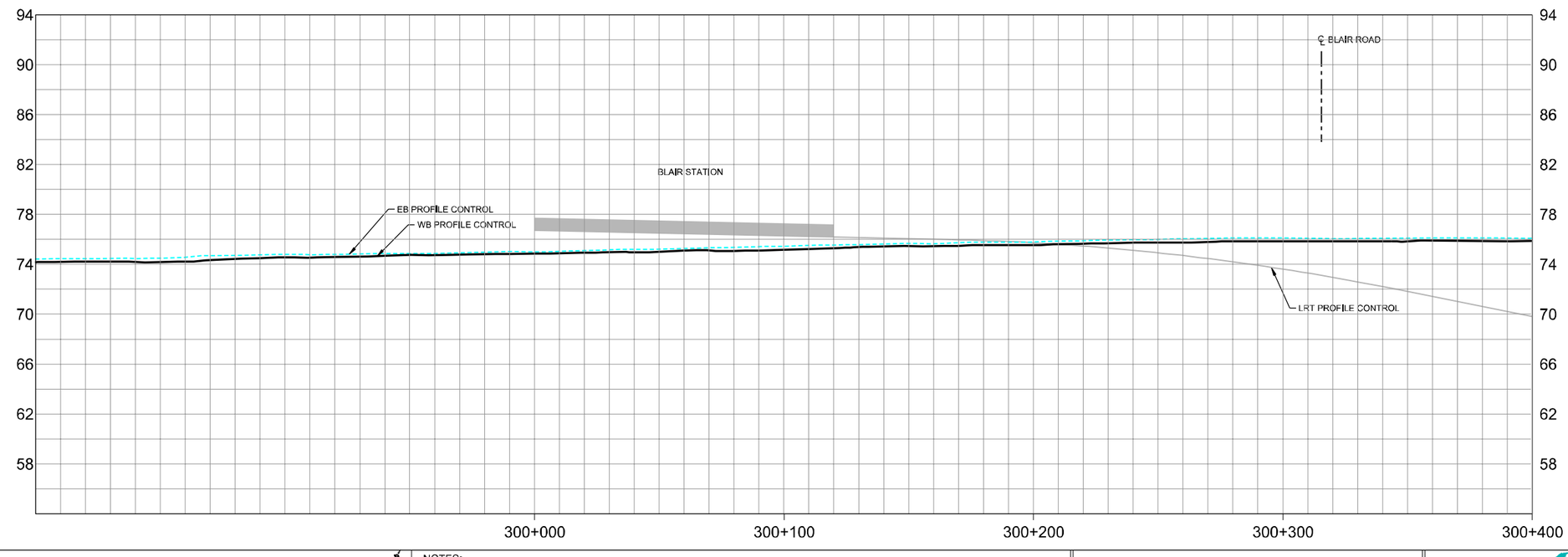

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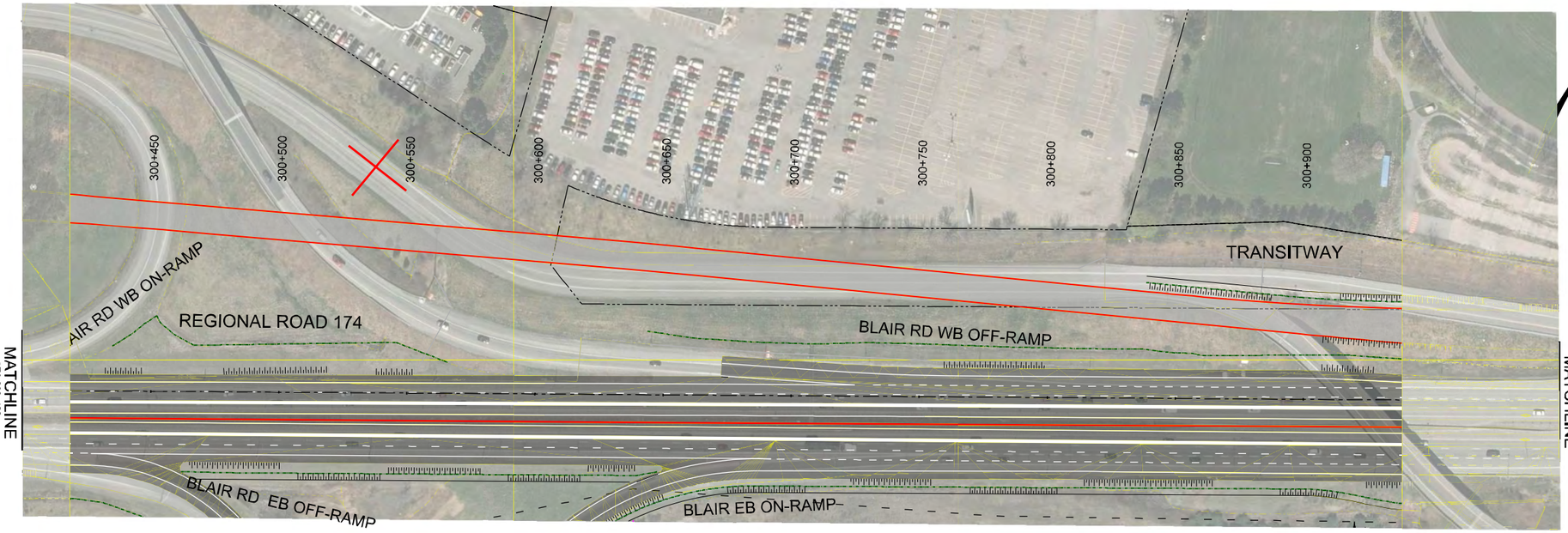

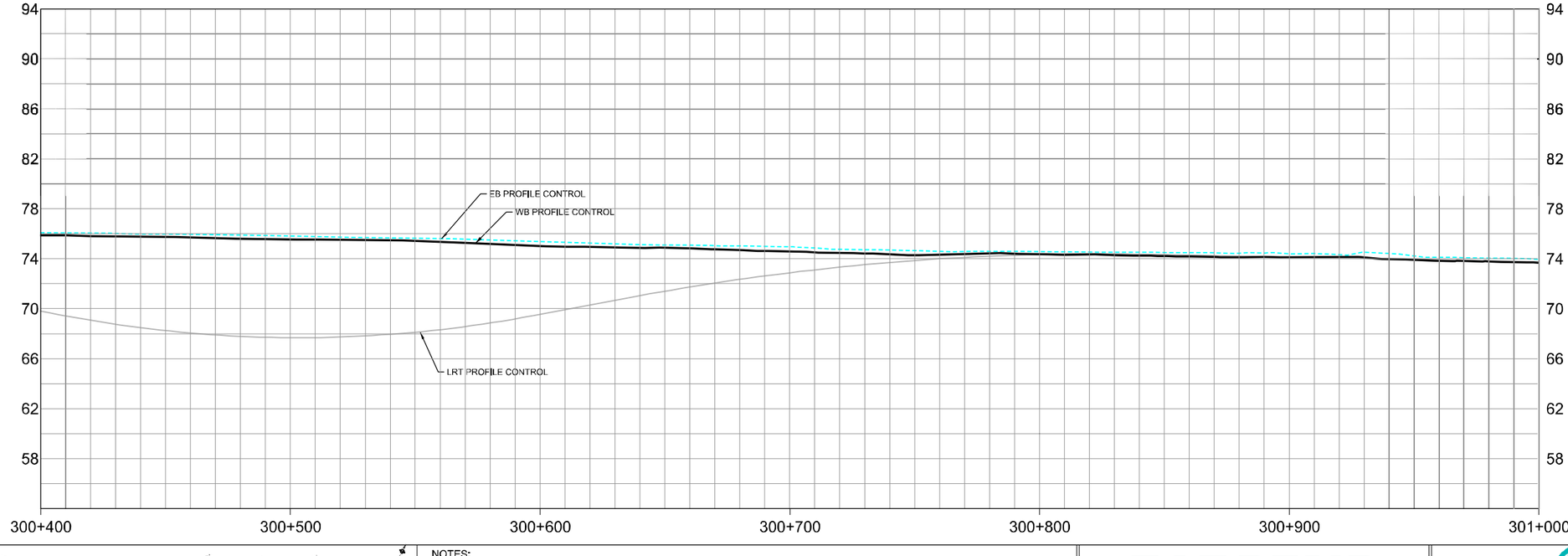

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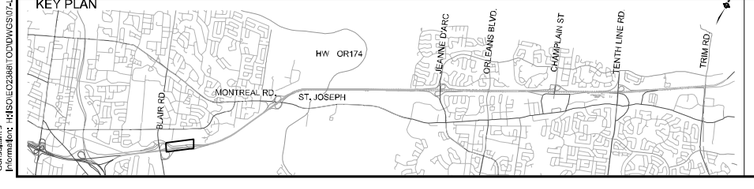

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HWY 174 ROAD WIDENING
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STA. 300+400 to STA 301+000

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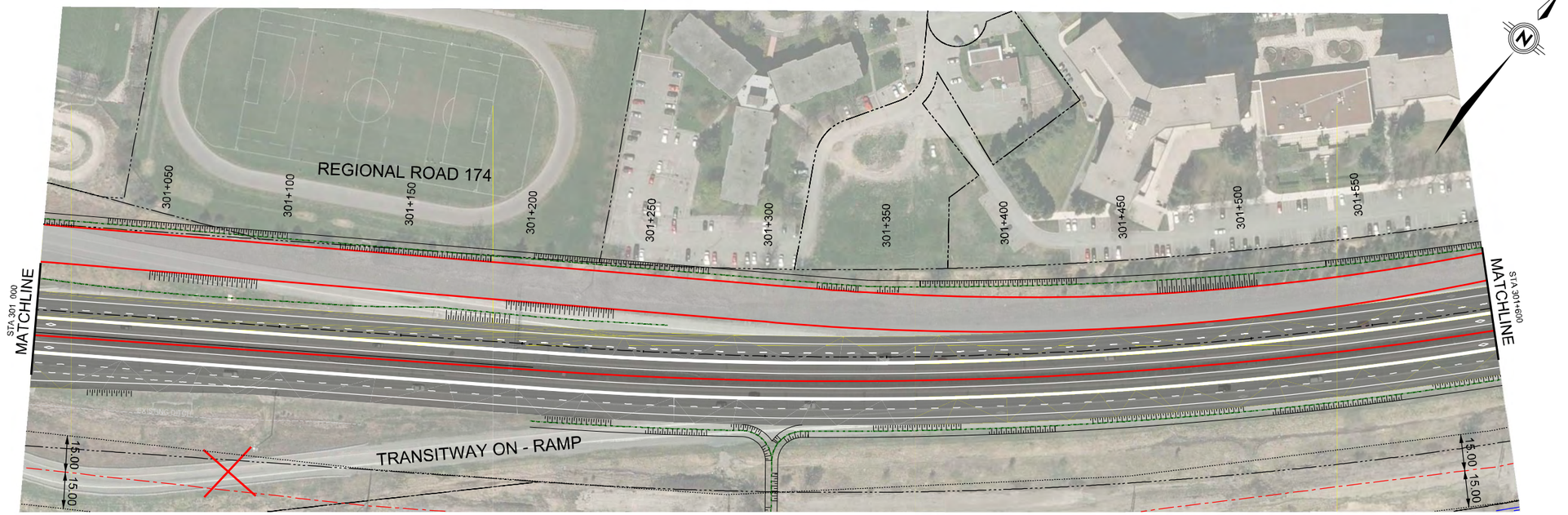

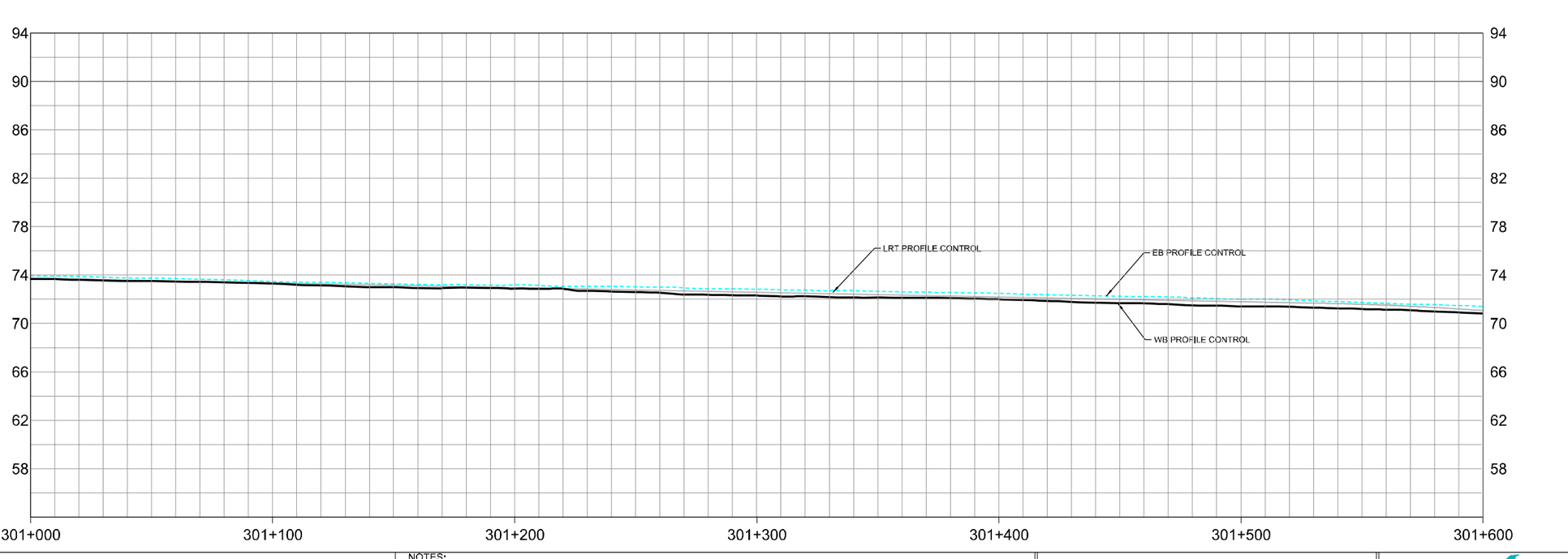

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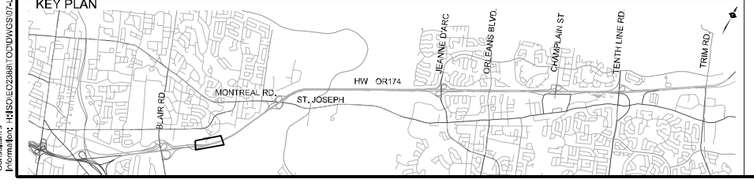

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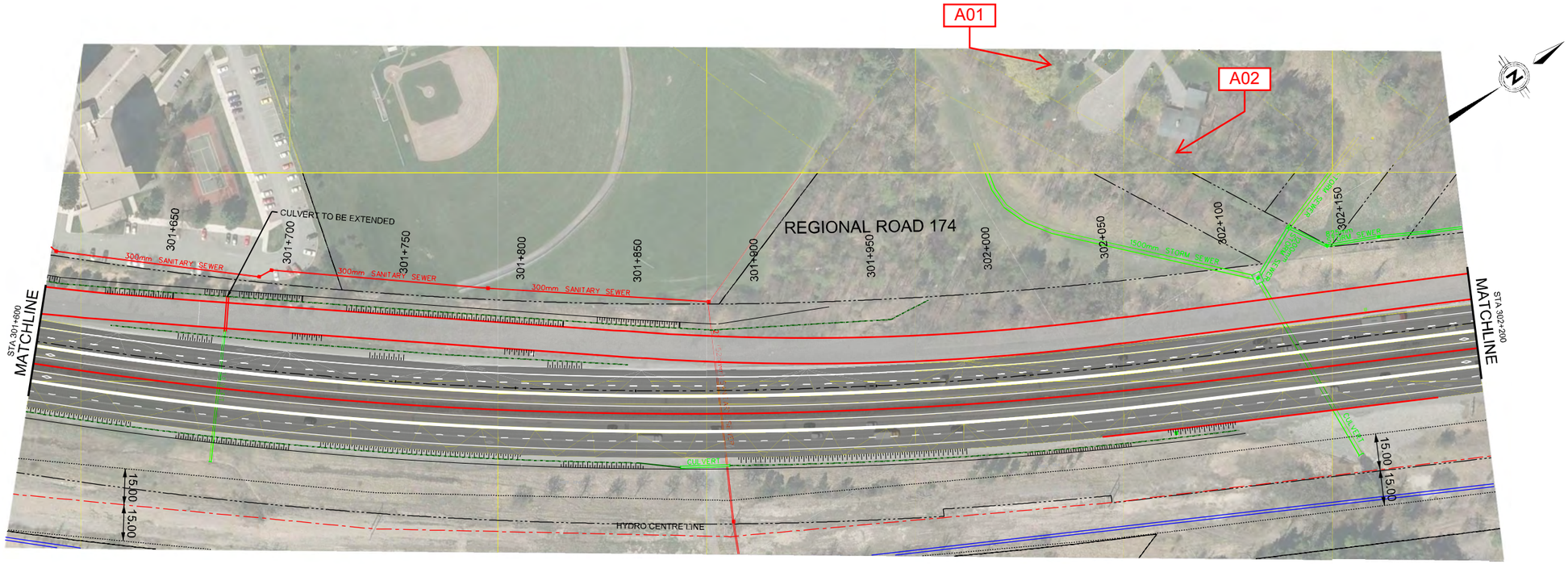

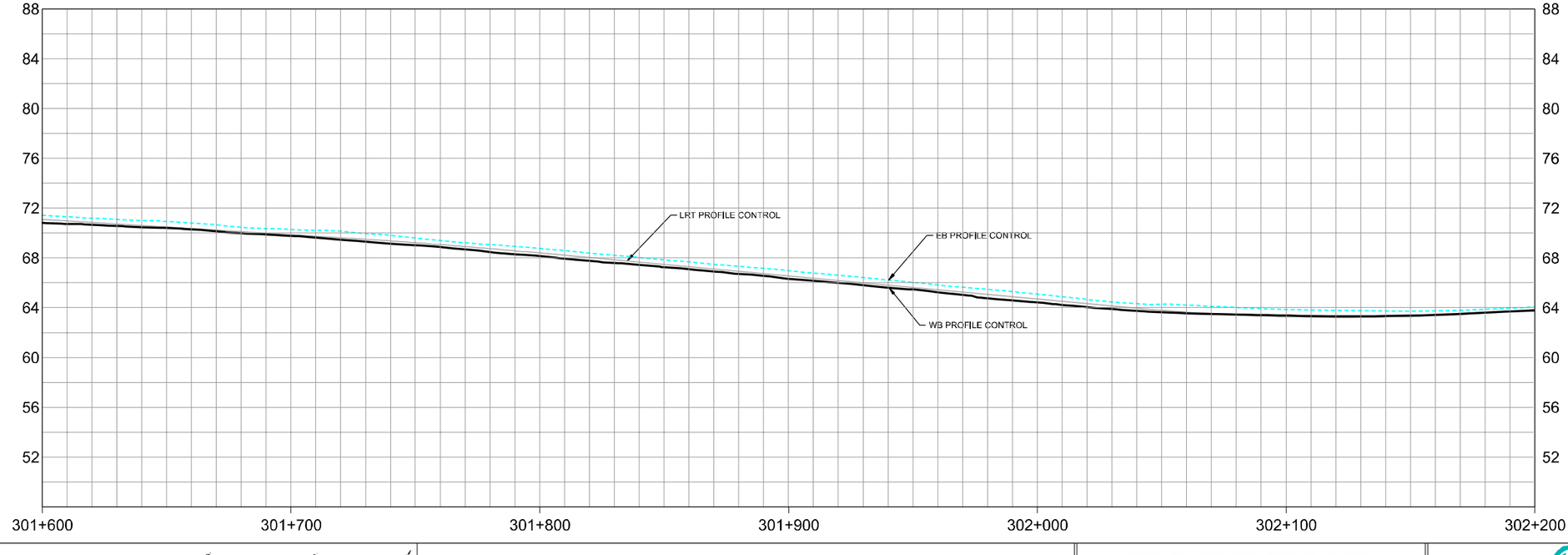

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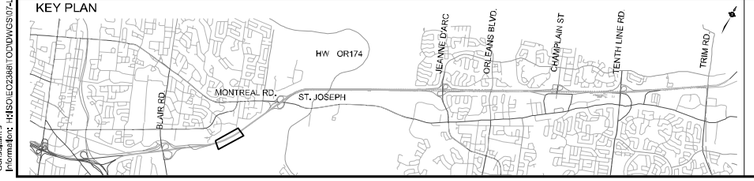

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HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
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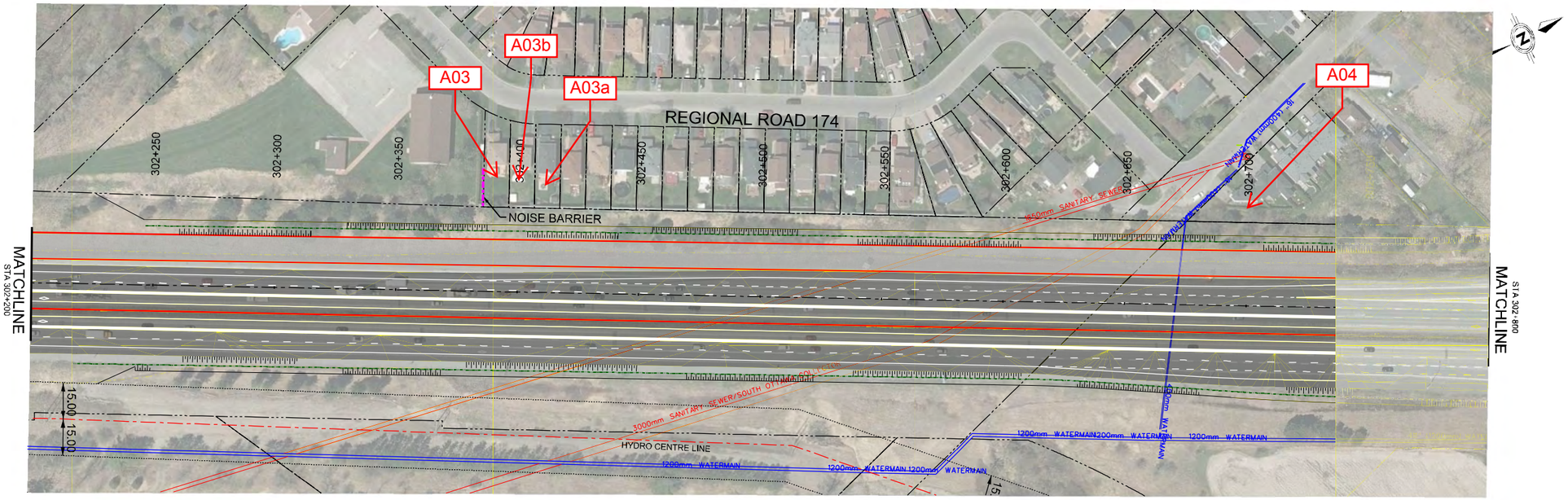

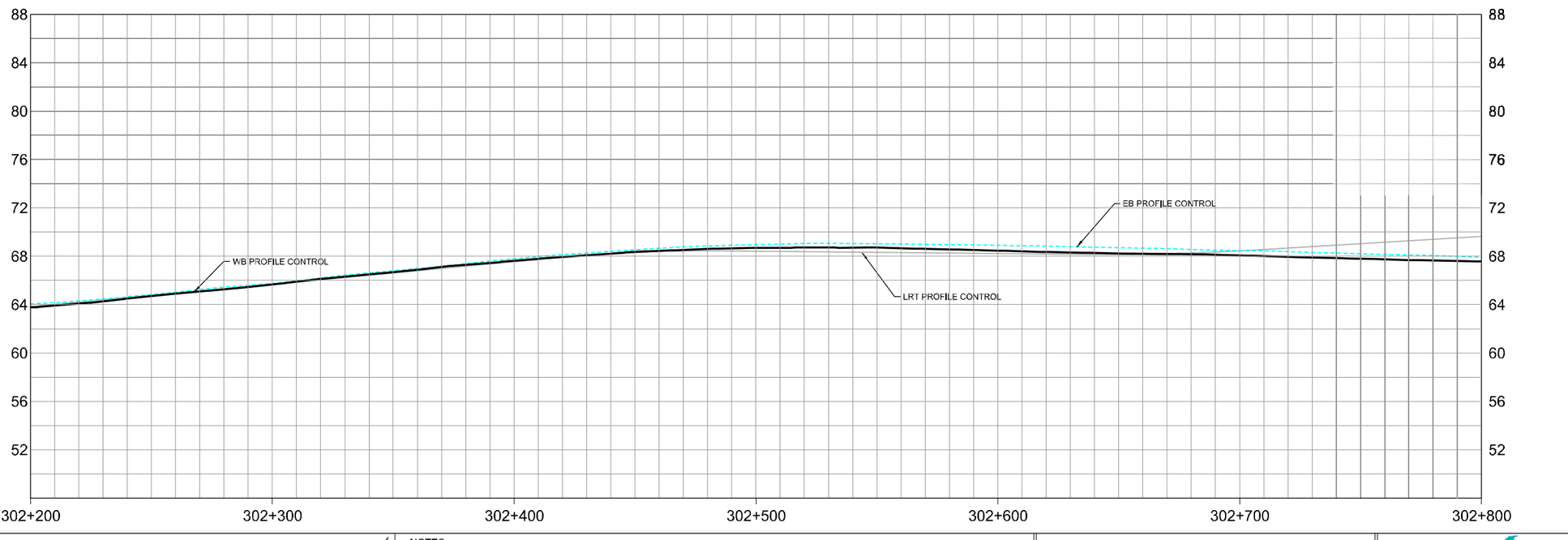

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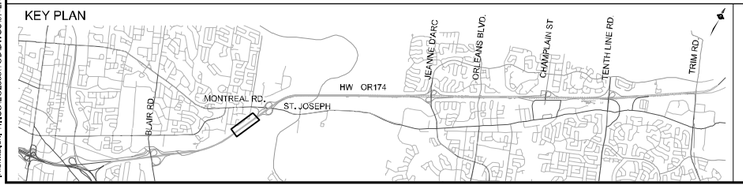

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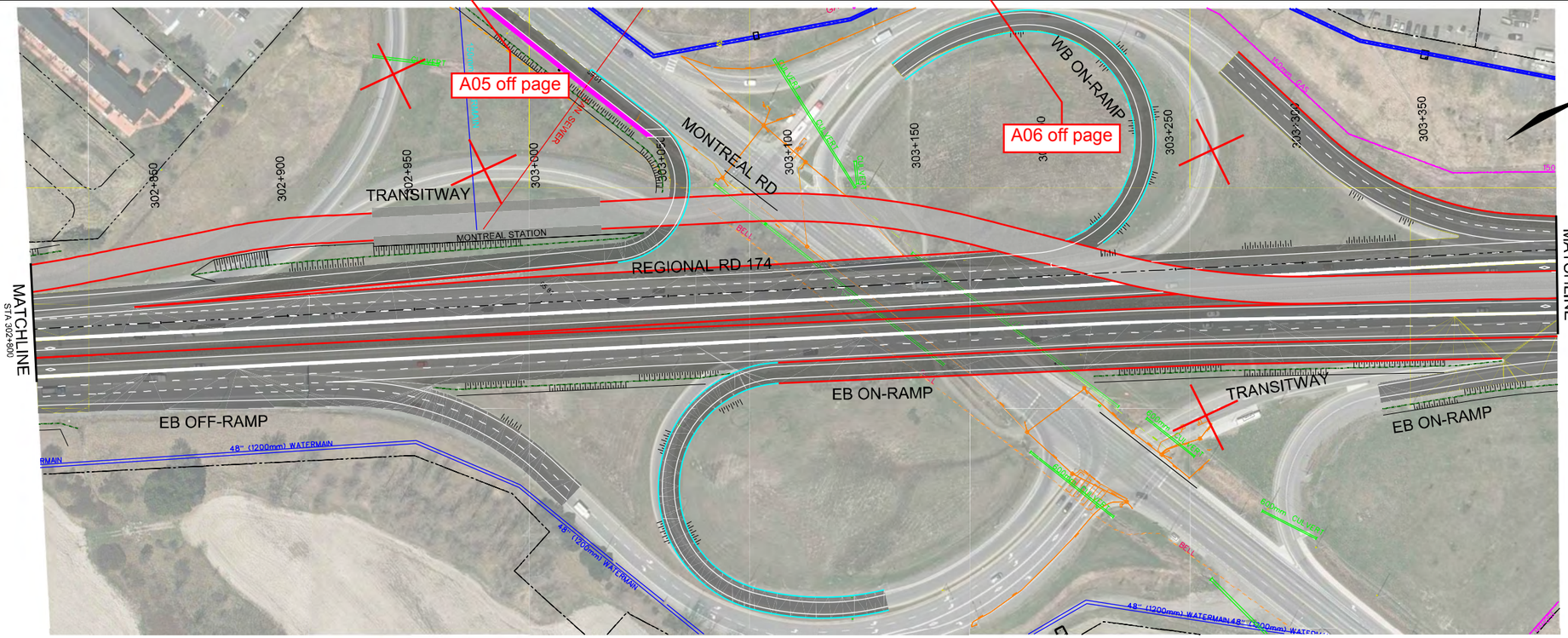
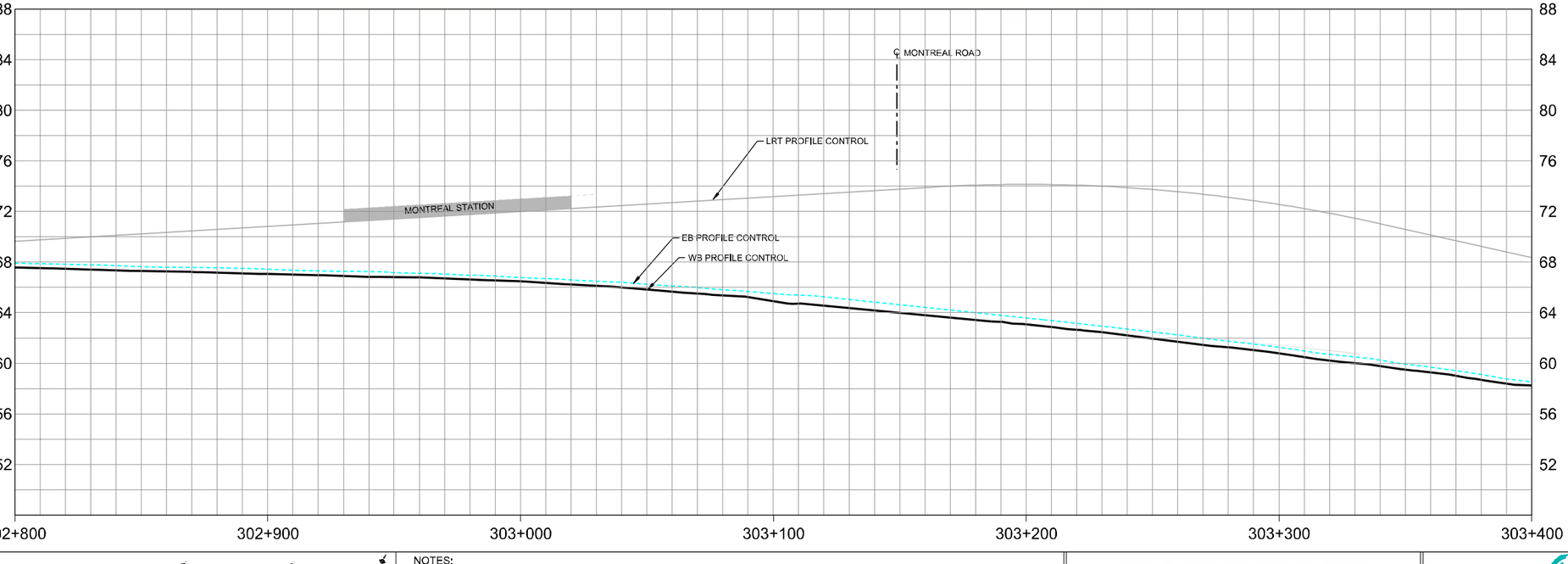
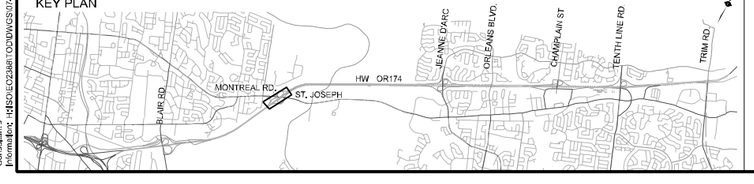
STA. 302+200 to STA 302+800

Drawings No.:	Revision 00	Sheet No. 06





KEY PLAN



NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

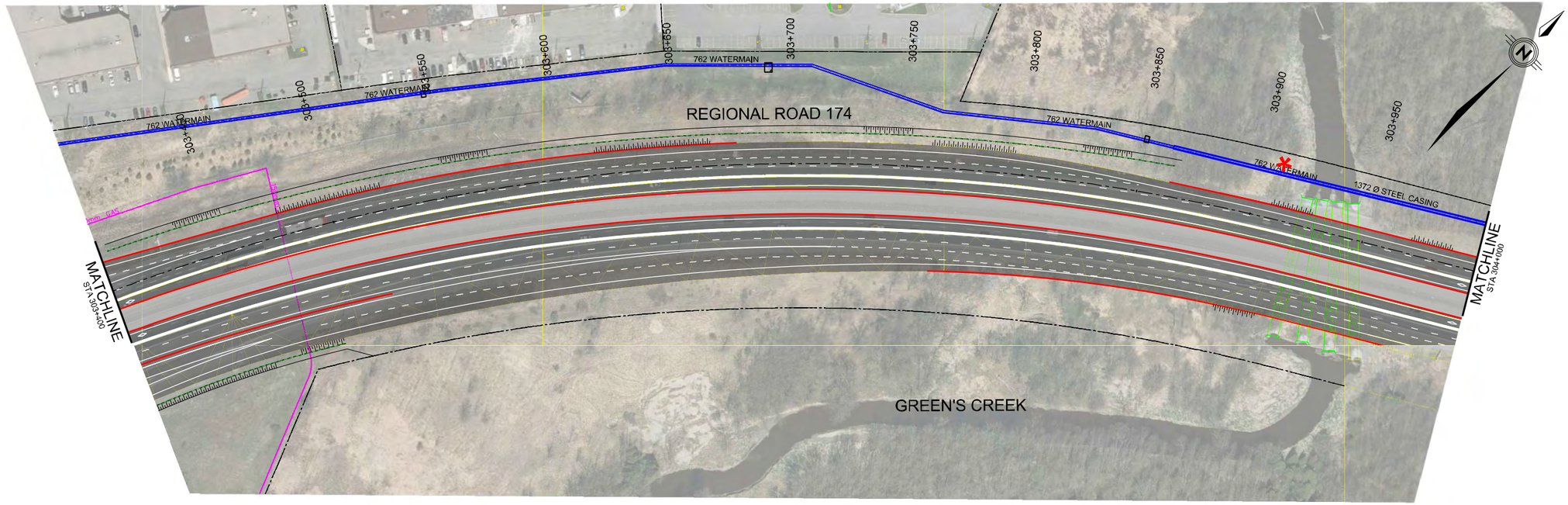
Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 0.5 5 10 20

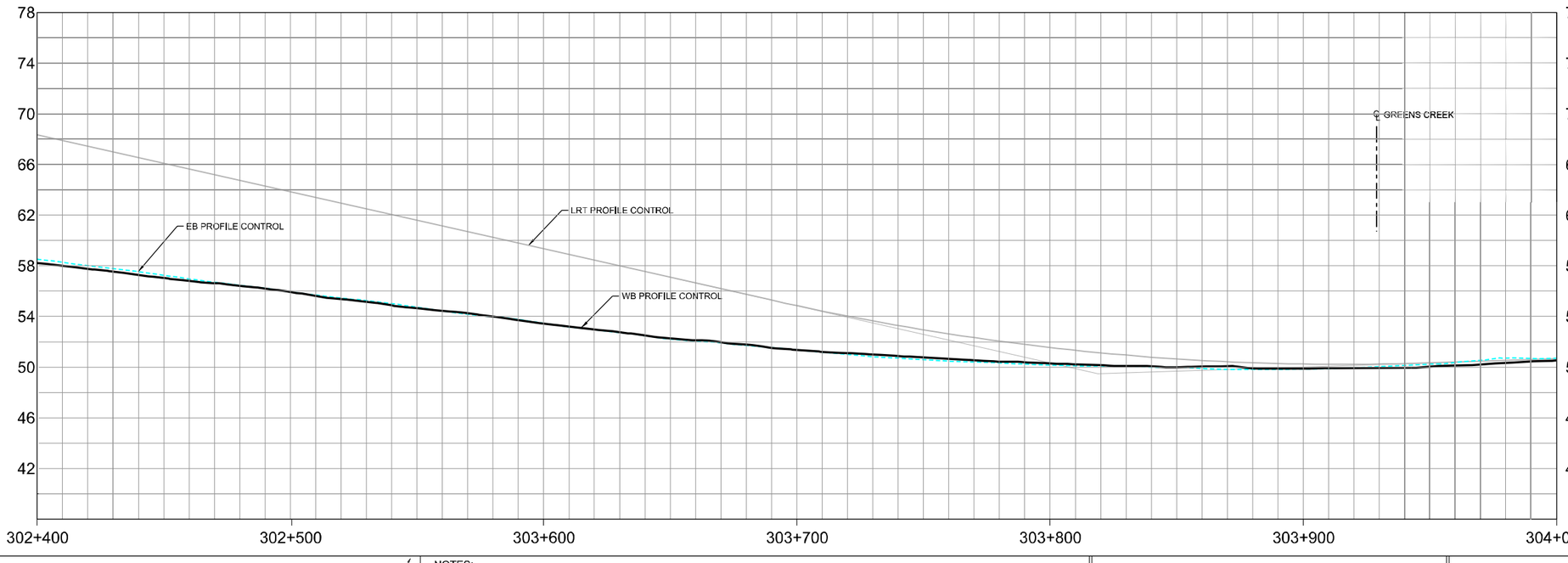
CAD File Name: EO2388TOD-01-PDR-07.DGN | Plot Date: XX/XX/XXXX

Ottawa

HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 302+800 to STA 303+400

Drawings No.: | Revision 00 | Sheet No. 07





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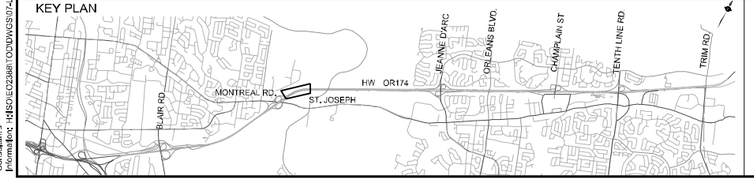


NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

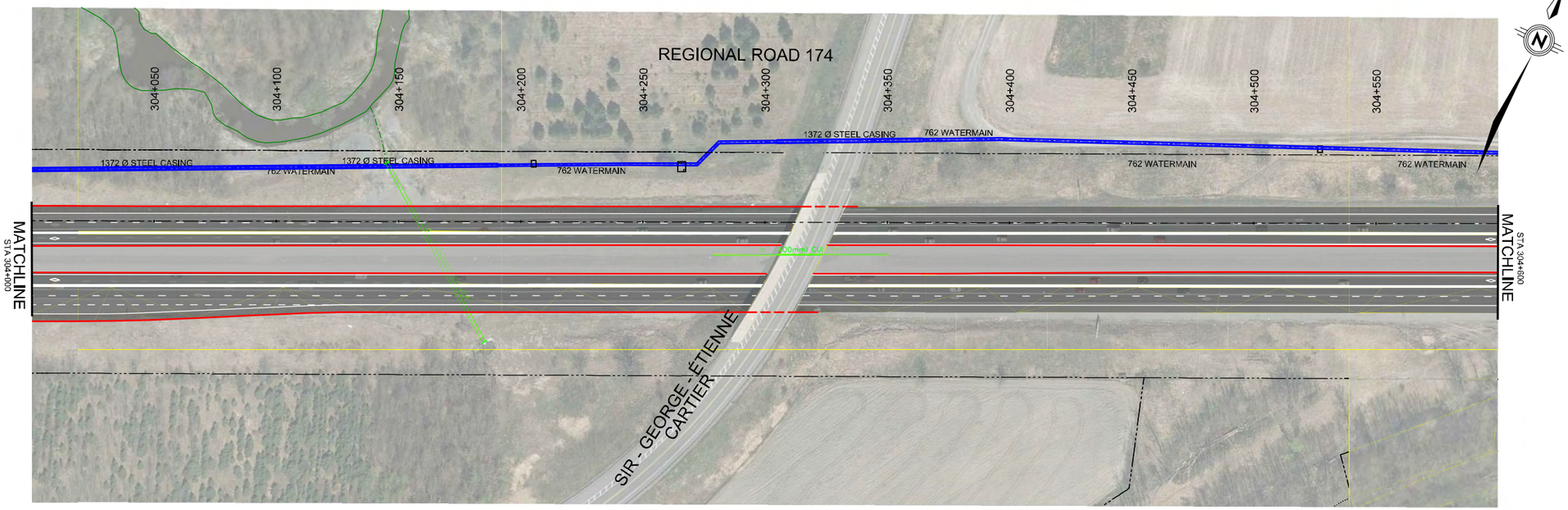
Scale: HORIZONTAL 0m 10 20 50 100 — VERTICAL 0m 0.5 5 10 20

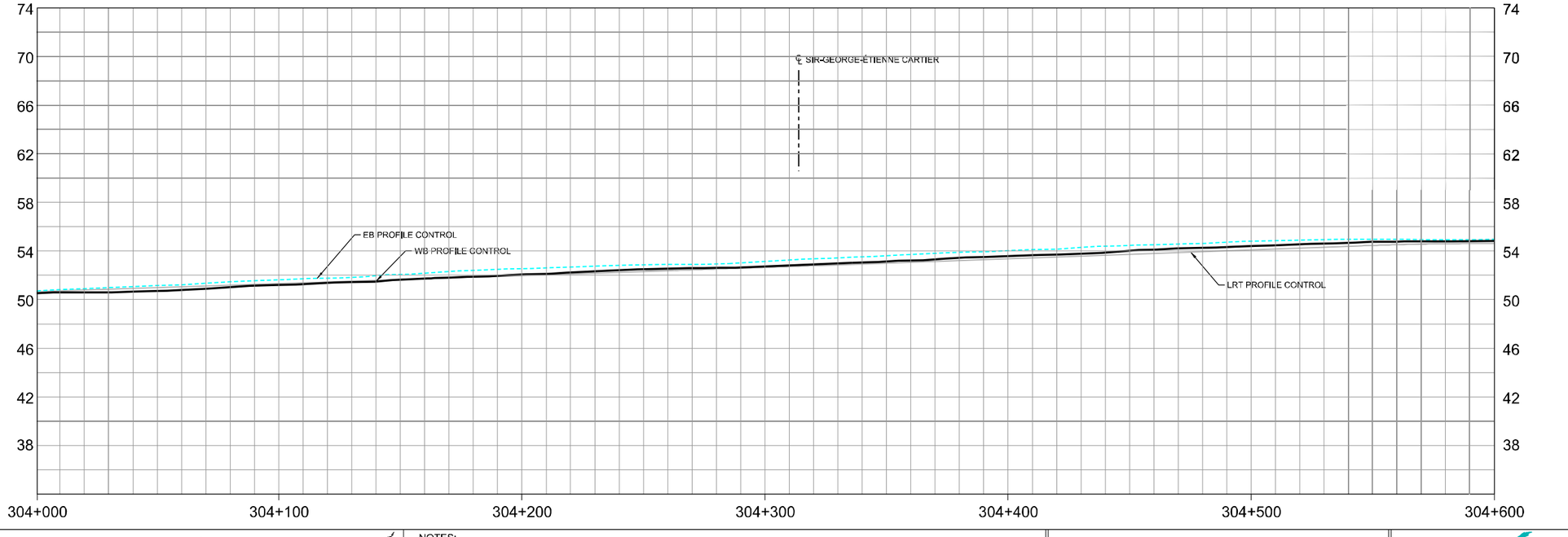
CAD File Name: EO2388TOD-01-PDR-08.DGN | Plot Date: XX/XX/XXXX

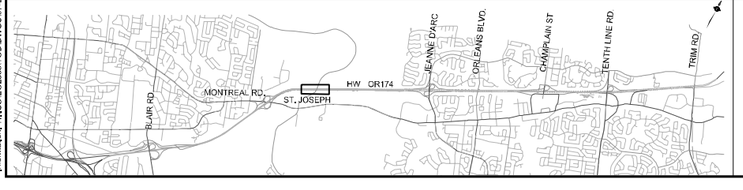
Ottawa

HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 303+400 to STA 304+000

Drawings No.: | Revision 00 | Sheet No. 08







NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

CAD File Name: EO2388TOD- 01-PDR-09.DGN

Plot Date: XX/XX/XXXX

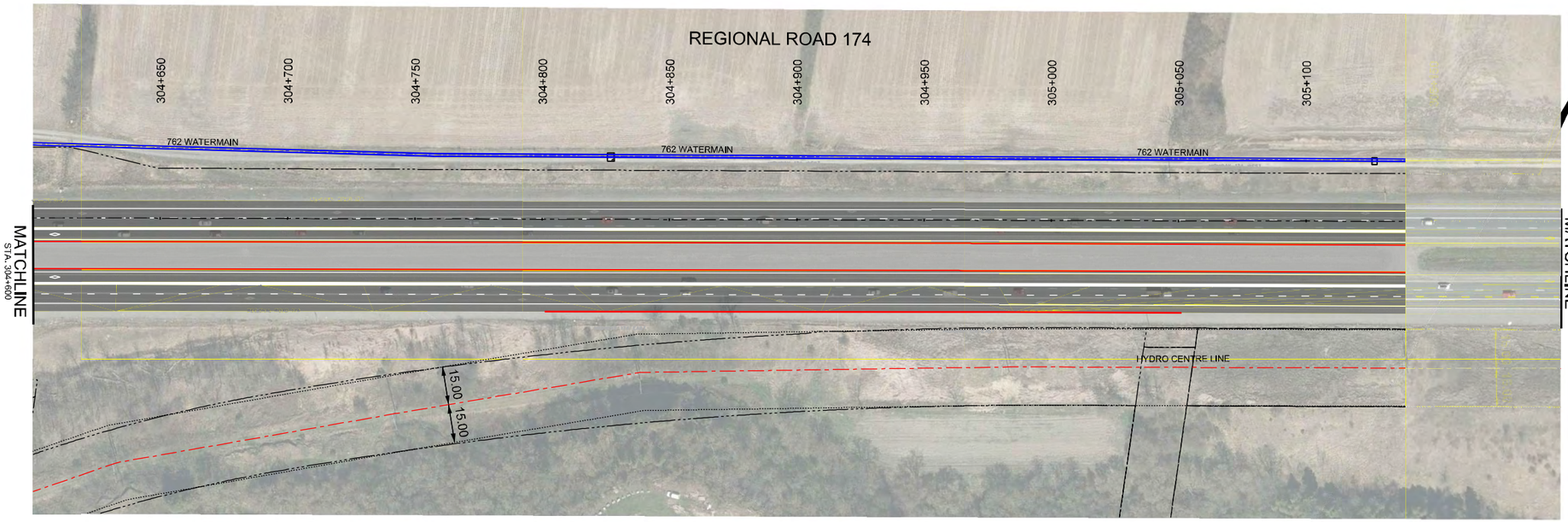
Ottawa

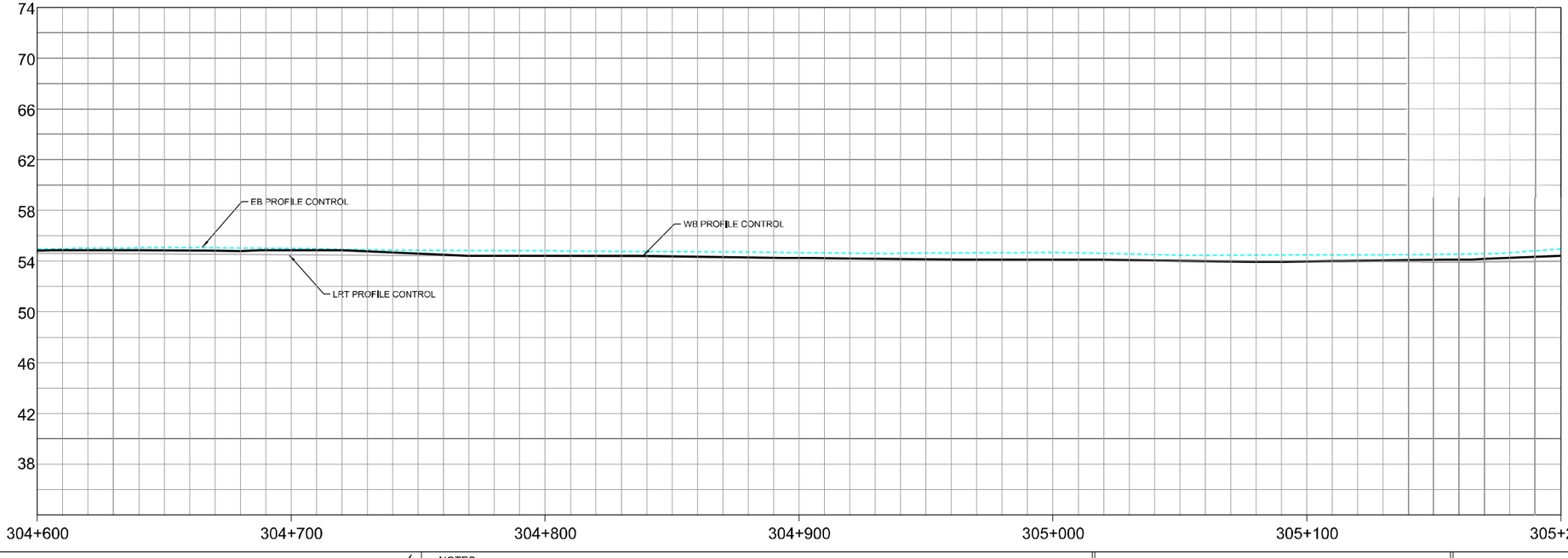
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 304+000 to STA 304+600

Drawings No.:

Revision: 00

Sheet No.: 09





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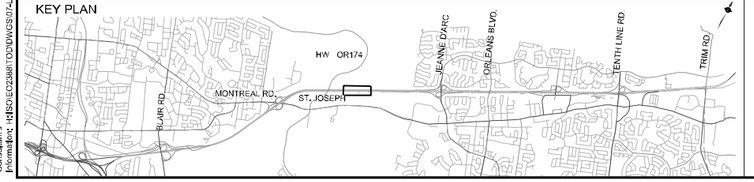

NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100 / 0m 2.5 5 10 20 VERTICAL

CAD File Name:	Plot Date:
EO2388TOD- 01-PDR-10.DGN	XX/XX/XXXX

Ottawa

HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 304+600 to STA 305+200

Drawings No.:	Revision	Sheet No.
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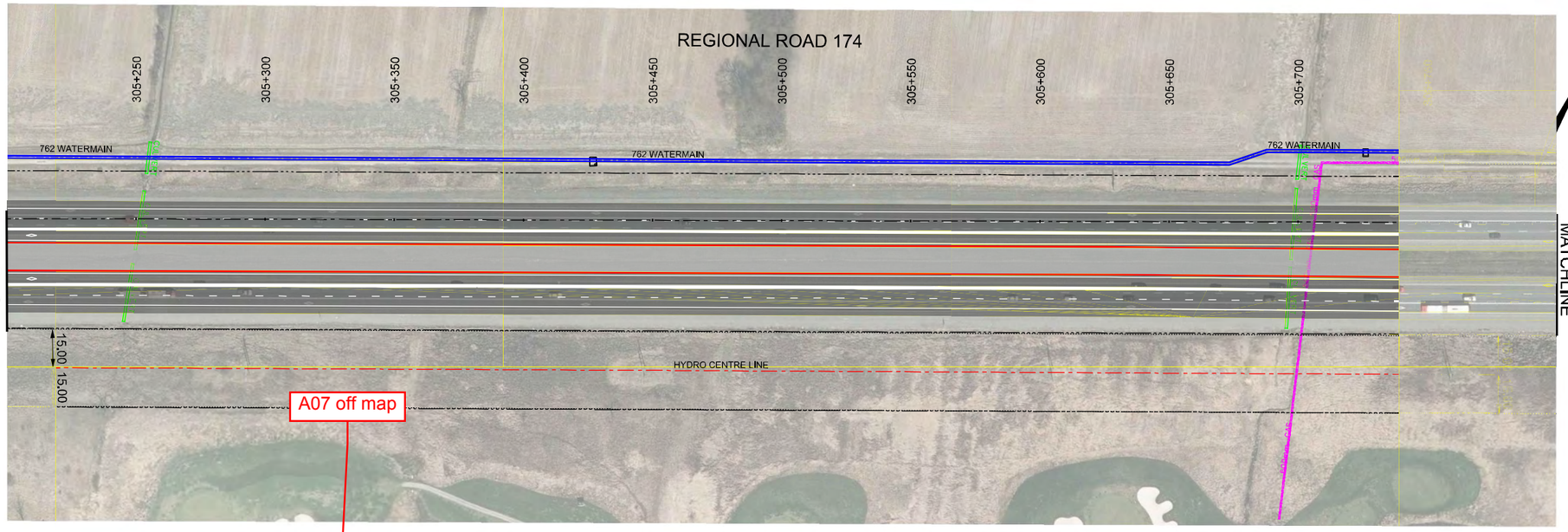

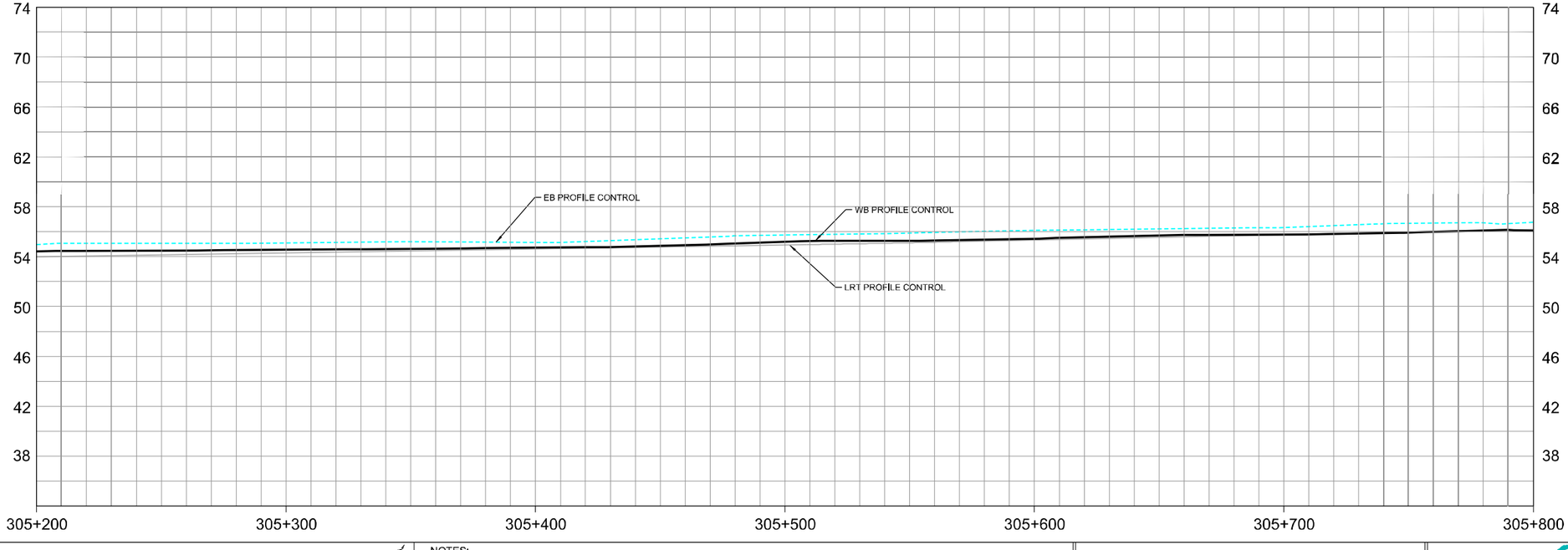

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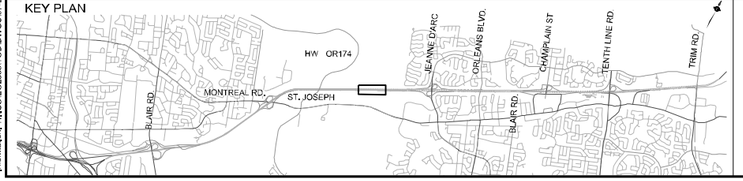


NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

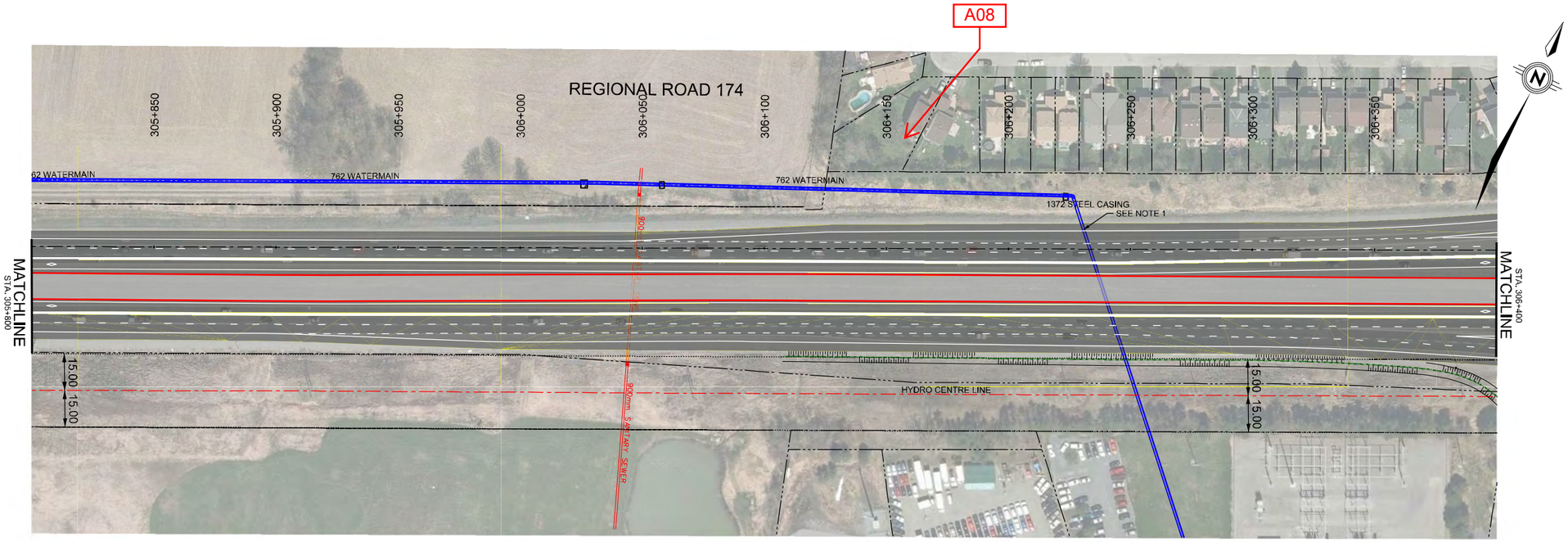
Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

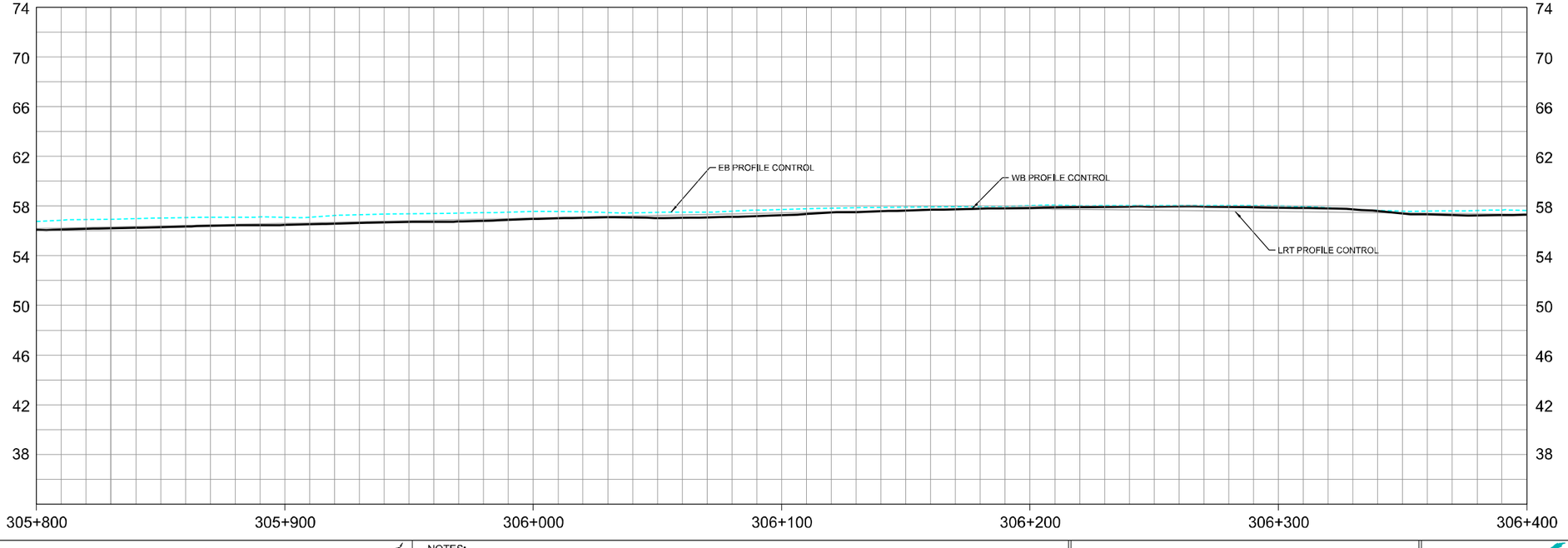
CAD File Name: EO2388TOD-01-PDR-11.DGN	Plot Date: XX/XX/XXXX	

Ottawa

HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 305+200 to STA 305+800

Drawings No.:	Revision	Sheet No.
	00	11





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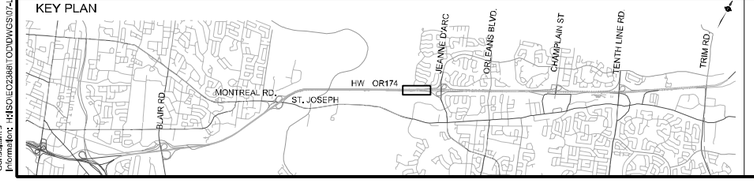


NOTES:

1. LOCATION OF NORTH-SOUTH WATERMAIN CROSSING OF OR174 IS APPROXIMATE AND IS TO BE CONFIRMED WHEN AS-BUILT INFORMATION IS AVALIABLE.

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

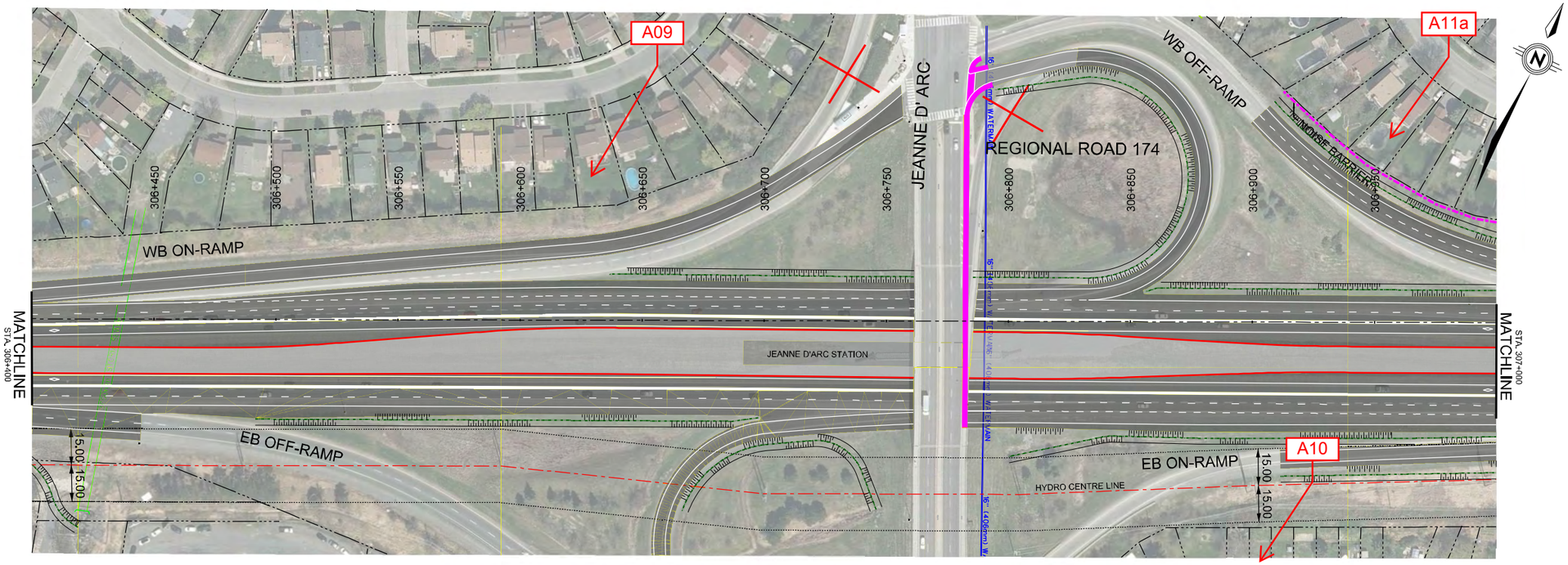
Scale:
HORIZONTAL 0m 10 20 50 100
VERTICAL 0m 2.5 5 10 20

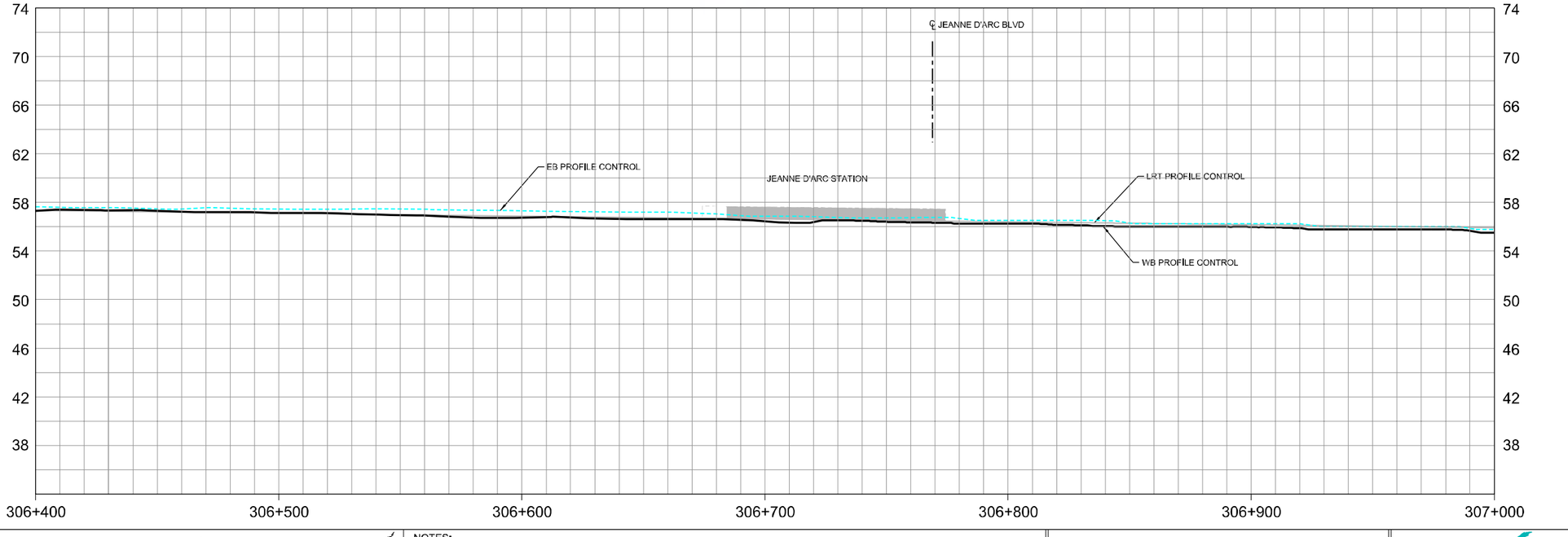
CAD File Name:	Plot Date:
EO2388TOD- 01-PDR-12.DGN	XX/XX/XXXX

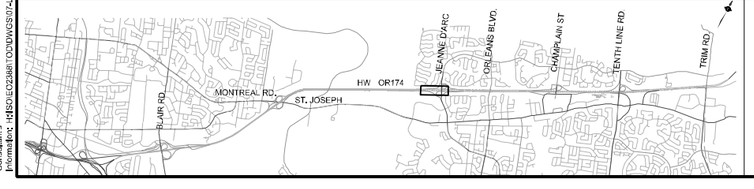
Ottawa

HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 305+800 to STA 306+400

Drawings No.:	Revision	Sheet No.
	00	12







NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

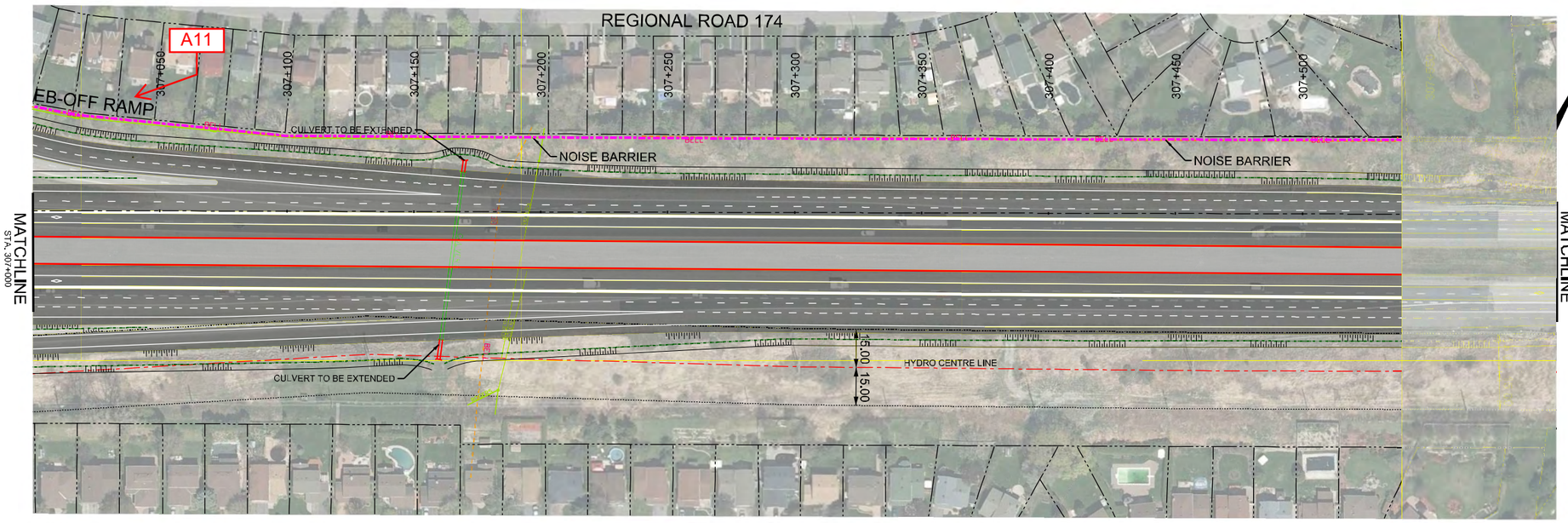
Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

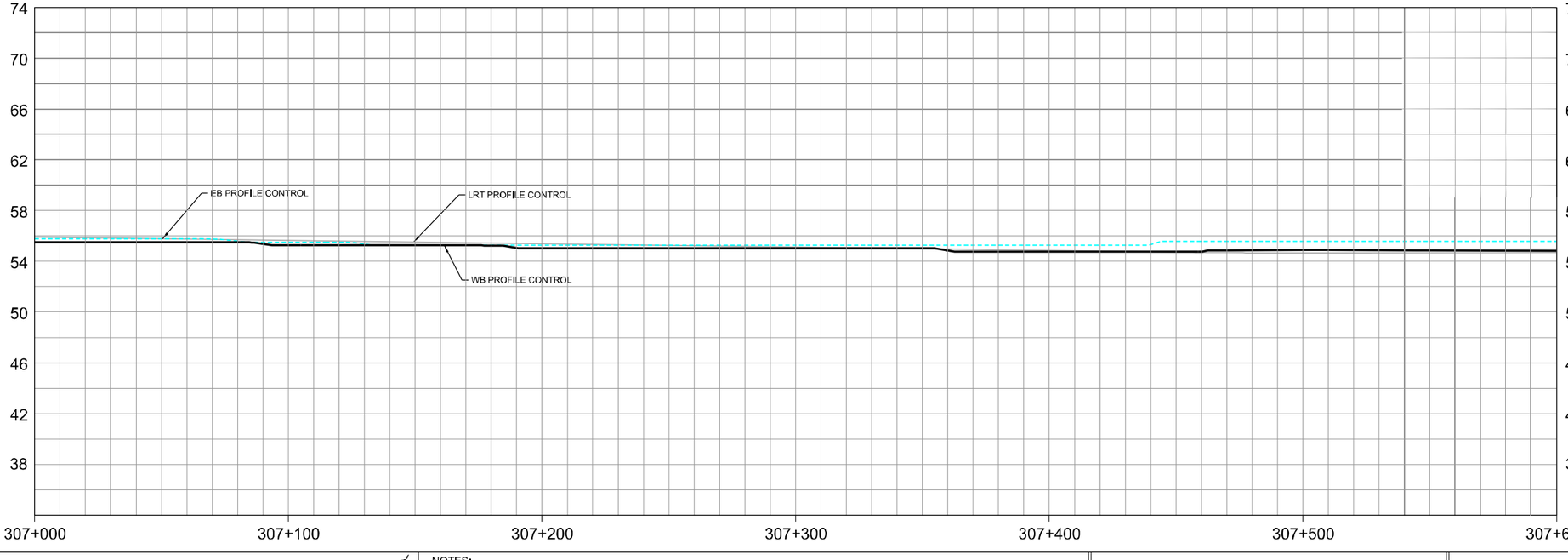
CAD File Name: EO2388TOD- 01-PDR-13.DGN | Plot Date: XX/XX/XXXX

Ottawa

HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 306+400 to STA 307+000

Drawings No.: | Revision 00 | Sheet No. 13





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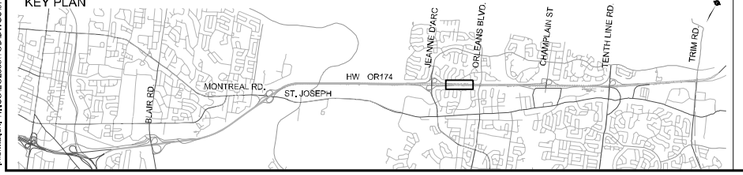


NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

CAD File Name: EO2388TOD-01-PDR-14.DGN

Plot Date: XX/XX/XXXX

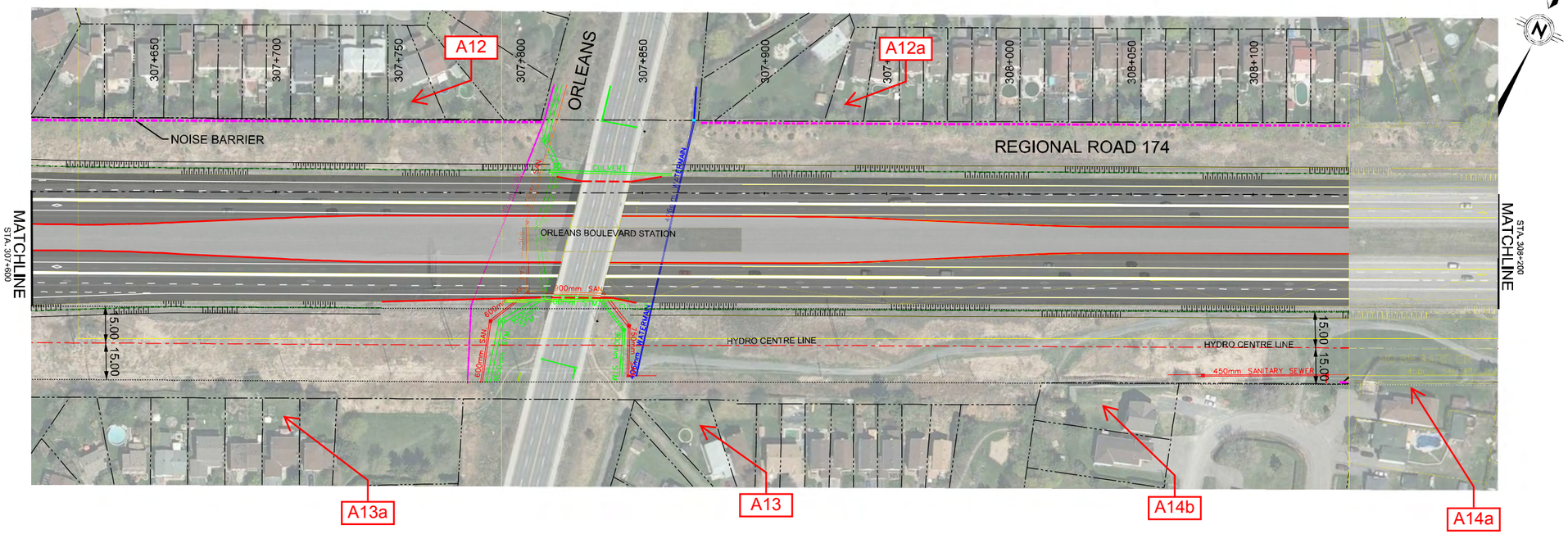
Ottawa

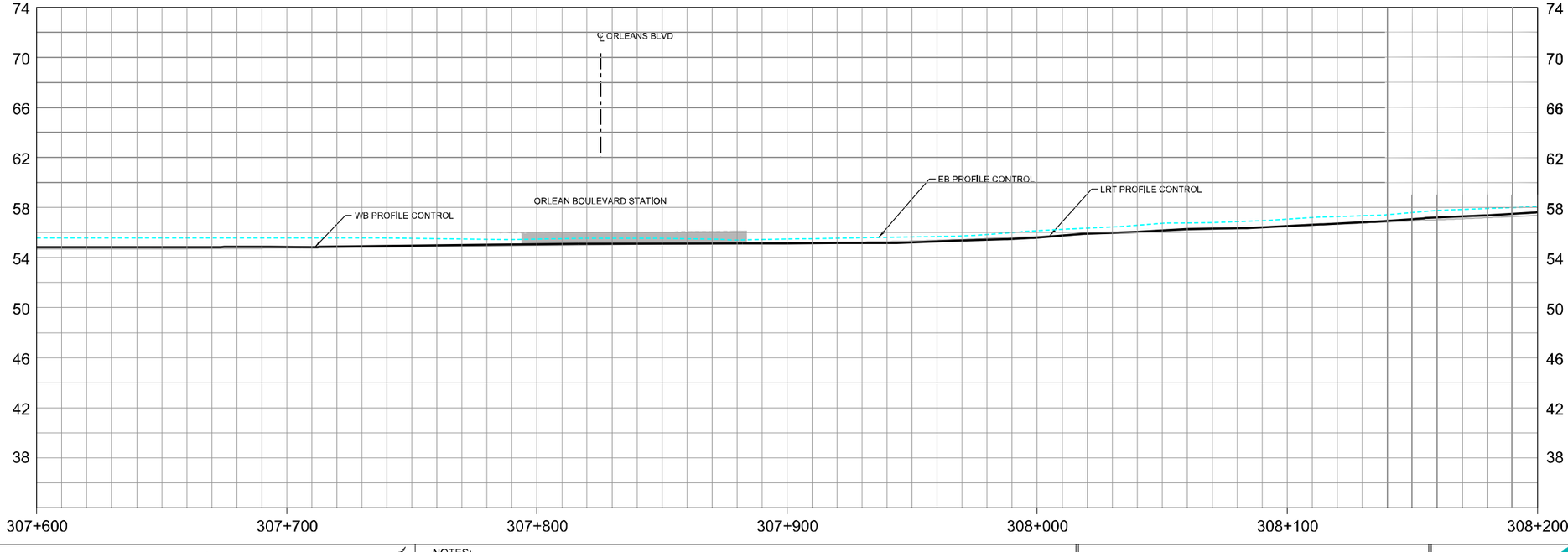
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 307+000 to STA 307+600

Drawings No.:

Revision: 00

Sheet No.: 14





KEY PLAN

NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

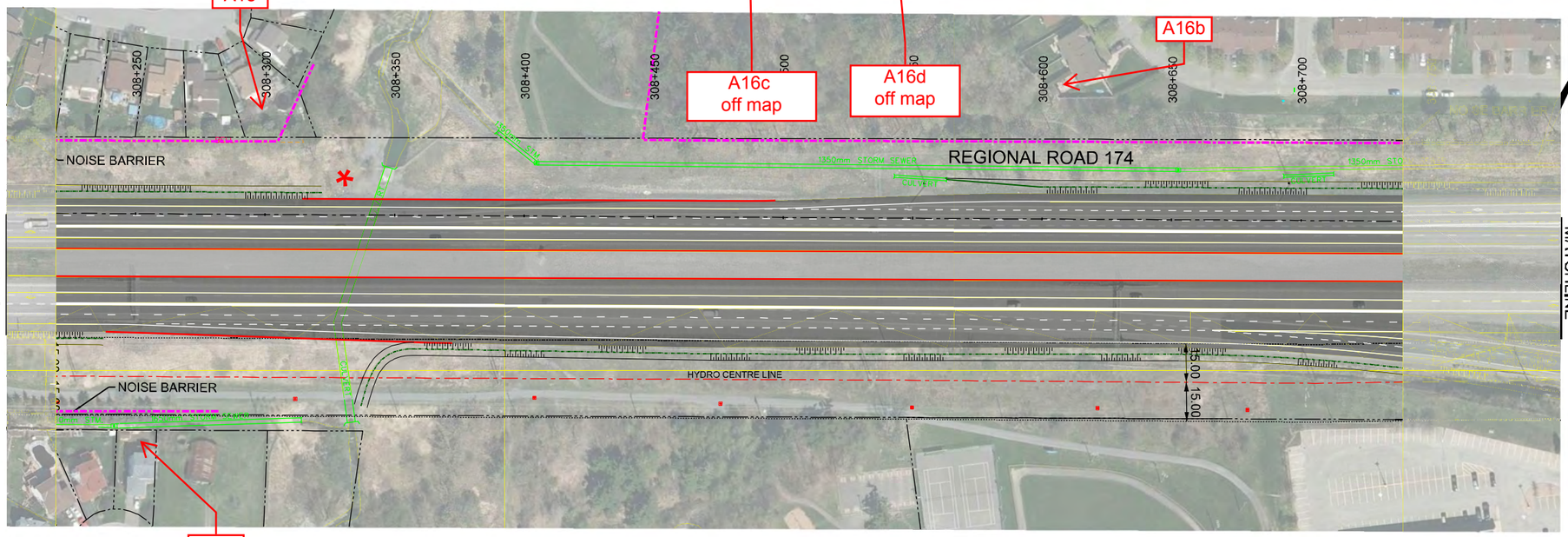
CAD File Name: EO2388TOD- 01-PDR-15.DGN

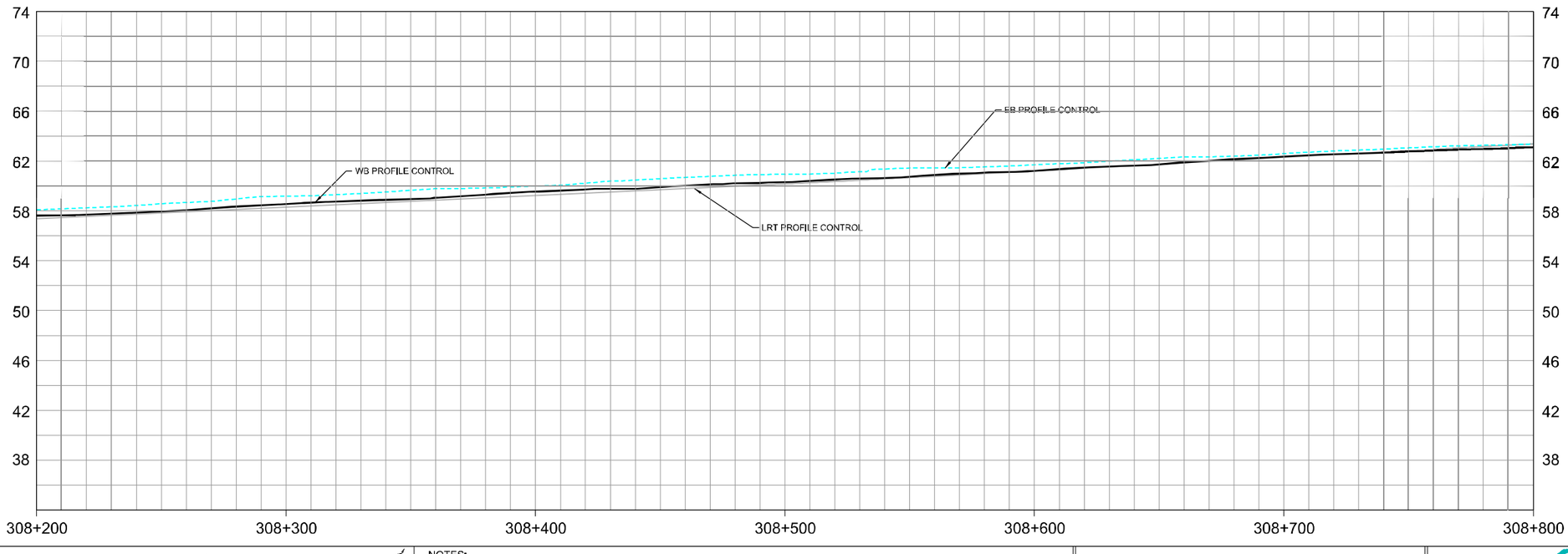
Plot Date: XX/XX/XXXX

Ottawa

HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 307+600 to STA 308+200

Drawings No.: | Revision: 00 | Sheet No.: 15





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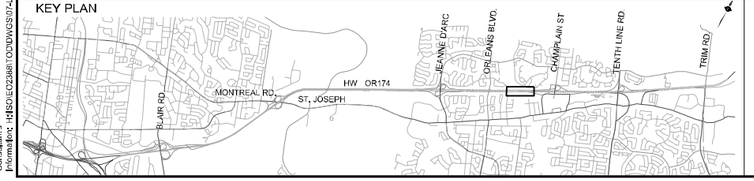


NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

CAD File Name: EO2388TOD-01-PDR-16.DGN

Plot Date: XX/XX/XXXX

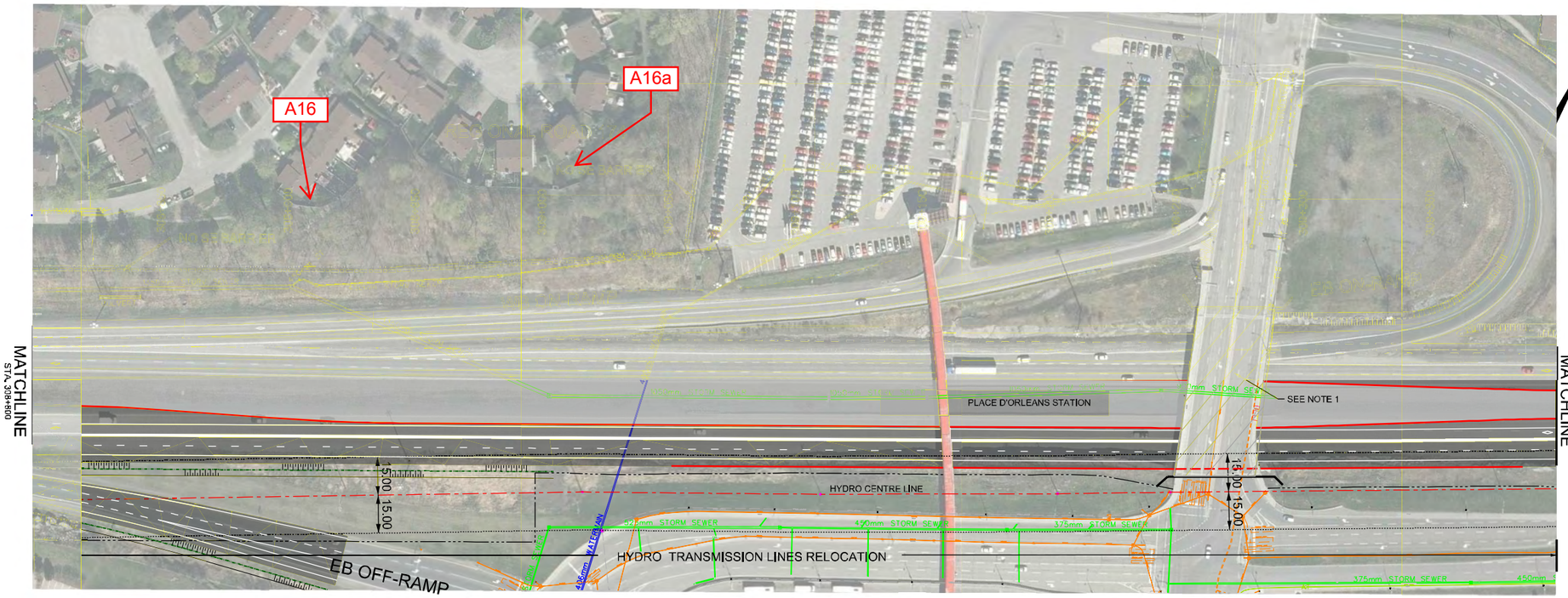
Ottawa

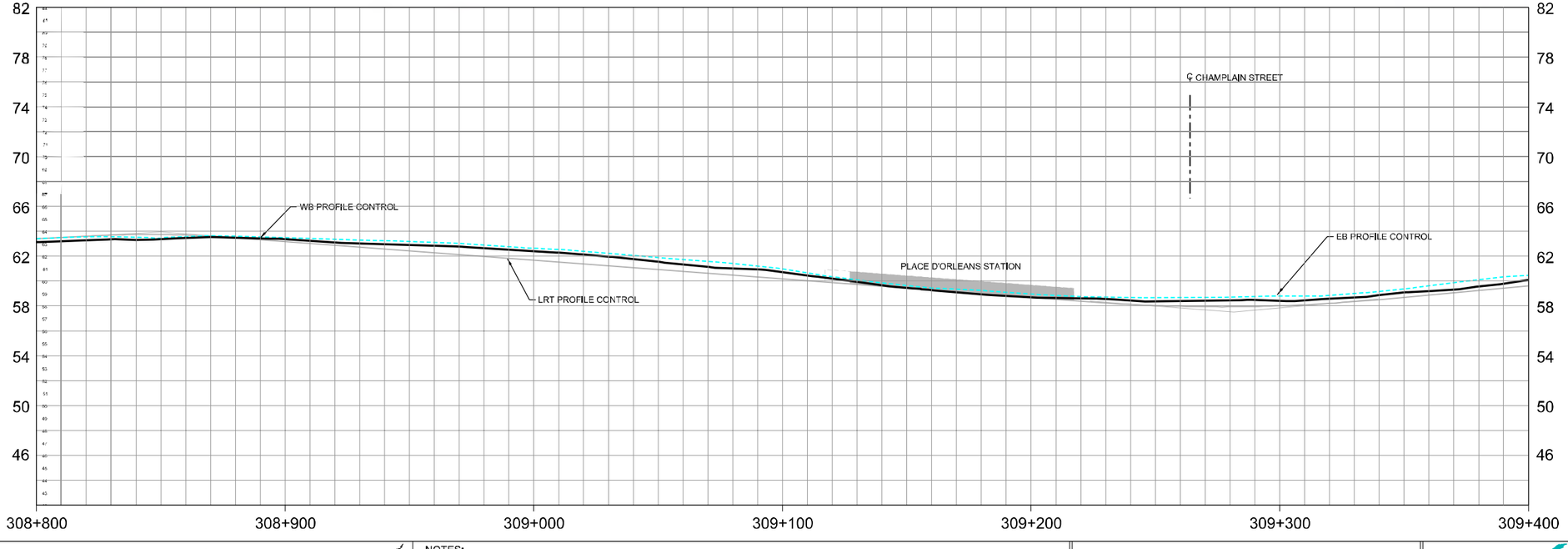
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 308+200 to STA 308+800

Drawings No.:

Revision: 00

Sheet No.: 16





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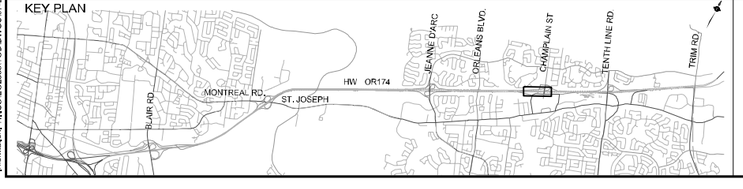


NOTES:

1. CHAMPLAIN BRIDGE TO BE REPLACED

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

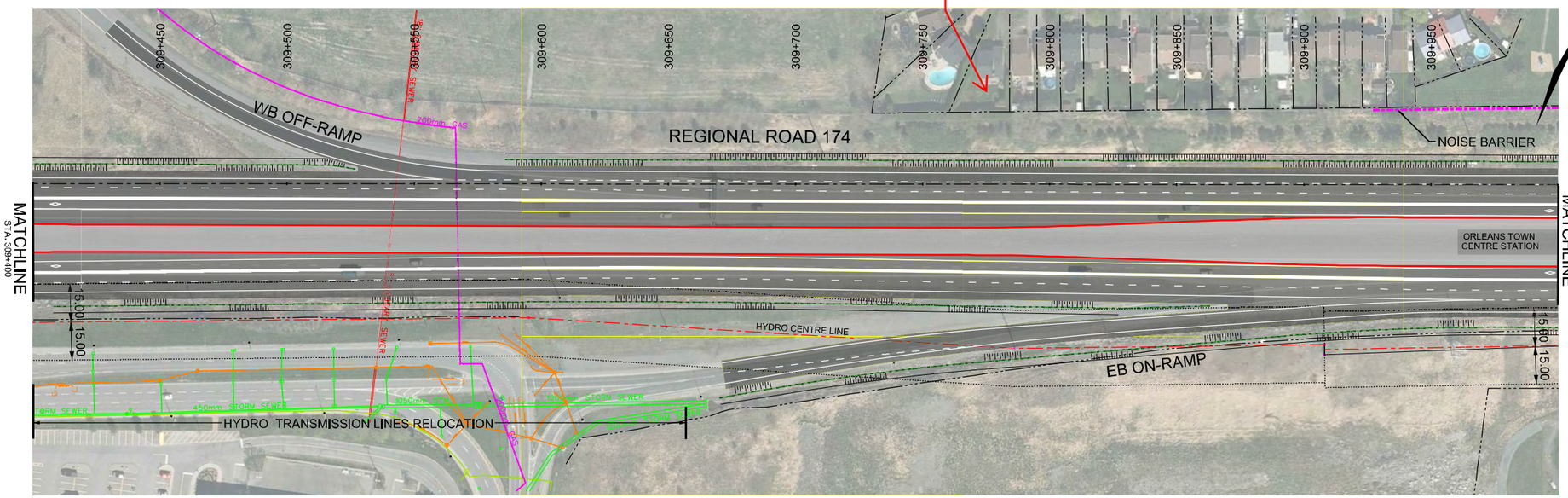
Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

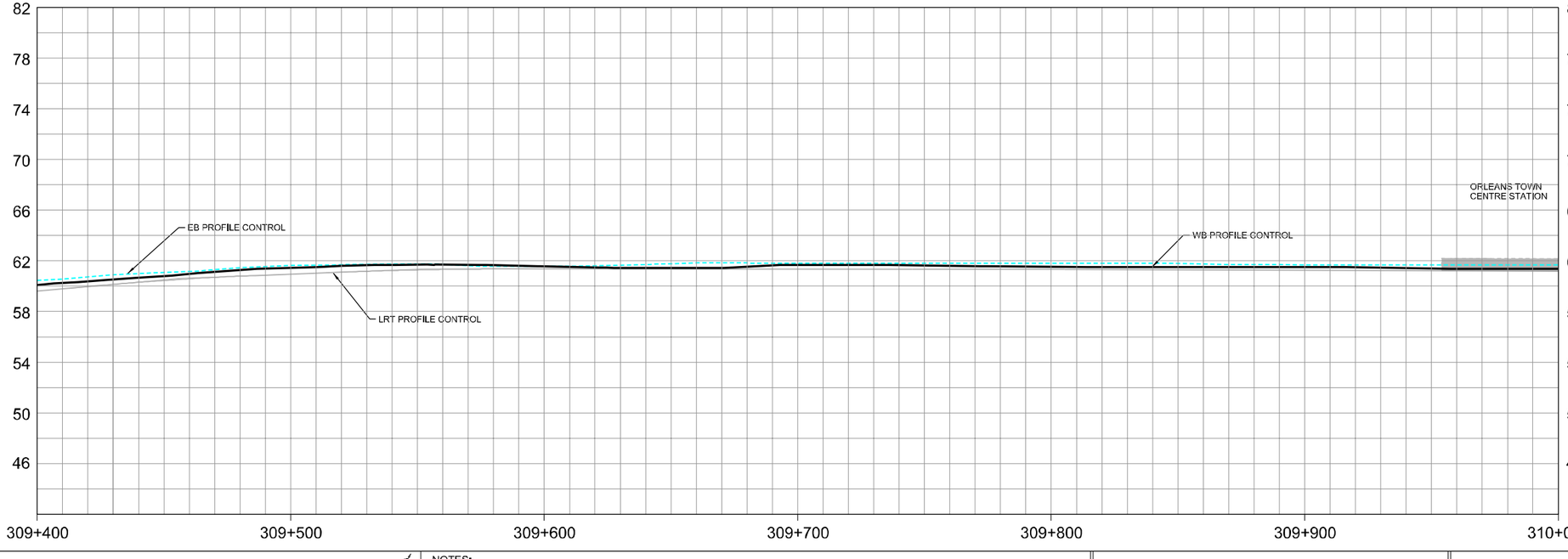
CAD File Name:	Plot Date:
EO2388TOD- 01-PDR-17.DGN	XX/XX/XXXX

Ottawa

HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 308+800 to STA309+400

Drawings No.:	Revision	Sheet No.
	00	17





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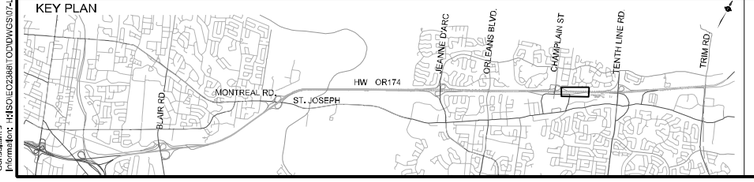


NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

CAD File Name: EO2388TOD- 01-PDR-18.DGN

Plot Date: XX/XX/XXXX

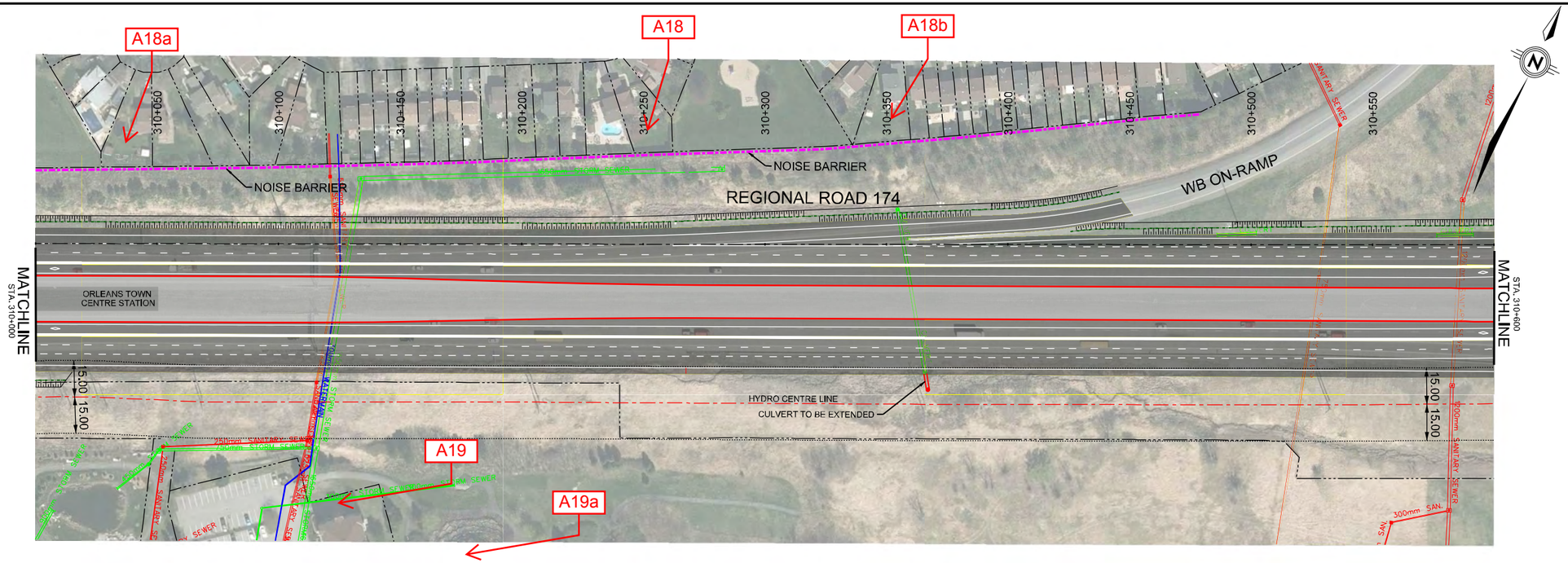
Ottawa

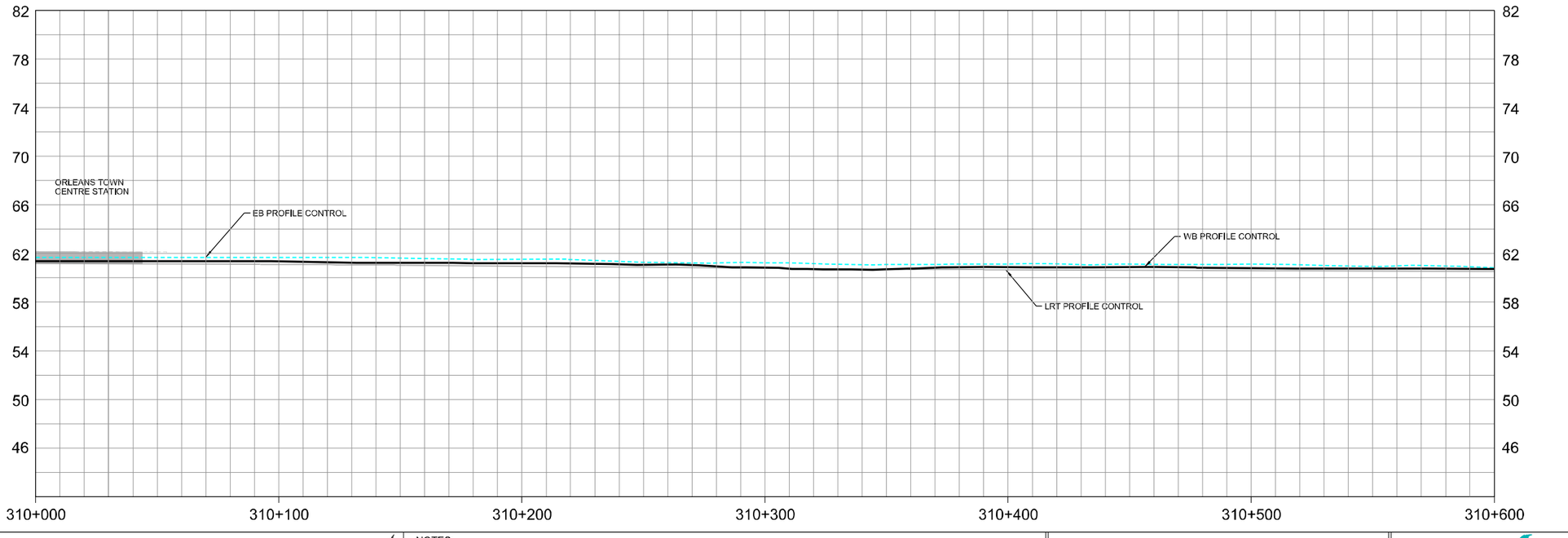
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 309+400 to STA. 310+000

Drawings No.:

Revision 00

Sheet No. 18





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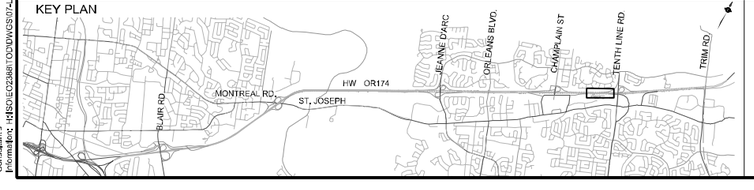


NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

CAD File Name: EO2388TOD- 01-PDR-19.DGN

Plot Date: XX/XX/XXXX

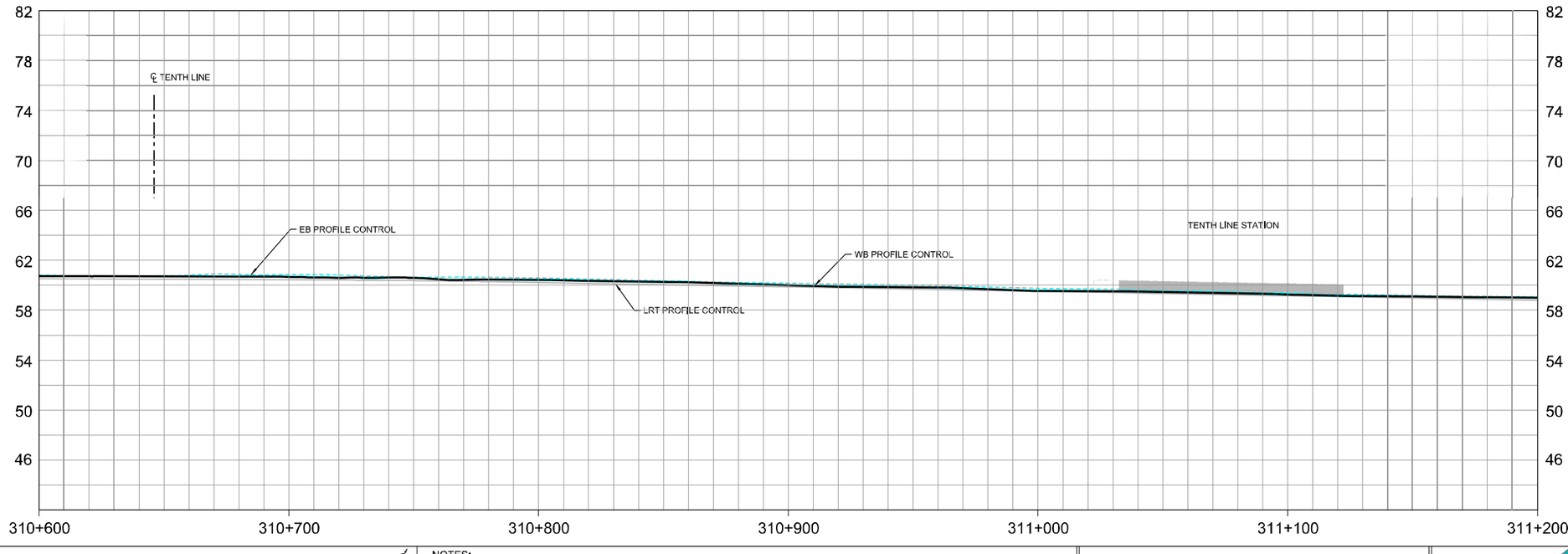
Ottawa

HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 310+000 to STA 310+600

Drawings No.:

Revision: 00

Sheet No.: 19



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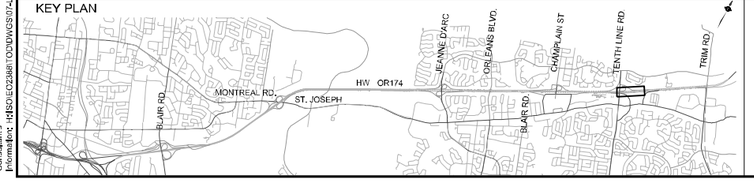


NOTES:

1. SLOPE PAVING TO BE MODIFIED ON NORTH SIDE OF STRUCTURE

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

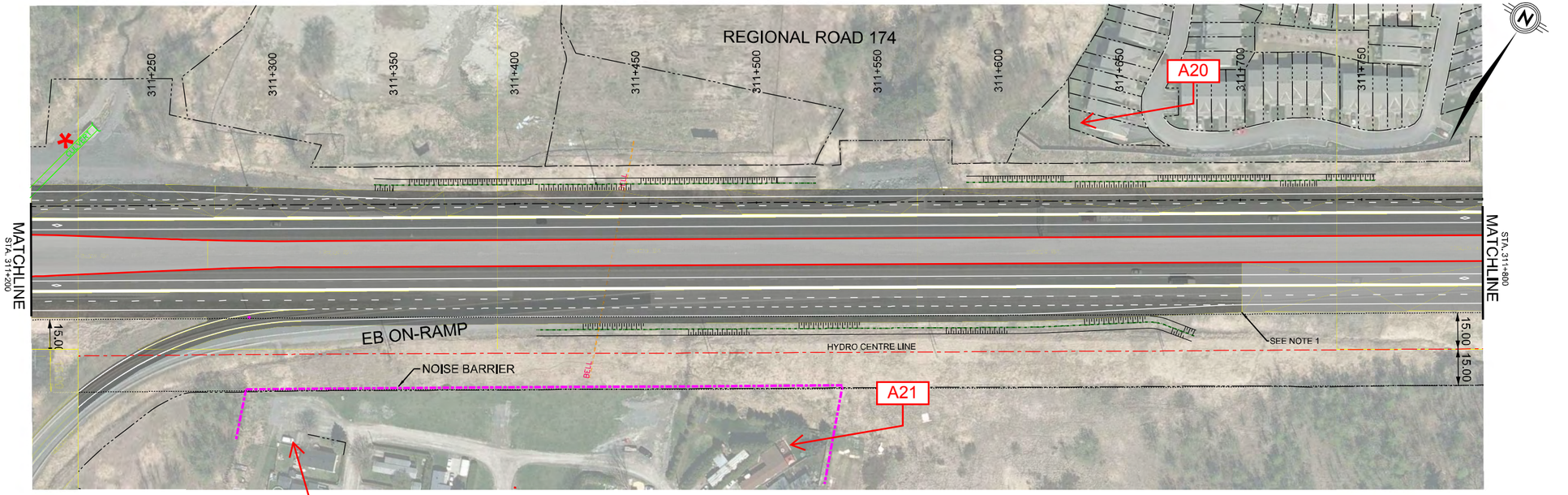
CAD File Name: EO2388TOD- 01-PDR-20.DGN

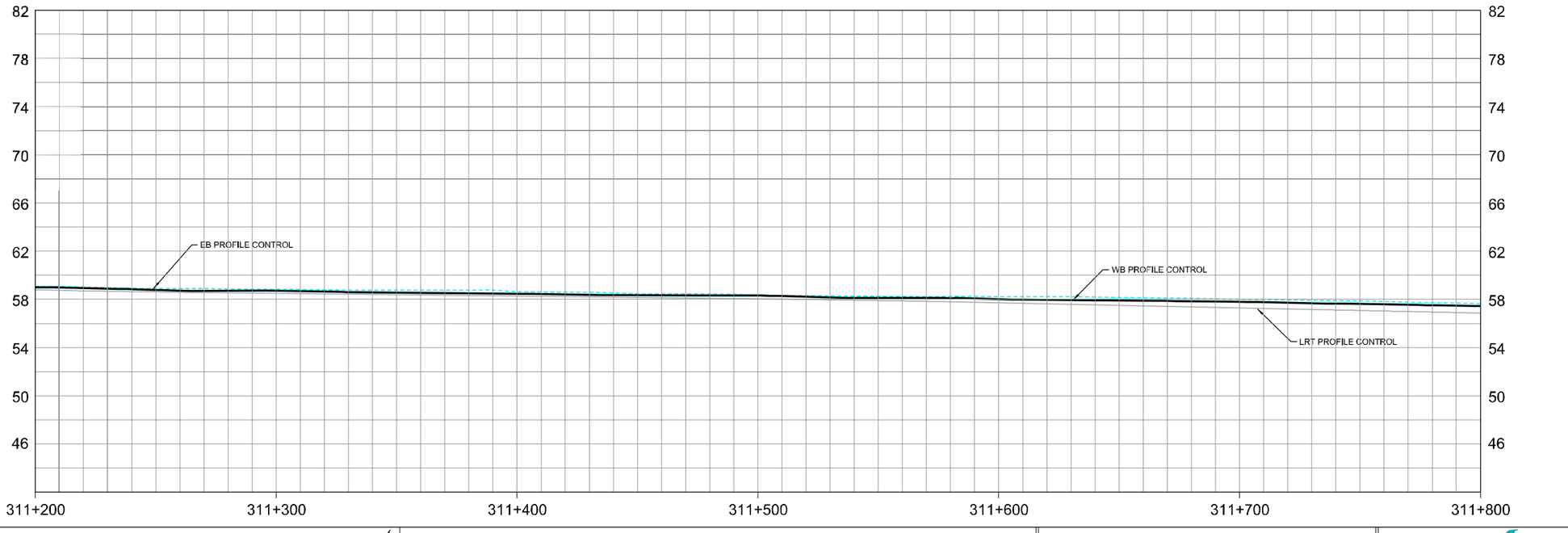
Plot Date: XX/XX/XXXX

Ottawa

HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 310+600to STA 311+200

Drawings No.: | Revision: 00 | Sheet No.: 20





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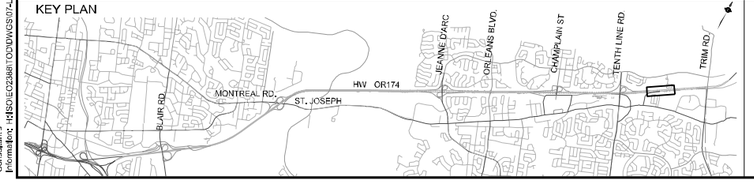


NOTES:

1. APPROXIMATE EASTBOUND TIE IN TO TRIM ROAD INTERCHANGE AT STA. 311+700

PARSONS

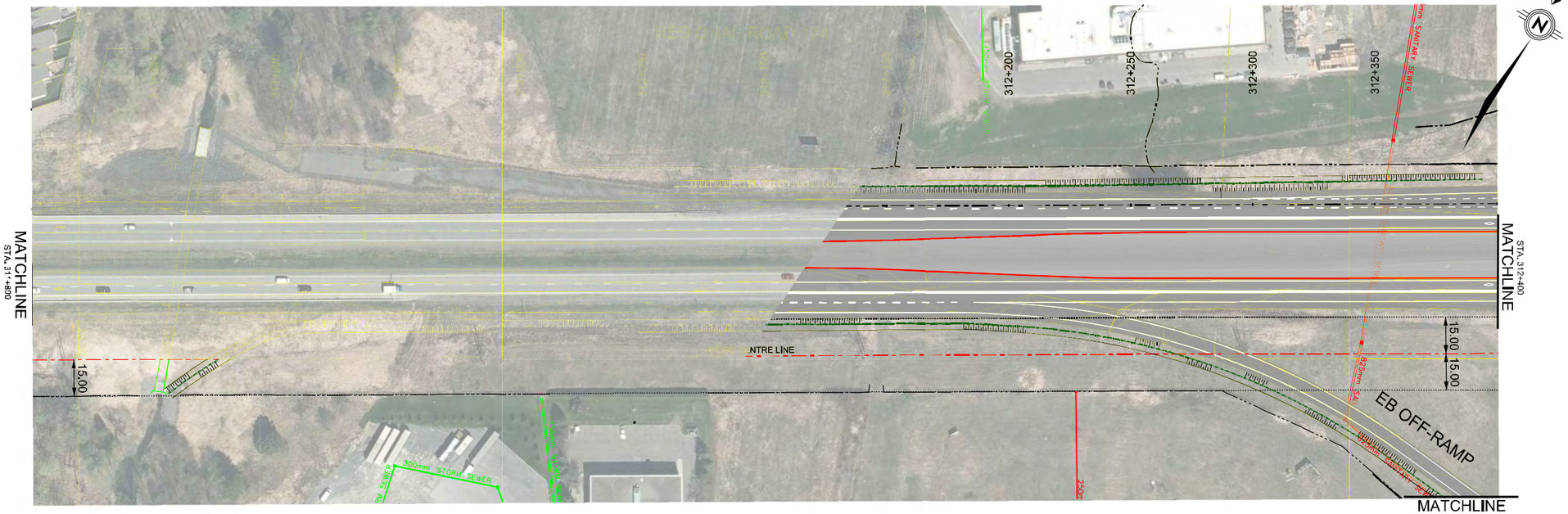
Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

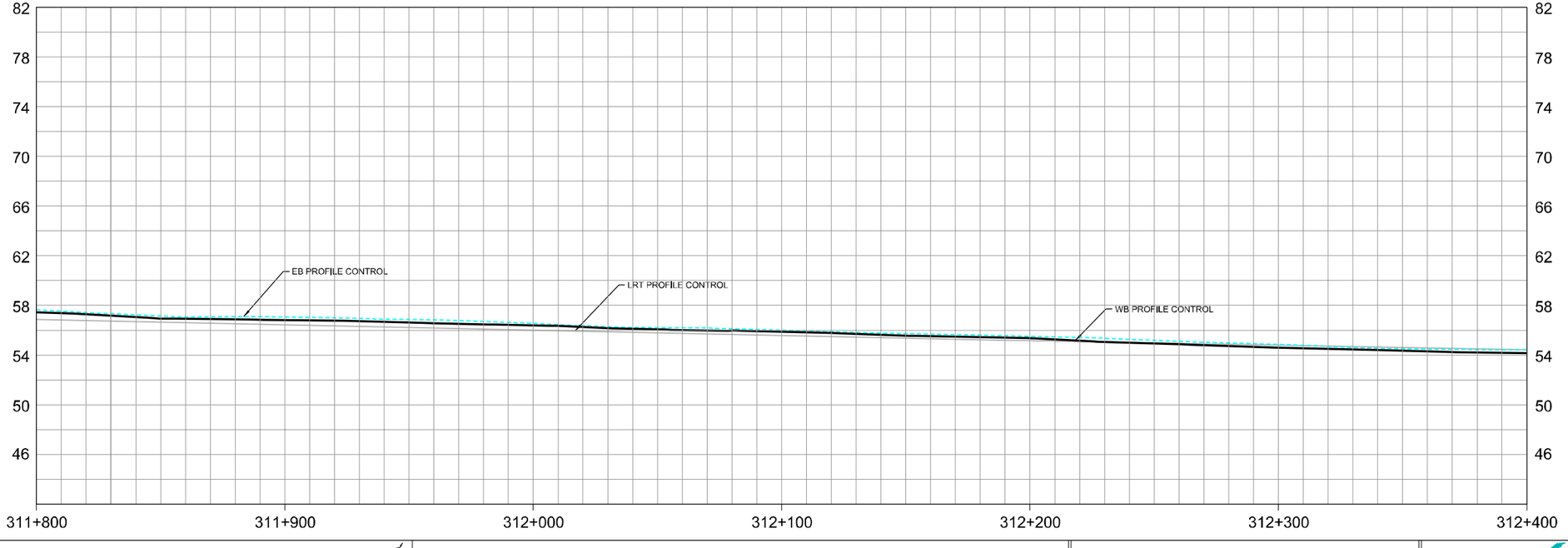
Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

CAD File Name: EO2388TOD-01-PDR-21.DGN	Plot Date: XX/XX/XXXX	Drawings No.:	Revision 00 / Sheet No. 21

Ottawa

HWY OR174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 311+200 to STA. 311+800





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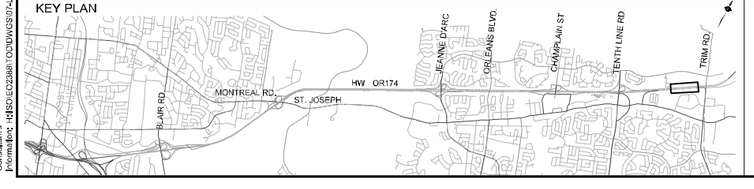

NOTES:

1. APPROXIMATE WESTBOUND TIE IN TO TRIM ROAD INTERCHANGE AT STA. 311+935

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

CAD File Name: EO2388TOD- 01-PDR-22.DGN

Plot Date: XX/XX/XXXX

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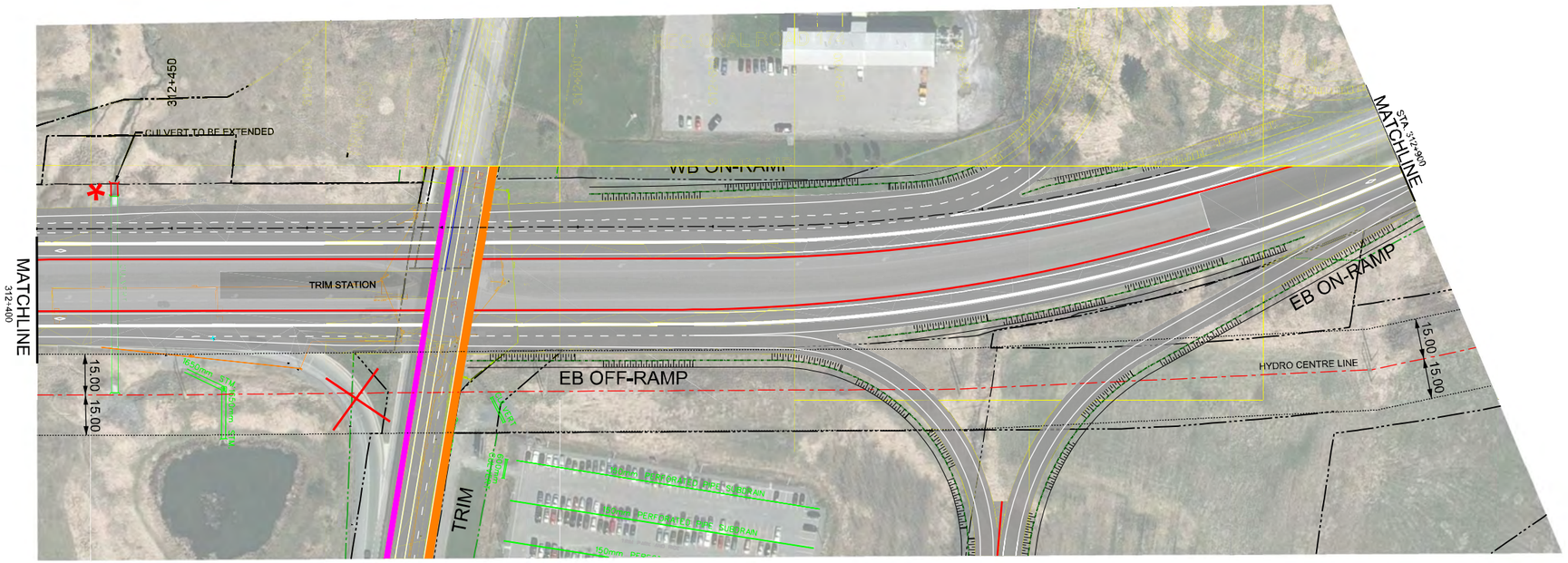
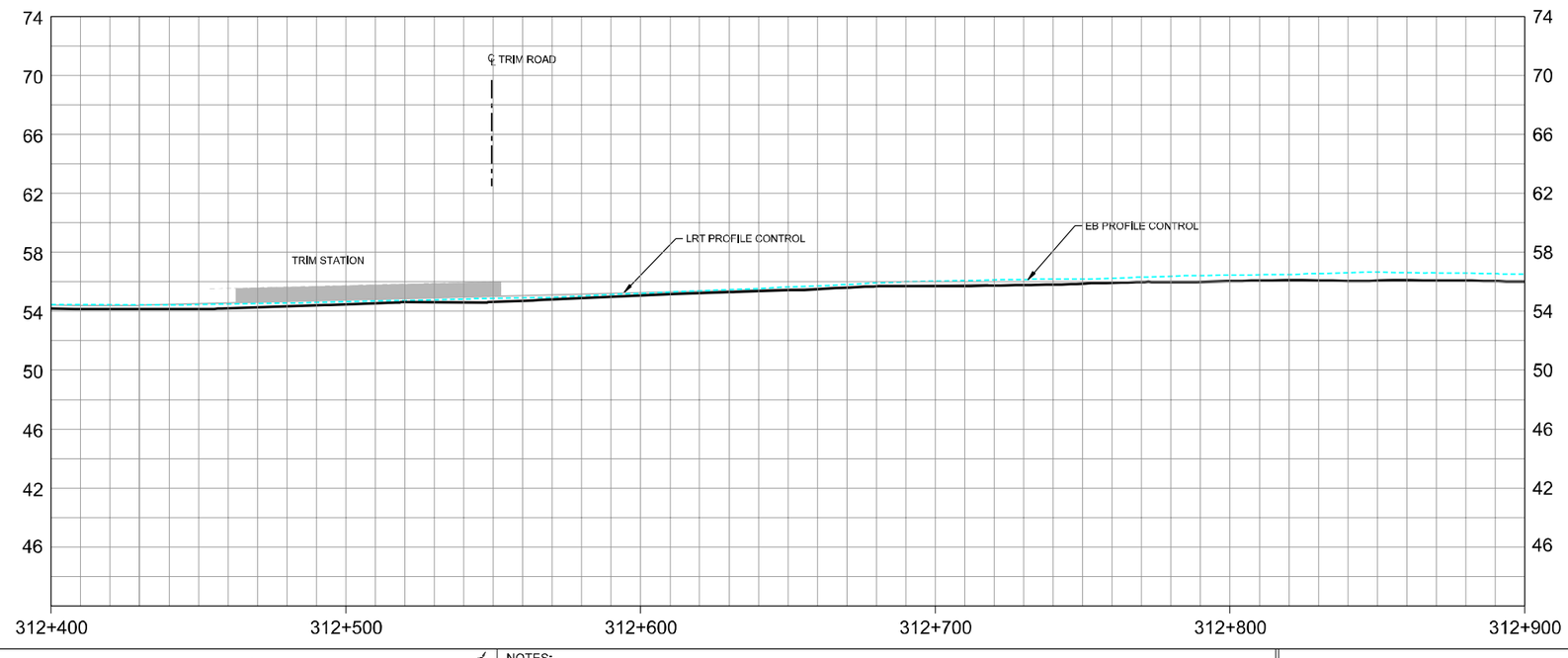
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 311+800 to STA. 312+400

Drawings No.:

Revision: 00

Sheet No.: 22





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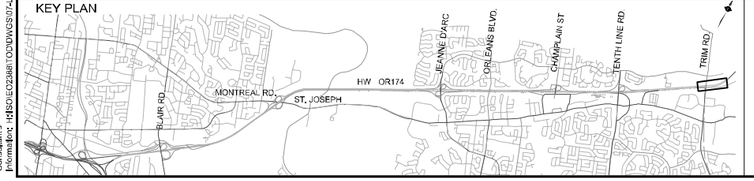

NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

CAD File Name: EO2388TOD-01-PDR-23.DGN | Plot Date: XX/XX/XXXX

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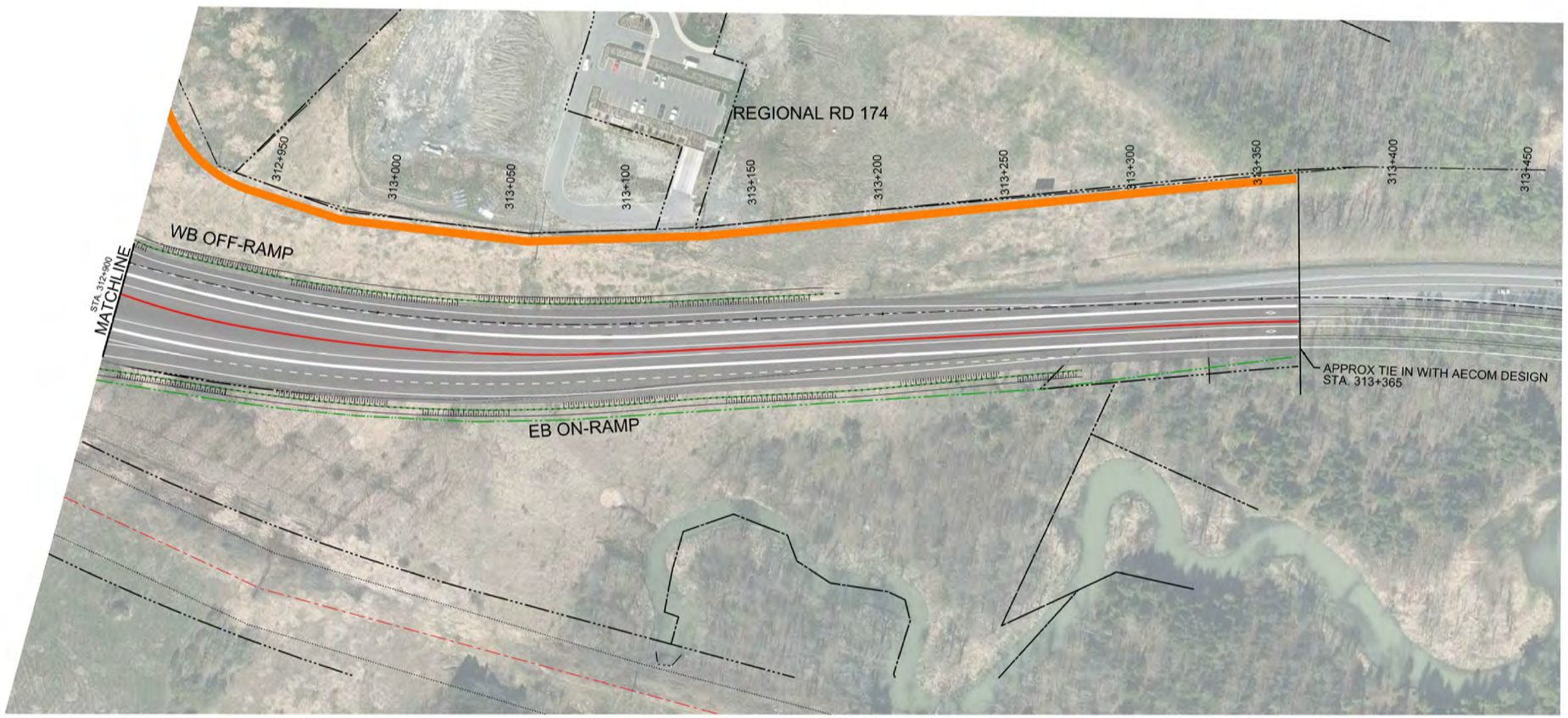
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 312+400 to STA. 312+900

Drawings No.: | Revision 00 | Sheet No. 23



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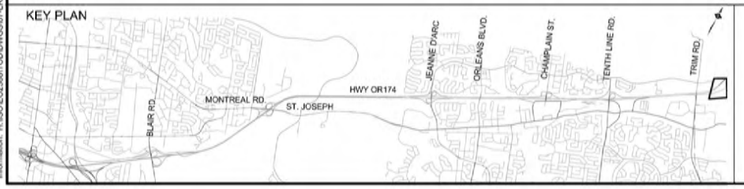

NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By

Scale: HORIZONTAL 1in 10 20 50 100; 1in 2.5 5 10 25; VERTICAL

CAD File Name: EO2388TOD- 01-PDR-24.DGN	Plot Date: XX/XX/XXXX

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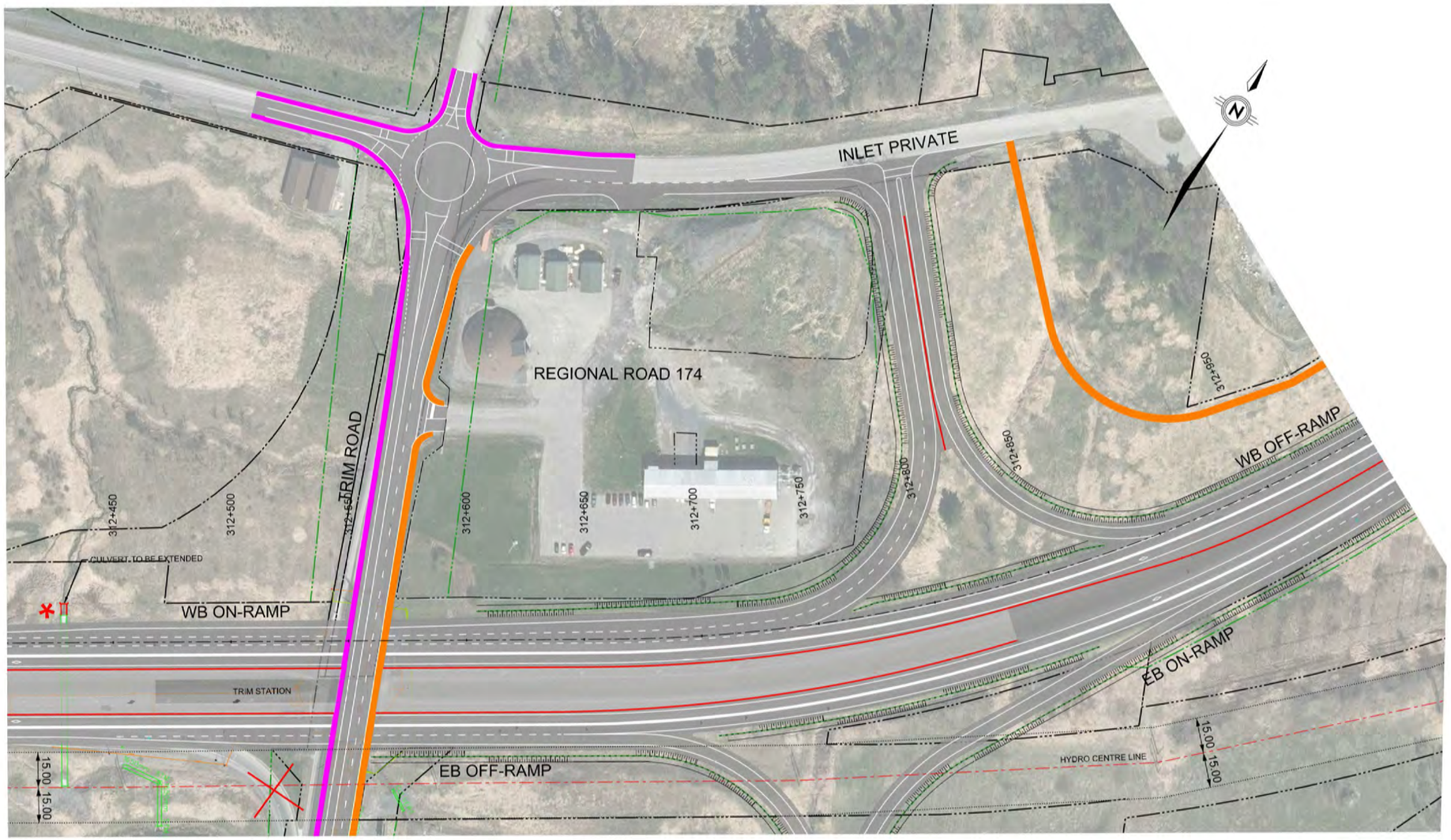
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 312+900 to STA 313+450

Drawings No.:	Revision	Sheet No.
	00	24



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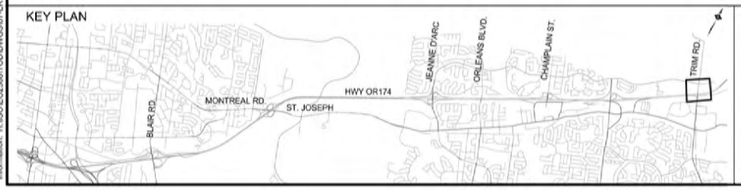

NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

CAD File Name: EO2388TOD- 01-PDR-25.DGN | Plot Date: XX/XX/XXXX

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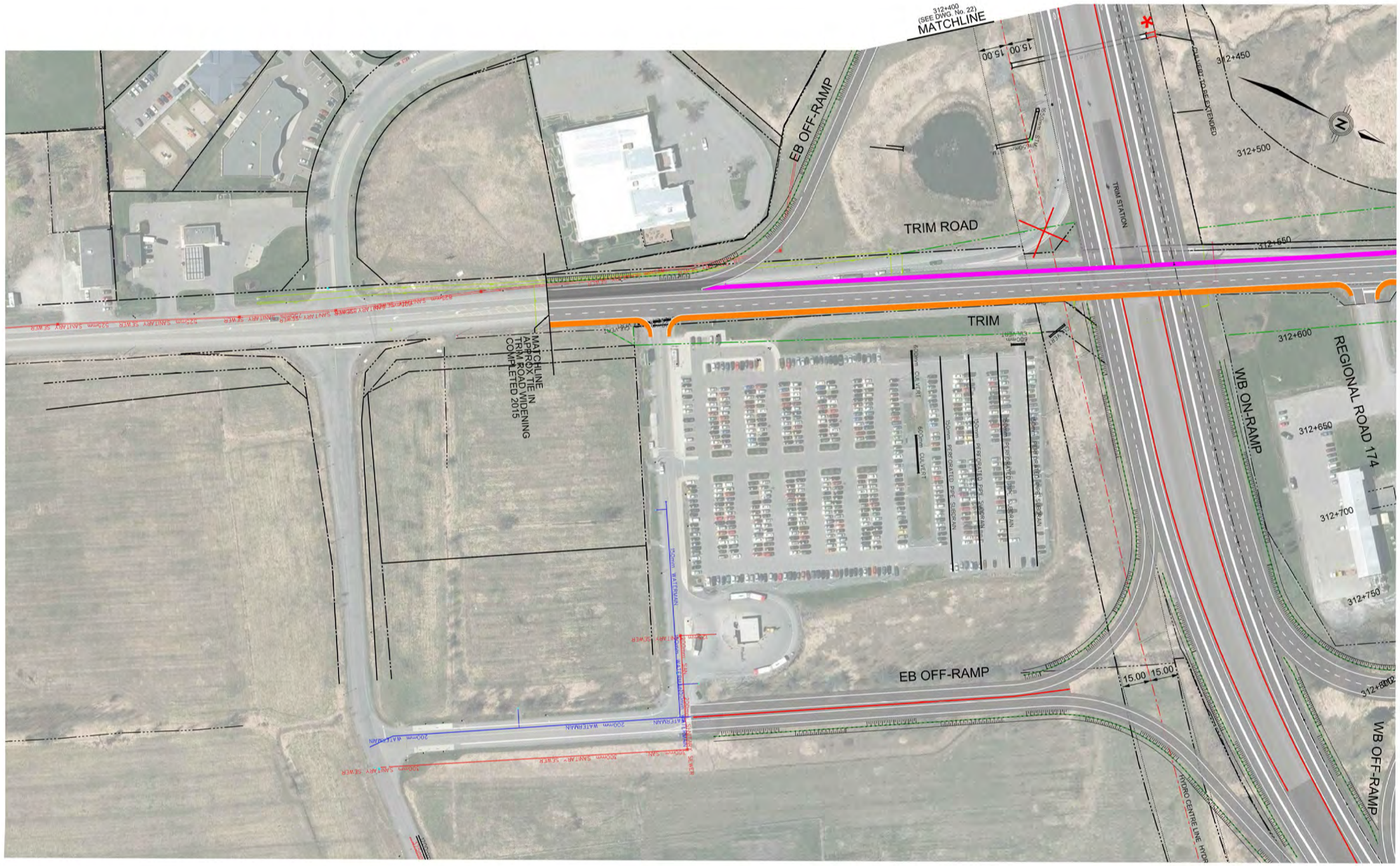
TRIM ROAD INTERCHANGE NORTH

Drawings No.: | Revision: 00 | Sheet No.: 25



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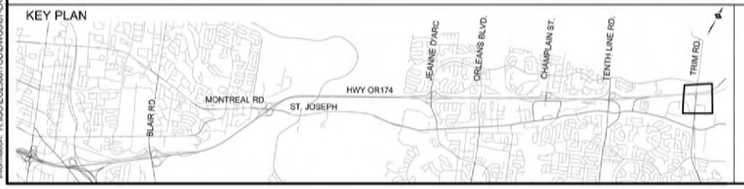

NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By

Scale: HORIZONTAL 1in 10 20 50 100; 1m 2.5 5 10 25; VERTICAL

CAD File Name: EO2388TOD- 01-PDR-26.DGN	Plot Date: XX/XX/XXXX

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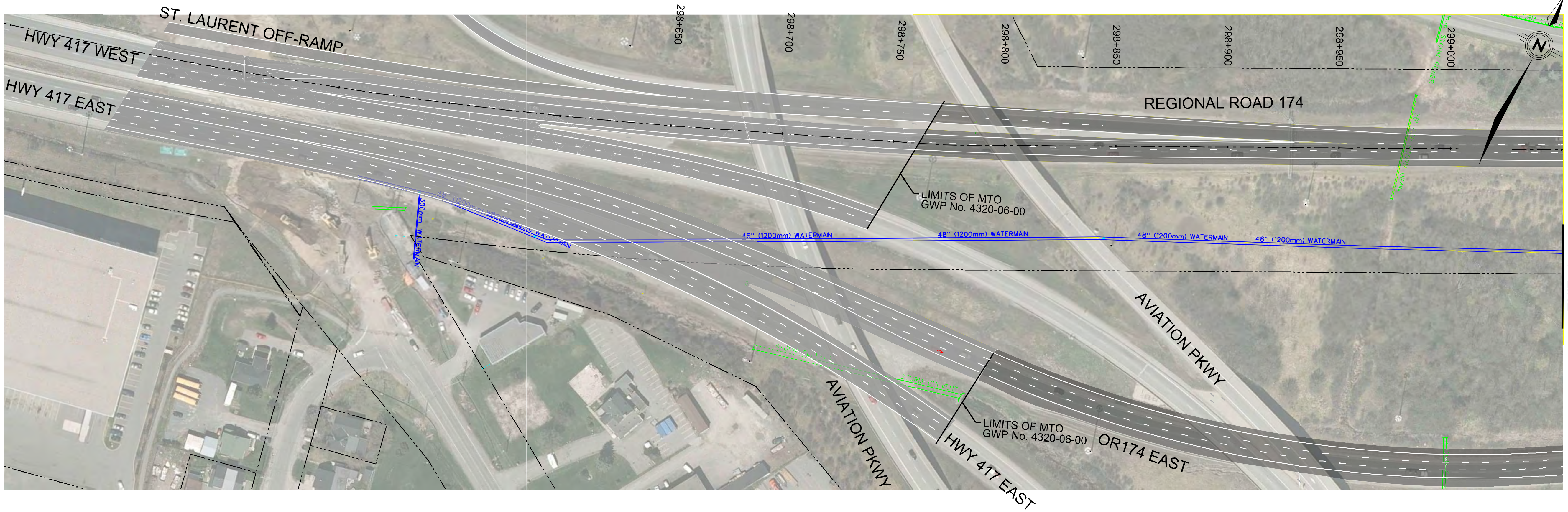
TRIM ROAD INTERCHANGE SOUTH

Drawings No.:	Revision 00	Sheet No. 26



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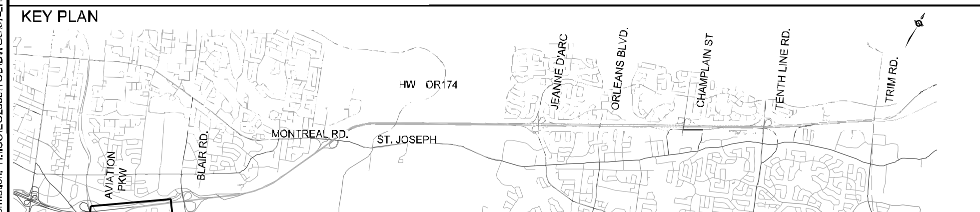

NOTES:

PARSONS

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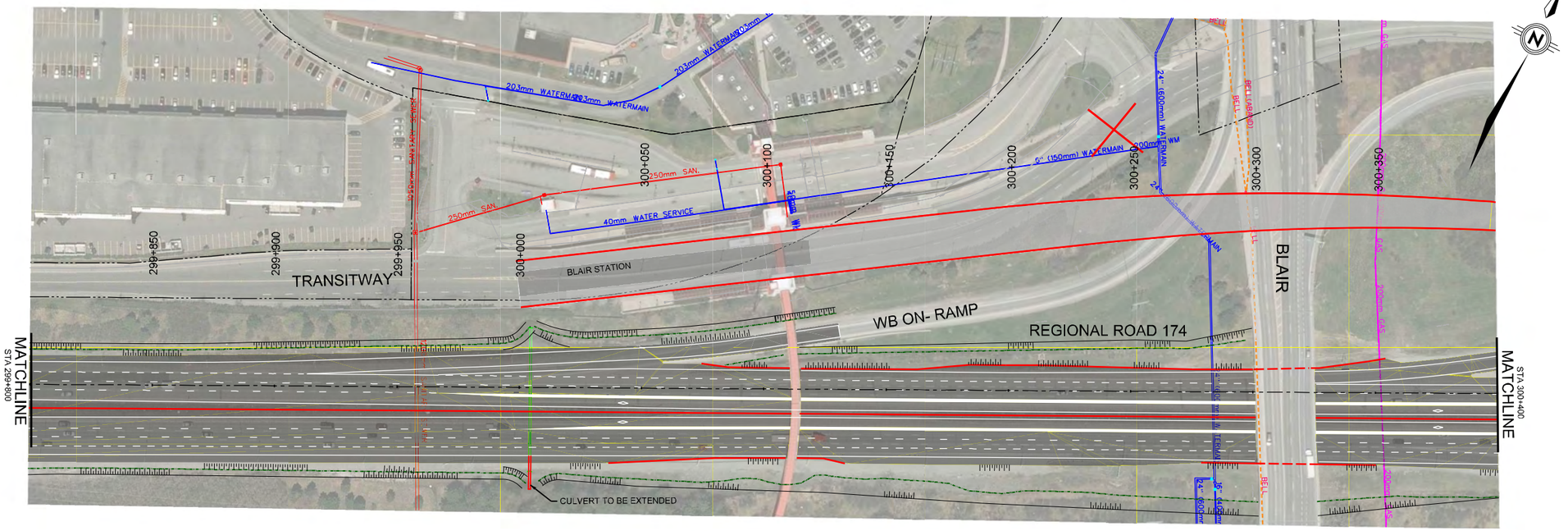
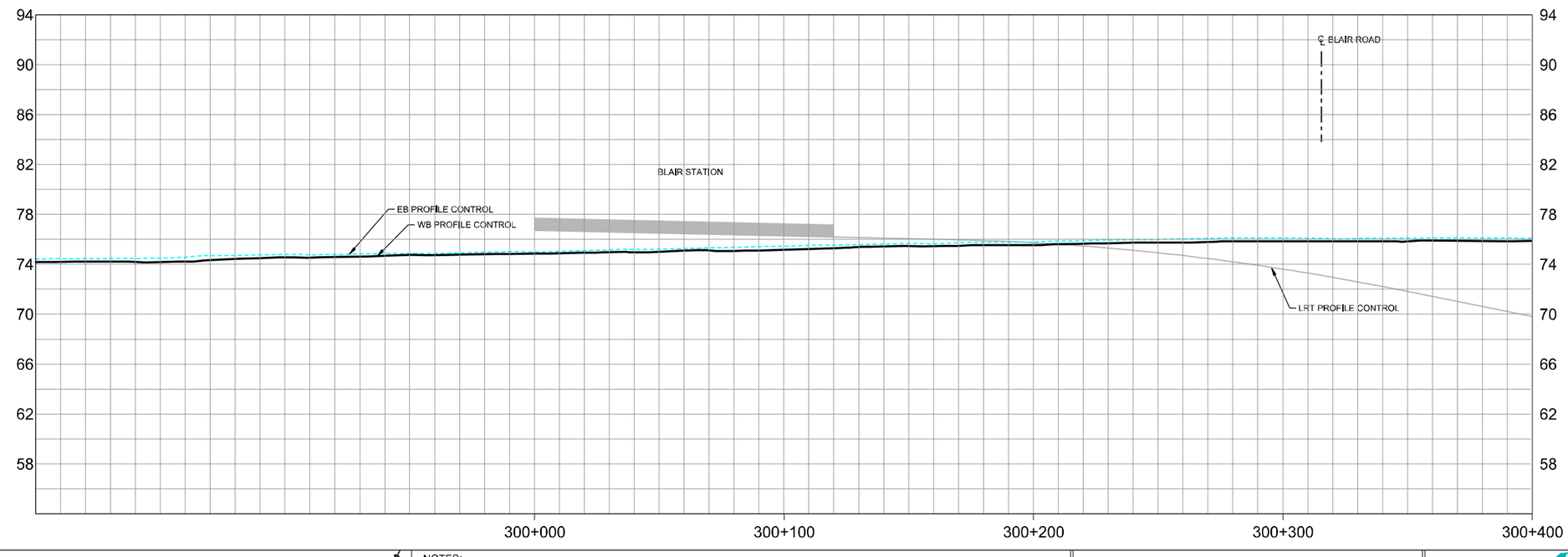
Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Dicipline Engineer:	Checked By:
Scale: HORIZONTAL 0m 10 20 50 100		
CAD File Name: EO2388TOD- 01-PDR-01.DGN		Plot Date: XX/XX/XXXX

HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 298+450 to STA 299+800

Drawings No.:	Revision	Sheet No.
	00	01





KEY PLAN

NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 0.5 5 10 20

CAD File Name: EO2388TOD-01-PDR-02.DGN | Plot Date: XX/XX/XXXX

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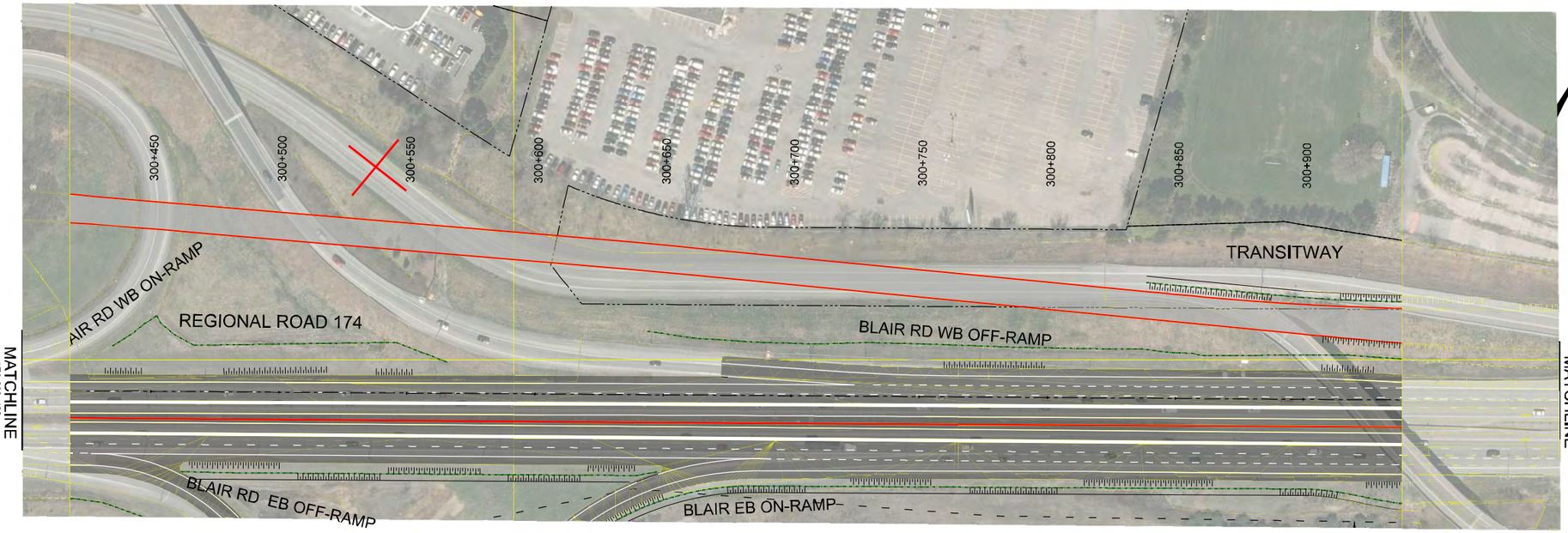
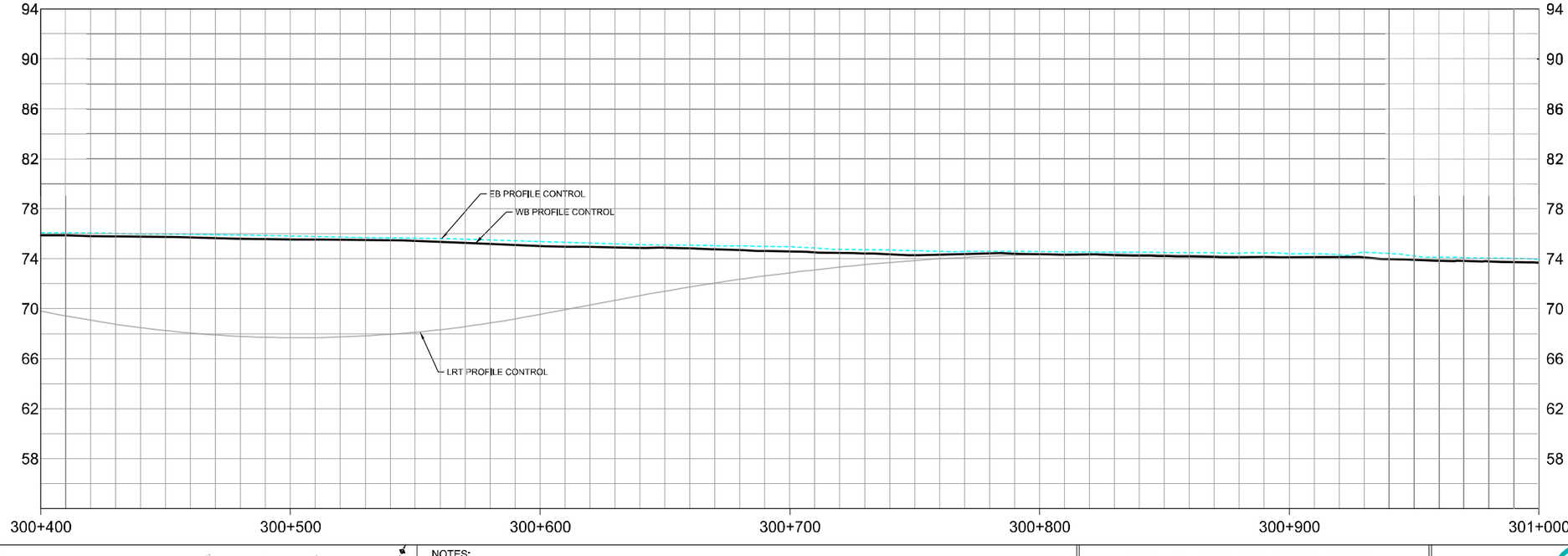
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 299+800 to STA 300+400

Drawings No.: | Revision 00 | Sheet No. 02





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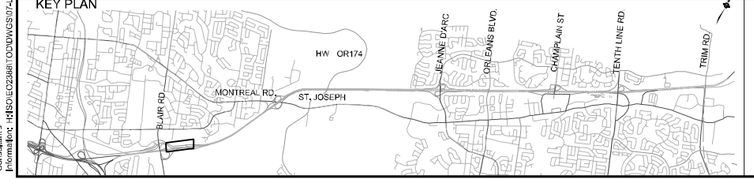

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PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100 — VERTICAL 0m 0.5 5 10 20

CAD File Name: EO2388TOD-01-PDR-03.DGN

Plot Date: XX/XX/XXXX

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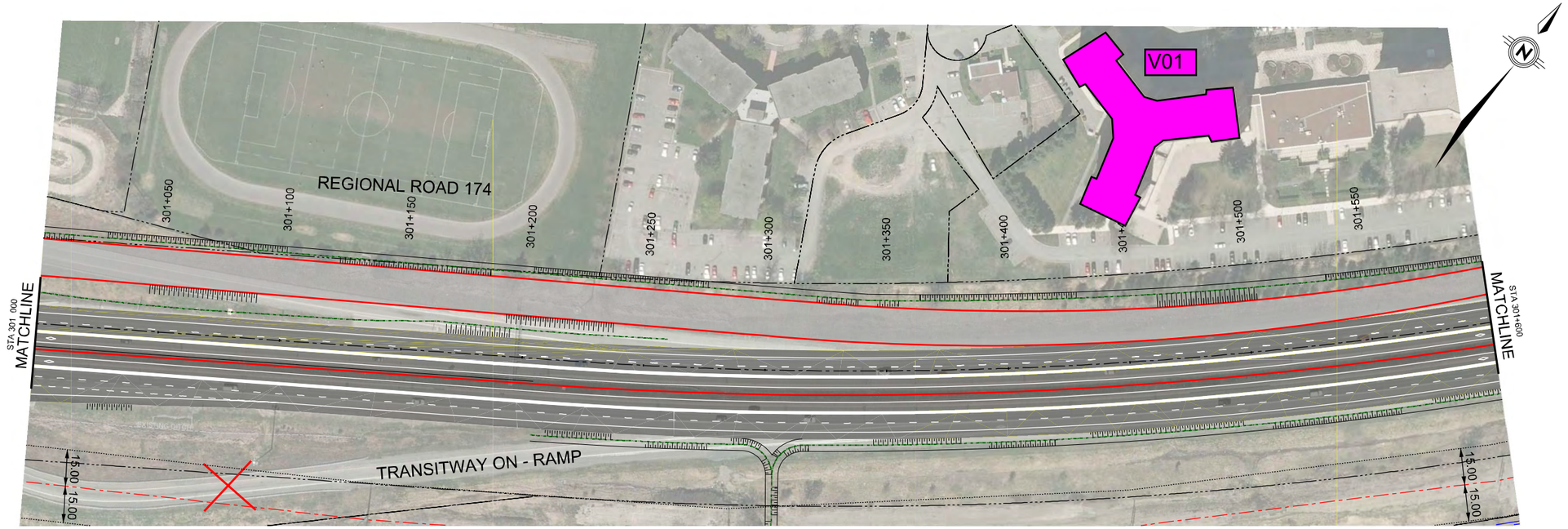
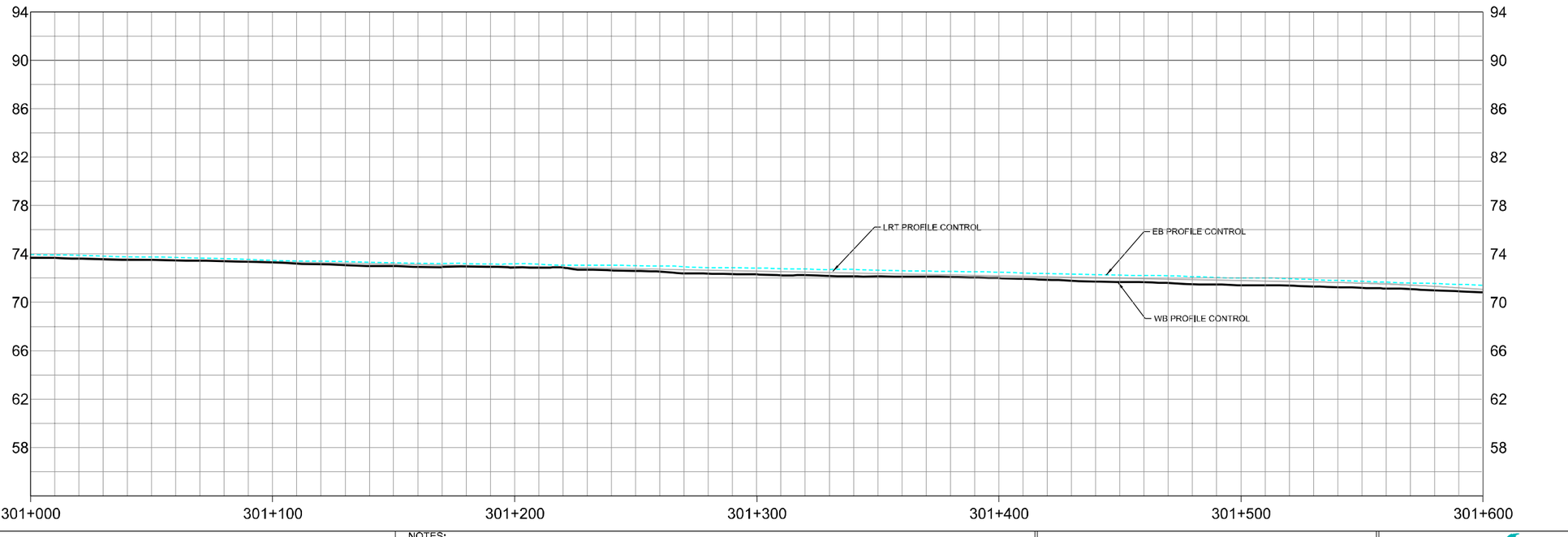
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 300+400 to STA 301+000

Drawings No.: | Revision 00 | Sheet No. 03





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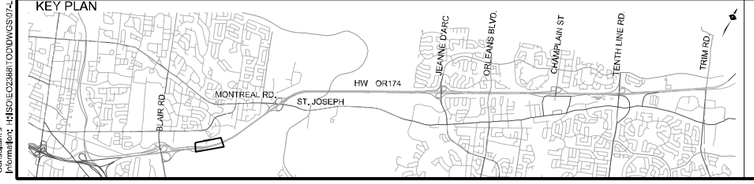

NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 0.5 5 10 20

CAD File Name: EO2388TOD- 01-PDR-04.DGN	Plot Date: XX/XX/XXXX	Drawings No.:	Revision 00 / Sheet No. 04

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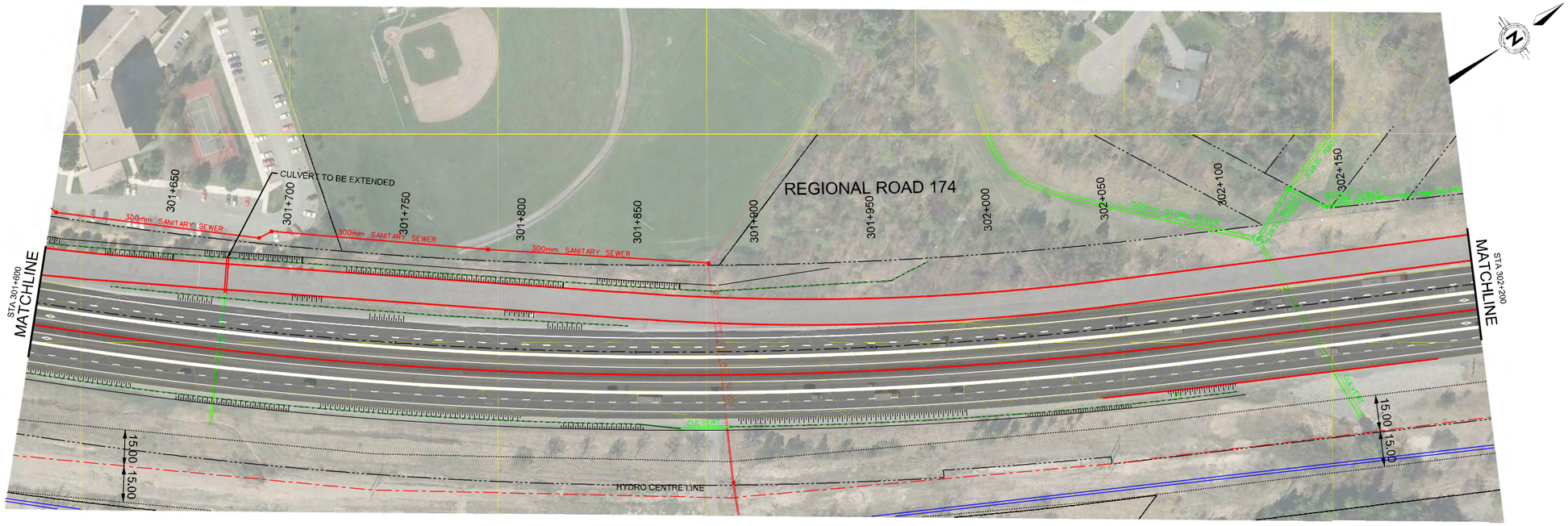
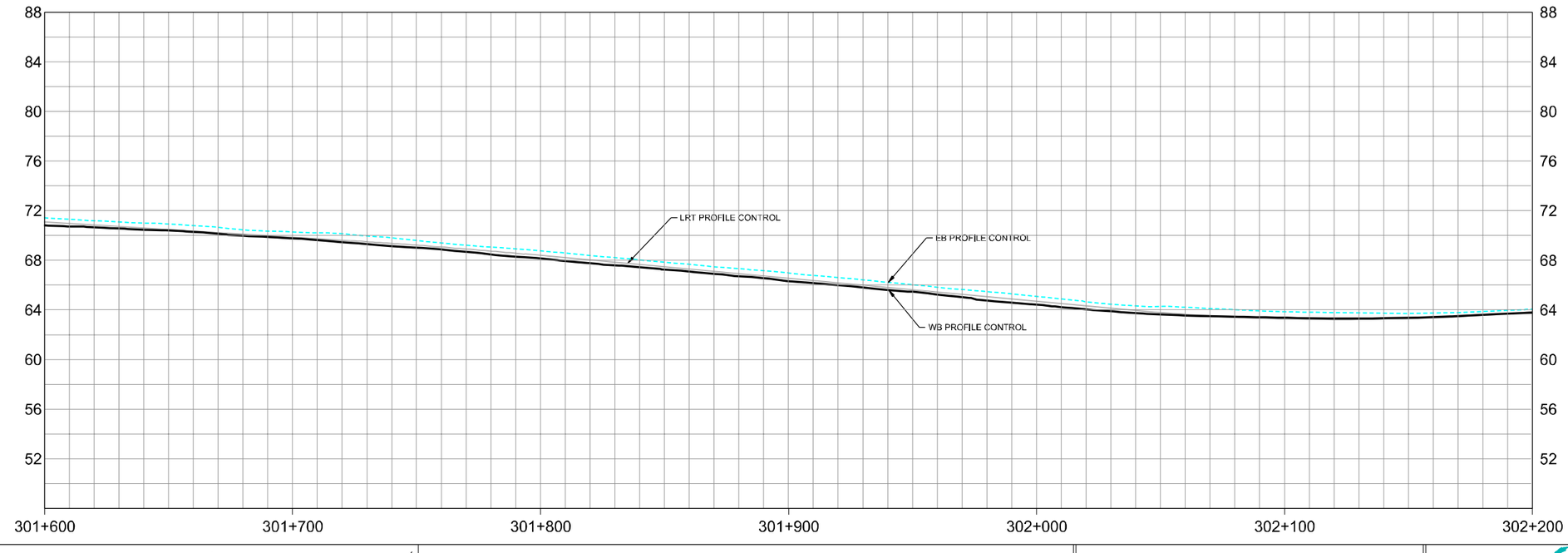
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 301+000 to STA 301+600





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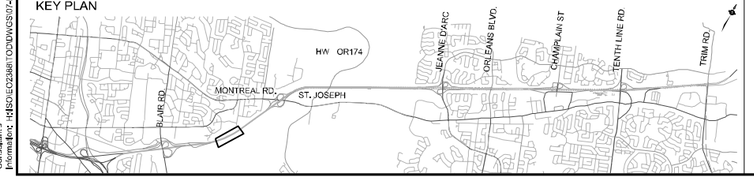

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 0.5 5 10 20

CAD File Name: EO2388TOD-01-PDR-05.DGN | Plot Date: XX/XX/XXXX

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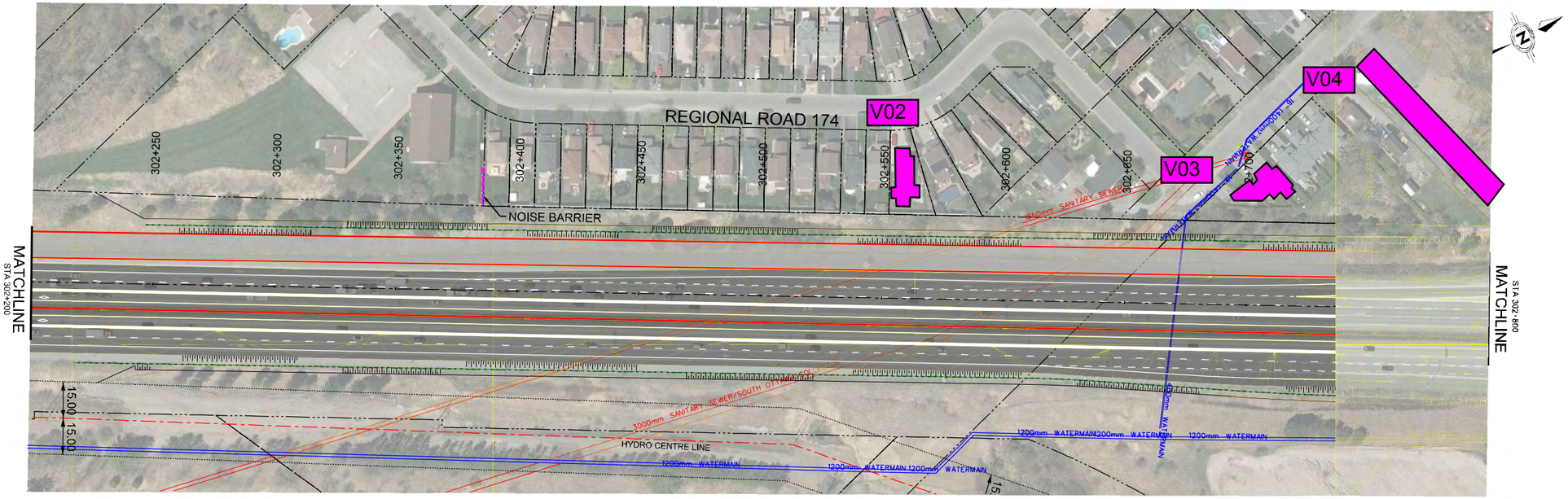
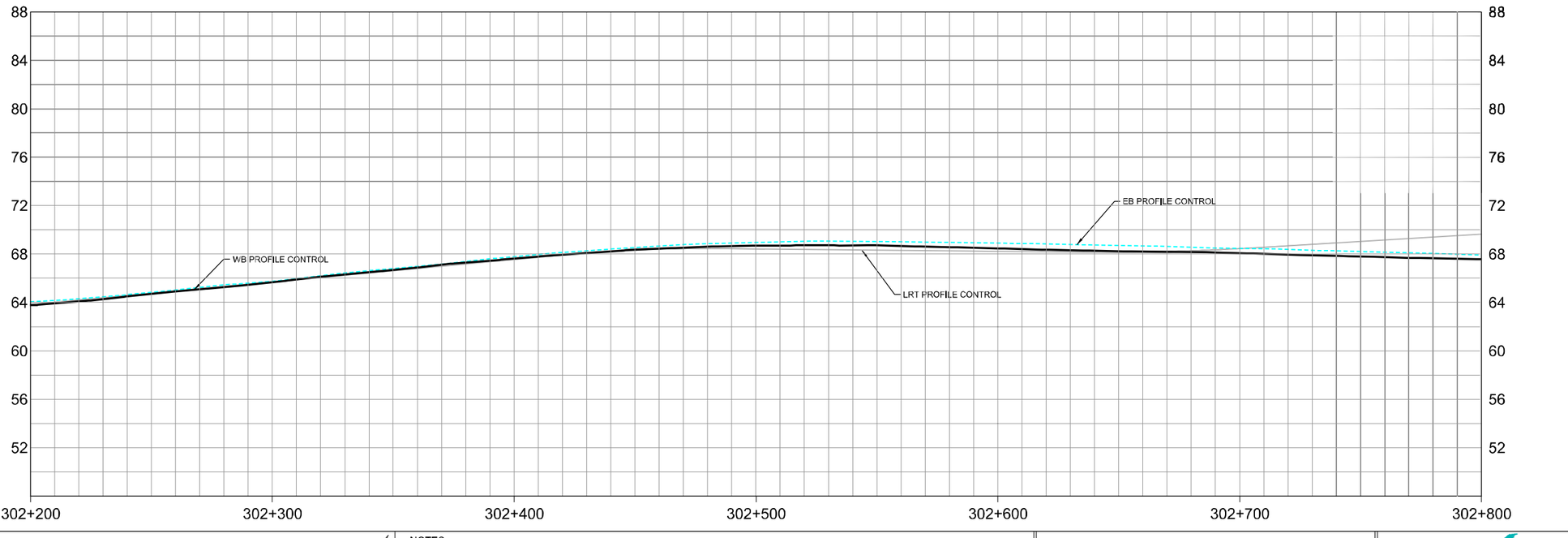
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 301+600 to STA 302+200

Drawings No.: | Revision: 00 | Sheet No.: 05





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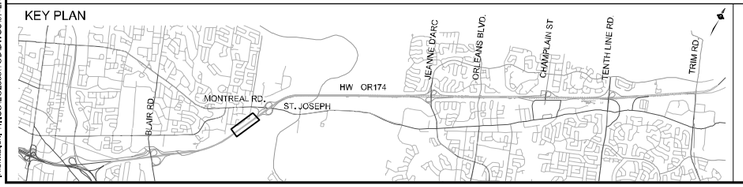

NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 0.5 5 10 20

CAD File Name: EO2388TOD-01-PDR-06.DGN	Plot Date: XX/XX/XXXX

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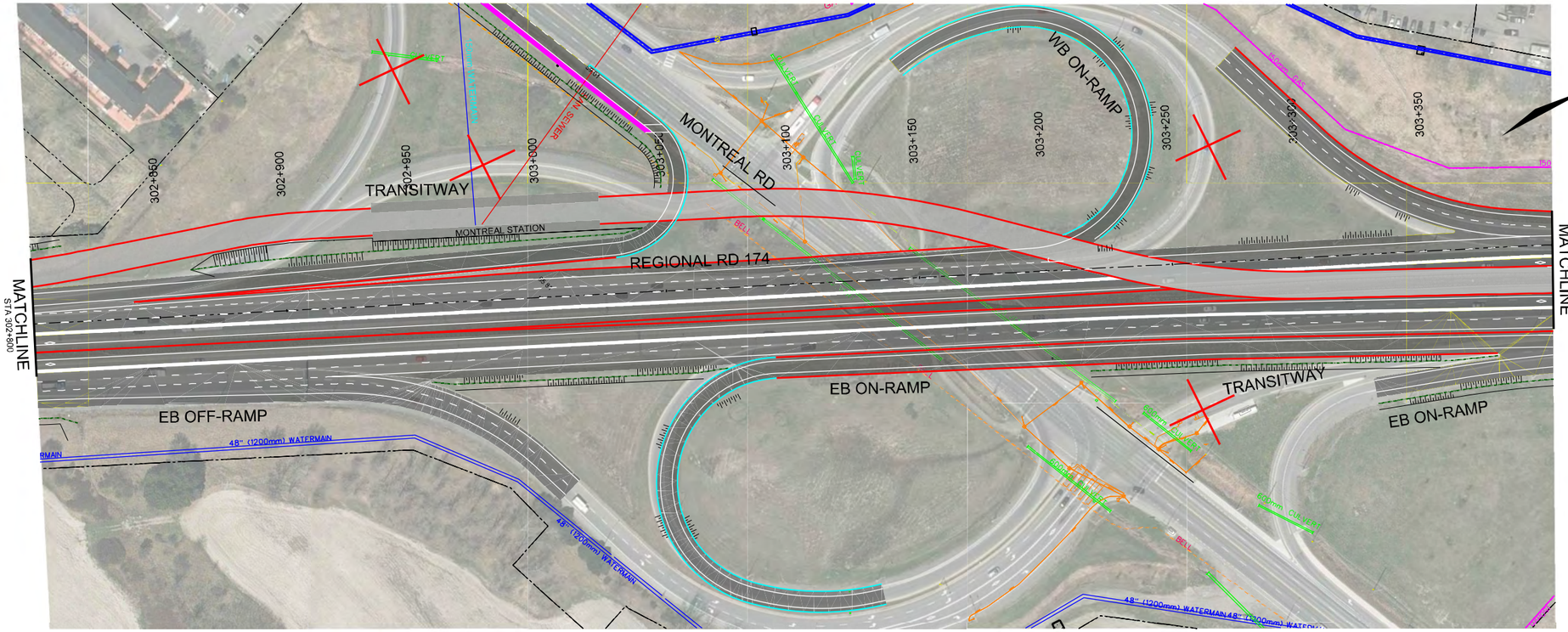
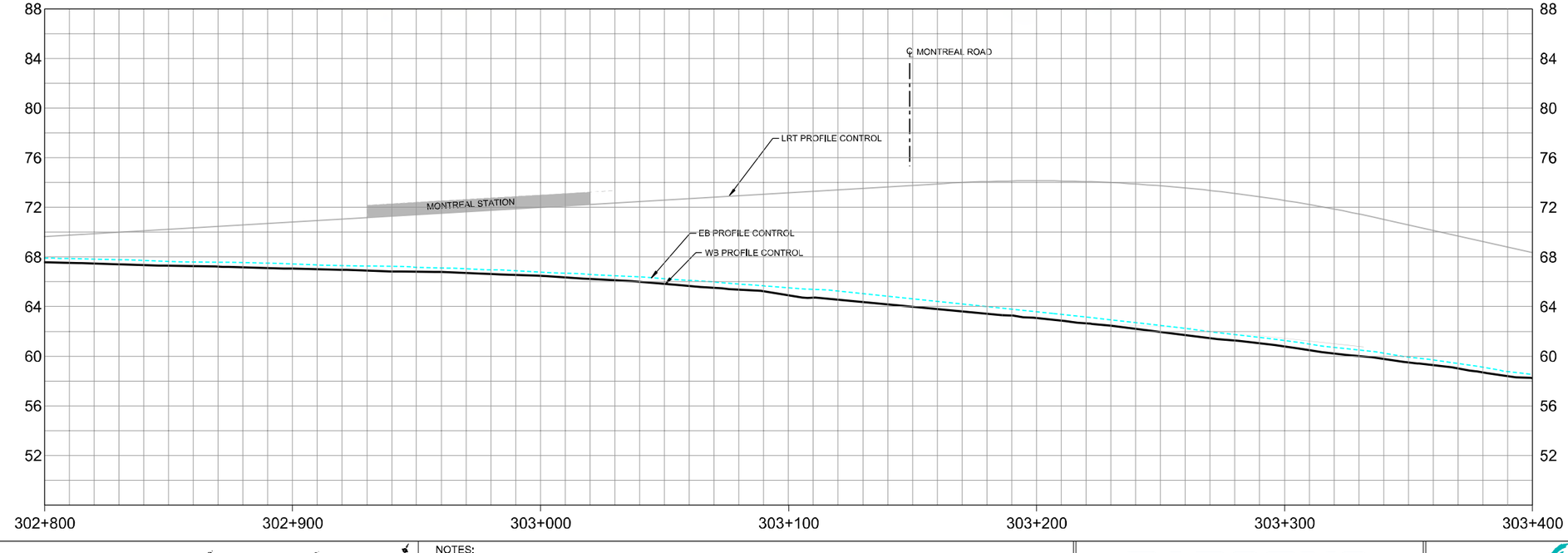
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 302+200 to STA 302+800

Drawings No.:	Revision 00	Sheet No. 06





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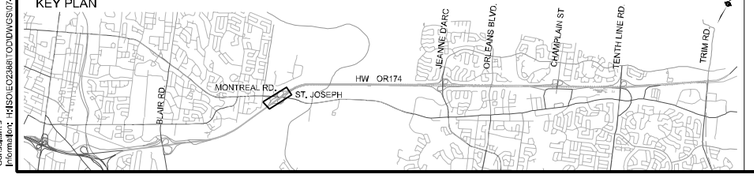

NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 0.5 5 10 20

CAD File Name: EO2388TOD-01-PDR-07.DGN	Plot Date: XX/XX/XXXX	Drawings No.:	Revision 00 / Sheet No. 07

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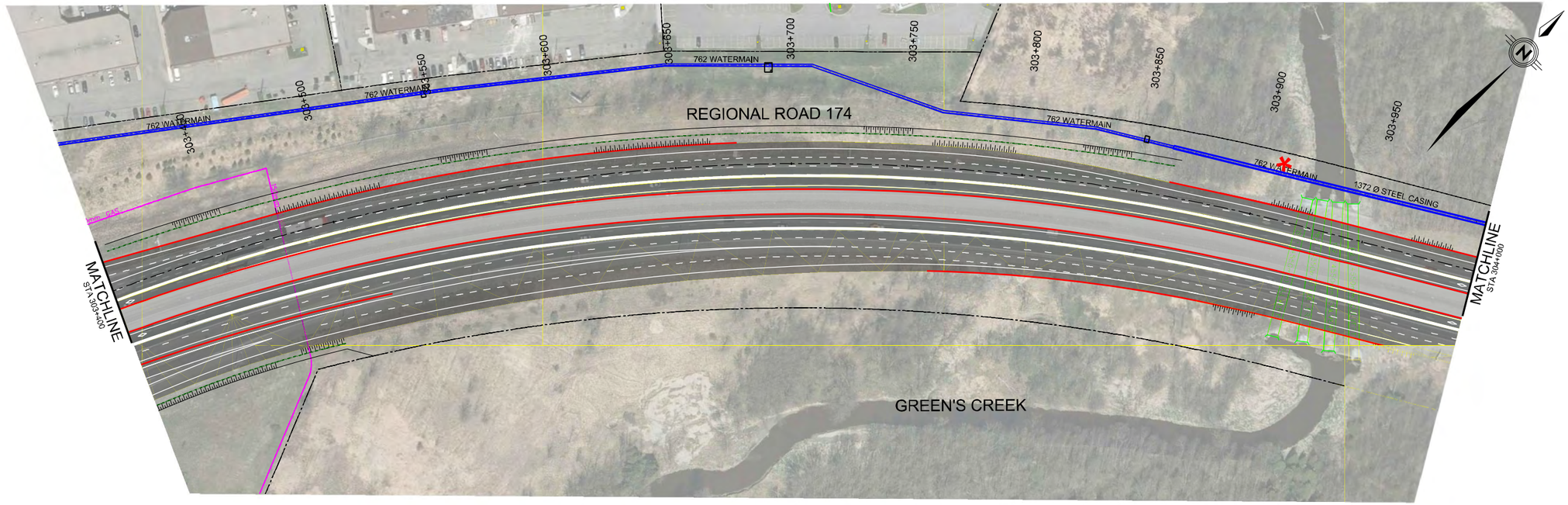
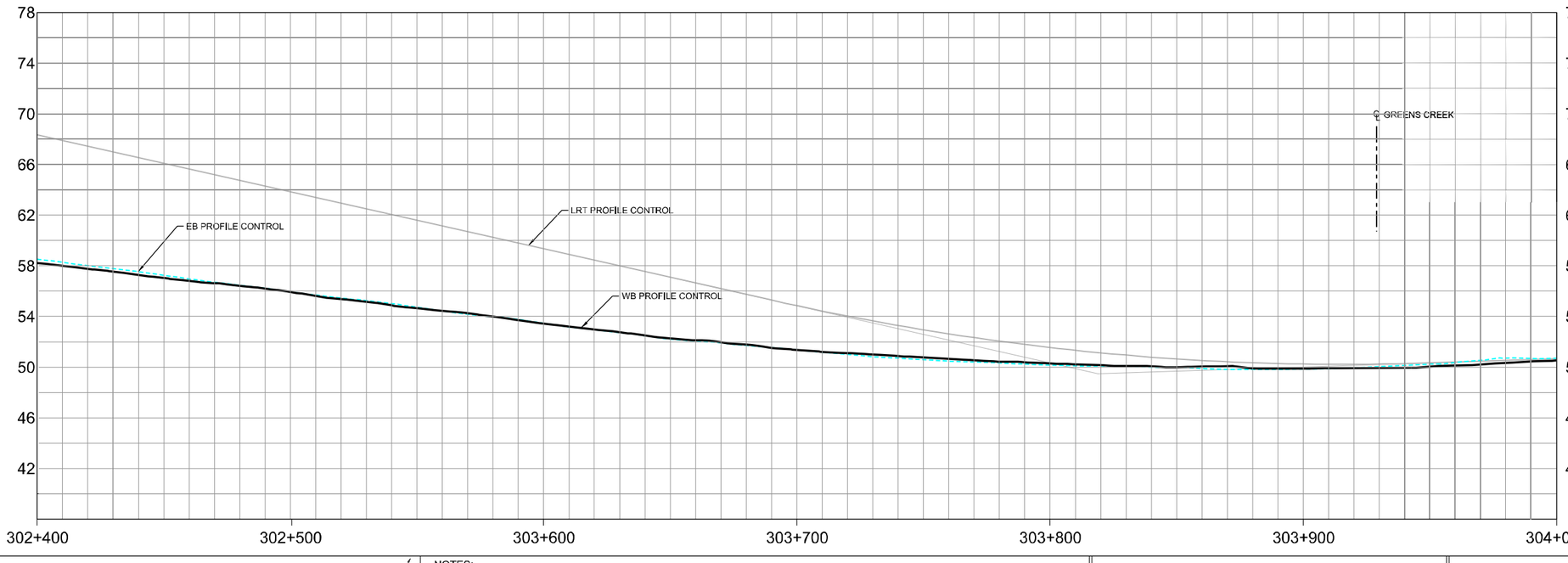
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 302+800 to STA 303+400





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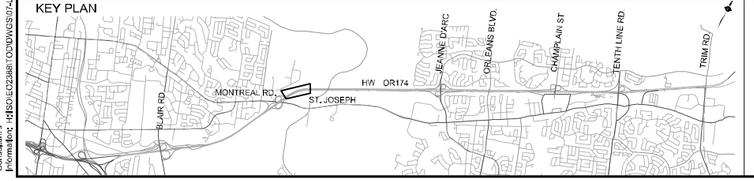

NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100 — VERTICAL 0m 0.5 5 10 20

CAD File Name: EO2388TOD-01-PDR-08.DGN | Plot Date: XX/XX/XXXX

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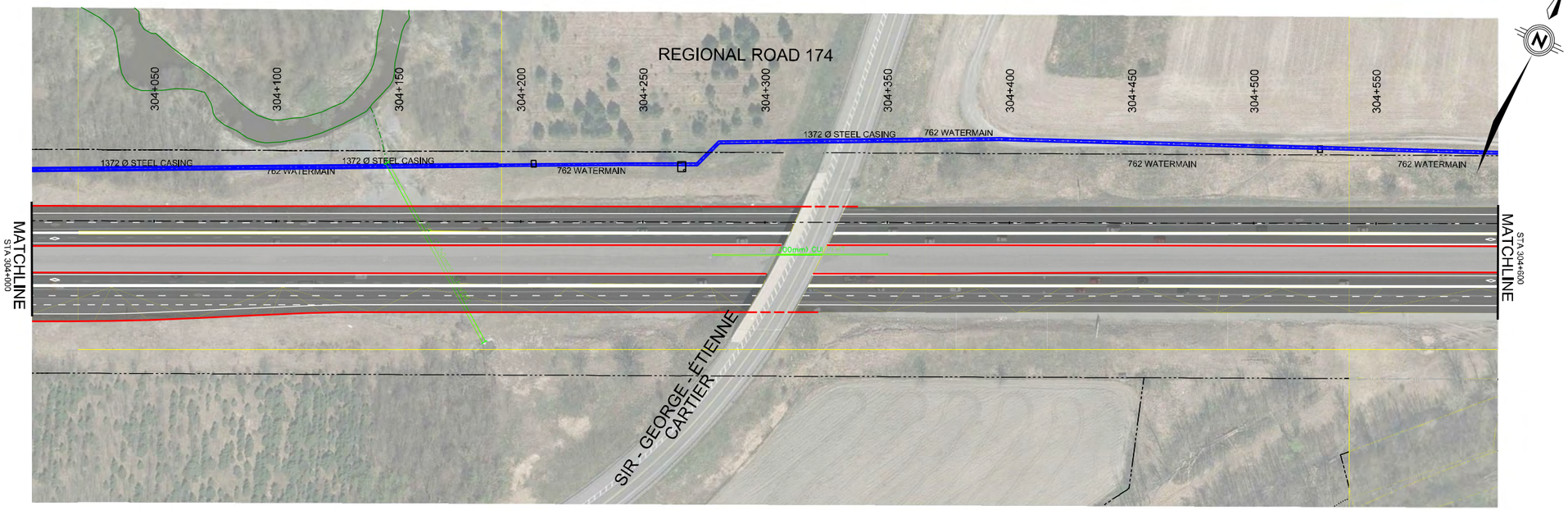
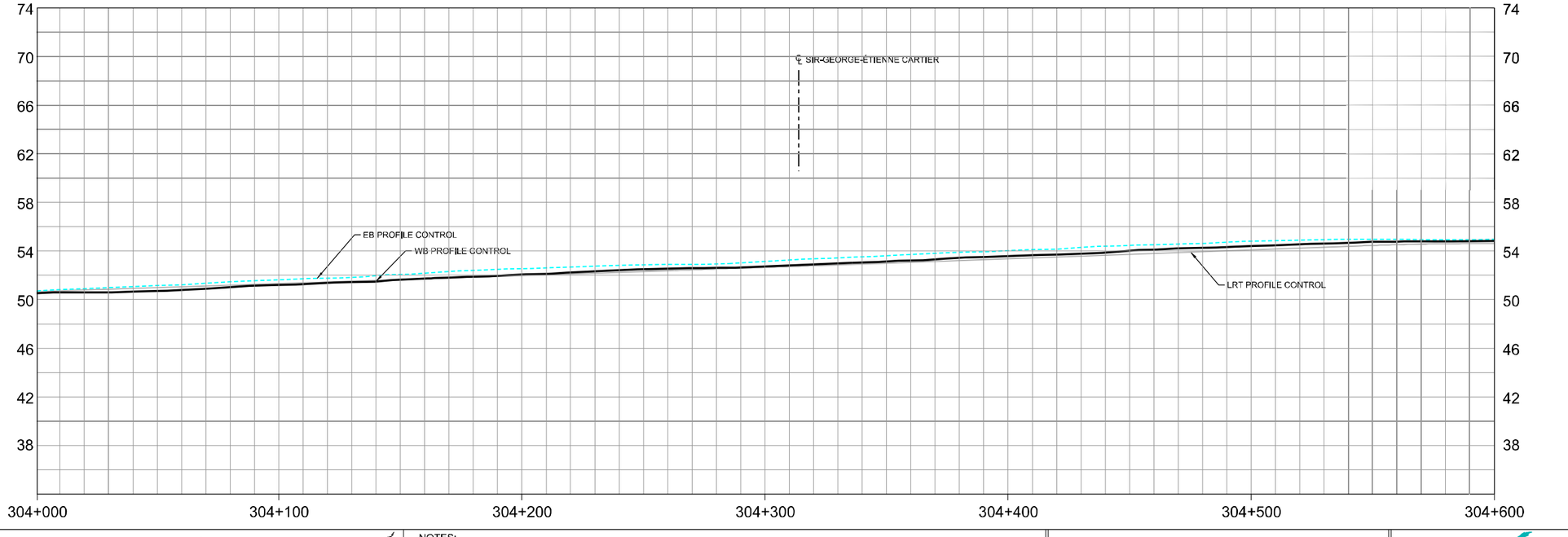
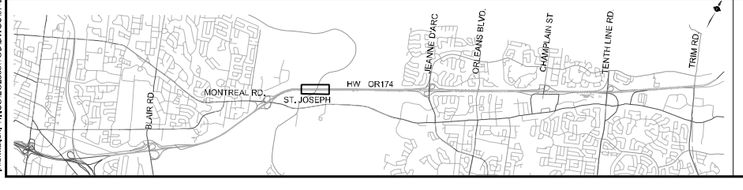
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 303+400 to STA 304+000

Drawings No.: | Revision 00 | Sheet No. 08







NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100 — VERTICAL 0m 2.5 5 10 20

CAD File Name: EO2388TOD- 01-PDR-09.DGN | Plot Date: XX/XX/XXXX

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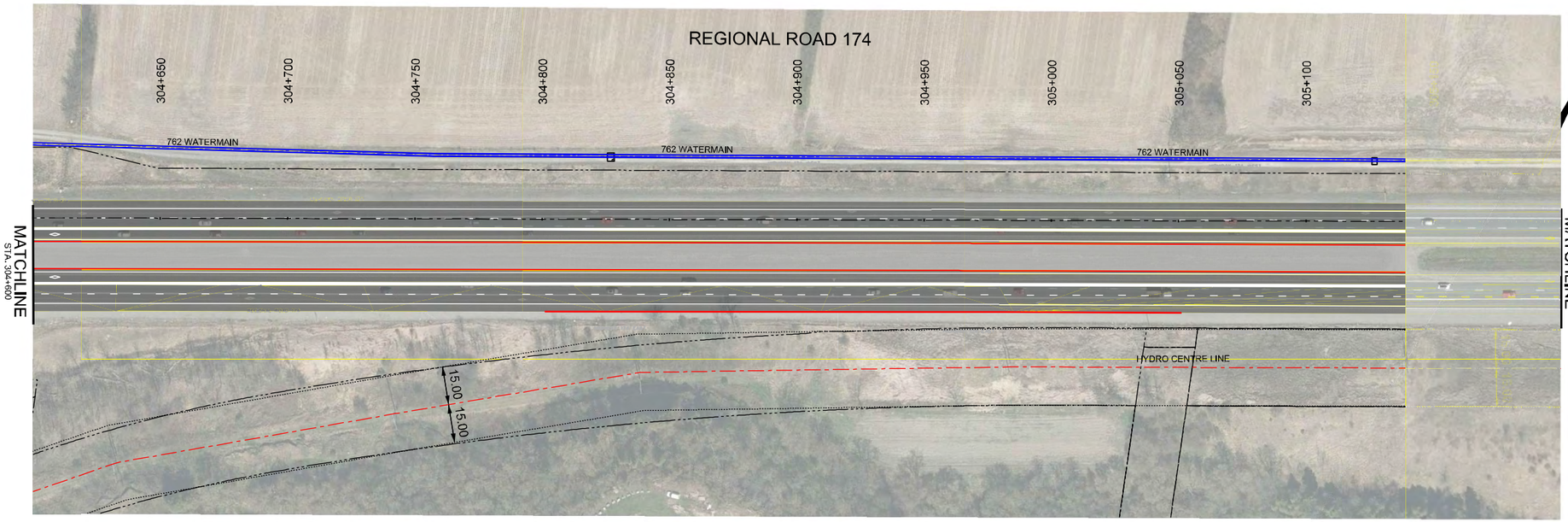
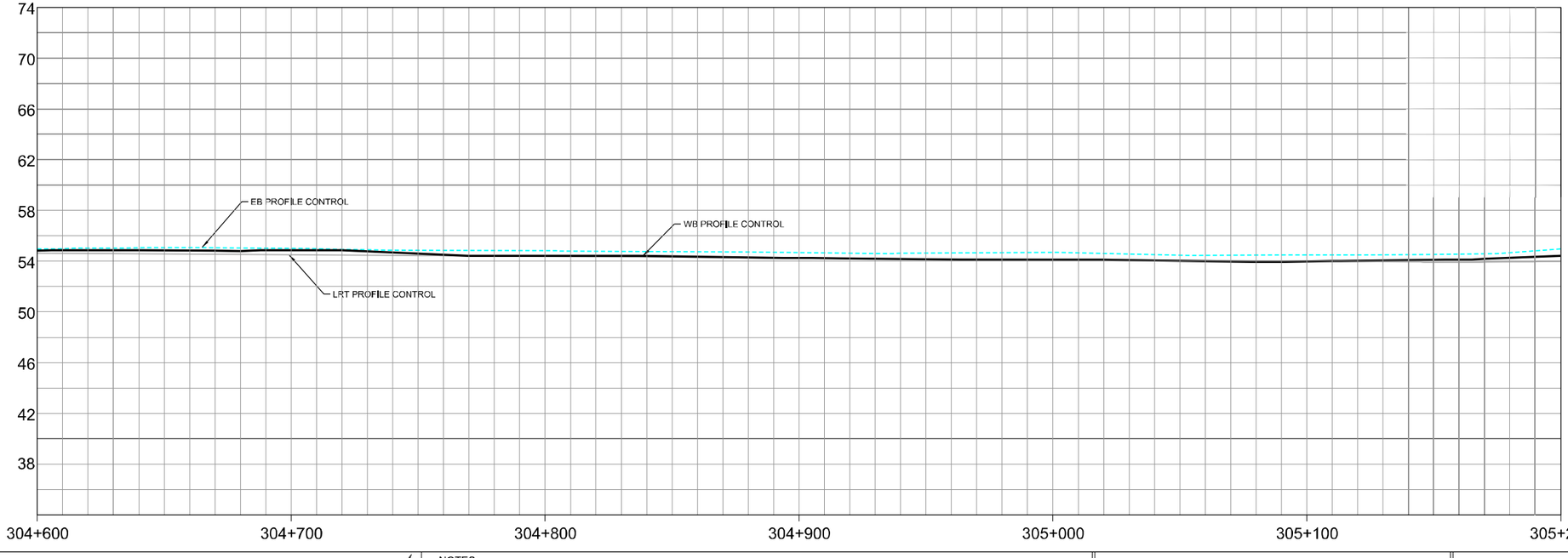
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 304+000 to STA 304+600

Drawings No.: | Revision: 00 | Sheet No.: 09





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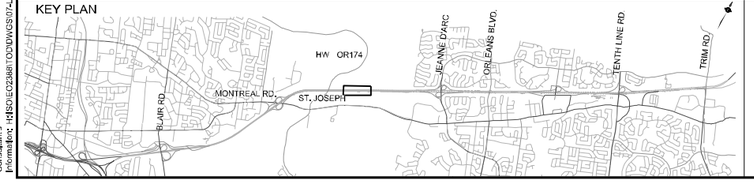

NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100 / 0m 2.5 5 10 20 VERTICAL

CAD File Name:	Plot Date:
EO2388TOD- 01-PDR-10.DGN	XX/XX/XXXX

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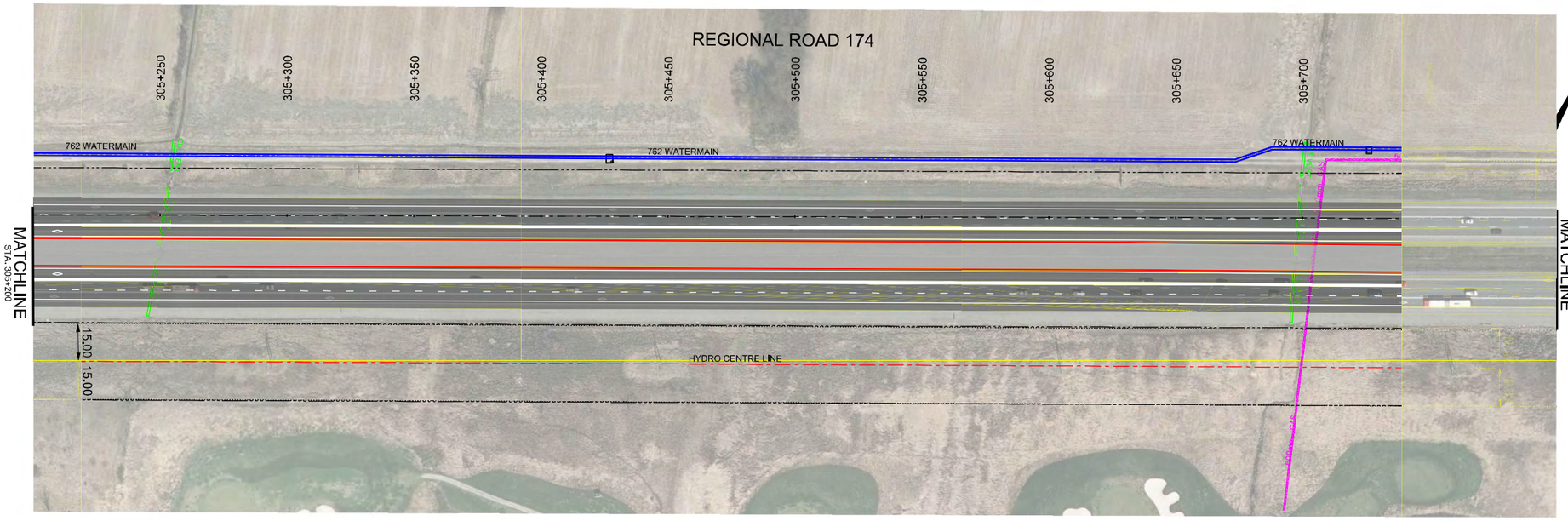
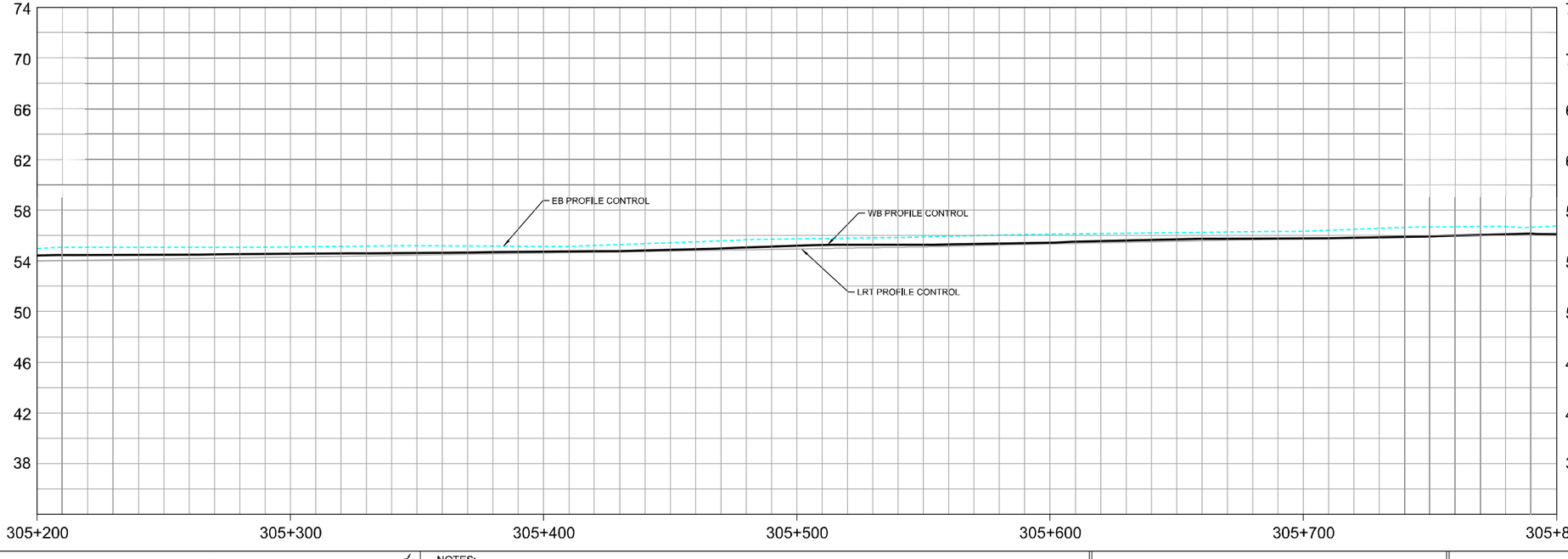
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 304+600 to STA 305+200

Drawings No.:	Revision	Sheet No.
	00	10





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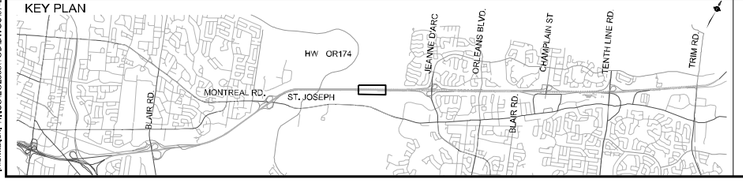

NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

CAD File Name: EO2388TOD-01-PDR-11.DGN

Plot Date: XX/XX/XXXX

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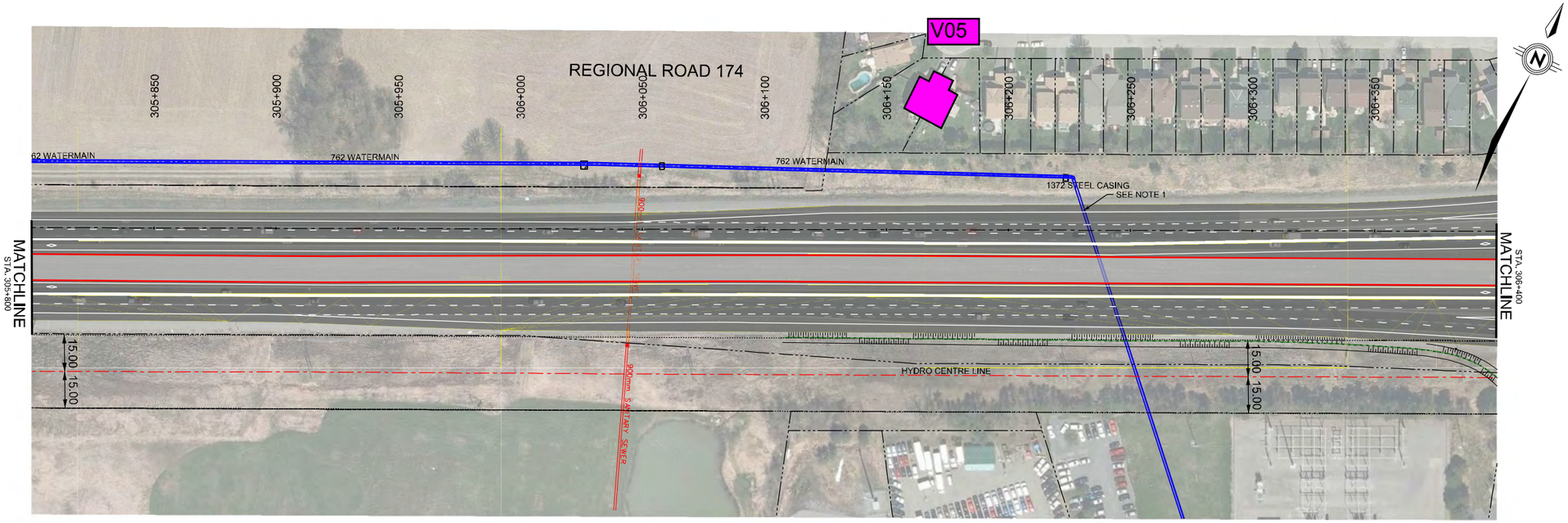
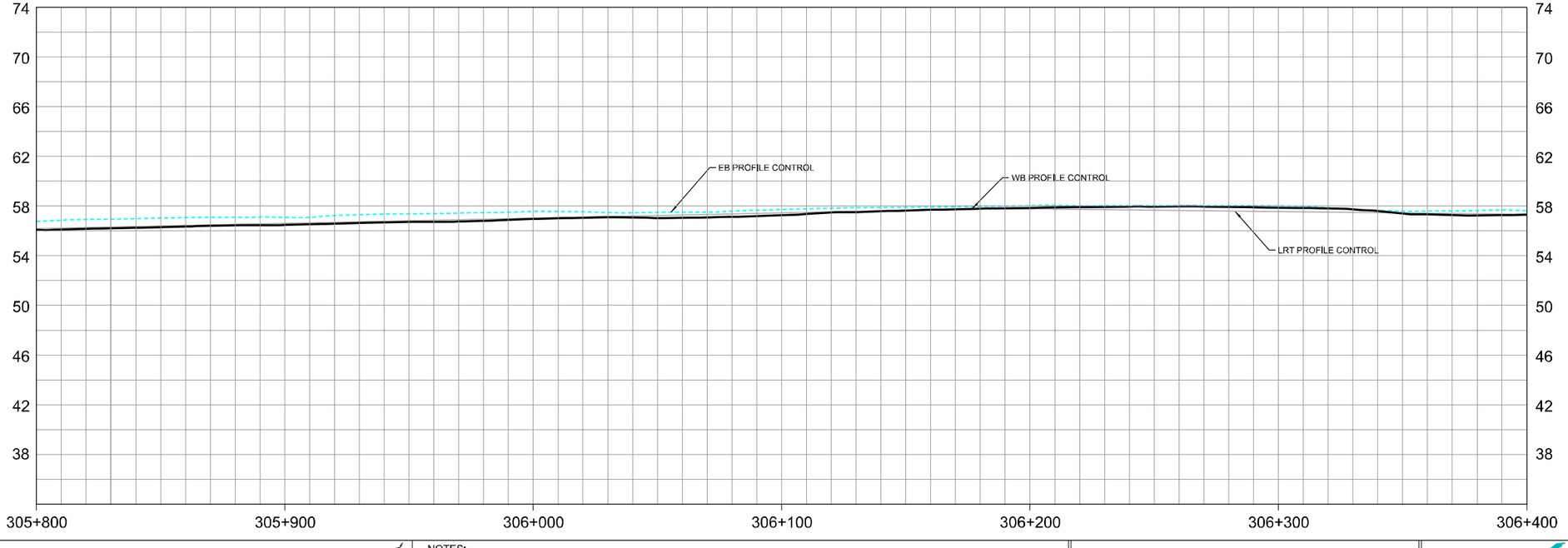
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 305+200 to STA 305+800

Drawings No.:

Revision: 00

Sheet No.: 11





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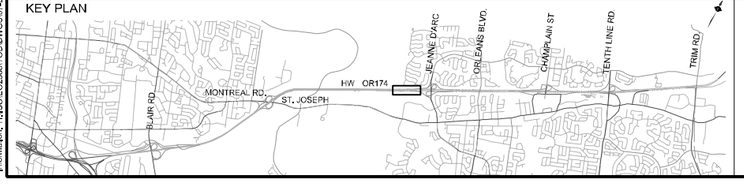

NOTES:

1. LOCATION OF NORTH-SOUTH WATERMAIN CROSSING OF OR174 IS APPROXIMATE AND IS TO BE CONFIRMED WHEN AS-BUILT INFORMATION IS AVALIABLE.

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale:
HORIZONTAL 0m 10 20 50 100
VERTICAL 0m 2.5 5 10 20

CAD File Name:	Plot Date:
EO2388TOD- 01-PDR-12.DGN	XX/XX/XXXX

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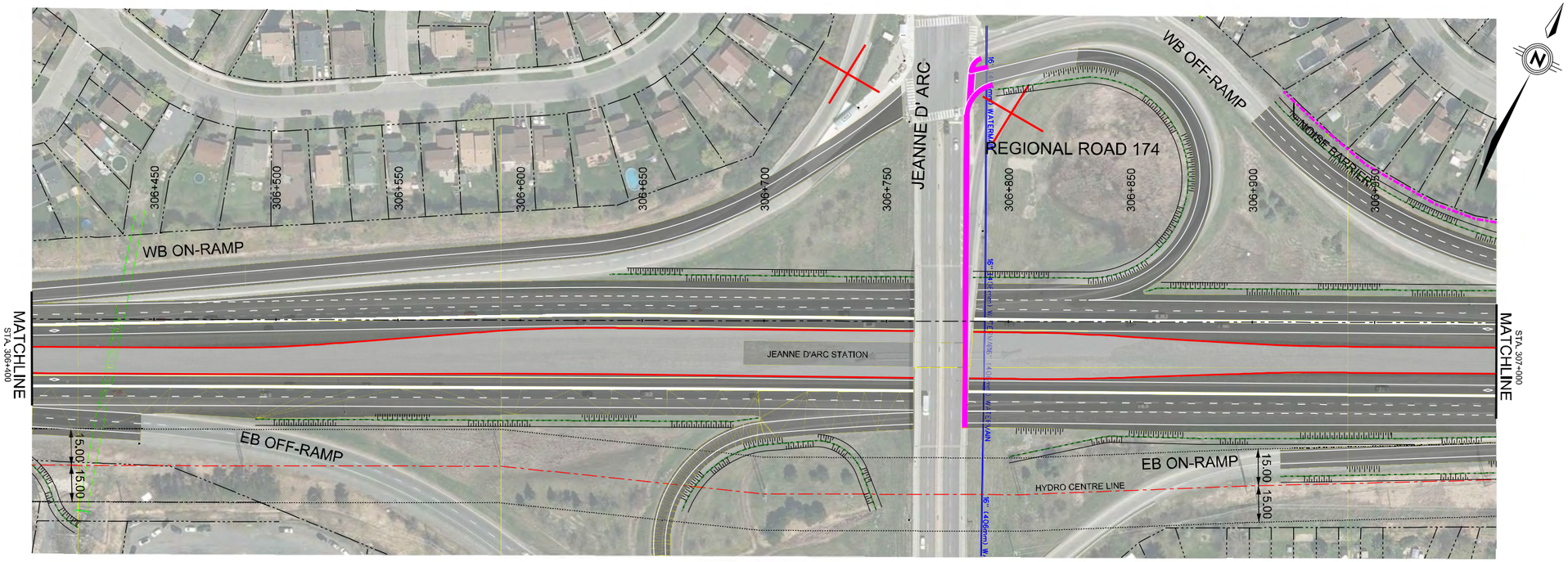
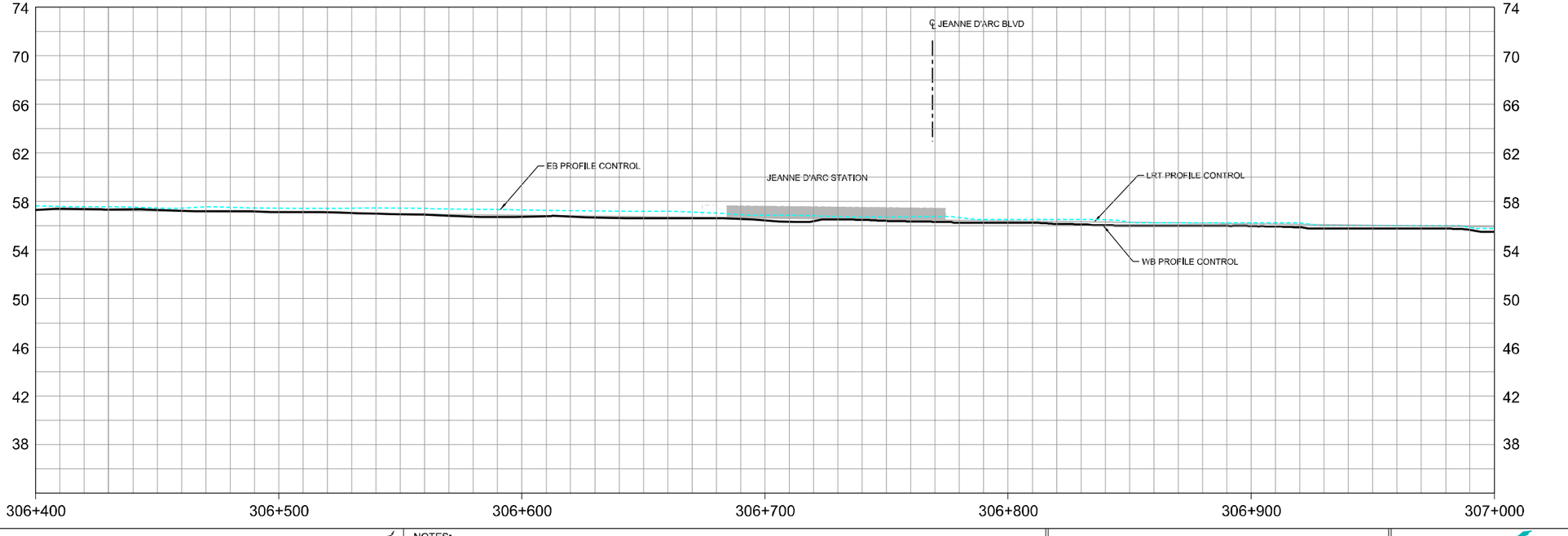
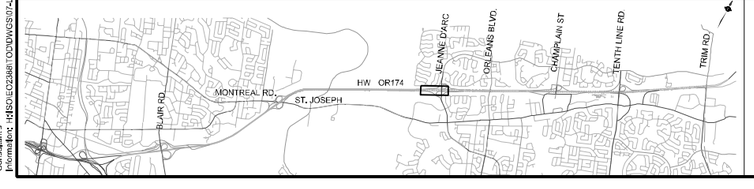
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 305+800 to STA 306+400

Drawings No.:	Revision	Sheet No.
	00	12







NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
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Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

CAD File Name: EO2388TOD-01-PDR-13.DGN

Plot Date: XX/XX/XXXX

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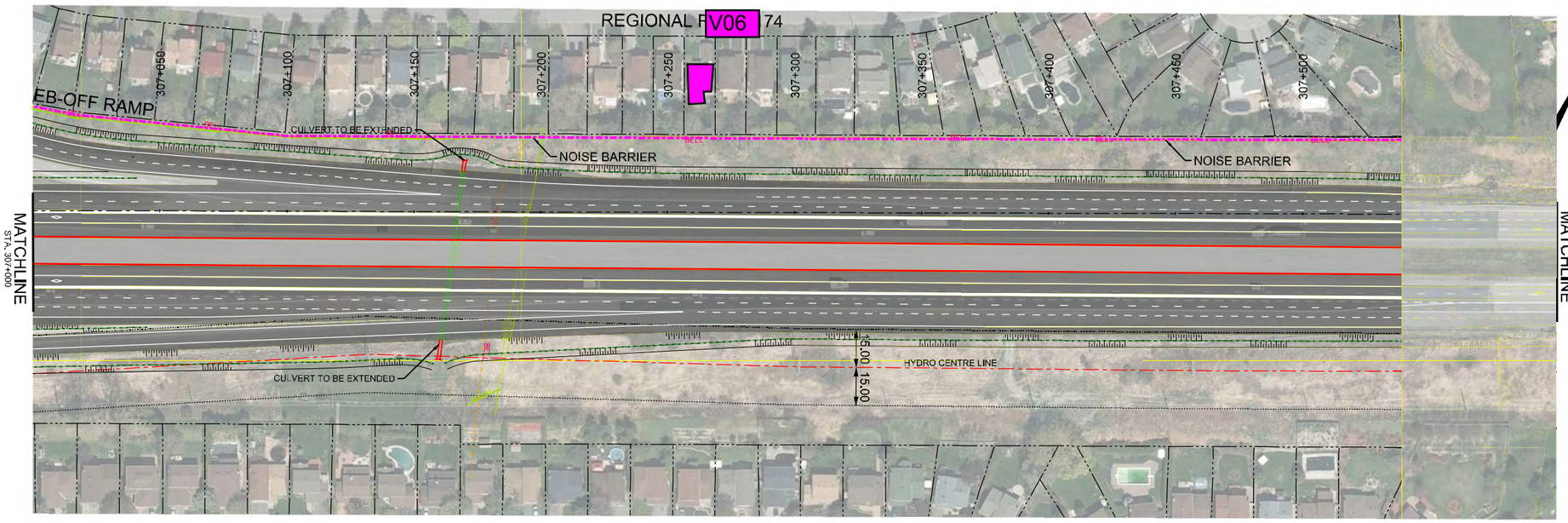
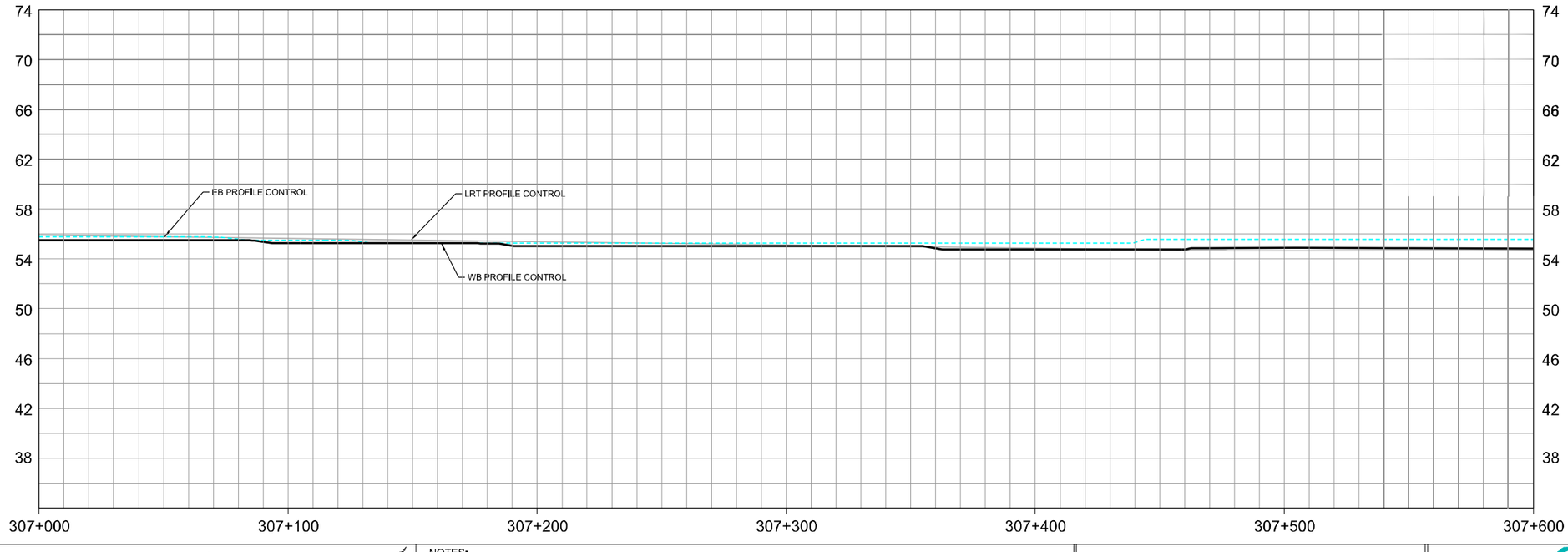
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 306+400 to STA 307+000

Drawings No.:

Revision: 00

Sheet No.: 13





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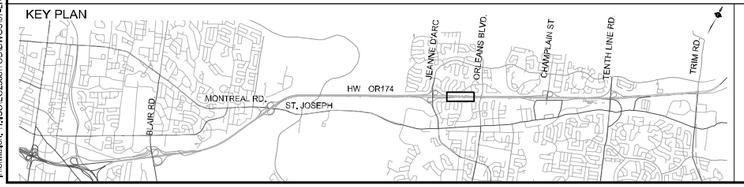

NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

CAD File Name: EO2388TOD-01-PDR-14.DGN	Plot Date: XX/XX/XXXX

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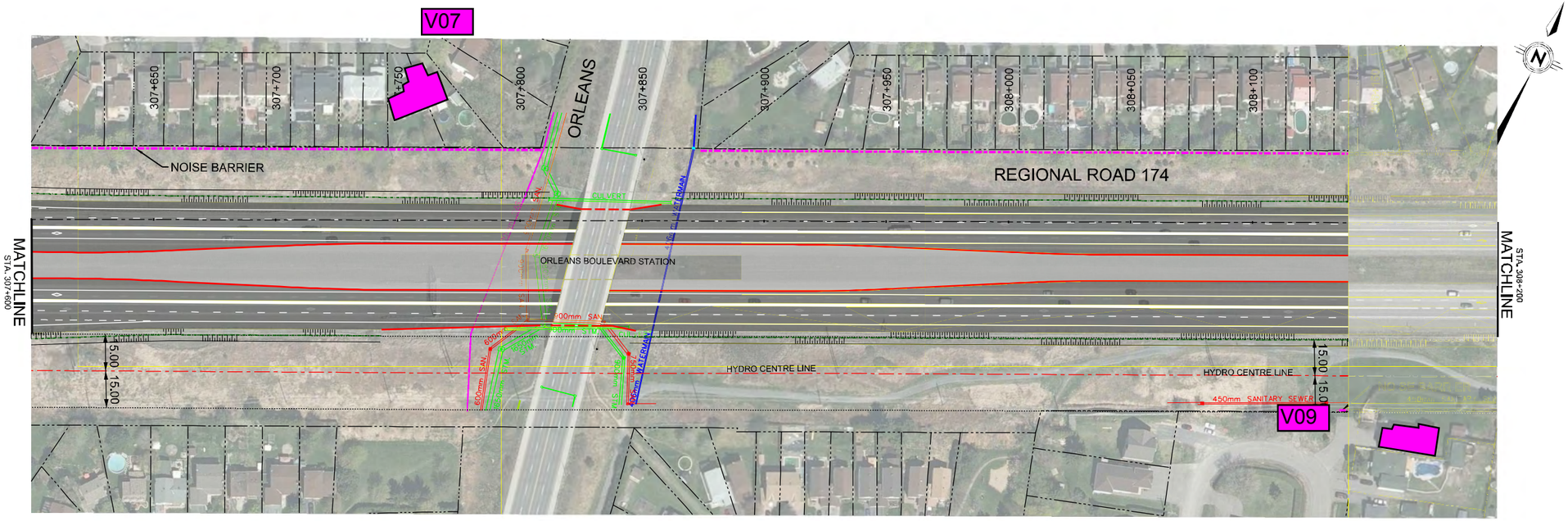
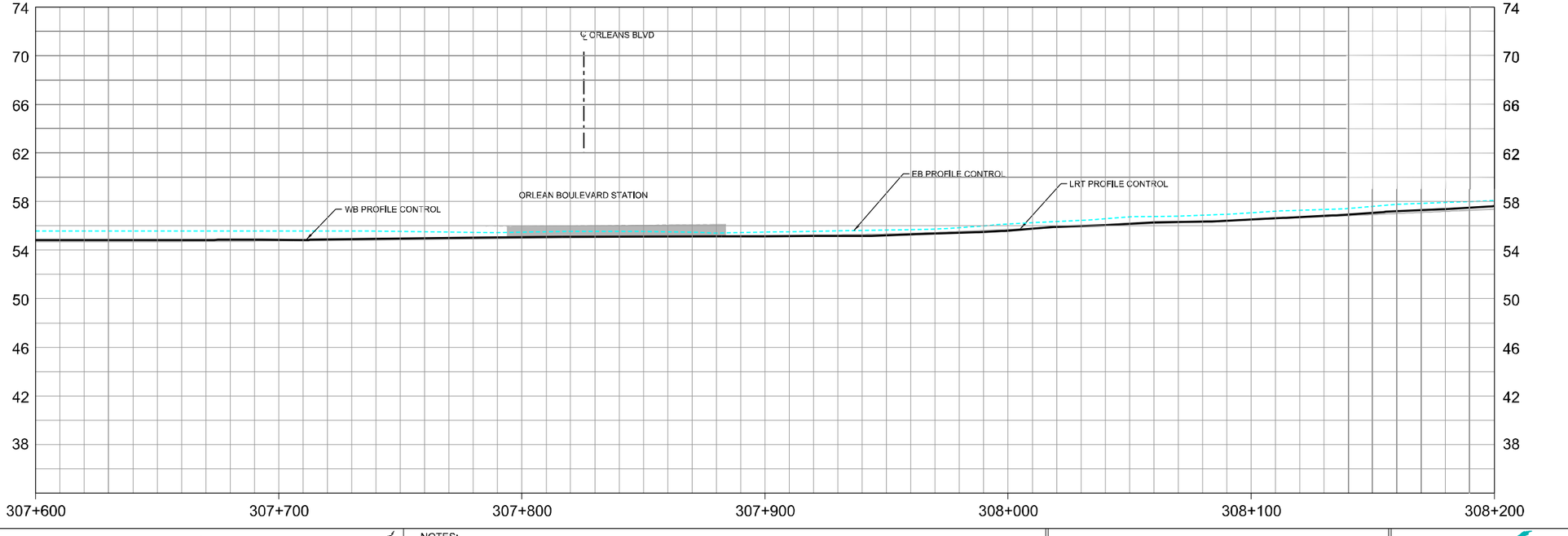
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 307+000 to STA 307+600

Drawings No.:	Revision 00	Sheet No. 14





KEY PLAN

NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

CAD File Name: EO2388TOD- 01-PDR-15.DGN

Plot Date: XX/XX/XXXX

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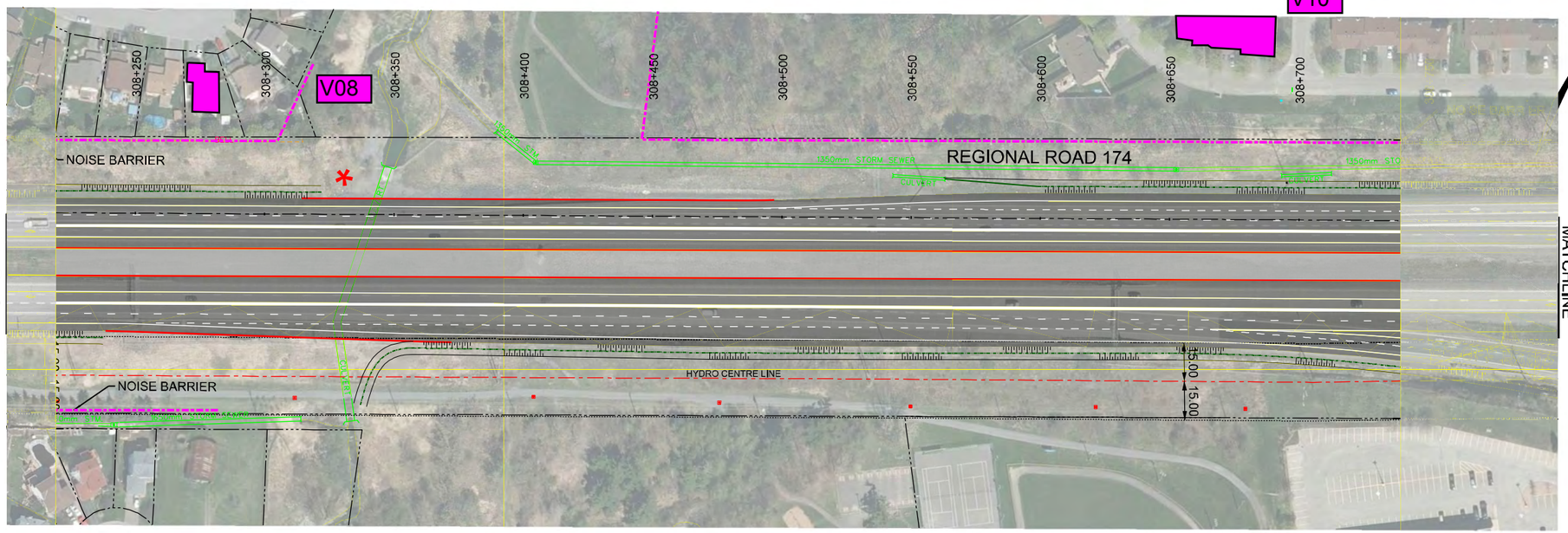
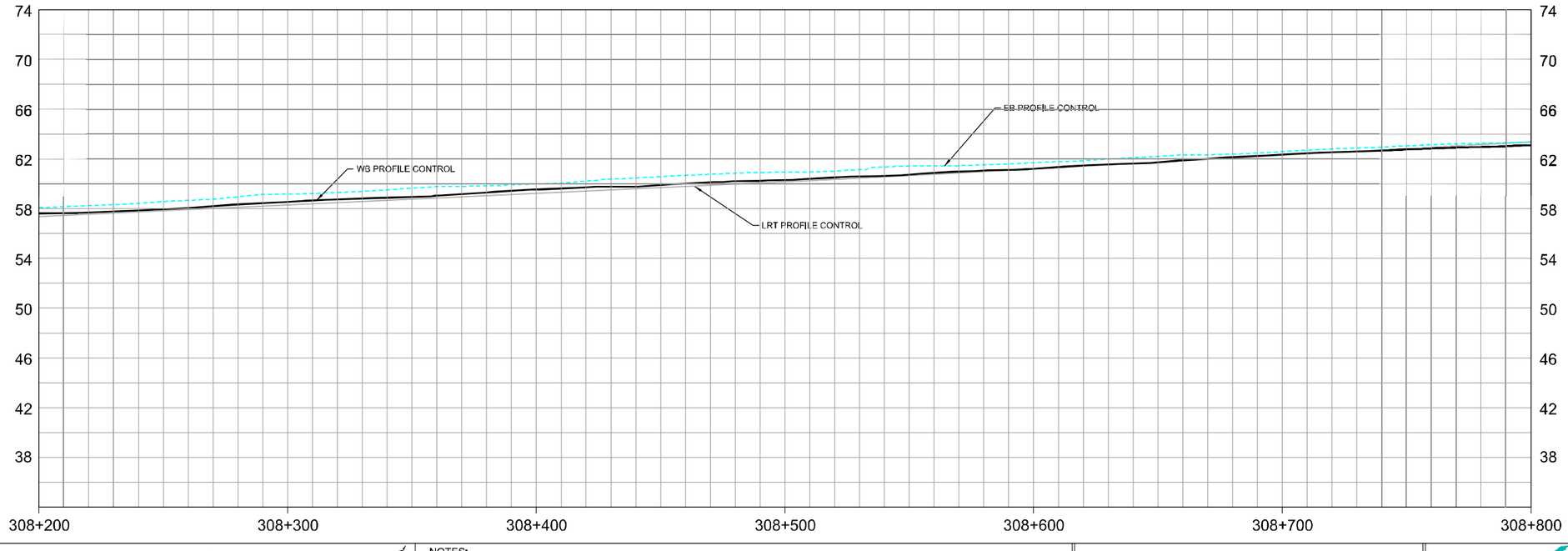
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 307+600 to STA 308+200

Drawings No.: | Revision: 00 | Sheet No.: 15





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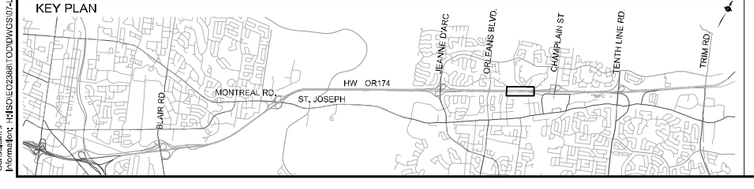


NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

CAD File Name: EO2388TOD-01-PDR-16.DGN

Plot Date: XX/XX/XXXX

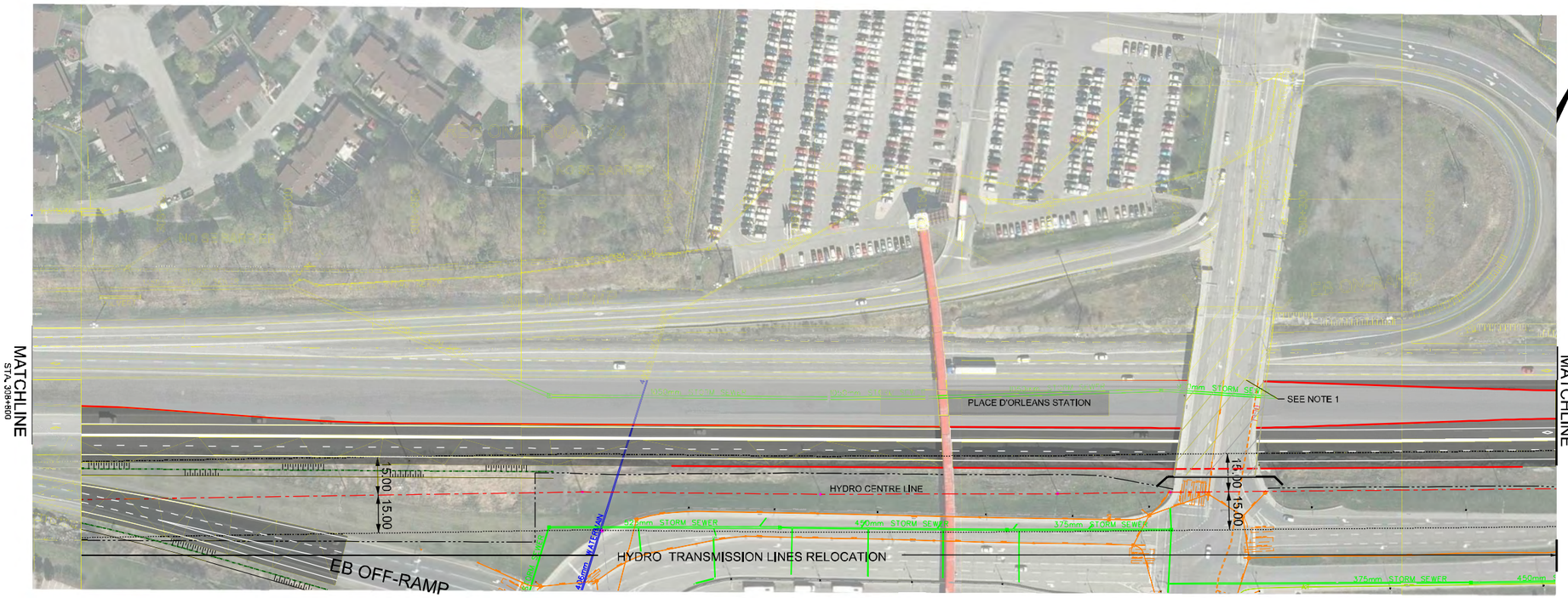
Ottawa

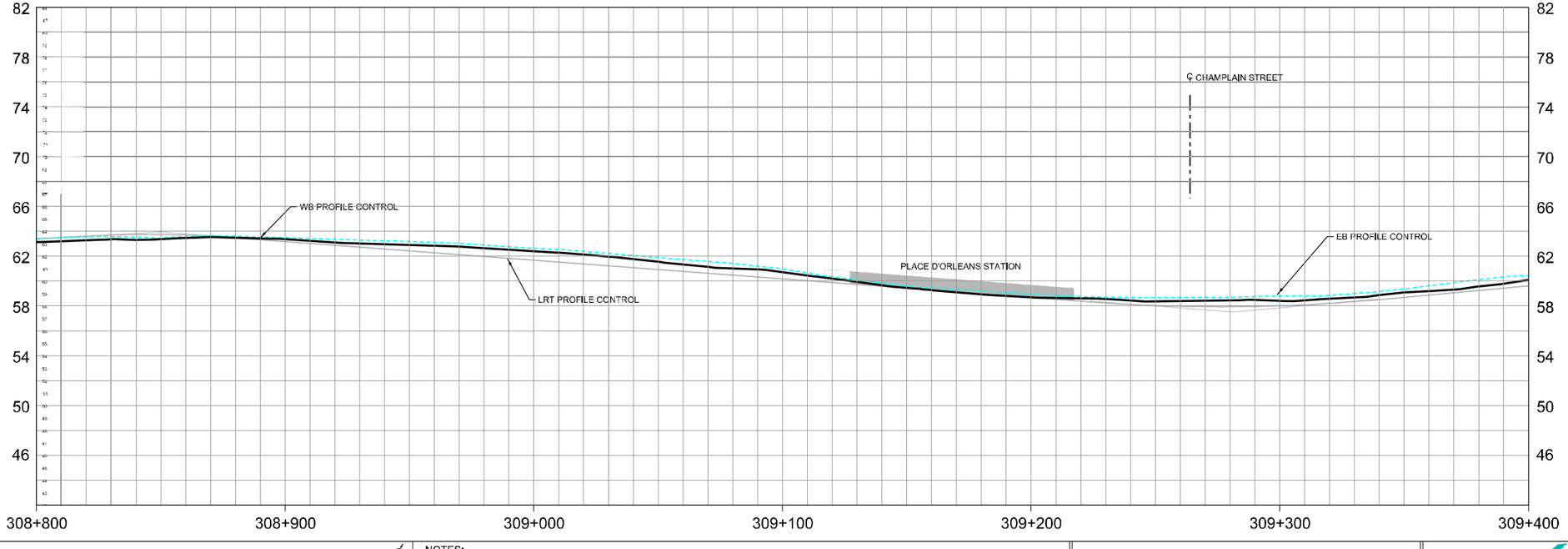
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 308+200 to STA 308+800

Drawings No.:

Revision: 00

Sheet No.: 16





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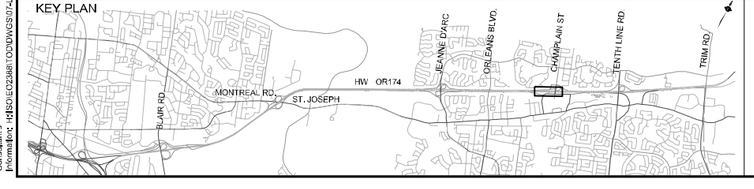

NOTES:

1. CHAMPLAIN BRIDGE TO BE REPLACED

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

CAD File Name: EO2388TOD- 01-PDR-17.DGN | Plot Date: XX/XX/XXXX

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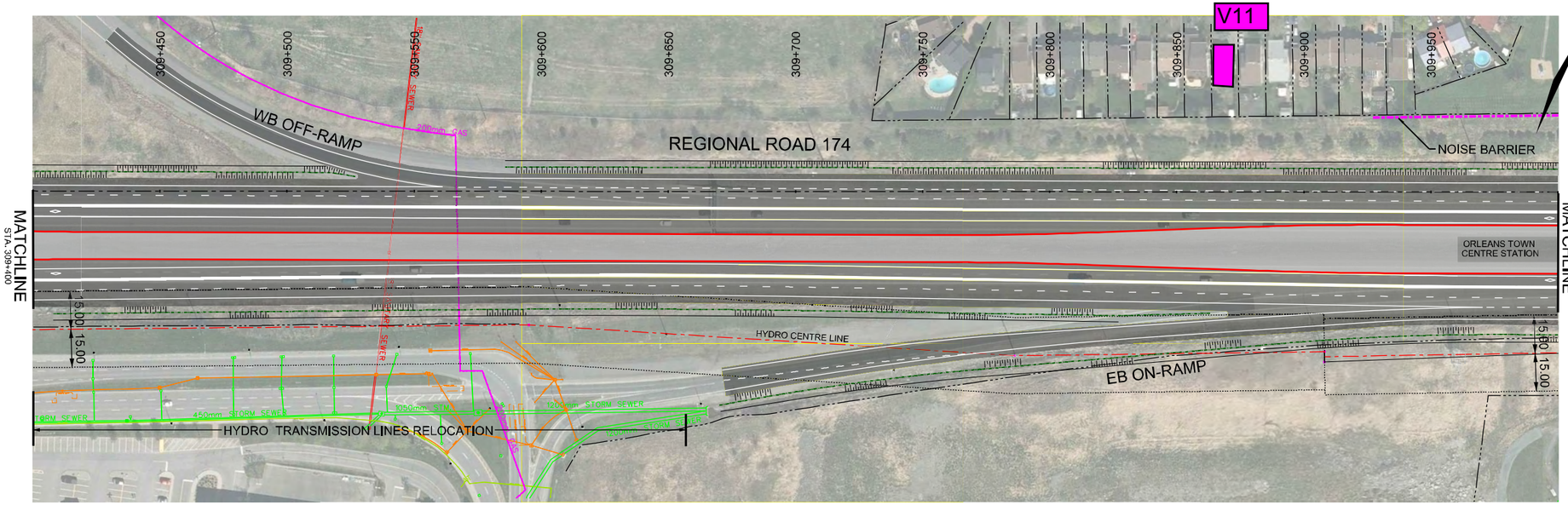
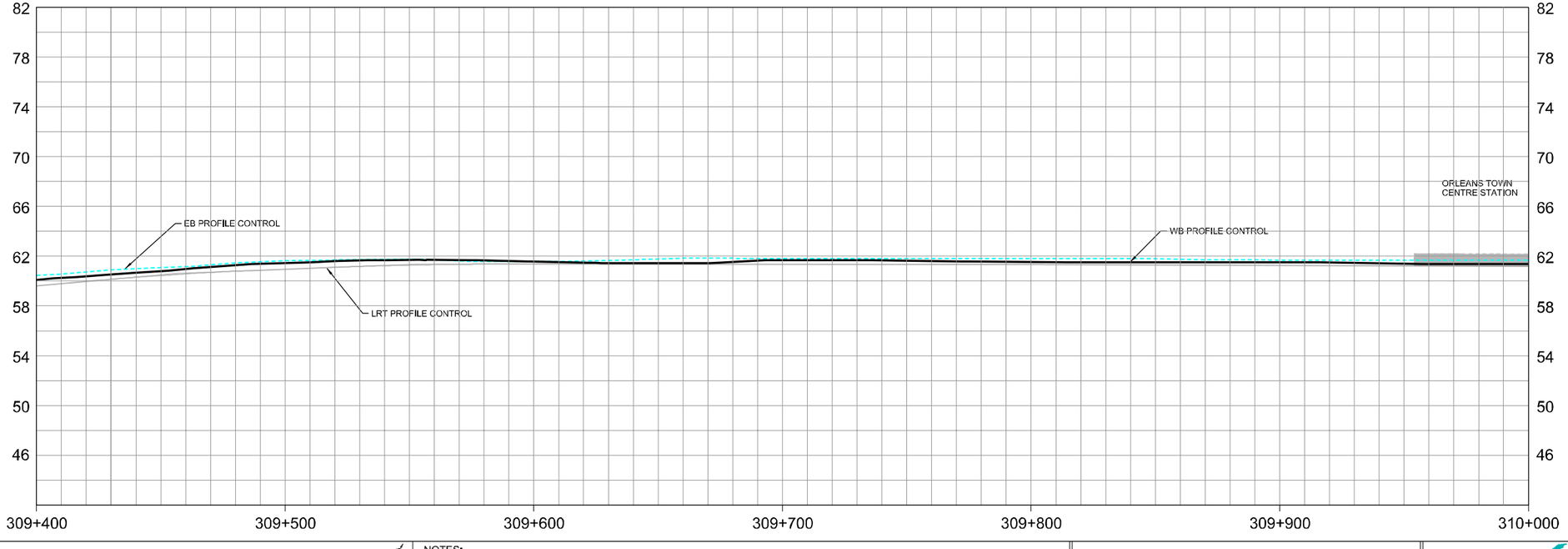
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 308+800 to STA309+400

Drawings No.: | Revision: 00 | Sheet No.: 17





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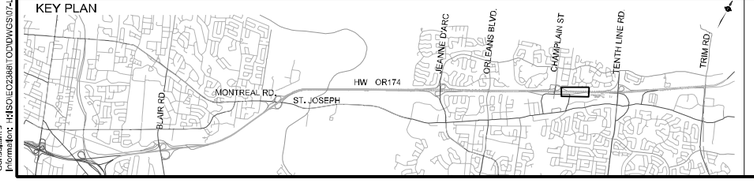

NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

CAD File Name: EO2388TOD- 01-PDR-18.DGN

Plot Date: XX/XX/XXXX

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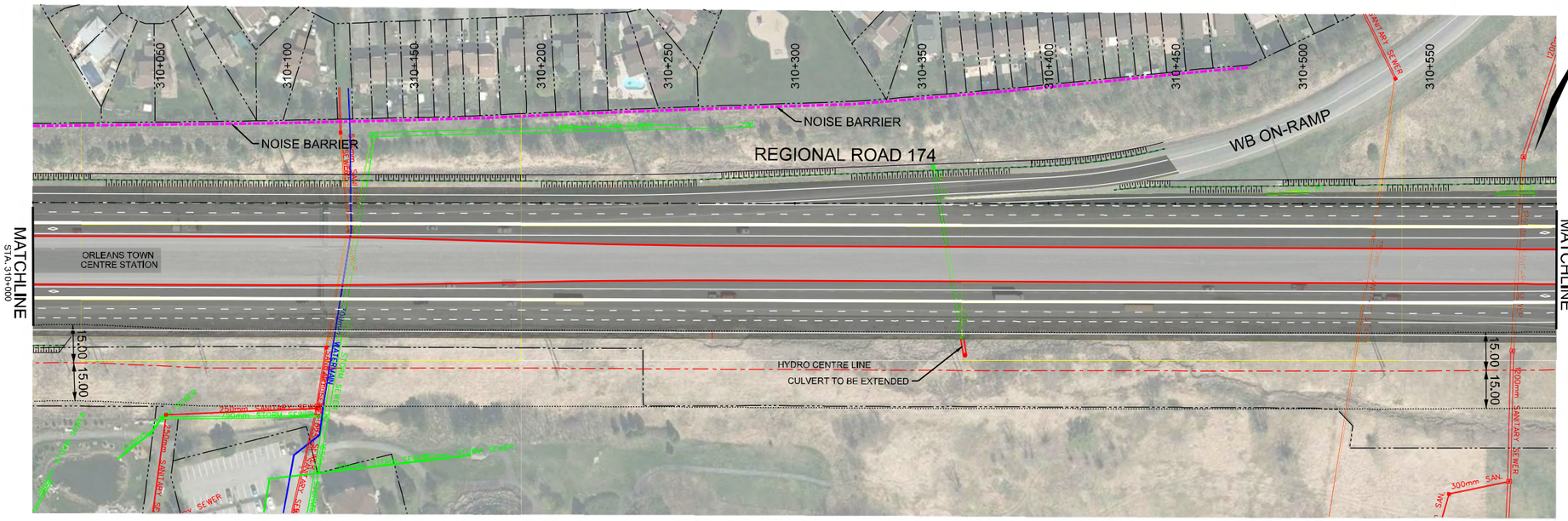
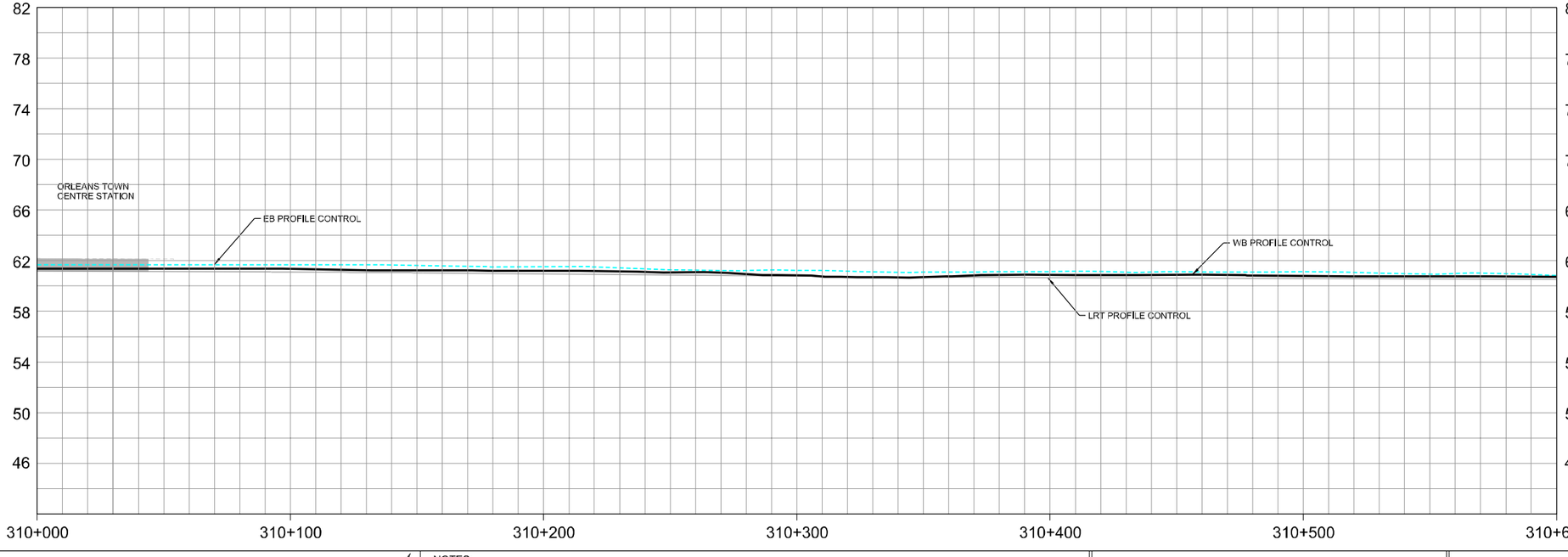
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 309+400 to STA. 310+000

Drawings No.:

Revision: 00

Sheet No.: 18





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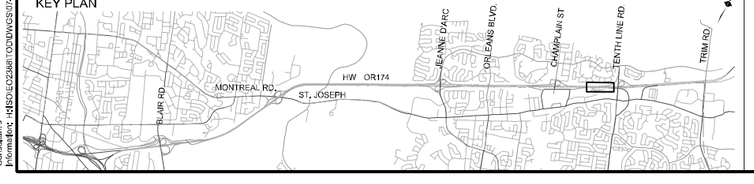

NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

CAD File Name: EO2388TOD- 01-PDR-19.DGN

Plot Date: XX/XX/XXXX

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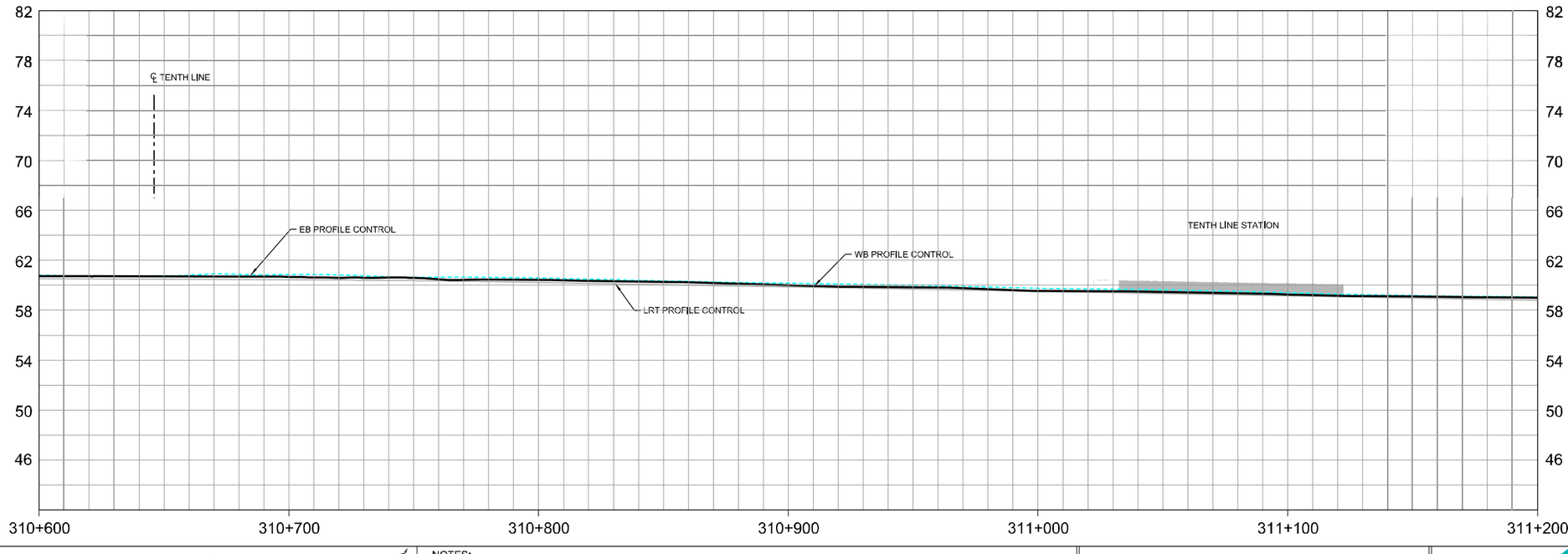
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 310+000 to STA 310+600

Drawings No.:

Revision: 00

Sheet No.: 19



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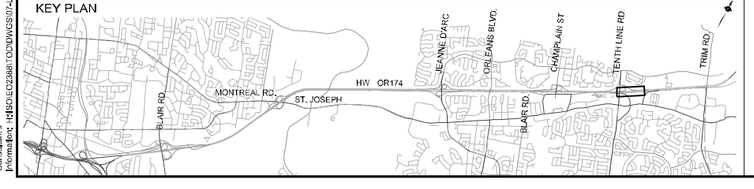

NOTES:

1. SLOPE PAVING TO BE MODIFIED ON NORTH SIDE OF STRUCTURE

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

CAD File Name: EO2388TOD- 01-PDR-20.DGN

Plot Date: XX/XX/XXXX

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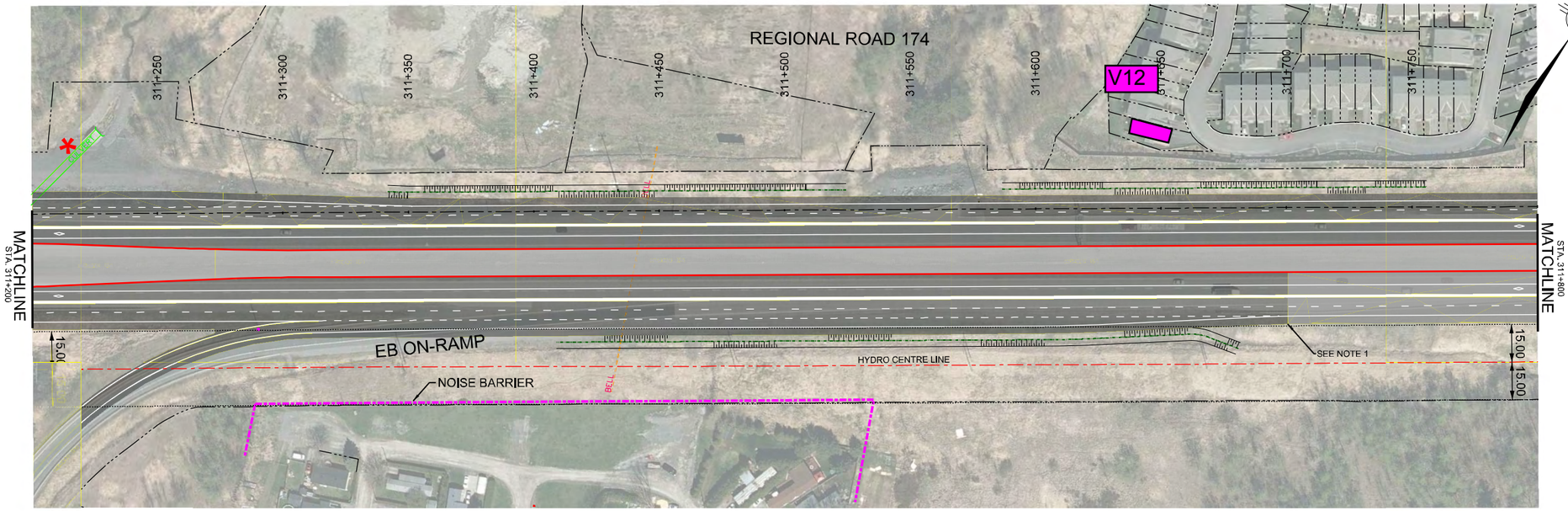
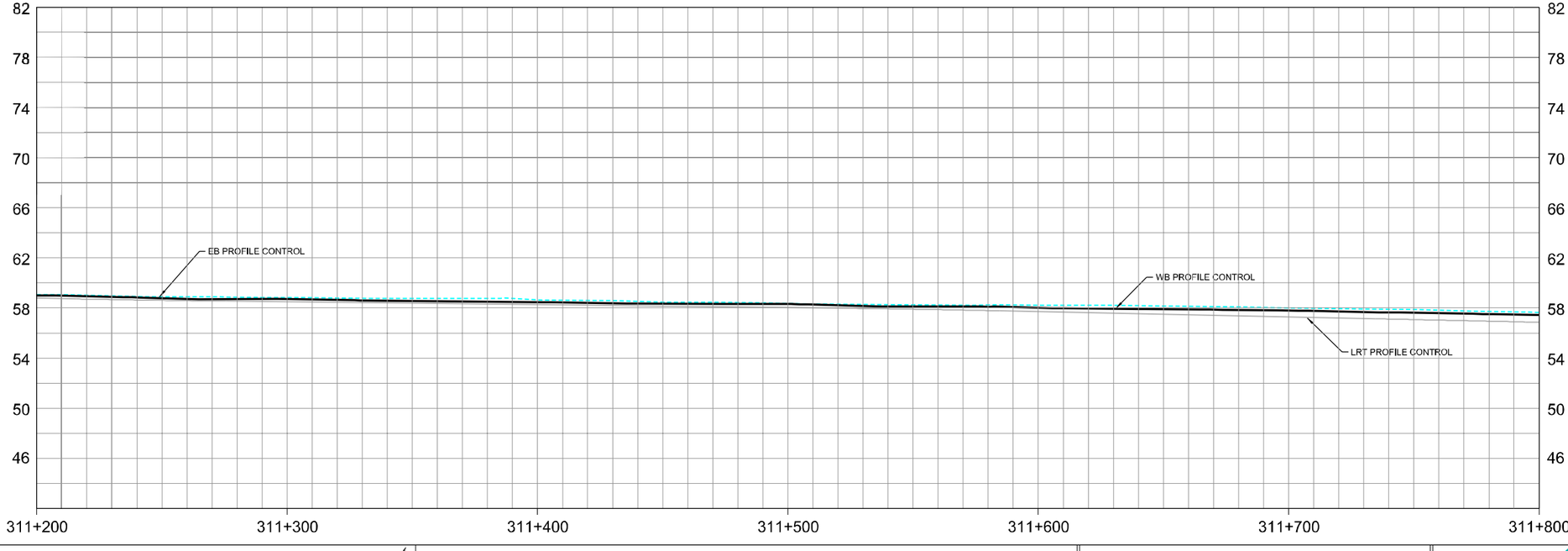
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 310+600to STA 311+200

Drawings No.: | Revision: 00 | Sheet No.: 20





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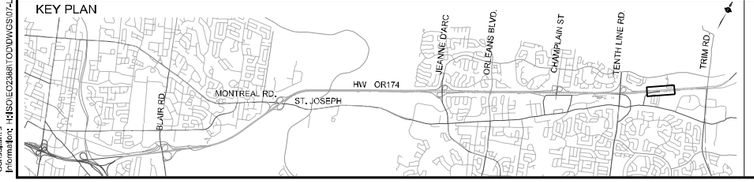

NOTES:

1. APPROXIMATE EASTBOUND TIE IN TO TRIM ROAD INTERCHANGE AT STA. 311+700

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

CAD File Name: EO2388TOD-01-PDR-21.DGN

Plot Date: XX/XX/XXXX

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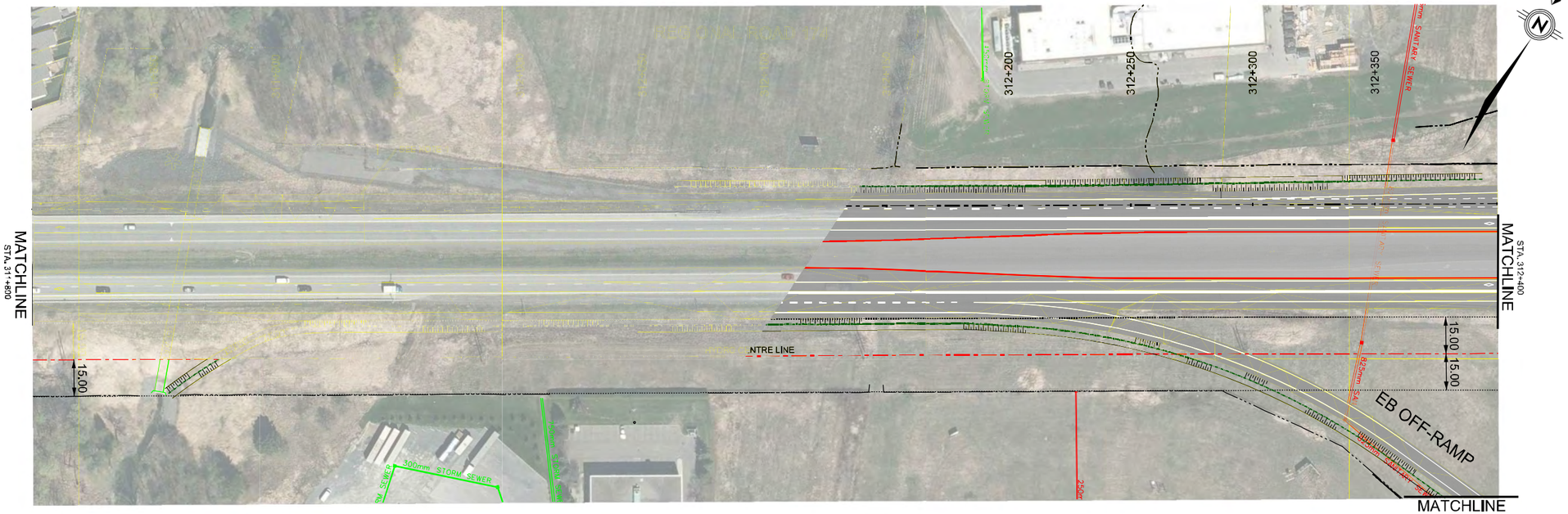
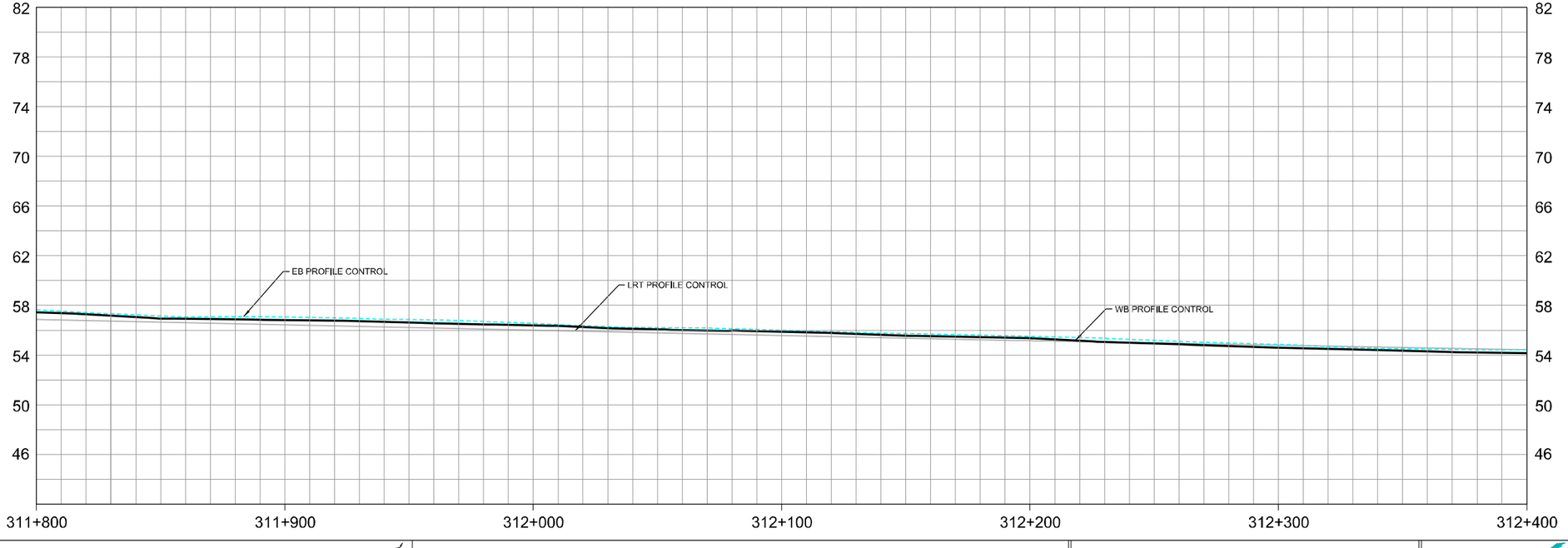
HWY OR174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 311+200 to STA. 311+800

Drawings No.:

Revision: 00

Sheet No.: 21





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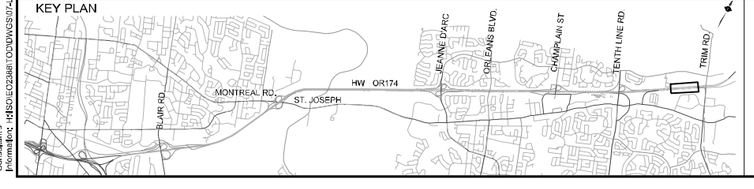

NOTES:

1. APPROXIMATE WESTBOUND TIE IN TO TRIM ROAD INTERCHANGE AT STA. 311+935

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

CAD File Name: EO2388TOD- 01-PDR-22.DGN

Plot Date: XX/XX/XXXX

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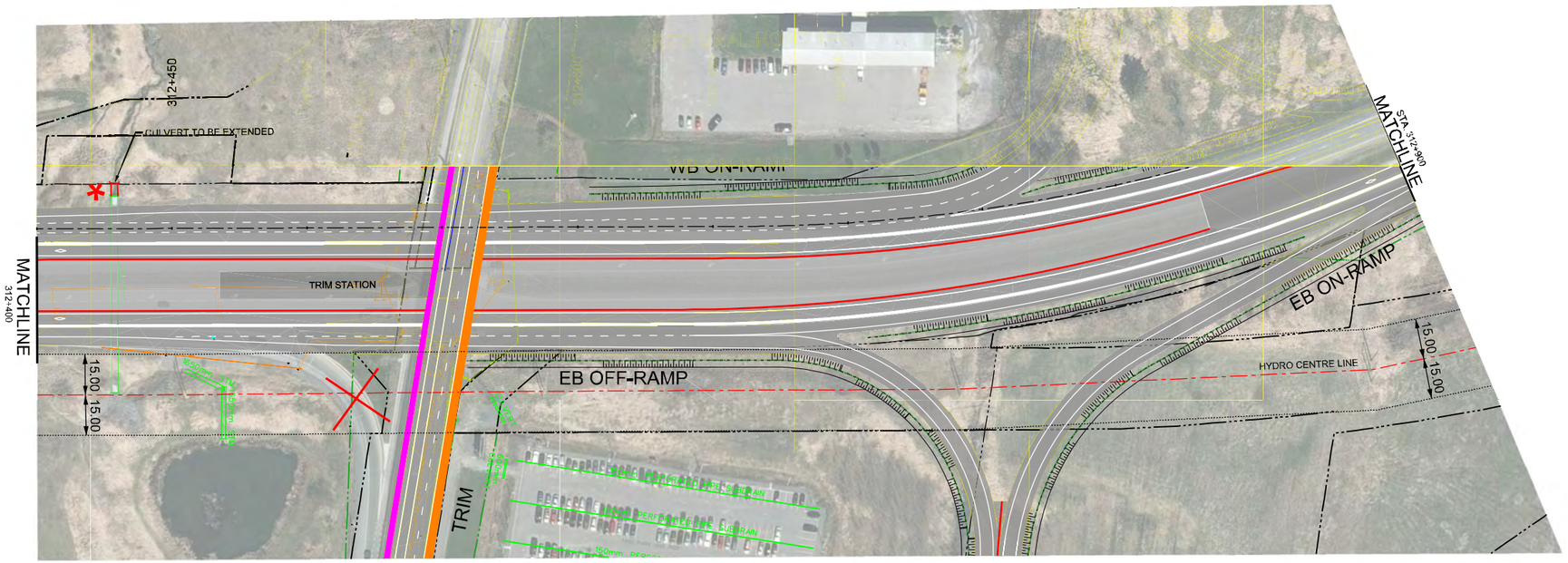
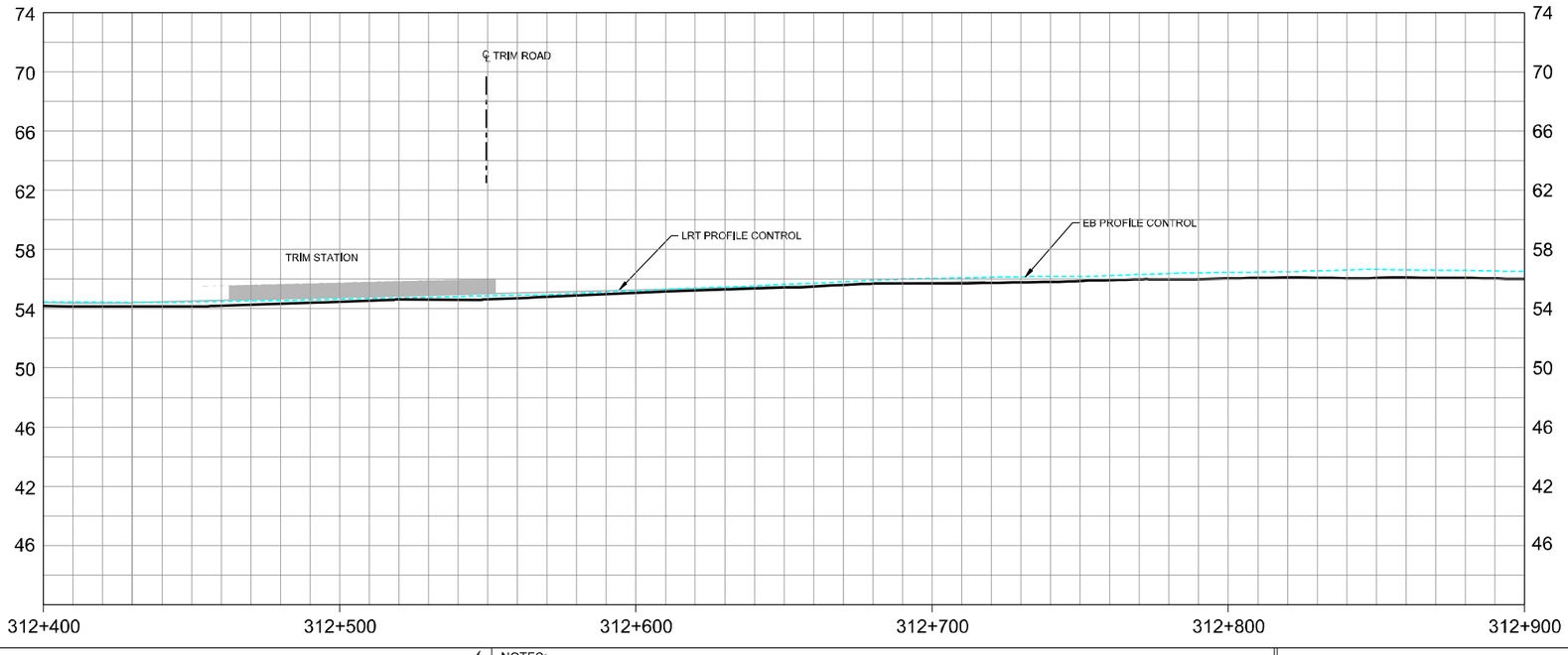
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 311+800 to STA. 312+400

Drawings No.:

Revision: 00

Sheet No.: 22





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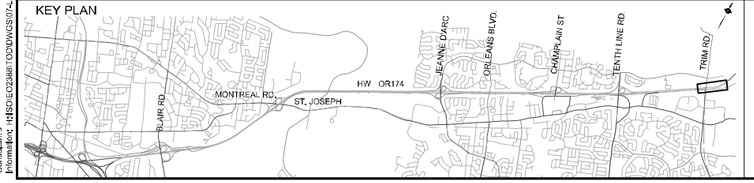

NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

CAD File Name: EO2388TOD-01-PDR-23.DGN	Plot Date: XX/XX/XXXX

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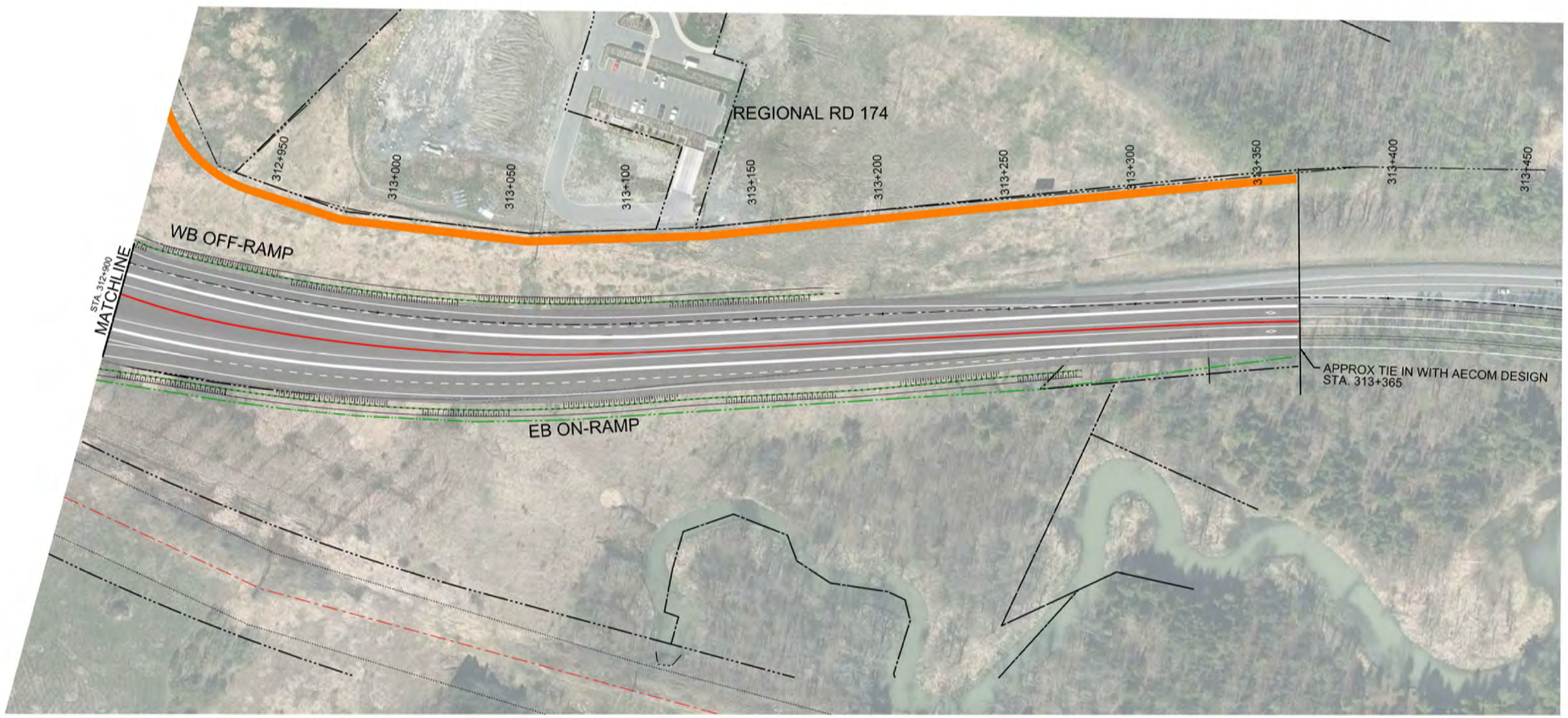
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 312+400 to STA. 312+900

Drawings No.:	Revision 00	Sheet No. 23



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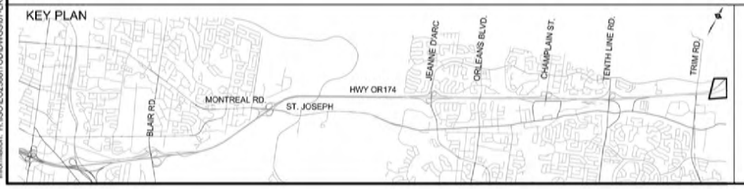

NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By

Scale: HORIZONTAL 1in 10 20 50 100; 1in 2.5 5 10 25; VERTICAL

CAD File Name: EO2388TOD- 01-PDR-24.DGN	Plot Date: XX/XX/XXXX

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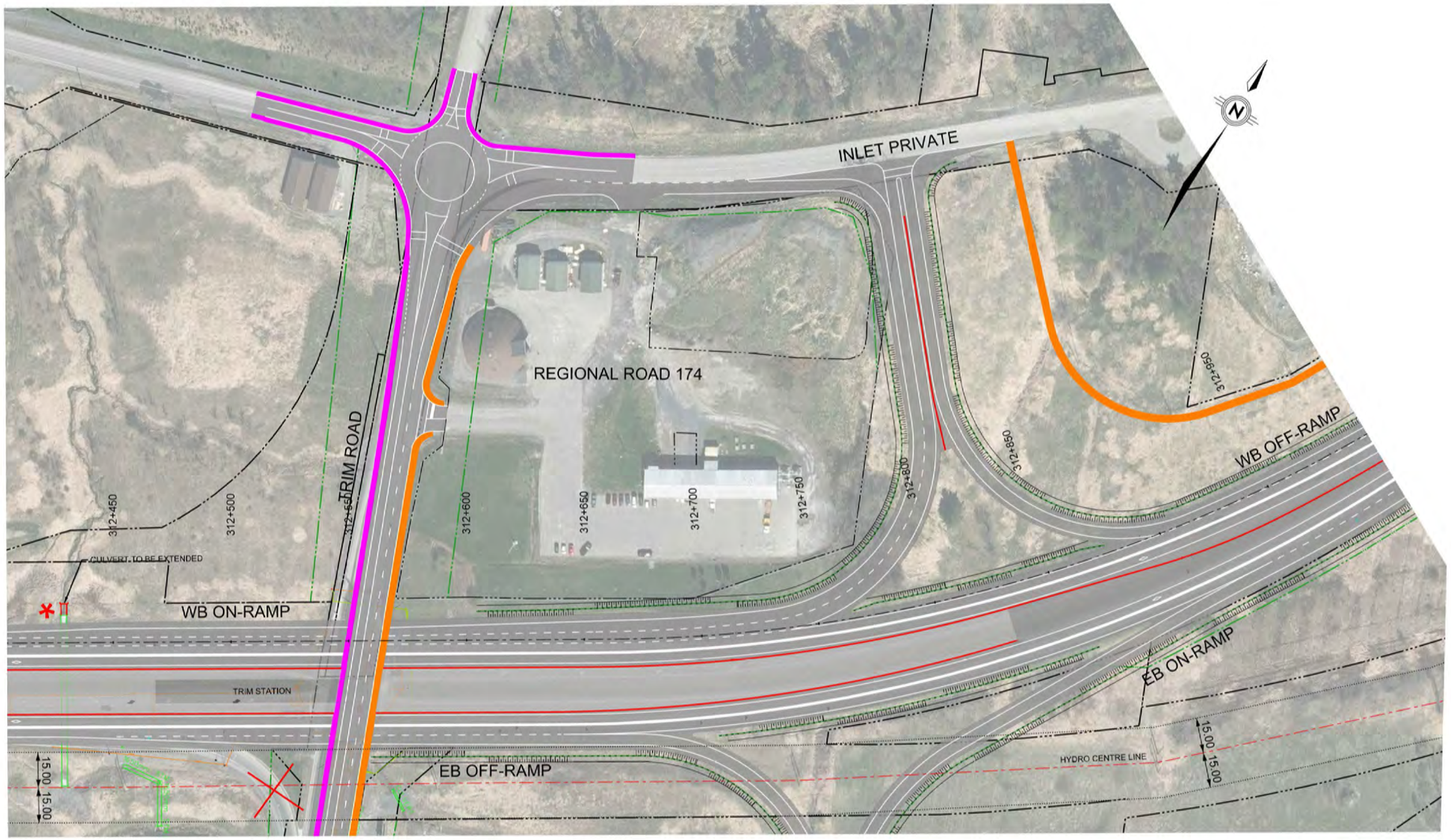
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 312+900 to STA 313+450

Drawings No.:	Revision	Sheet No.
	00	24



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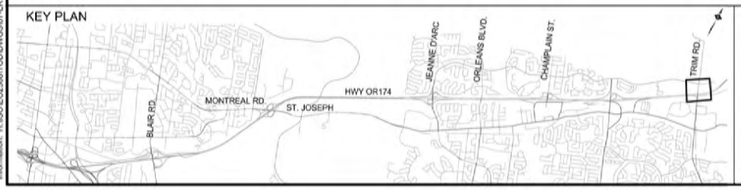


NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By

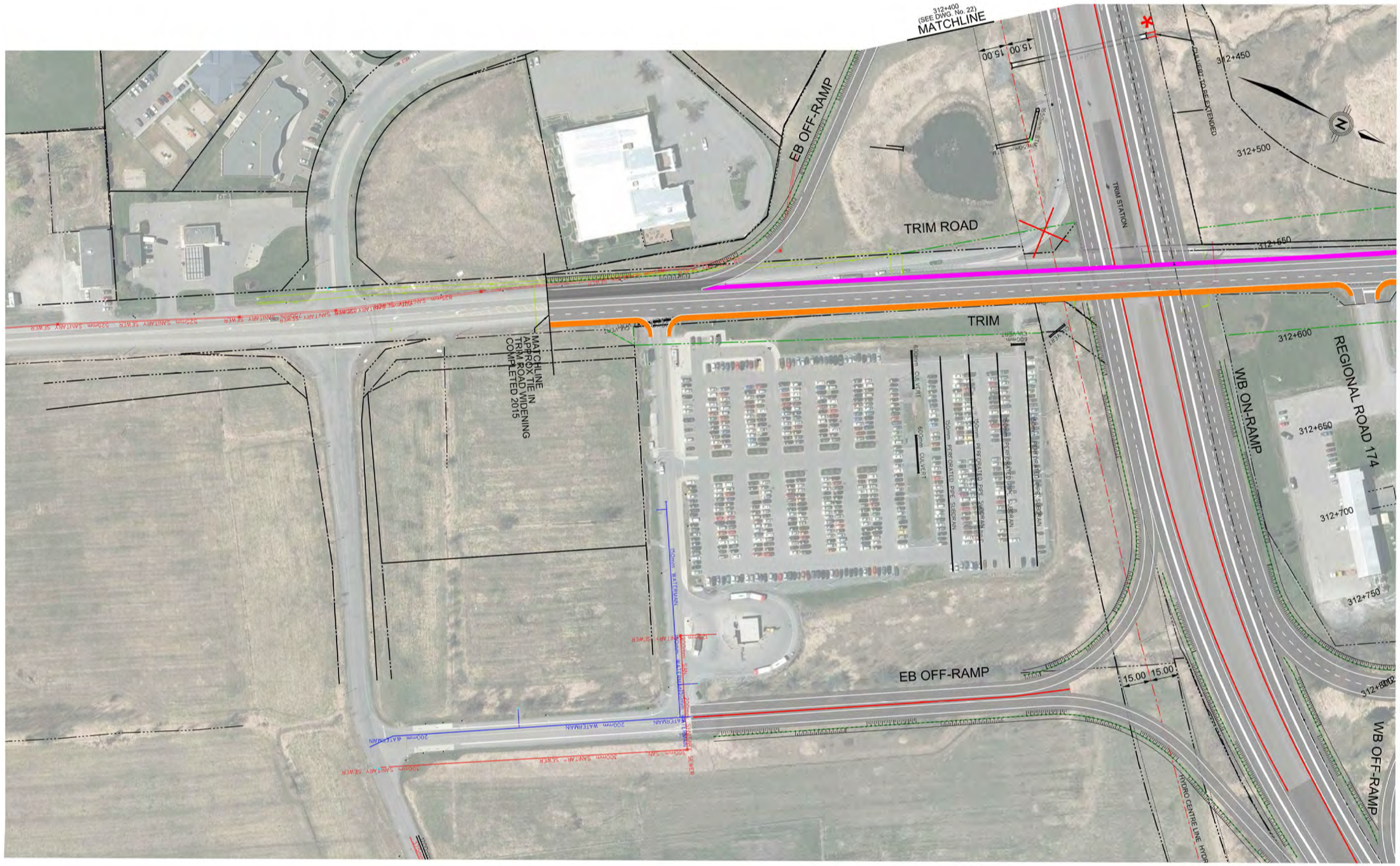
Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

CAD File Name: EO2388TOD- 01-PDR-25.DGN | Plot Date: XX/XX/XXXX

Ottawa

TRIM ROAD INTERCHANGE NORTH

Drawings No.: | Revision: 00 | Sheet No.: 25



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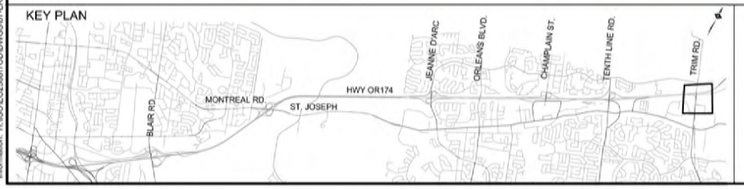

NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By

Scale: HORIZONTAL 1in 10 20 50 100; 1m 2.5 5 10 25; VERTICAL

CAD File Name: EO2388TOD- 01-PDR-26.DGN	Plot Date: XX/XX/XXXX

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TRIM ROAD INTERCHANGE SOUTH

Drawings No.:	Revision 00	Sheet No. 26

Appendix B

Appendix B: Zoning Plan

TABLE 35(B)- LIST OF PRIMARY ZONES AND CODES

(I) Zone Name	(II) Zone Code
RESIDENTIAL ZONES	
(1) Residential First Density Zone	R1
(2) Residential Second Density Zone	R2
(3) Residential Third Density Zone	R3
(4) Residential Fourth Density Zone	R4
(5) Residential Fifth Density Zone	R5
(6) Mobile Home Park Zone	RM
INSTITUTIONAL ZONES	

INSTITUTIONAL ZONES	
(7) Minor Institutional Zone	I1
(8) Major Institutional Zone	I2
OPEN SPACE AND LEISURE ZONES	
(9) Parks and Open Space Zone	O1
(10) Community Leisure Facility Zone	L1
(11) Major Leisure Facility Zone	L2
(12) Central Experimental Farm Zone	L3
ENVIRONMENTAL ZONE	
(13) Environmental Protection Zone	EP
COMMERCIAL/MIXED USE ZONES	
(14) Local Commercial Zone	LC
(15) General Mixed Use Zone	GM
(16) Traditional Mainstreet Zone	TM
(17) Arterial Mainstreet Zone	AM
(18) Mixed Use Centre Zone	MC

(18) Mixed Use Centre Zone	MC
(19) Mixed Use Downtown Zone	MD
INDUSTRIAL ZONES	
(20) Business Park Industrial Zone	IP
(21) Light Industrial Zone	IL
(22) General Industrial Zone	IG
(23) Heavy Industrial Zone	IH
TRANSPORTATION ZONES	
(24) Air Transportation Facility Zone	T1
(25) Ground Transportation Facility Zone	T2
RURAL ZONES	
(26) Agricultural Zone	AG
(27) Mineral Extraction Zone	ME
(28) Mineral Aggregate Reserve Zone	MR
(29) Rural Commercial Zone	RC
(30) Rural General Industrial Zone	RG

(30) Rural General Industrial Zone	RG
(31) Rural Heavy Industrial Zone	RH
(32) Rural Institutional Zone	RI
(33) Rural Residential Zone	RR
(34) Rural Countryside Zone	RU
(35) Village Mixed Use Zone	VM
(36) Village Residential First Density Zone	V1
(37) Village Residential Second Density Zone	V2
(38) Village Residential Third Density Zone	V3
OTHER ZONES	
(39) Development Reserve Zone	DR

March 27, 2015

1:5,774

- Flood Plain (Section 58) / Plaine inondable (Article 58)
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- Zoning Boundary / Limite de la zone
- Water / Eau

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City of Ottawa

March 27, 2015

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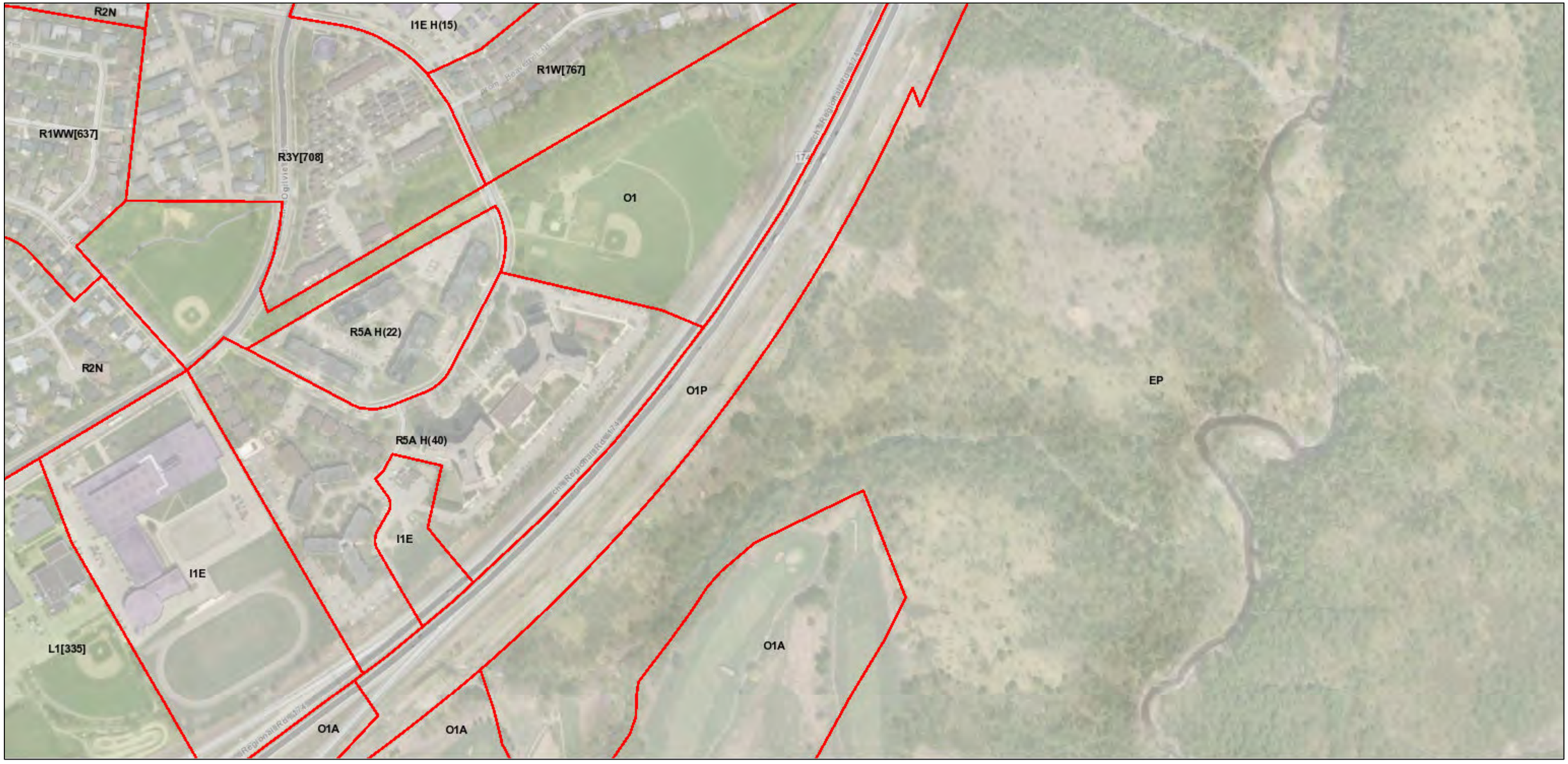

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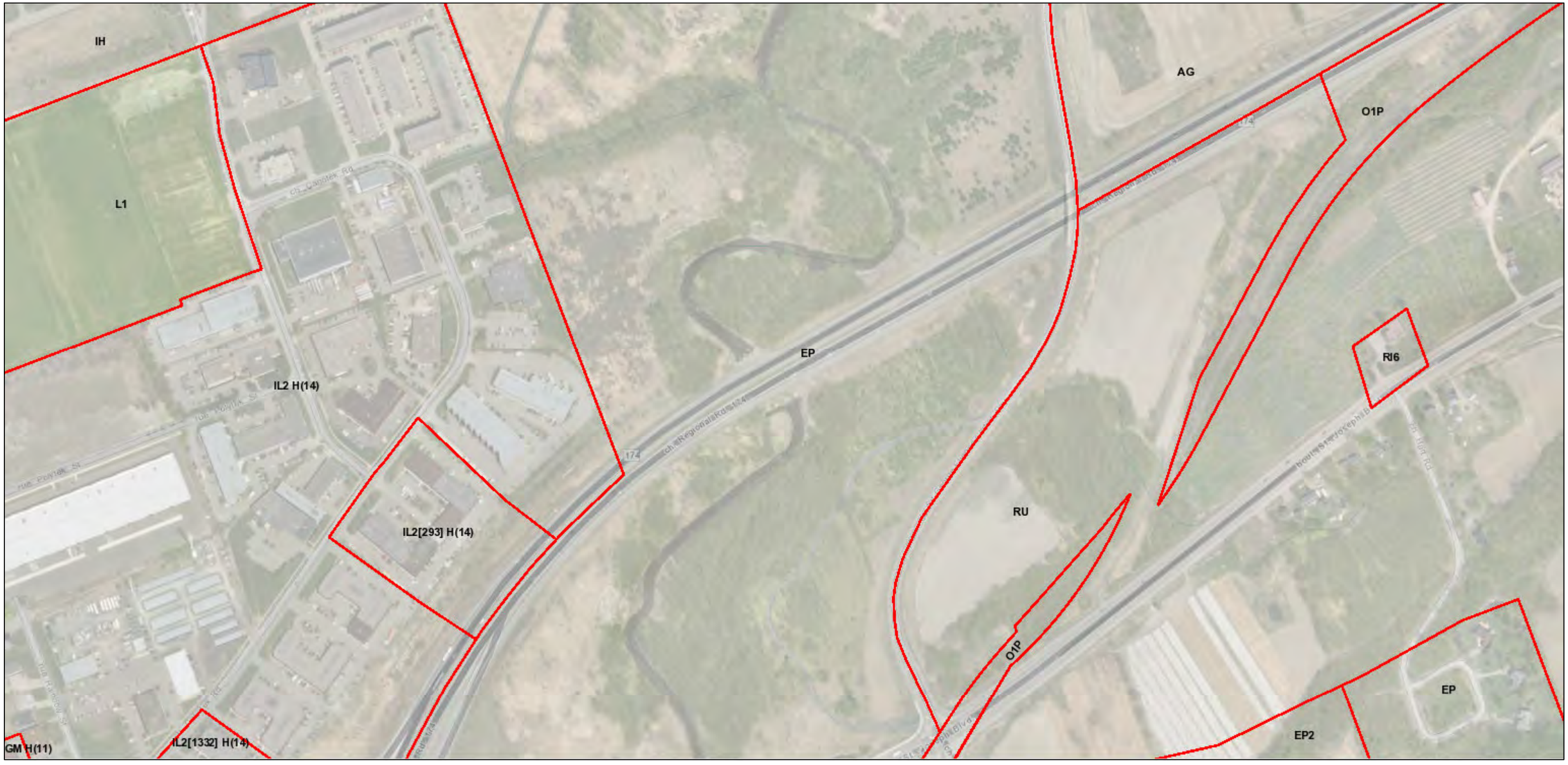

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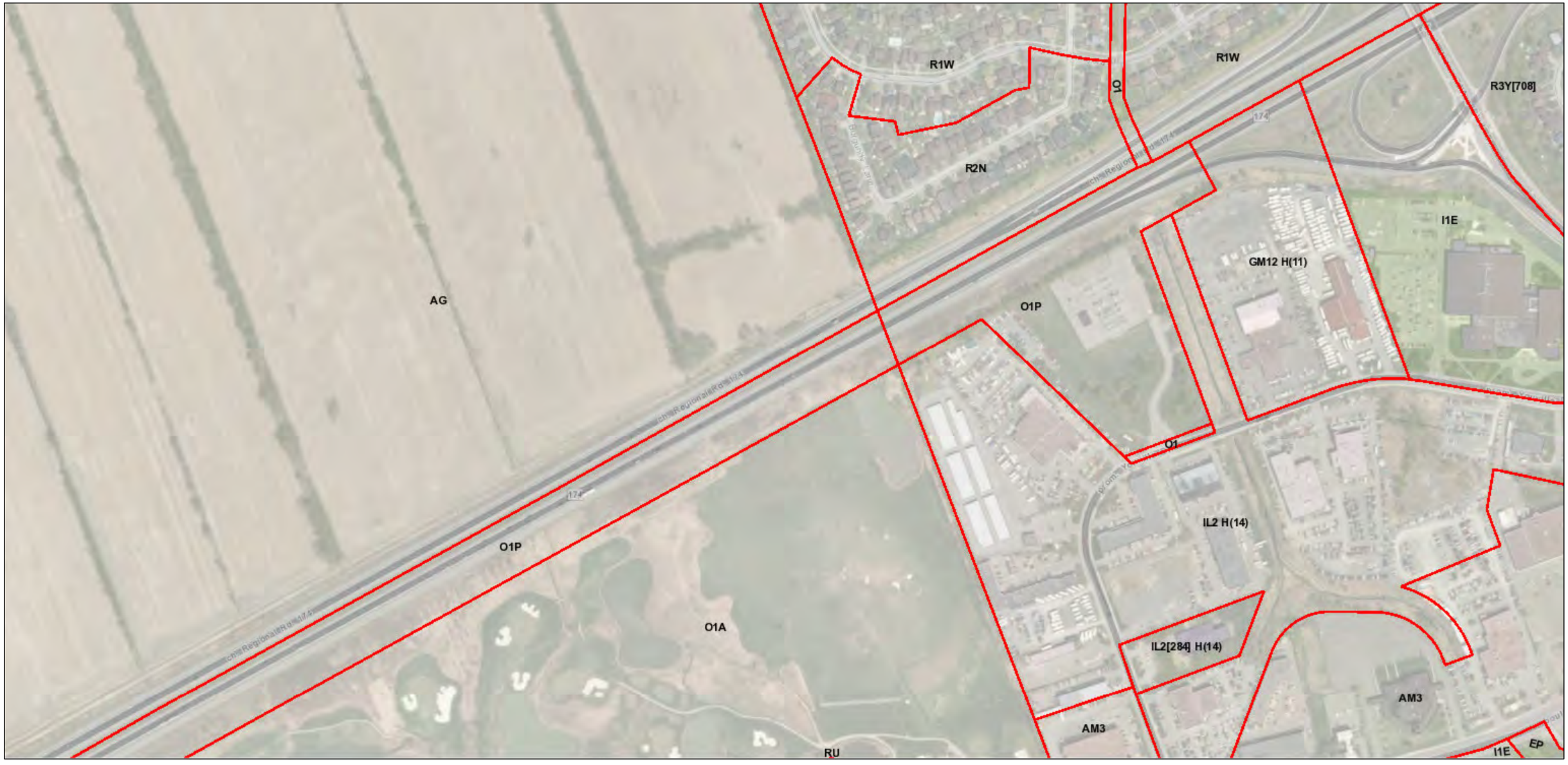

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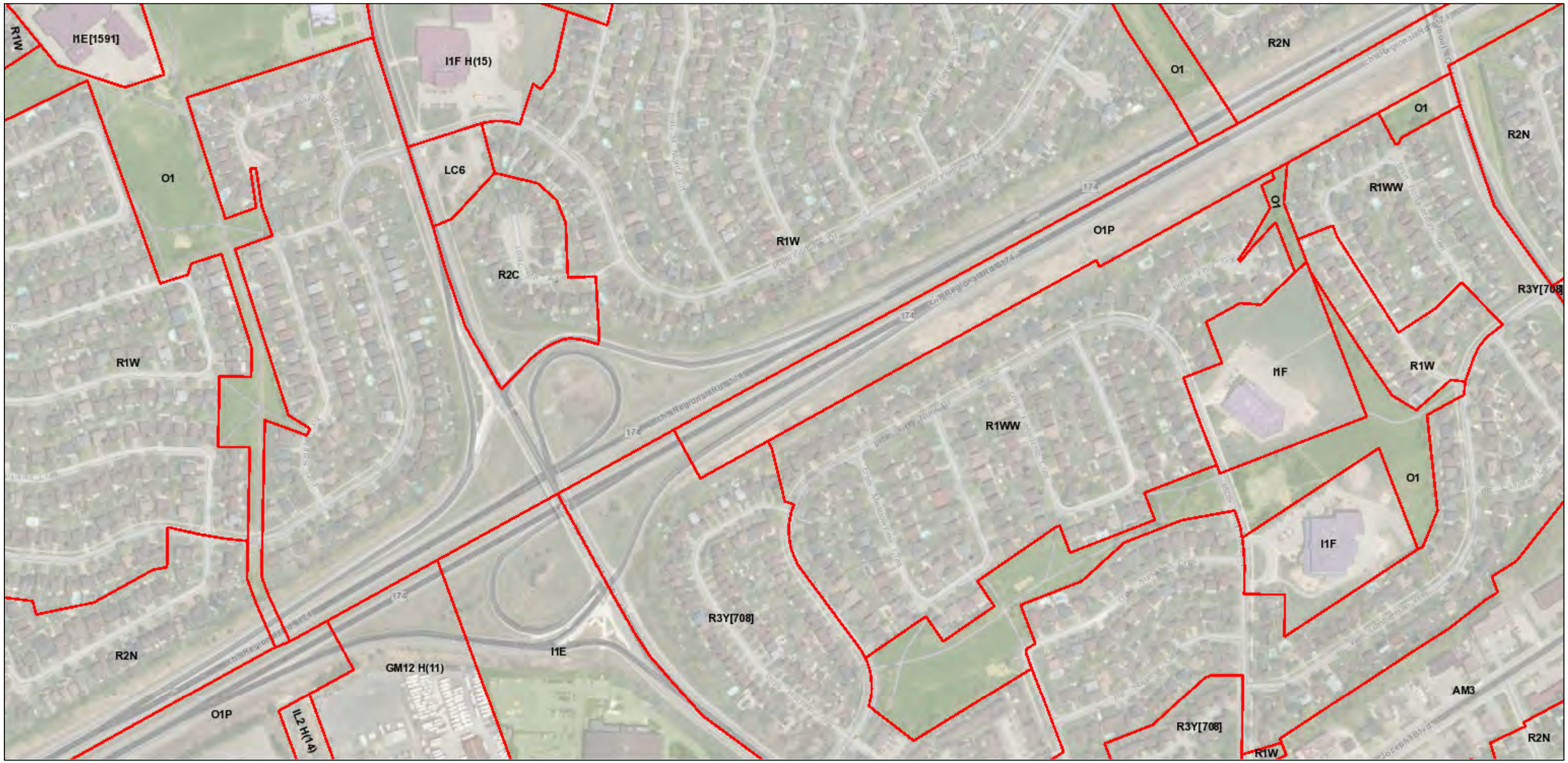

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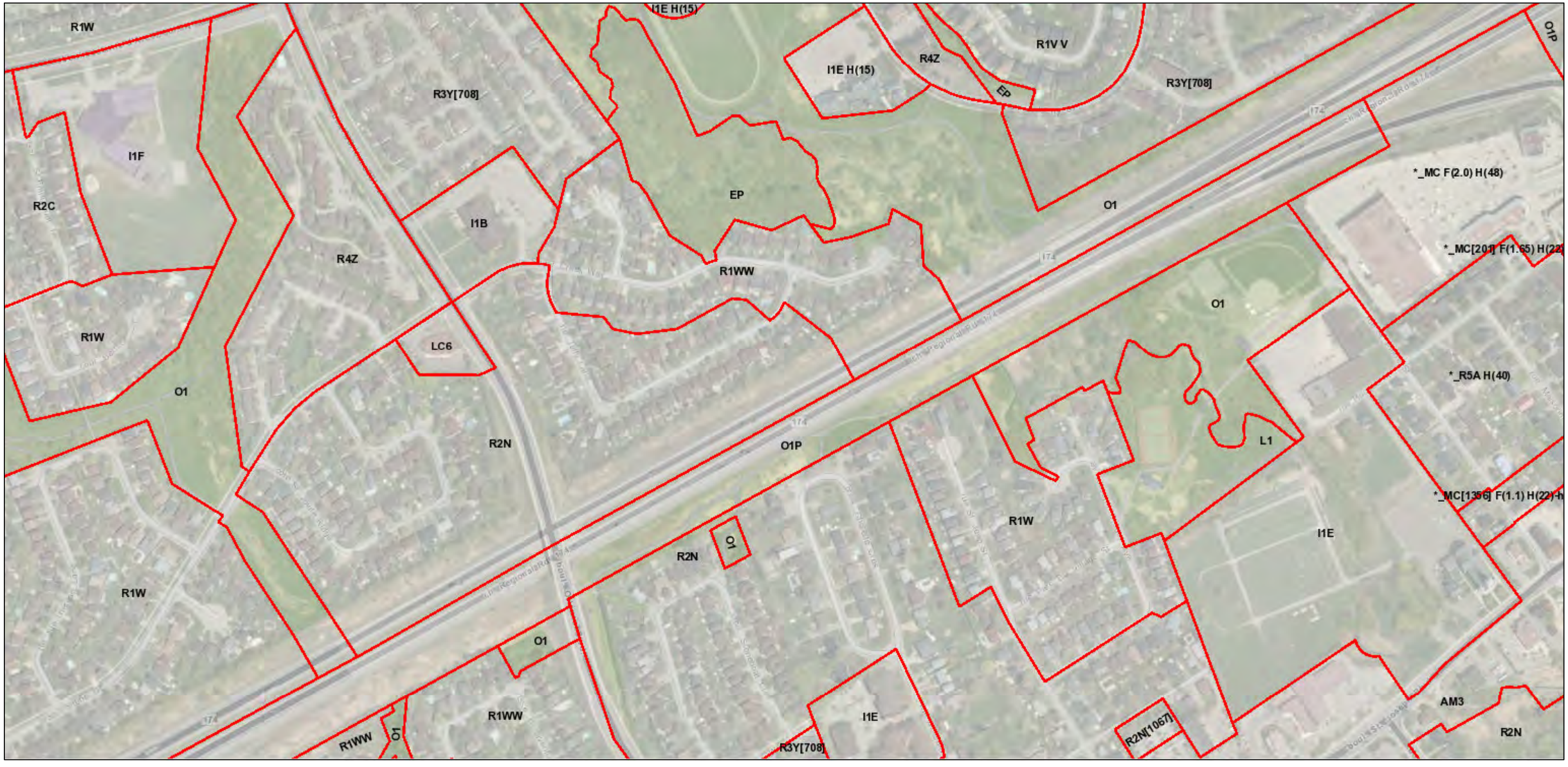

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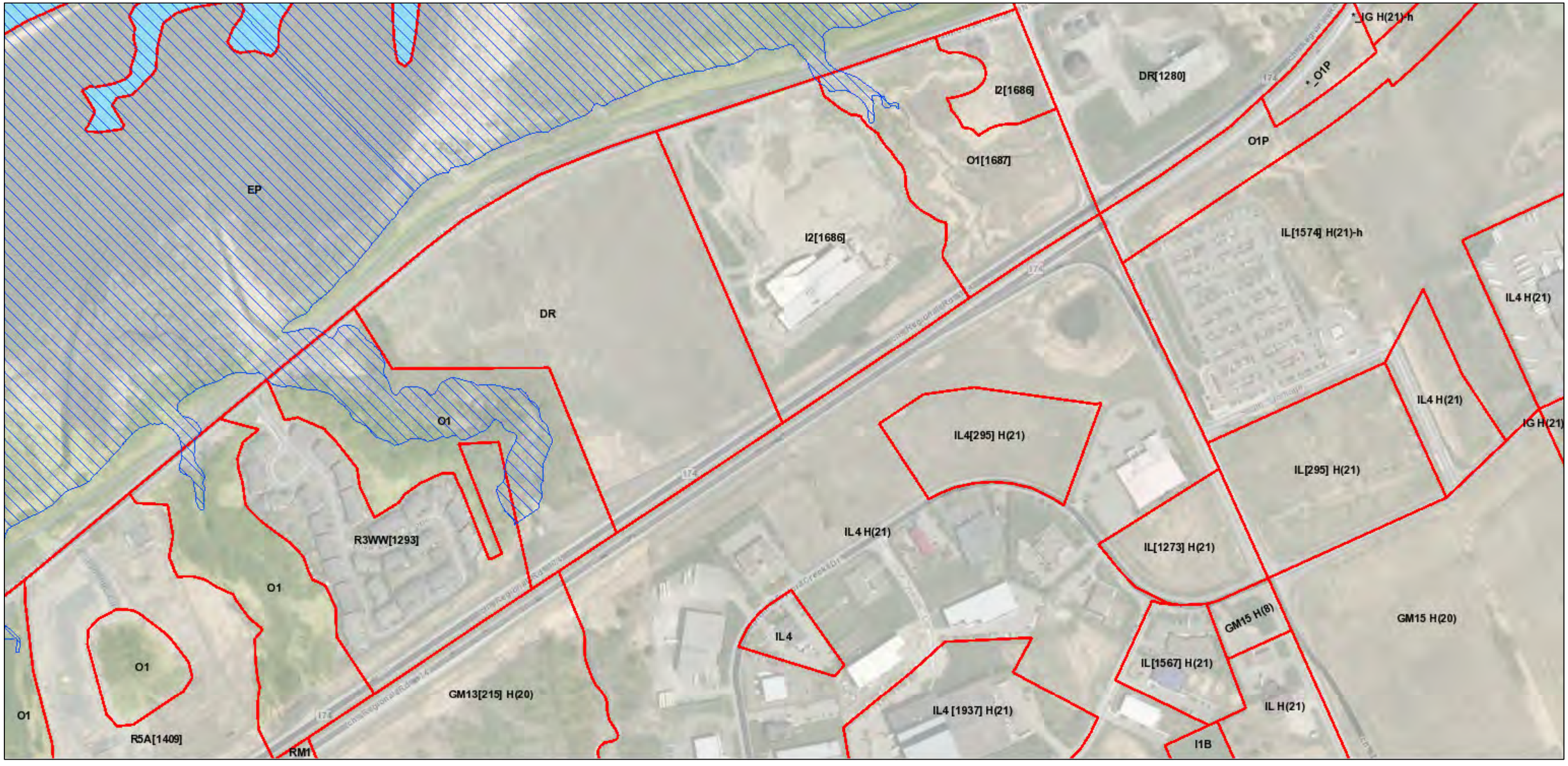

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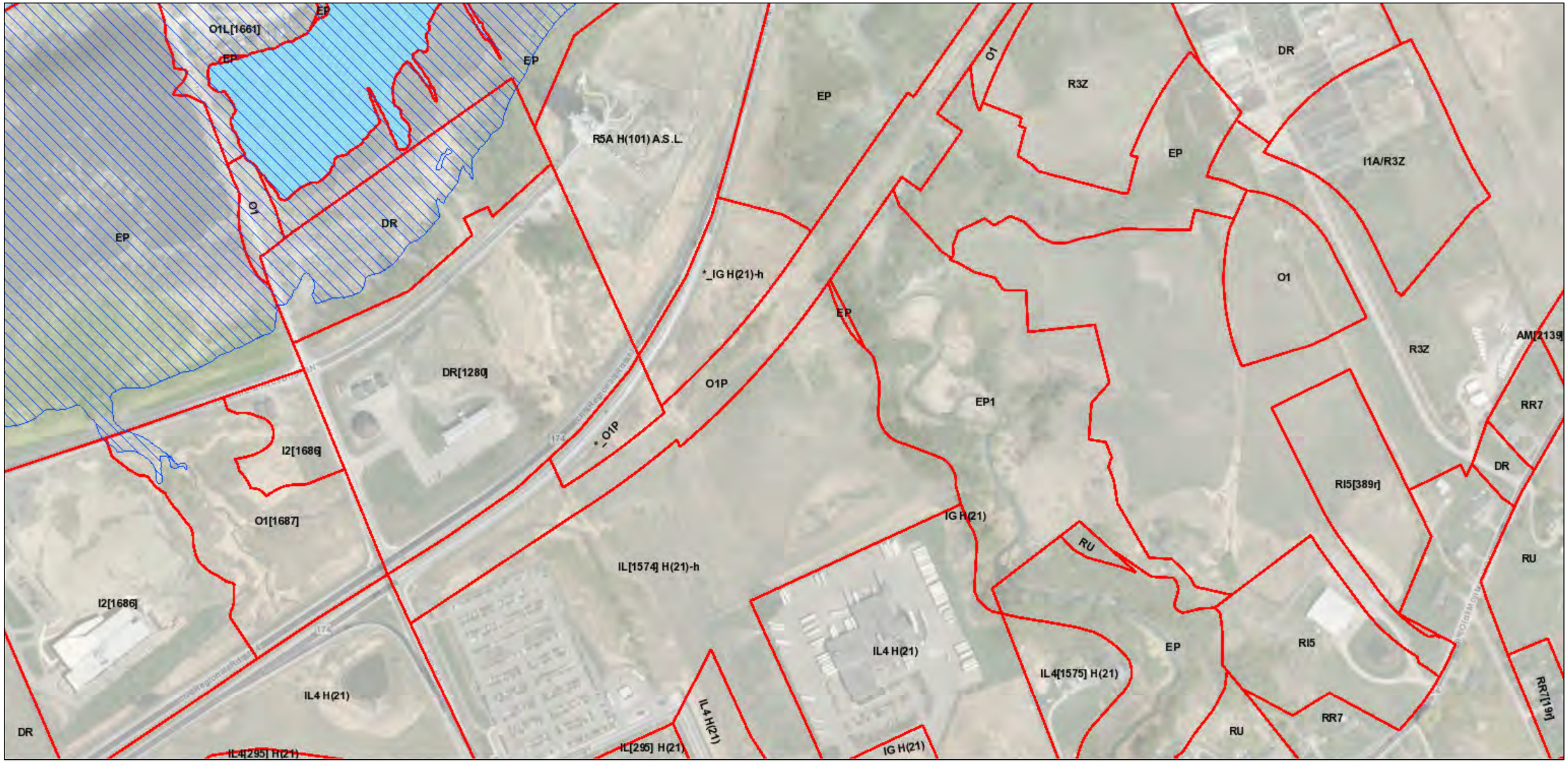

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Appendix C

Appendix C: Noise Barriers

Document 4: Ottawa Road 174 Functional Design from the Highway 417 Split to Trim Road

Date: January 2016

Note: Noise analysis completed without lane widening. Lane widening to occur as part of Highway 174/74 project. Minimum barrier heights and extensions noted on this drawing. Further details regarding analysis forthcoming in Highway 174/74 noise report.

INDEX

SHEET NO.	NAME
01	STA. 298+450 to STA. 299+800
02	STA. 299+800 to STA. 300+400 (BLAIR RD)
03	STA. 300+400 to STA. 301+000
04	STA. 301+000 to STA. 301+600
05	STA. 301+600 to STA. 302+200
06	STA. 302+200 to STA. 302+800
07	STA. 302+800 to STA. 303+400 (MONTREAL RD)
08	STA. 303+400 to STA. 304+000 (GREENS CREEK)
09	STA. 304+000 to STA. 304+600
10	STA. 304+600 to STA. 305+200
11	STA. 305+200 to STA. 305+800
12	STA. 305+800 to STA. 306+400
13	STA. 306+400 to STA. 307+000 (JEANNE D'ARC)
14	STA. 307+000 to STA. 307+600
15	STA. 307+600 to STA. 308+200 (ORLEANS)
16	STA. 308+200 to STA. 308+800
17	STA. 308+800 to STA. 309+400 (CHAMPLAIN)
18	STA. 309+400 to STA. 310+000
19	STA. 310+000 to STA. 310+600
20	STA. 310+600 to STA. 311+200 (TENTH LINE)
21	STA. 311+200 to STA. 311+800
22	STA. 311+800 to STA. 312+400
23	STA. 312+400 to STA. 312+900
24	STA. 312+900 to STA. 313+450
25	TRIM ROAD NORTH INTERCHANGE
26	TRIM ROAD SOUTH INTERCHANGE

LEGEND:

- ELRT CORRIDOR
- ELRT STATIONS
- WB-CENTRELINE CONTROL
- PROPOSED LANE ALIGNMENT
- PROPOSED HOV BUFFER
- PROPOSED HOV LANE
- PROPOSED BARRIER
- PROPOSED CURB AND GUTTER
- PROPOSED SIDEWALK
- PROPOSED MUP
- PROPOSED DITCH WORK
- PROPOSED NOISE BARRIER
- PROPOSED SWM QUALITY CONTROL
- EXISITING ROAD
- EXISTING GASLINE
- EXISTING BELL
- EXISTING ROGERS
- EXISTING HYDRO TRANSMISSION CENTRE LINE
- EXISTING HYDRO TRANSMISSION CORRIDOR
- EXISTING WATERMAIN
- EXISTING SANITARY
- EXISTING CULVERTS AND STORM SEWERS
- EXISTING PROPERTY LIMITS
- PROPOSED PROPERTY LIMITS
- MINIMUM BARRIER
- EXISTING BARRIER

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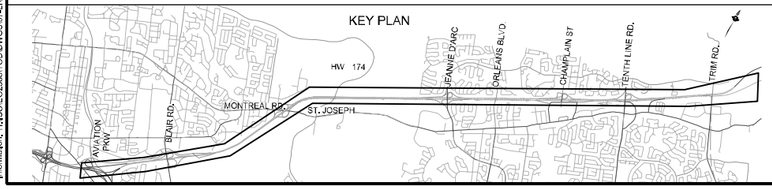

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Project Manager:	Discipline Engineer:	Checked By:
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Ottawa

HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
LEGEND AND INDEX

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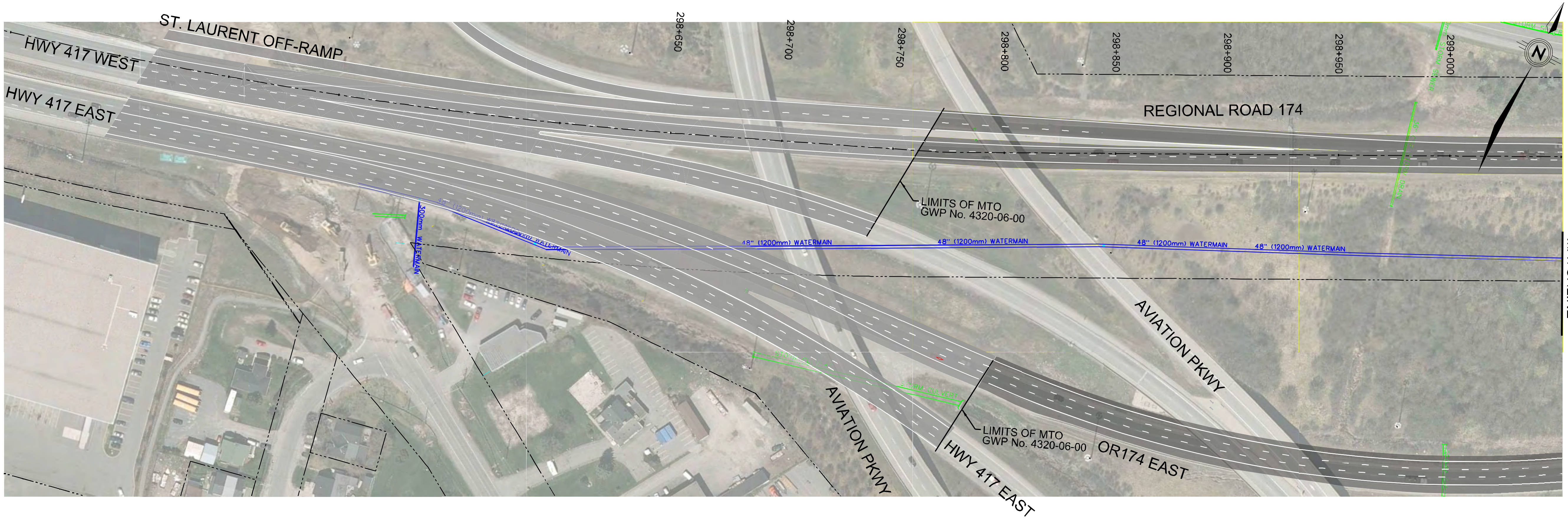

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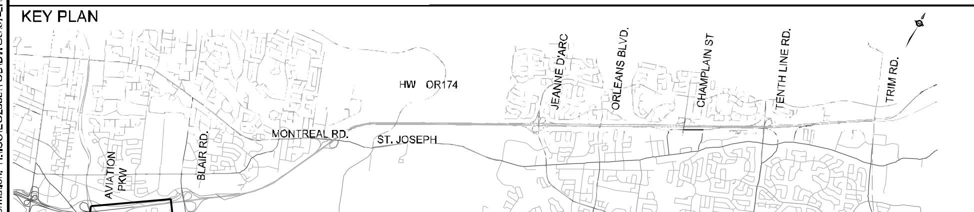

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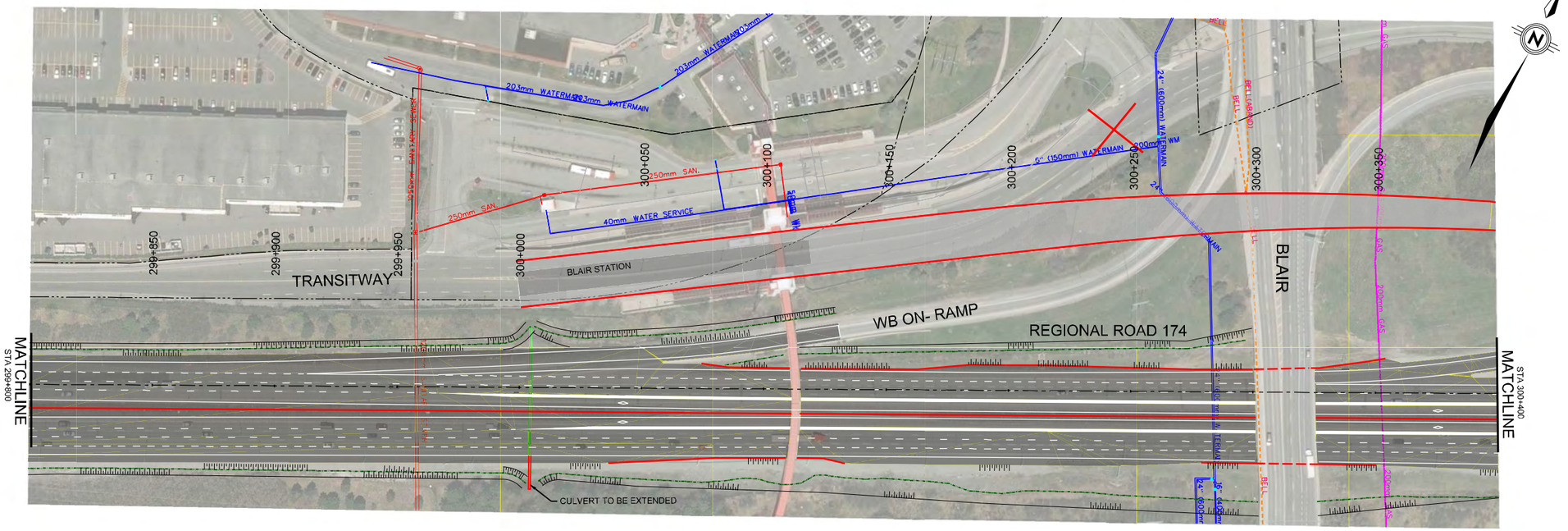
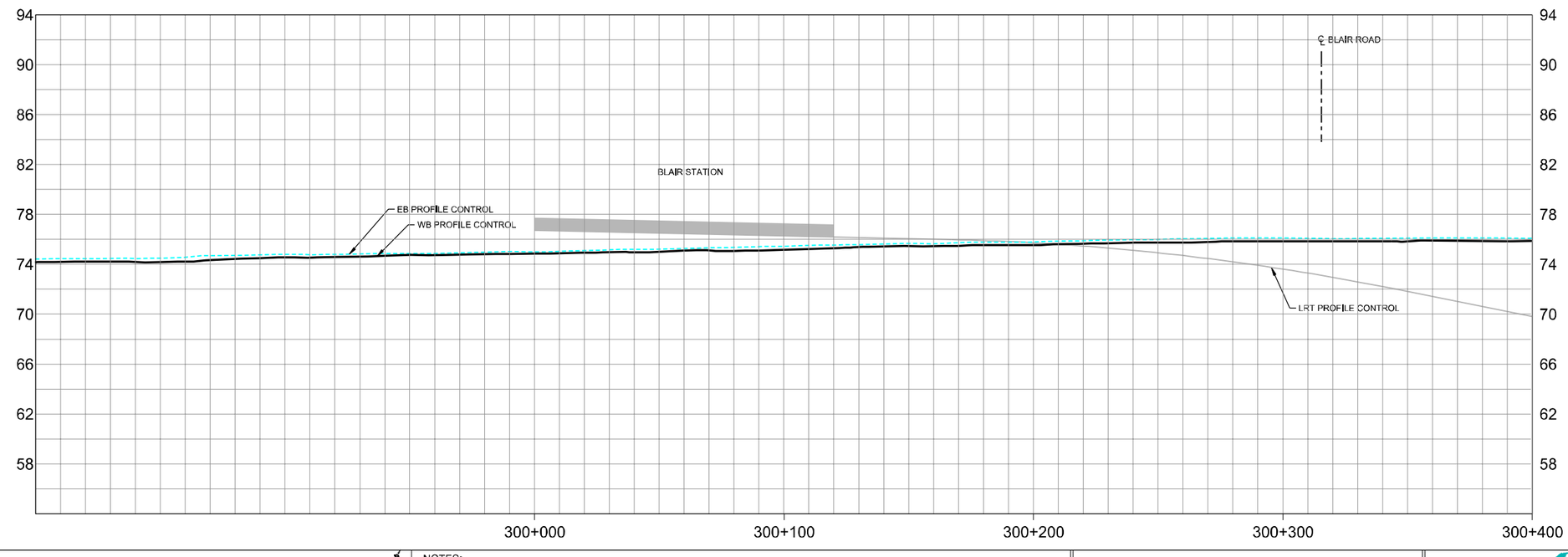
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 298+450 to STA 299+800

Drawings No.:

Revision 00

Sheet No. 01





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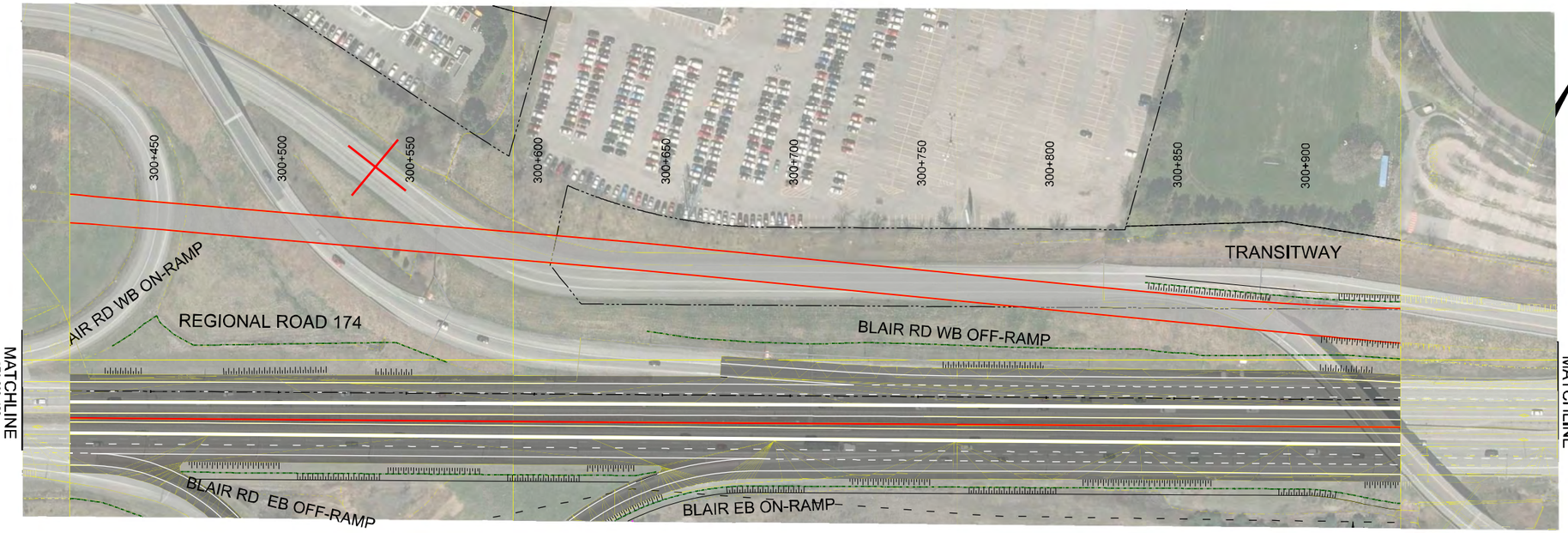
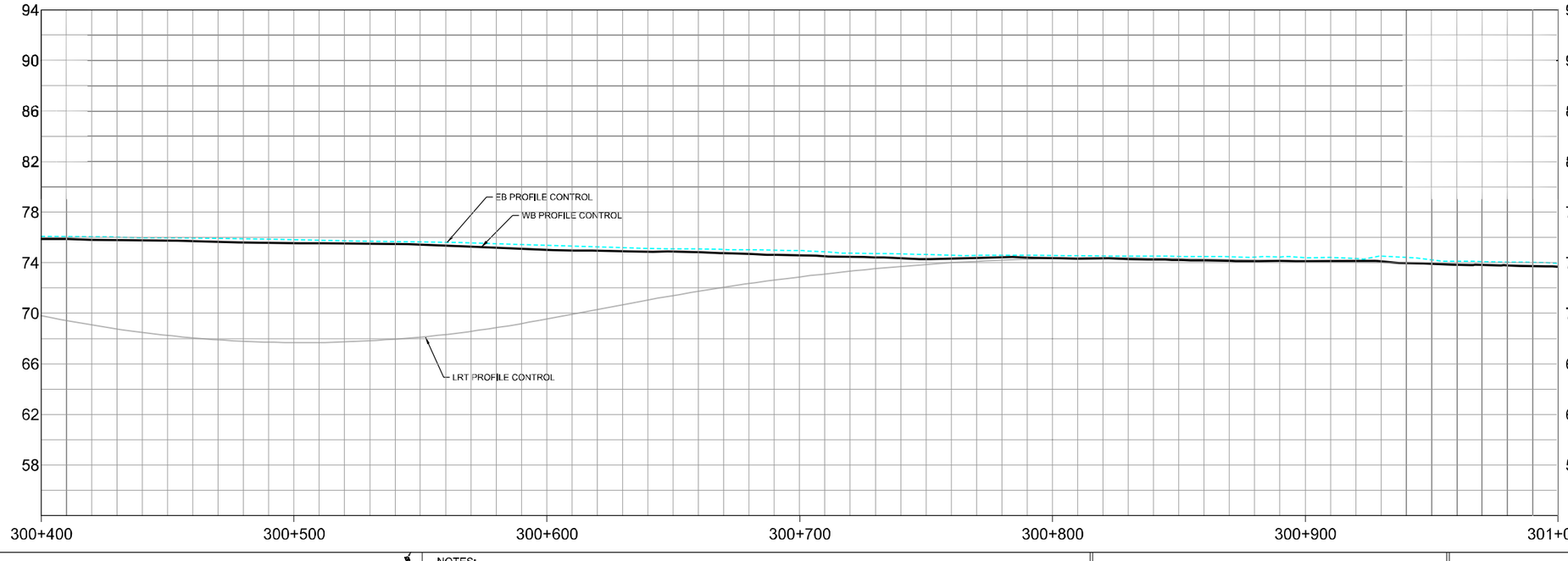
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 299+800 to STA 300+400

Drawings No.: | Revision 00 | Sheet No. 02





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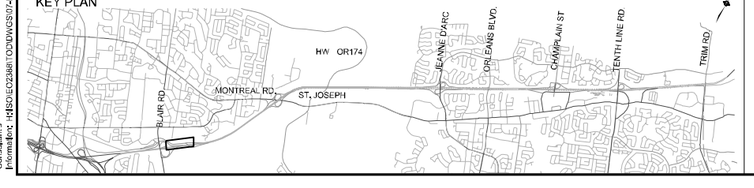

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HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 300+400 to STA 301+000

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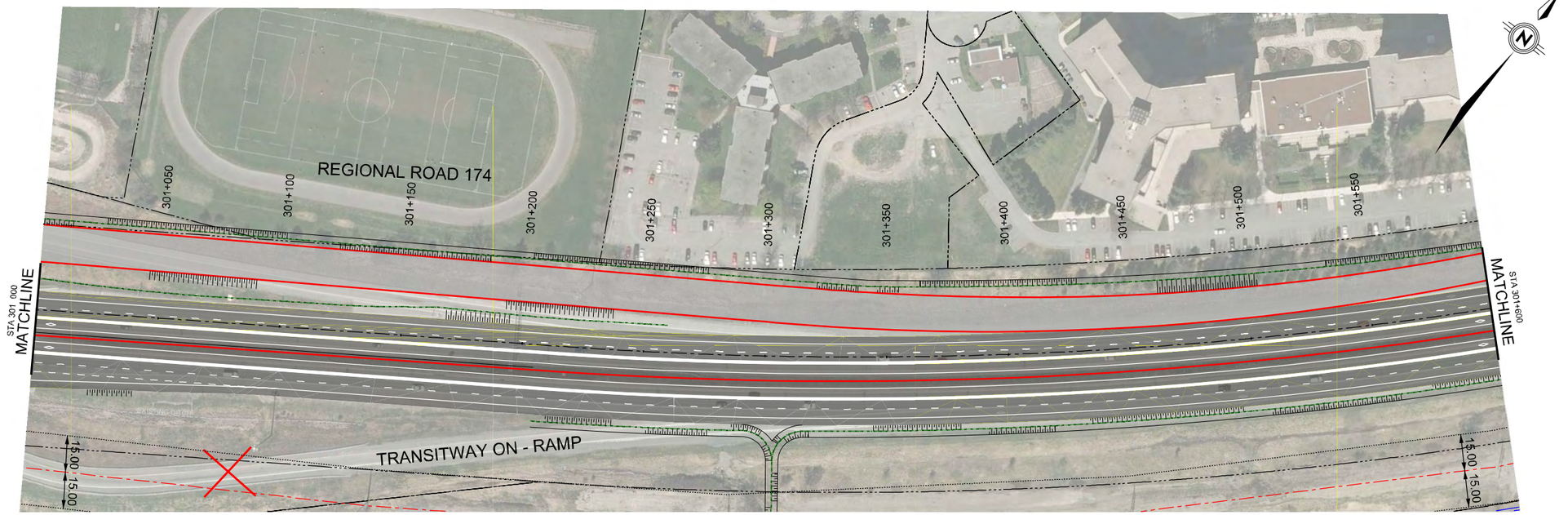

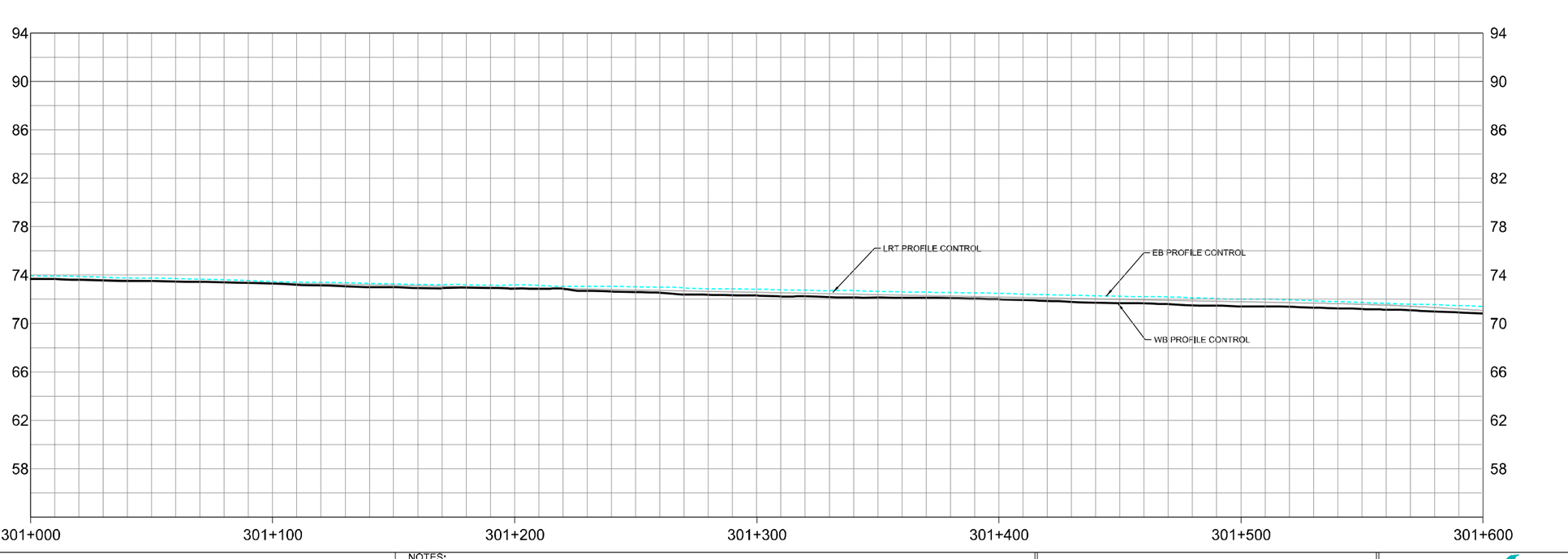

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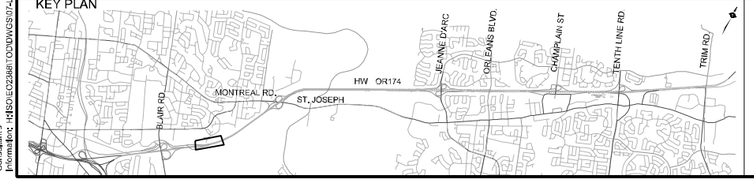

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HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 301+000 to STA 301+600

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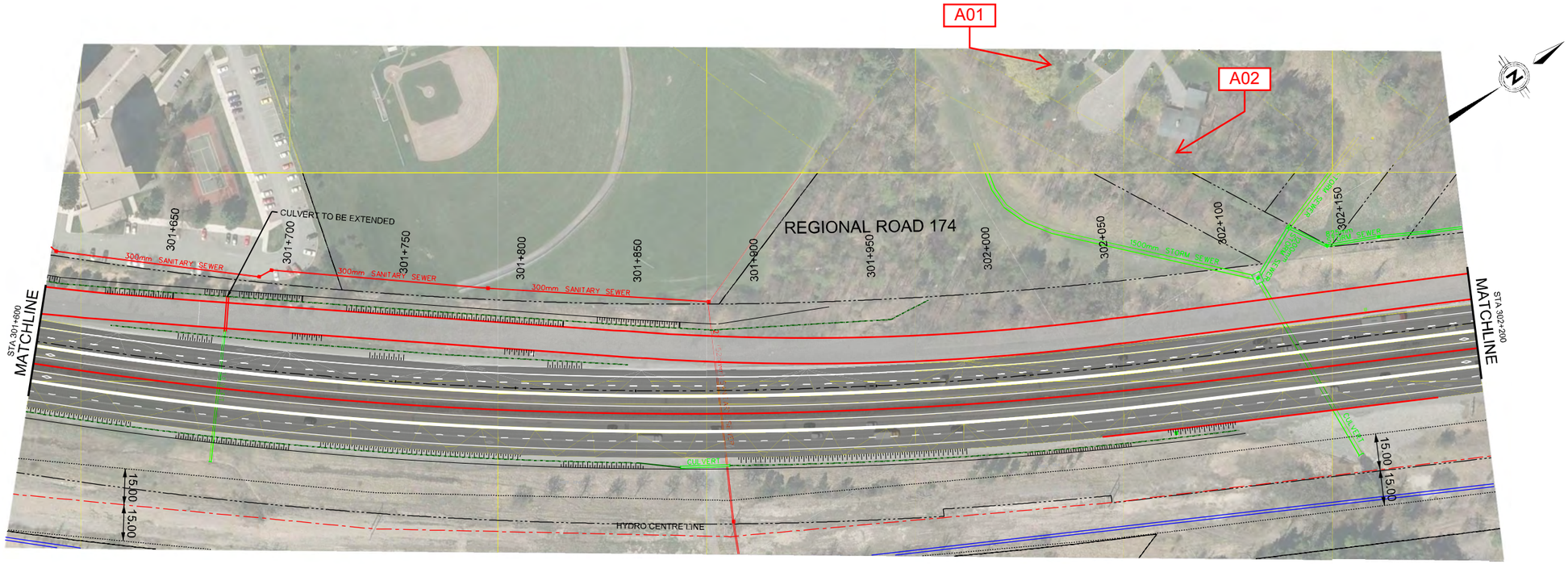

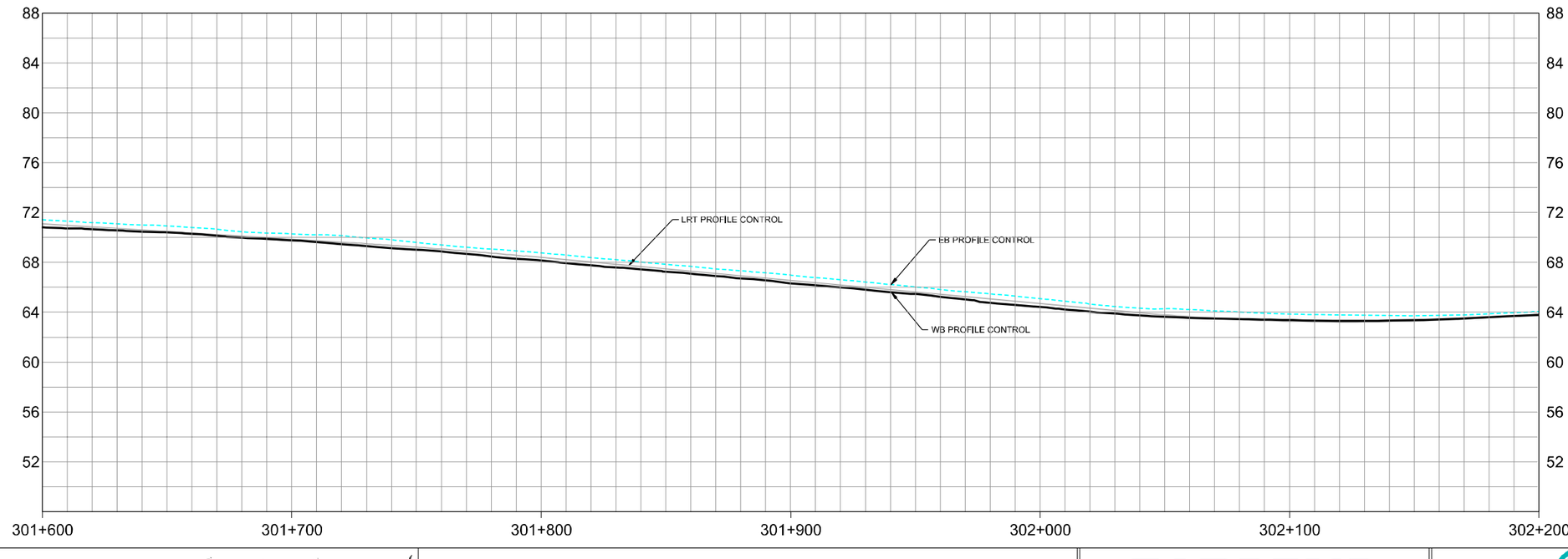

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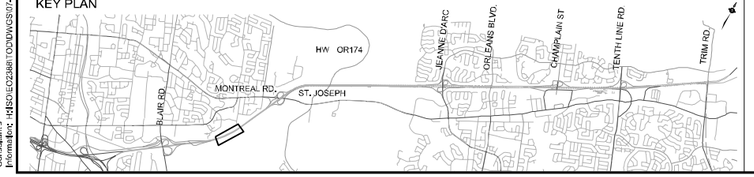

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HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 301+600 to STA 302+200

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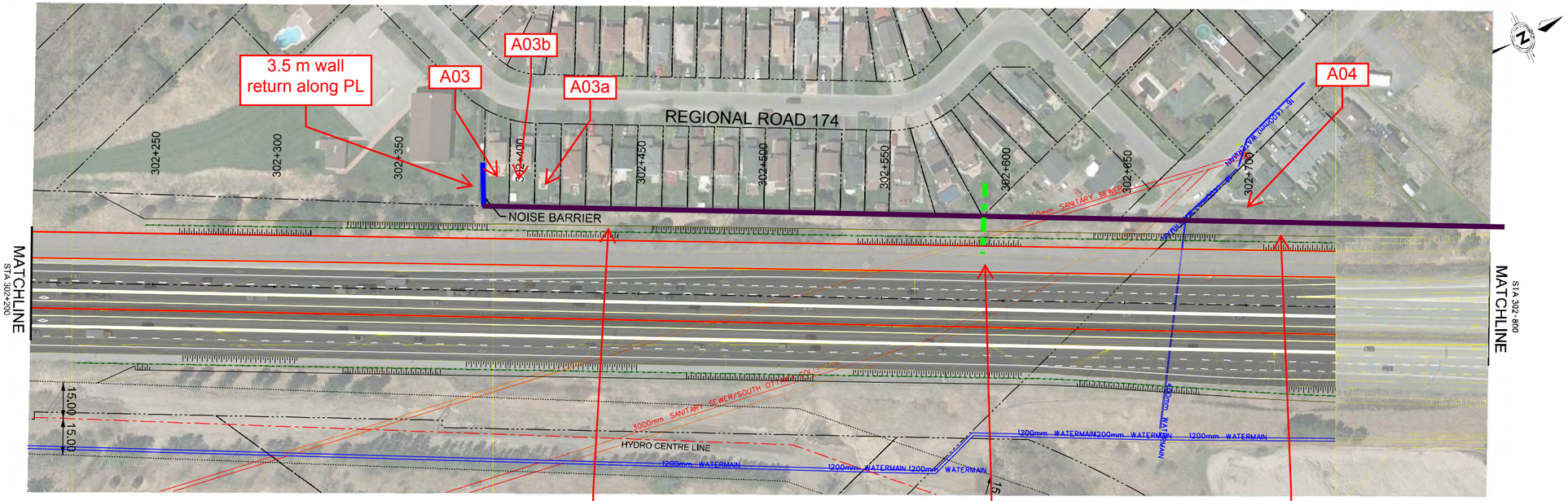

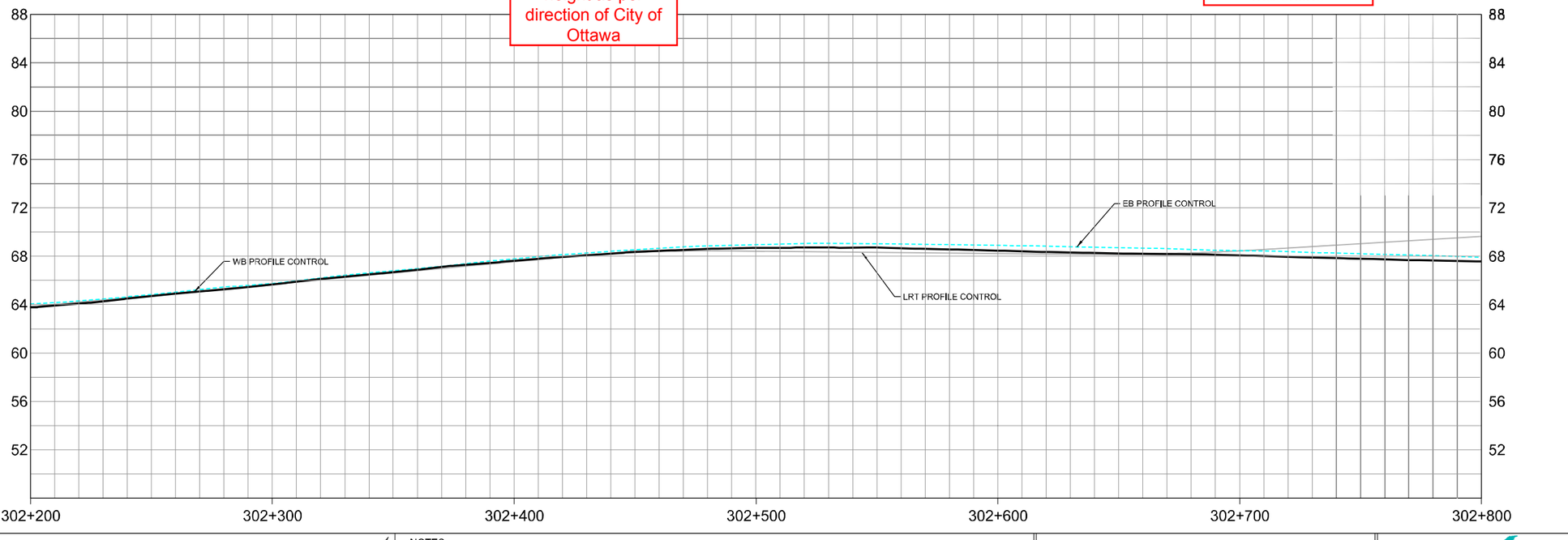

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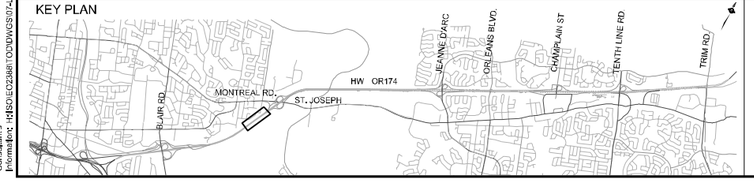

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HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 302+200 to STA 302+800

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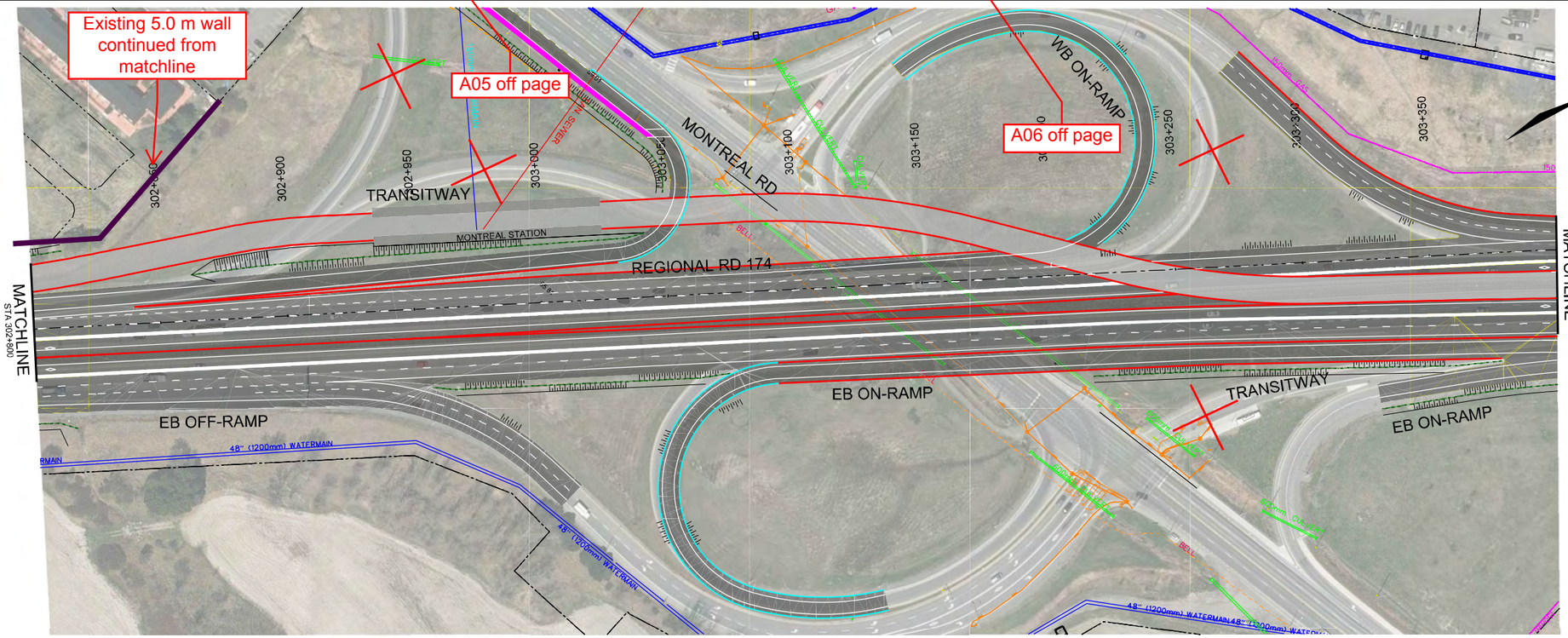

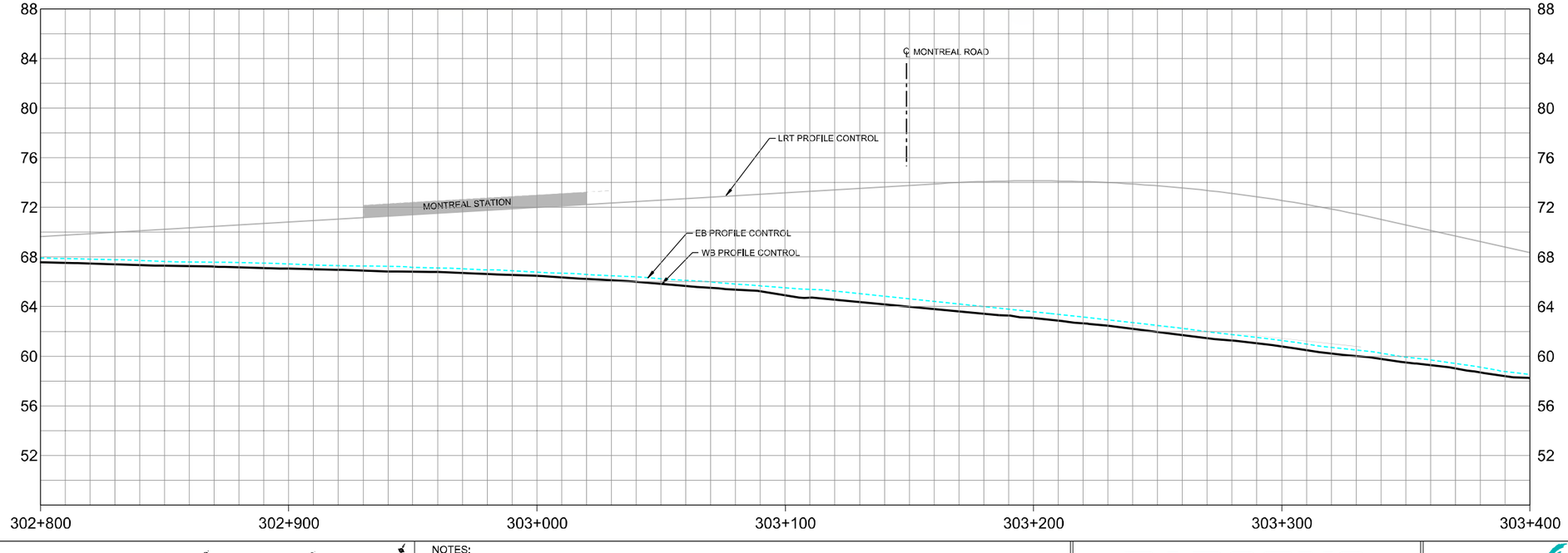

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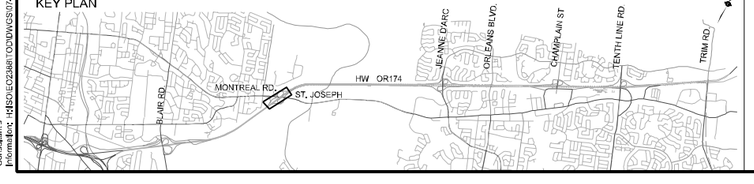

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Project Manager:	Discipline Engineer:	Checked By:

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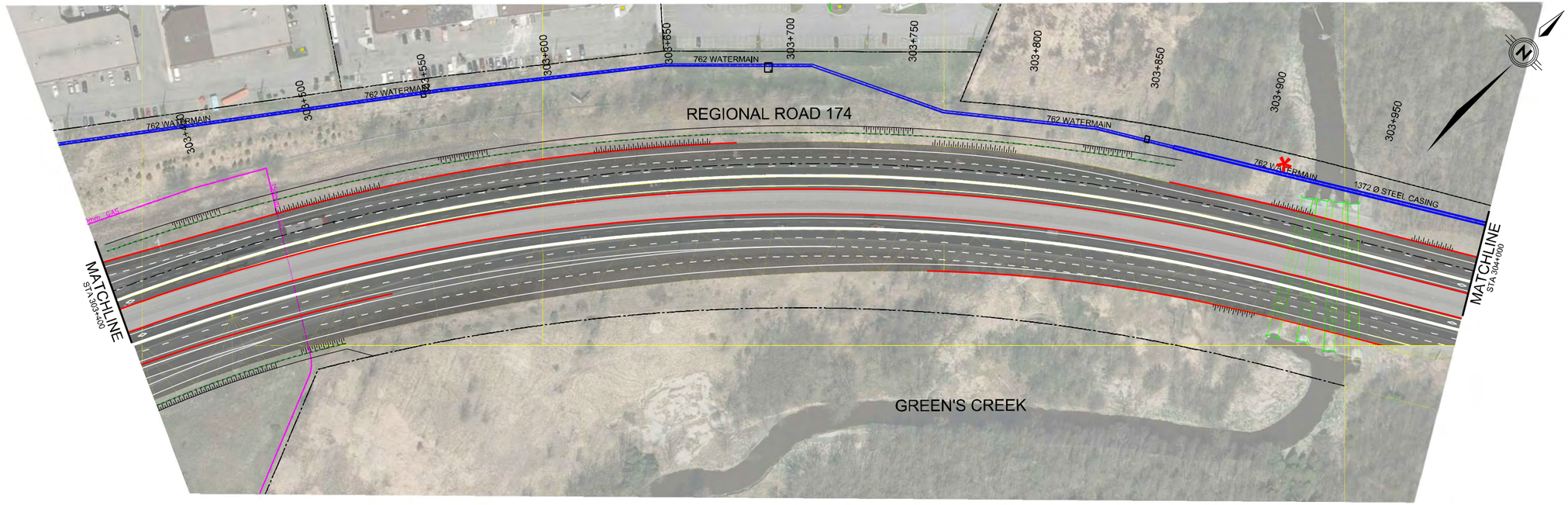
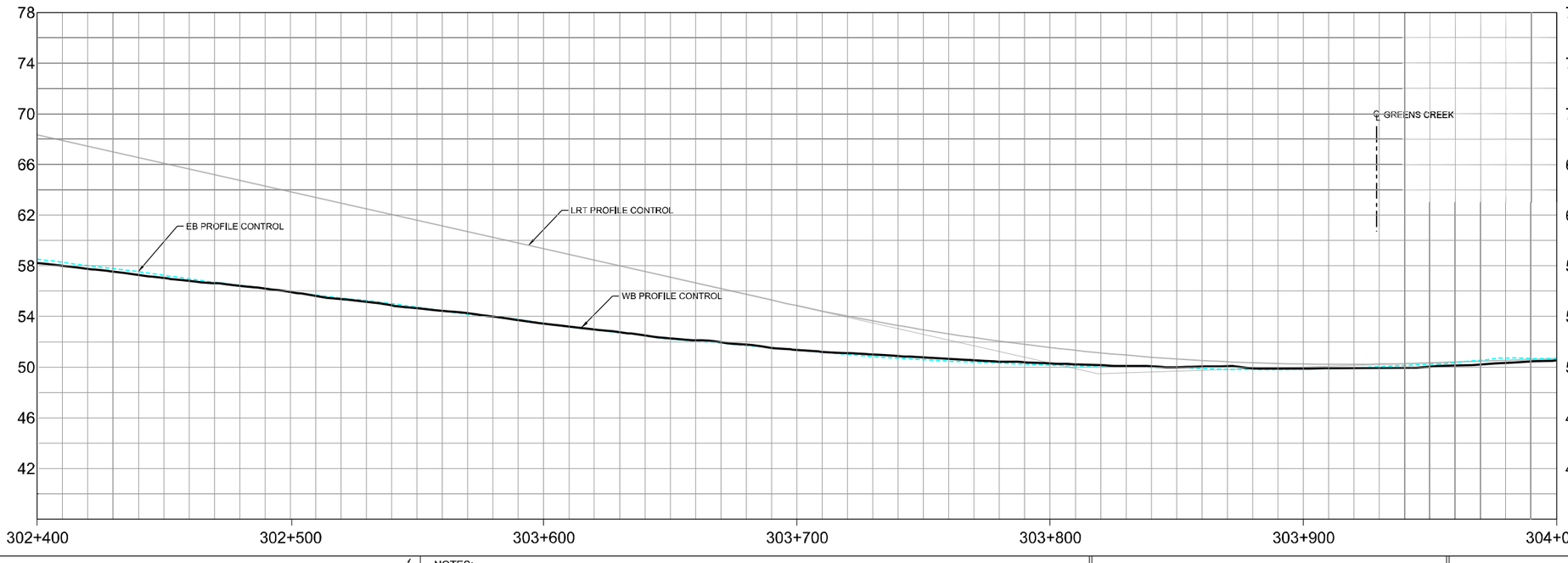
CAD File Name: EO2388TOD-01-PDR-07.DGN | Plot Date: XX/XX/XXXX

Ottawa

HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 302+800 to STA 303+400

Drawings No.: | Revision 00 | Sheet No. 07





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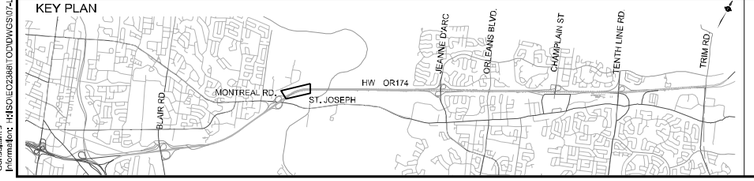


NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

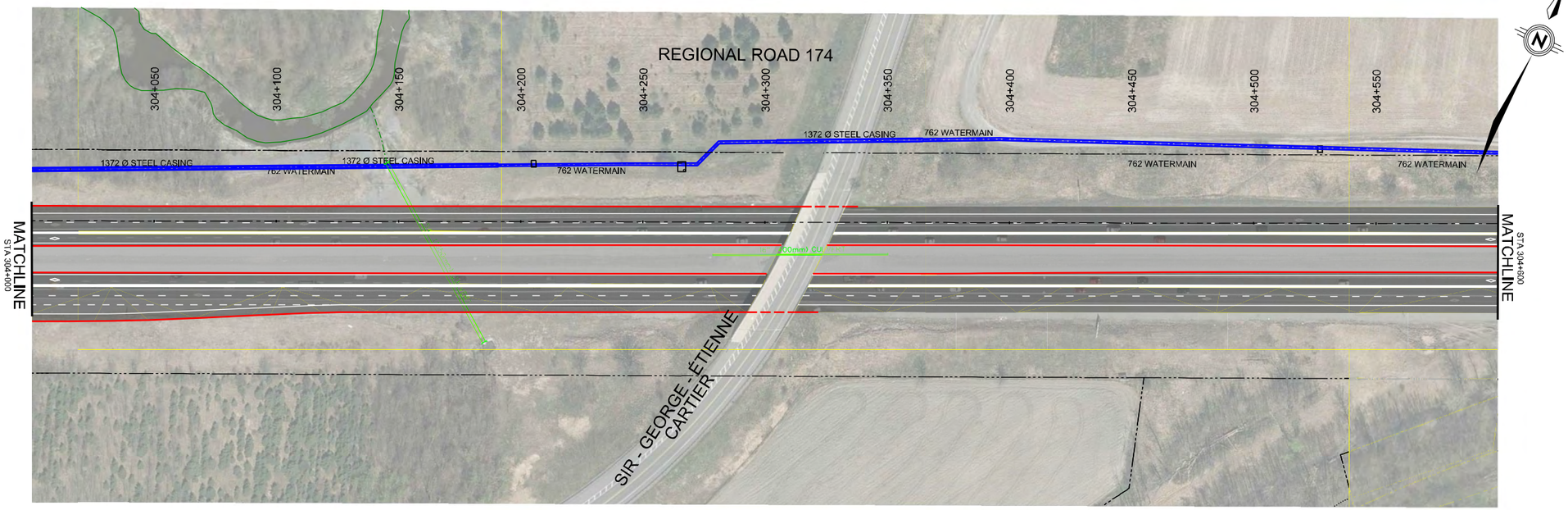
Scale: HORIZONTAL 0m 10 20 50 100 — VERTICAL 0m 0.5 5 10 20

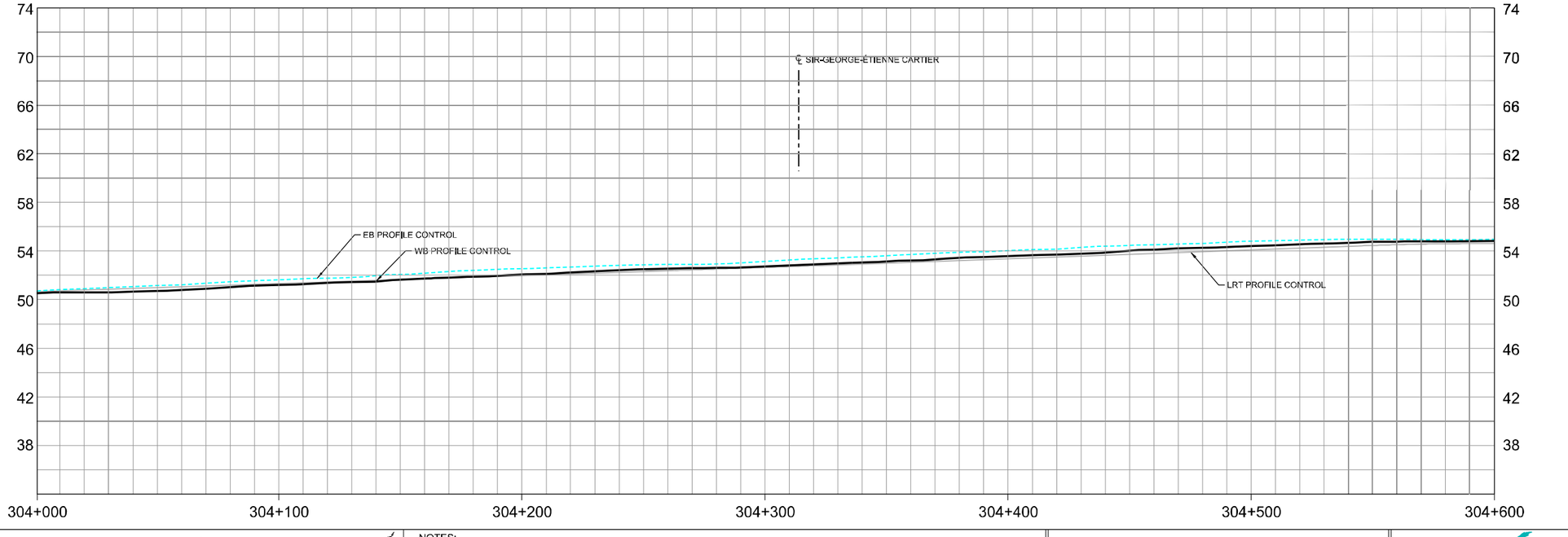
CAD File Name: EO2388TOD-01-PDR-08.DGN | Plot Date: XX/XX/XXXX

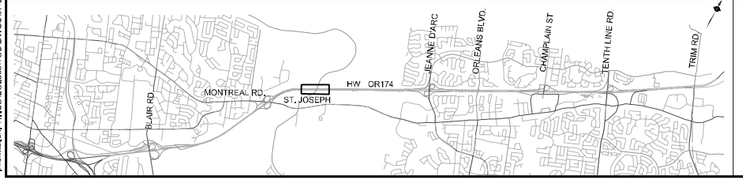
Ottawa

HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 303+400 to STA 304+000

Drawings No.: | Revision 00 | Sheet No. 08







NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

CAD File Name: EO2388TOD- 01-PDR-09.DGN

Plot Date: XX/XX/XXXX

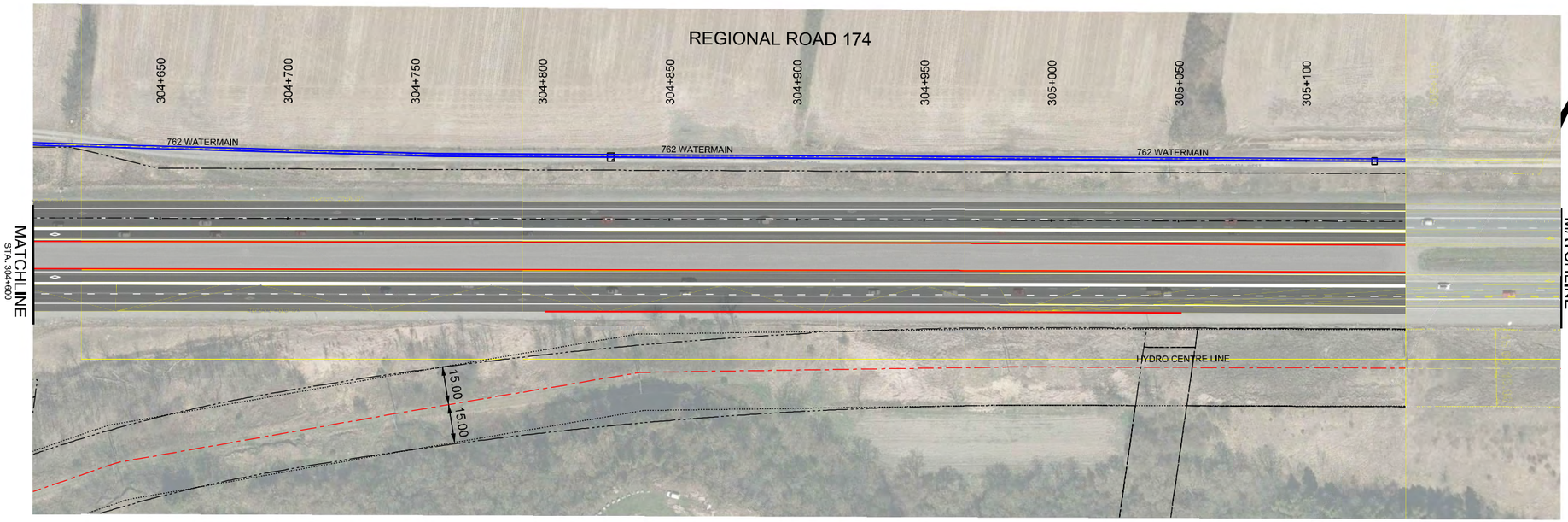
Ottawa

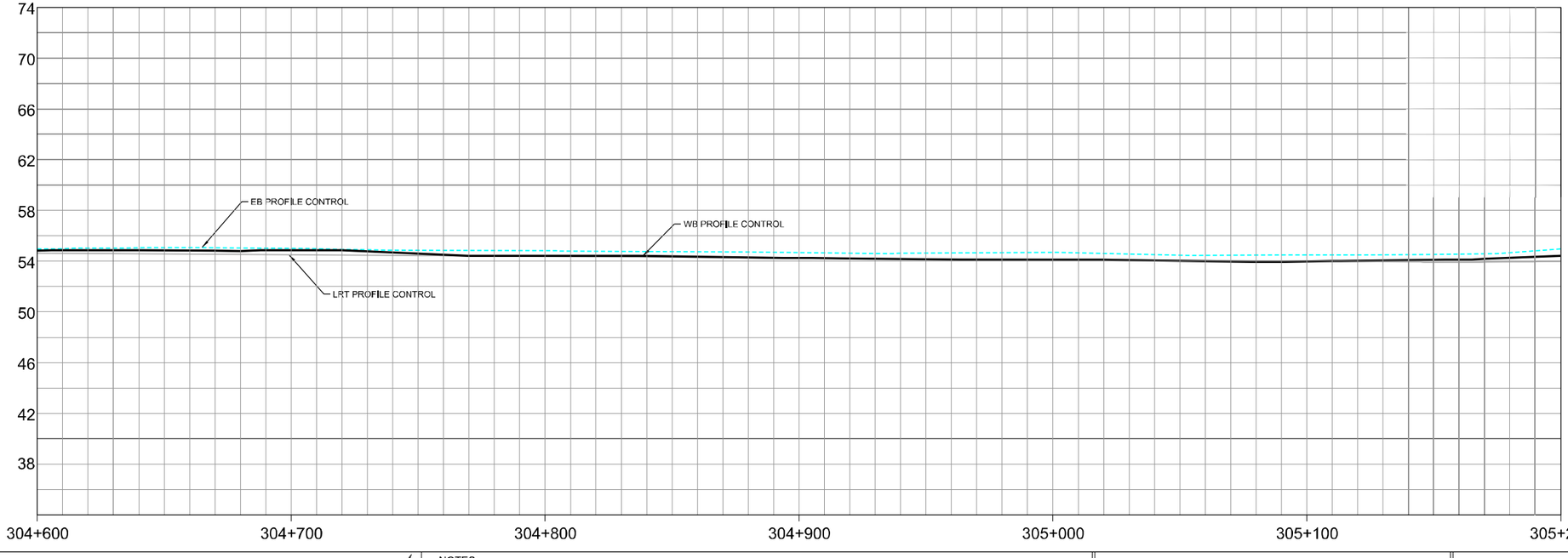
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 304+000 to STA 304+600

Drawings No.:

Revision: 00

Sheet No.: 09





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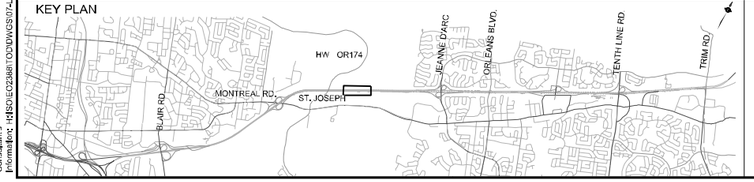


NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

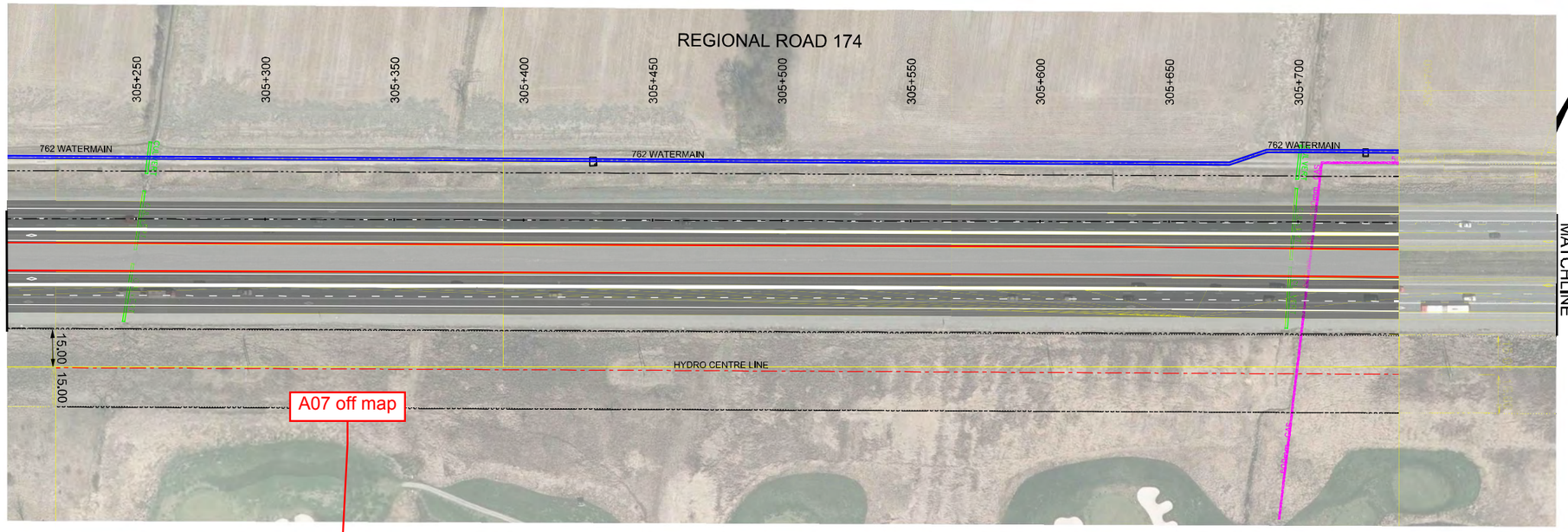
Scale: HORIZONTAL 0m 10 20 50 100 / 0m 2.5 5 10 20 VERTICAL

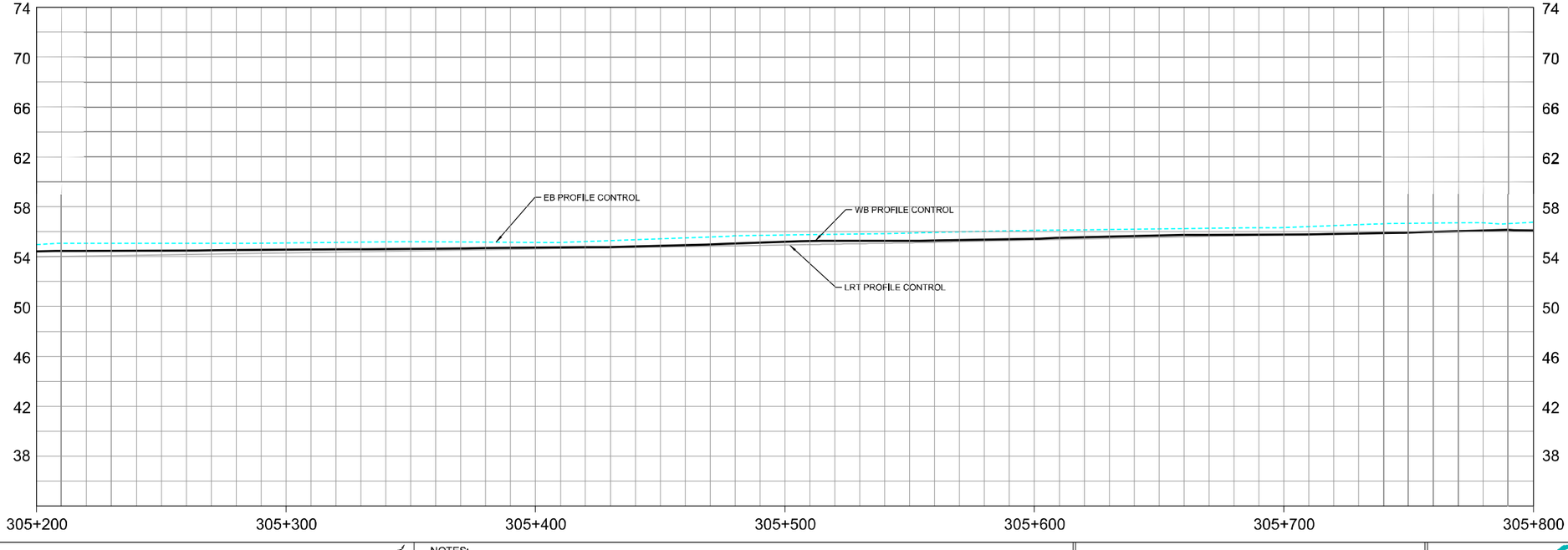
CAD File Name:	Plot Date:
EO2388TOD- 01-PDR-10.DGN	XX/XX/XXXX

Ottawa

HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 304+600 to STA 305+200

Drawings No.:	Revision	Sheet No.
	00	10





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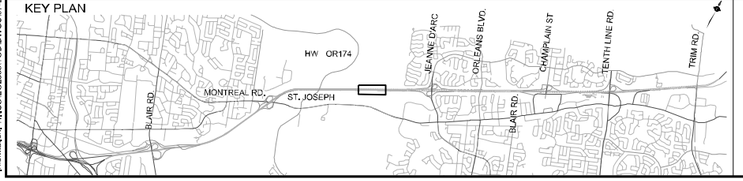

NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

CAD File Name: EO2388TOD-01-PDR-11.DGN	Plot Date: XX/XX/XXXX	

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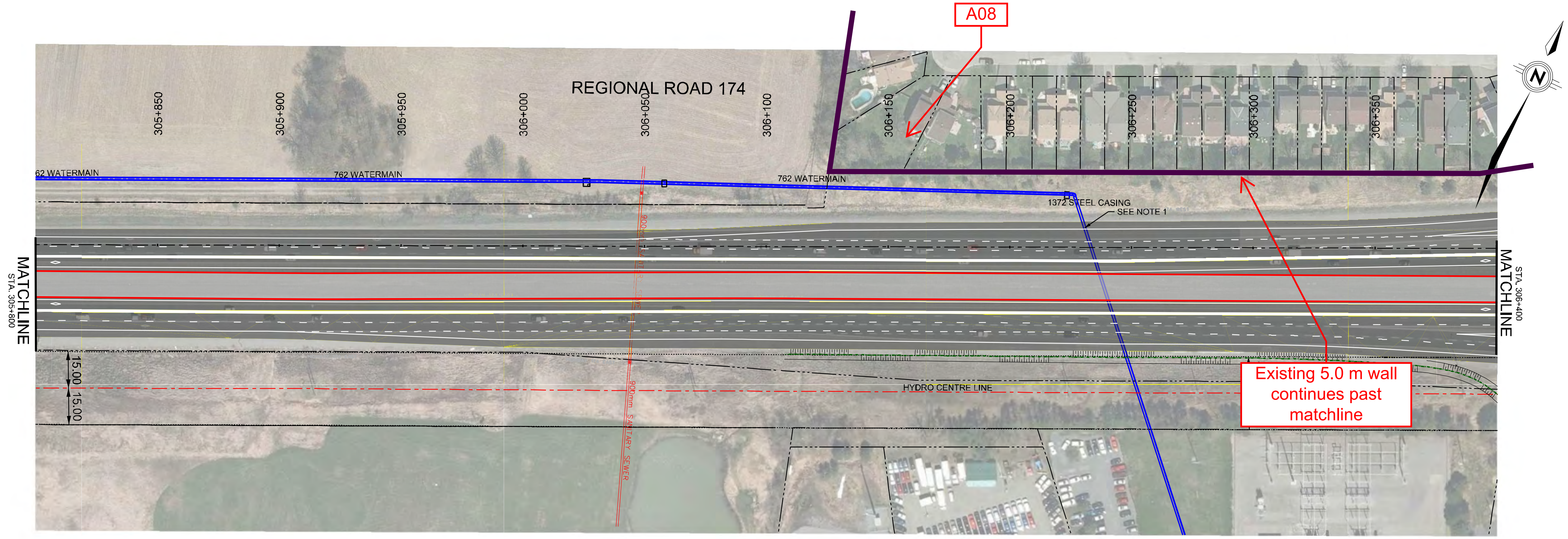
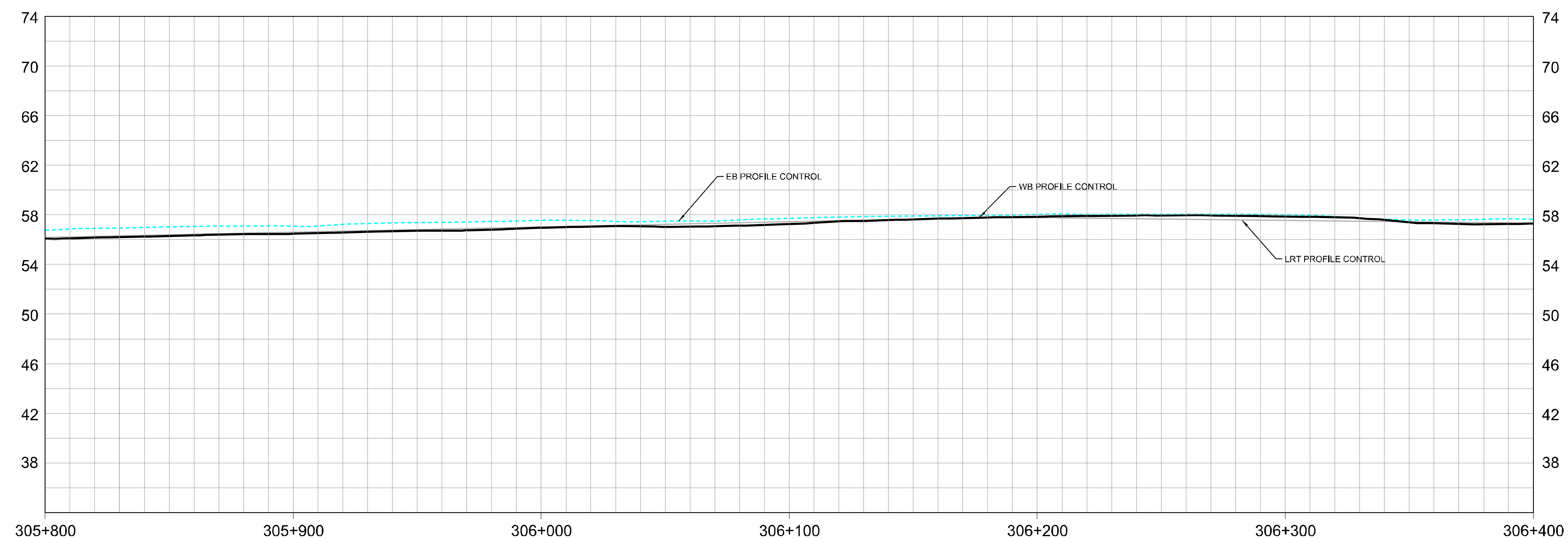
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 305+200 to STA 305+800

Drawings No.:	Revision	Sheet No.
	00	11





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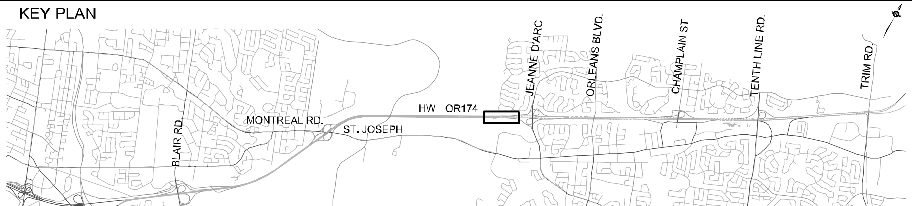


NOTES:

1. LOCATION OF NORTH-SOUTH WATERMAIN CROSSING OF OR174 IS APPROXIMATE AND IS TO BE CONFIRMED WHEN AS-BUILT INFORMATION IS AVALIABLE.

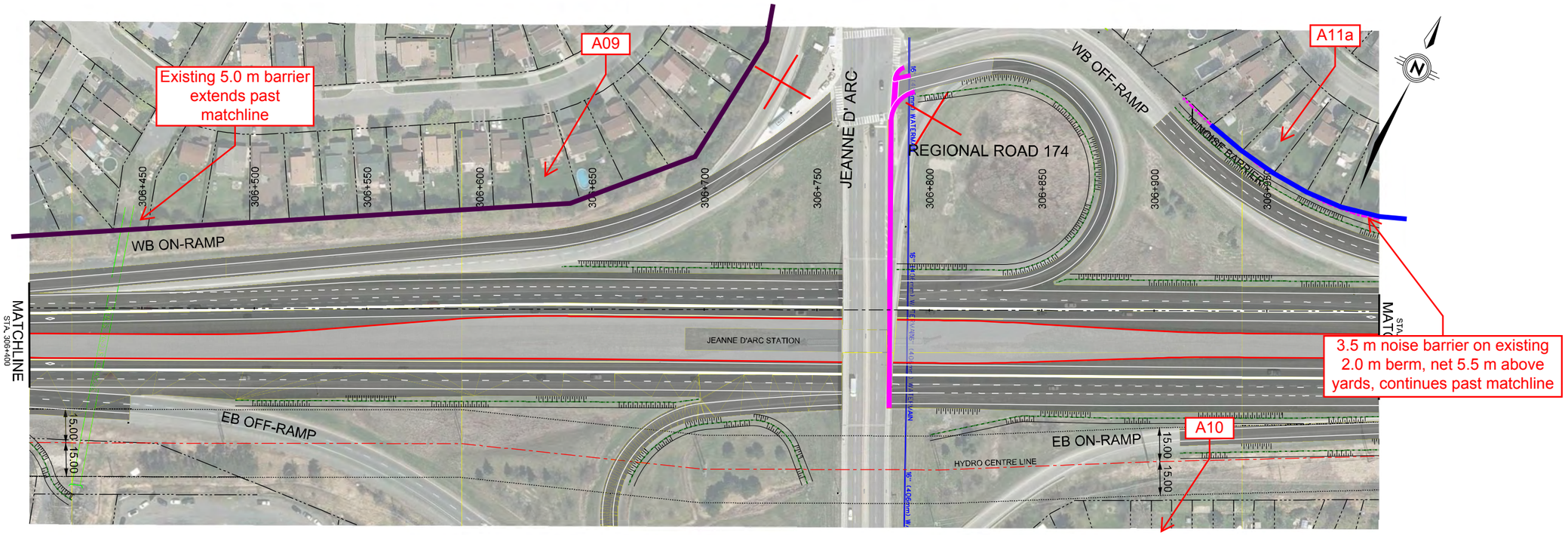
PARSONS

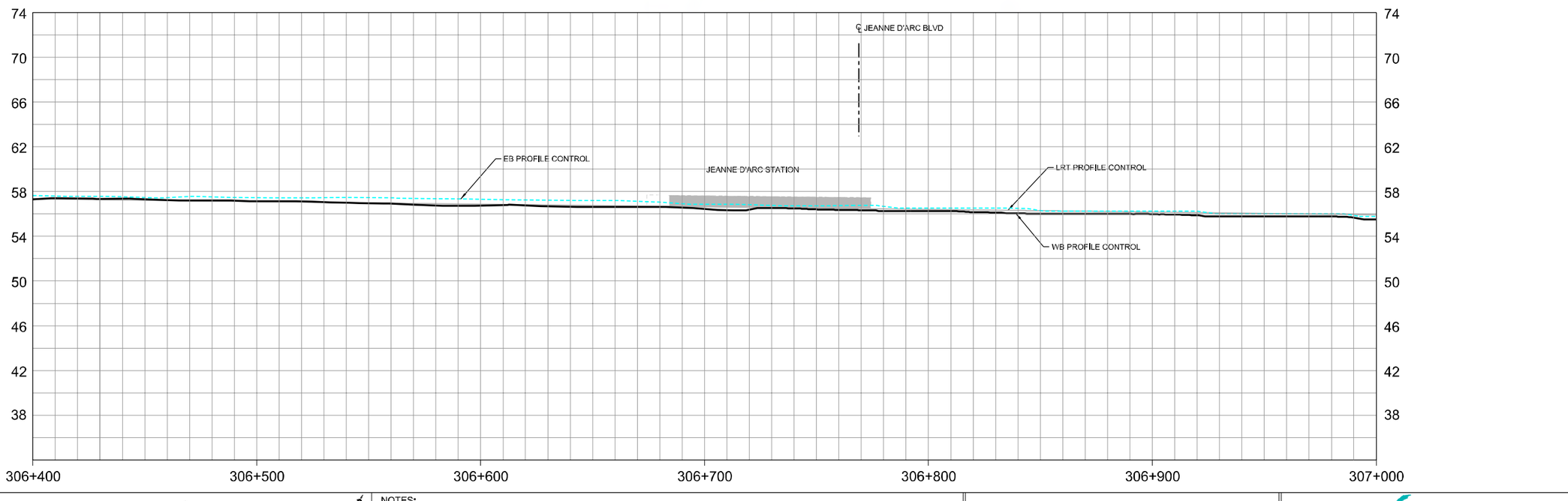
Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Dicipline Engineer:	Checked By:
Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20		
CAD File Name: EO2388TOD- 01-PDR-12.DGN		Plot Date: XX/XX/XXXX

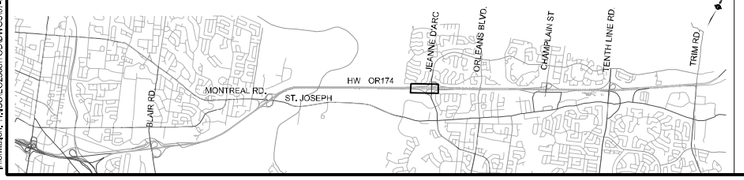
Ottawa

HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 305+800 to STA 306+400

Drawings No.:	Revision	Sheet No.
	00	12







NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

CAD File Name: EO2388TOD-01-PDR-13.DGN

Plot Date: XX/XX/XXXX

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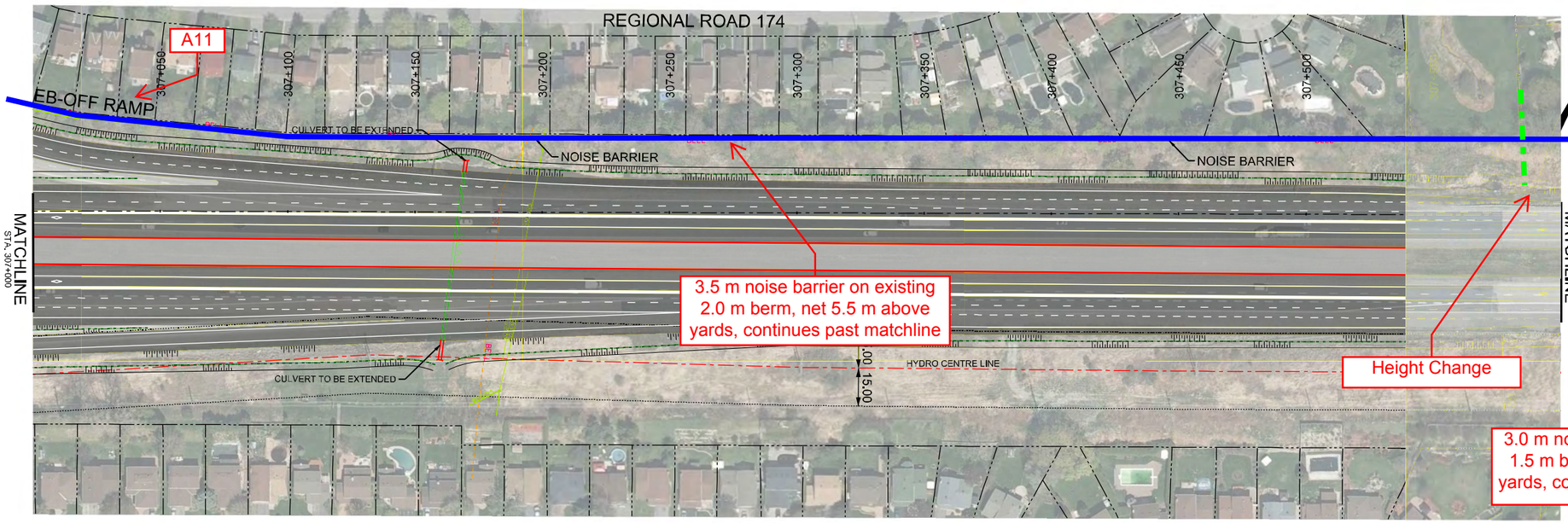
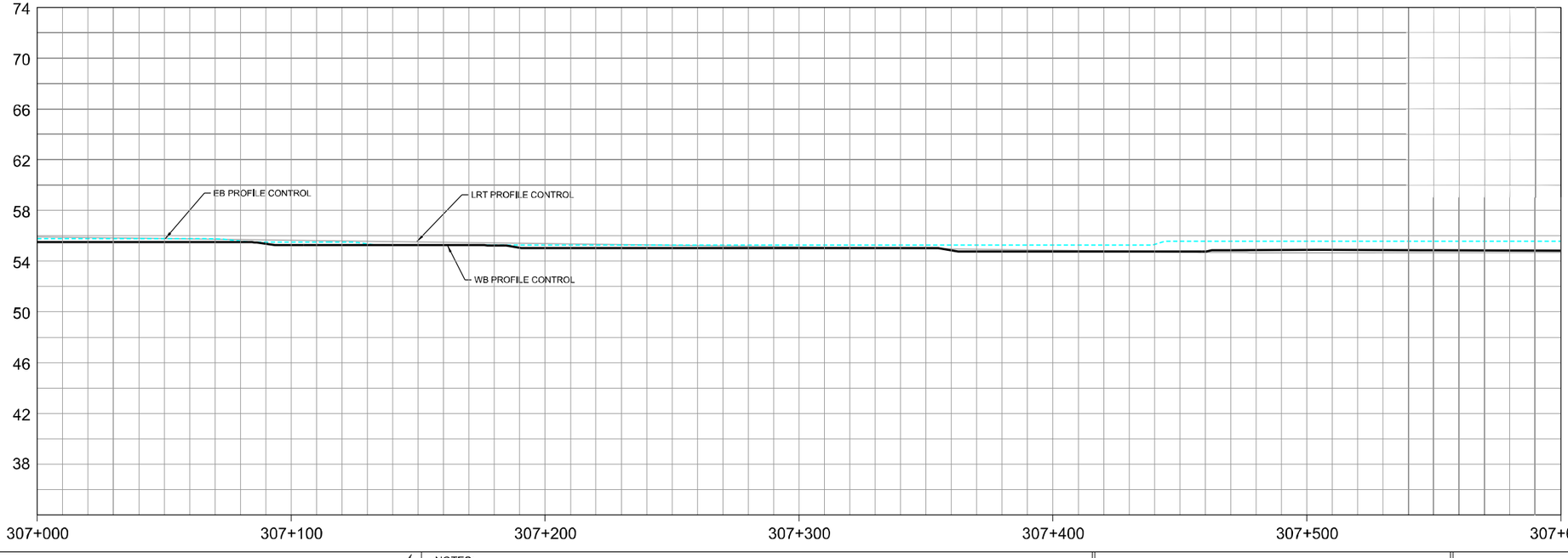
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 306+400 to STA 307+000

Drawings No.:

Revision: 00

Sheet No.: 13





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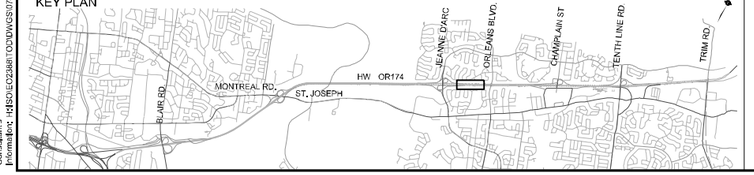


NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

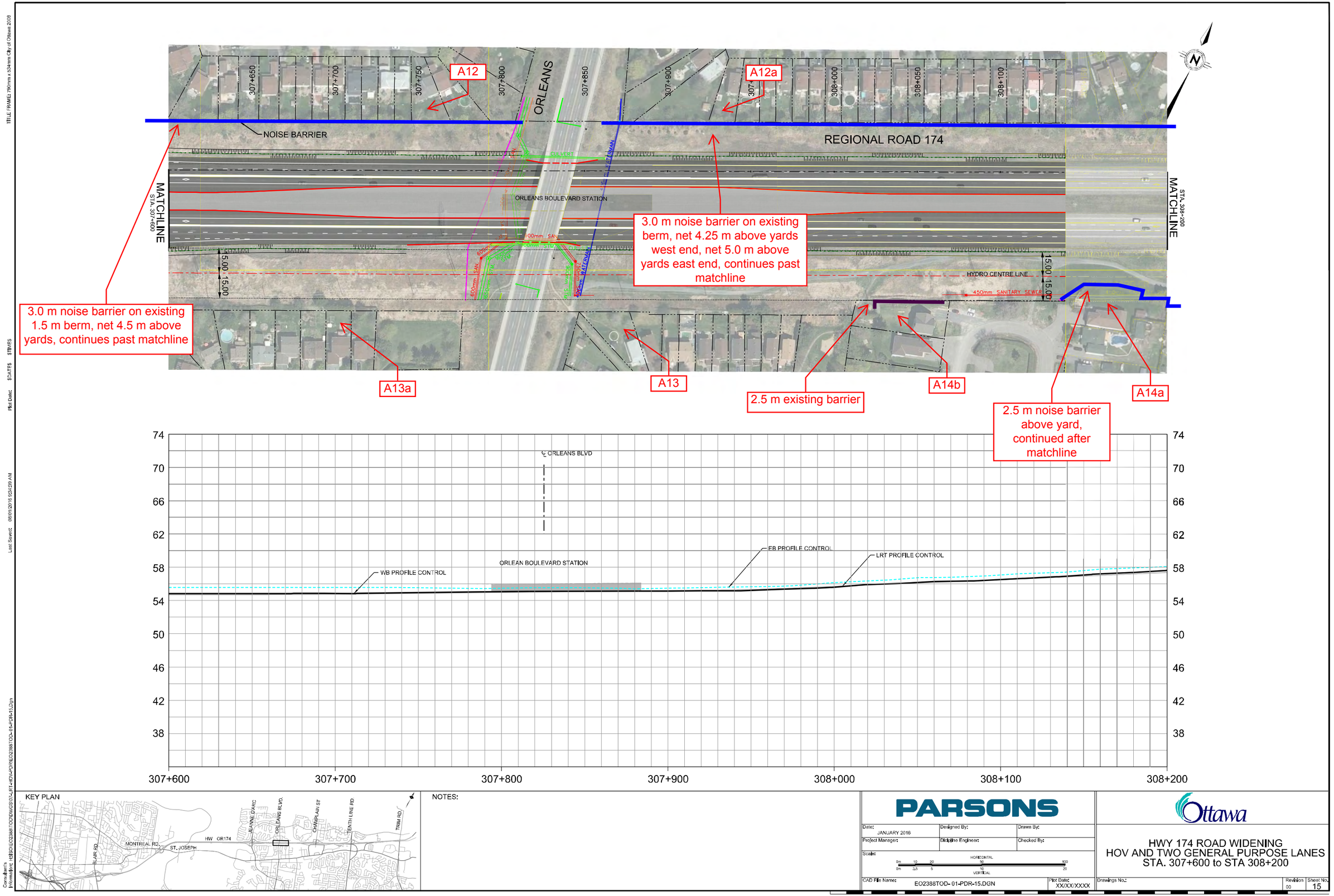
Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

CAD File Name: EO2388TOD-01-PDR-14.DGN	Plot Date: XX/XX/XXXX	

Ottawa

HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 307+000 to STA 307+600

Drawings No.:	Revision 00	Sheet No. 14



KEY PLAN

NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

CAD File Name: EO2388TOD- 01-PDR-15.DGN | Plot Date: XX/XX/XXXX

Ottawa

HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 307+600 to STA 308+200

Drawings No.: | Revision 00 | Sheet No. 15

3.0 m noise barrier on existing berm, net 4.25 m above yards west end, net 5.0 m above yards east end, continues past matchline

A15

A16c off map

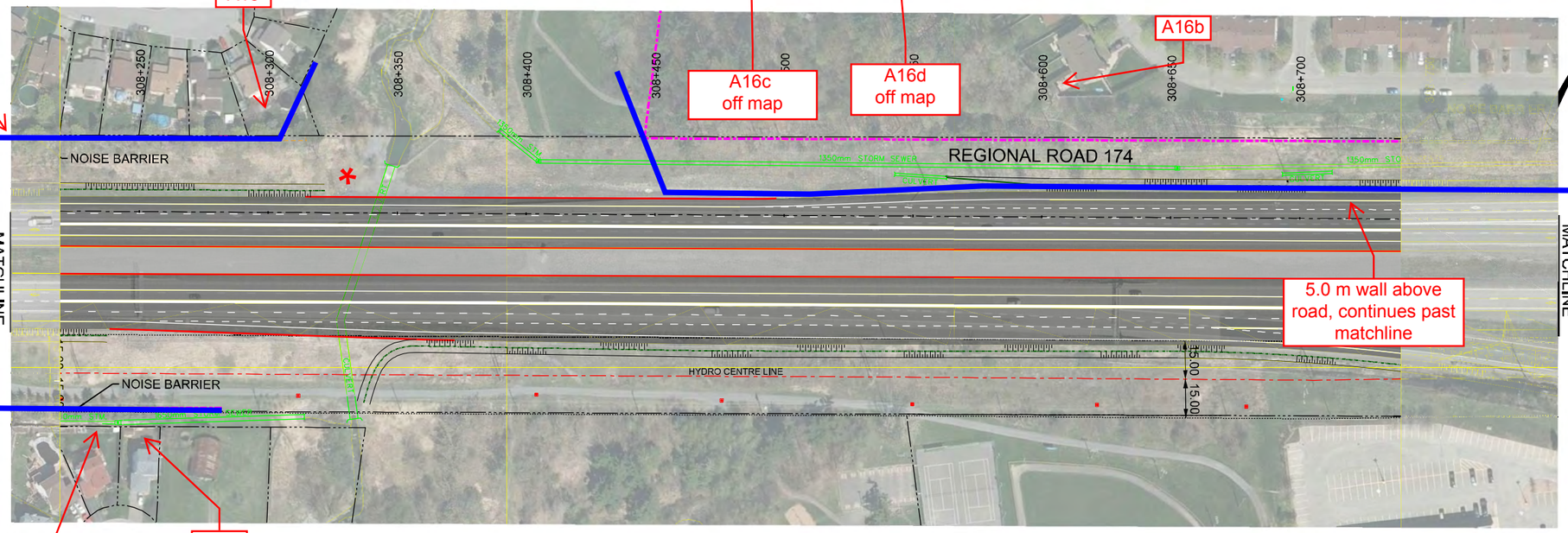
A16d off map

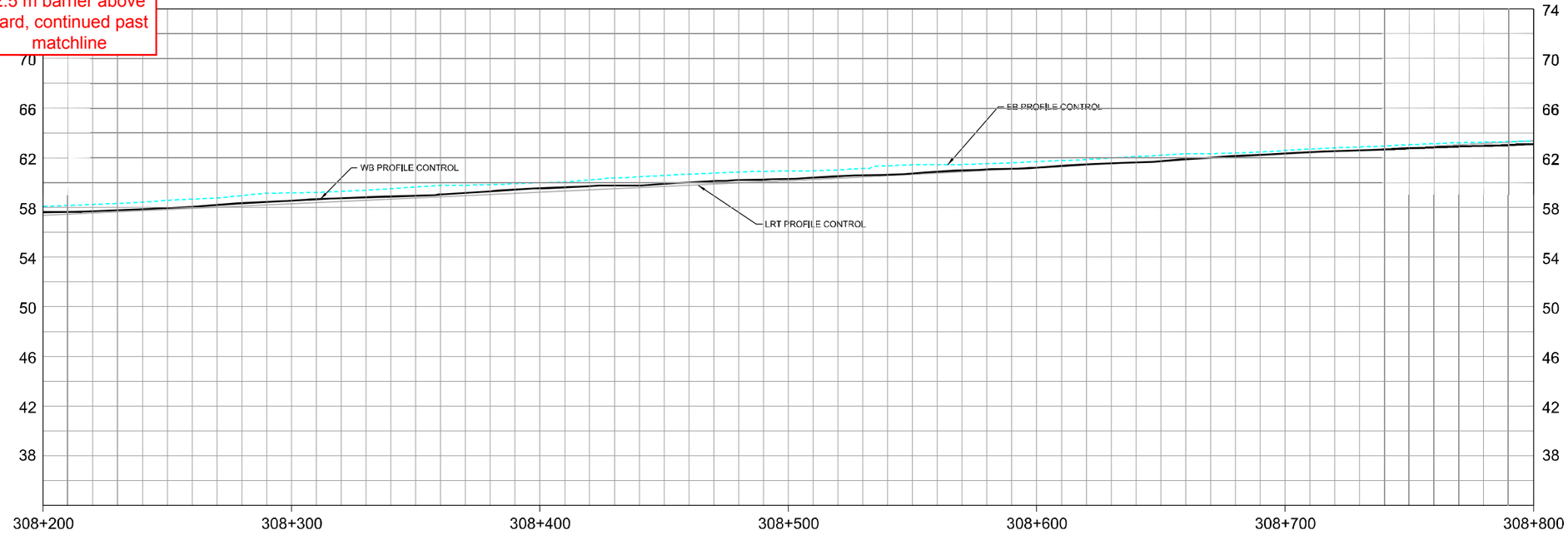
A16b

5.0 m wall above road, continues past matchline

2.5 m barrier above yard, continued past matchline

A14





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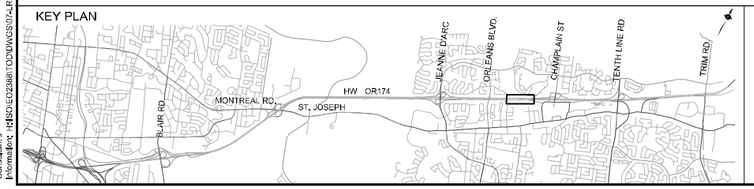

NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; 0m 2.5 5 10 20 VERTICAL

CAD File Name: EO2388TOD-01-PDR-16.DGN | Plot Date: XX/XX/XXXX

Ottawa

HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 308+200 to STA 308+800

Drawings No.: | Revision 00 | Sheet No. 16

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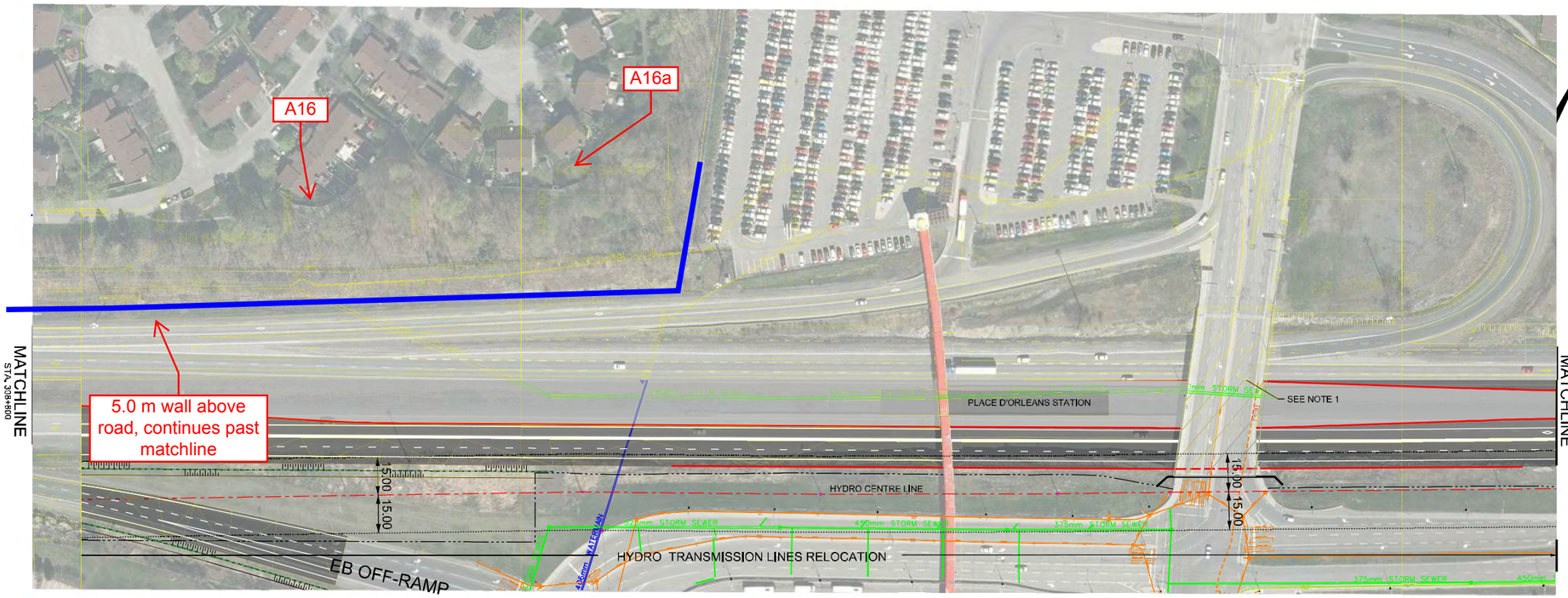

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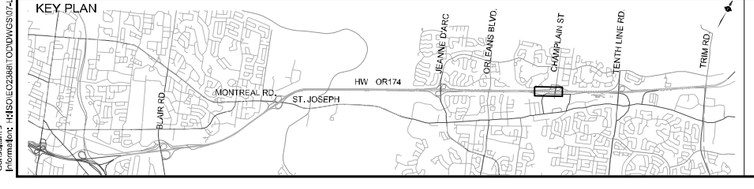


NOTES:

1. CHAMPLAIN BRIDGE TO BE REPLACED

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

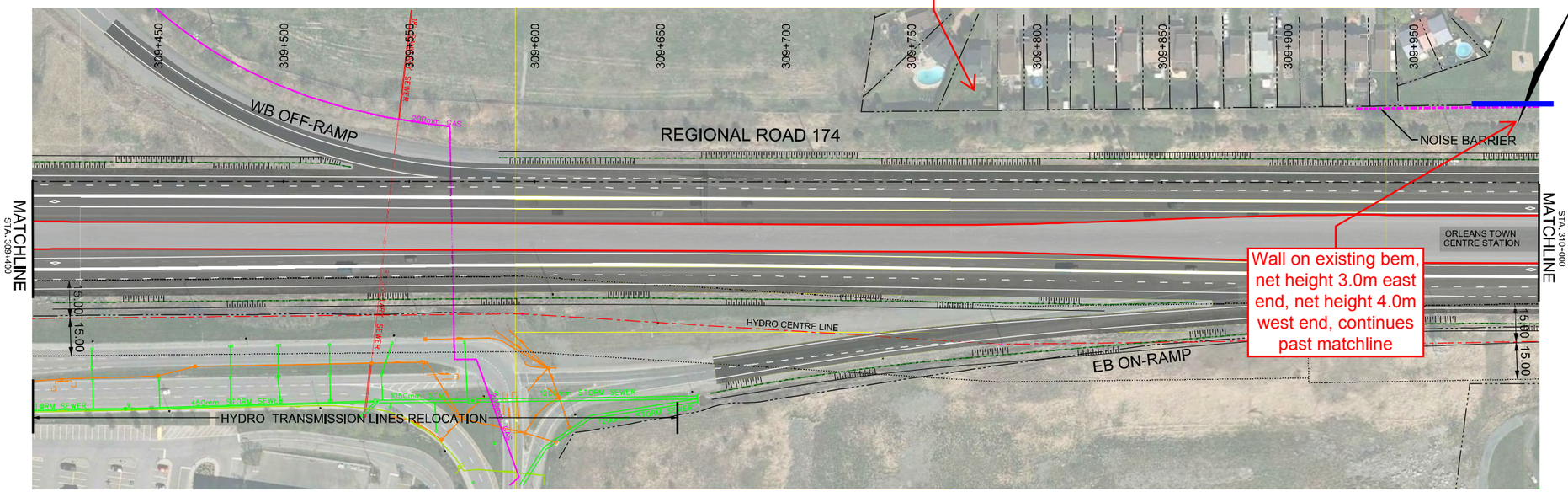
Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

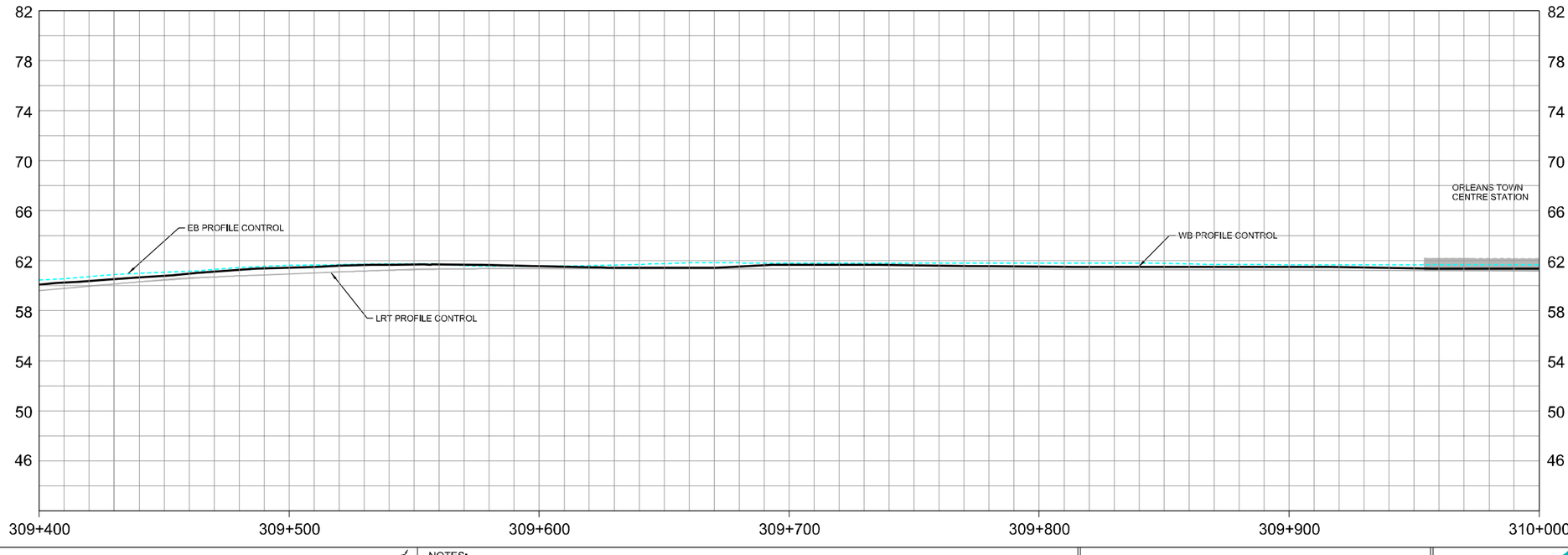
CAD File Name:	Plot Date:
EO2388TOD- 01-PDR-17.DGN	XX/XX/XXXX

Ottawa

HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 308+800 to STA309+400

Drawings No.:	Revision	Sheet No.
	00	17





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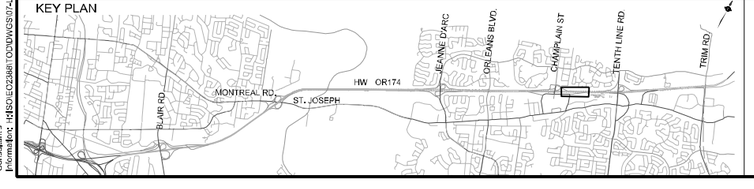


NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

CAD File Name: EO2388TOD- 01-PDR-18.DGN

Plot Date: XX/XX/XXXX

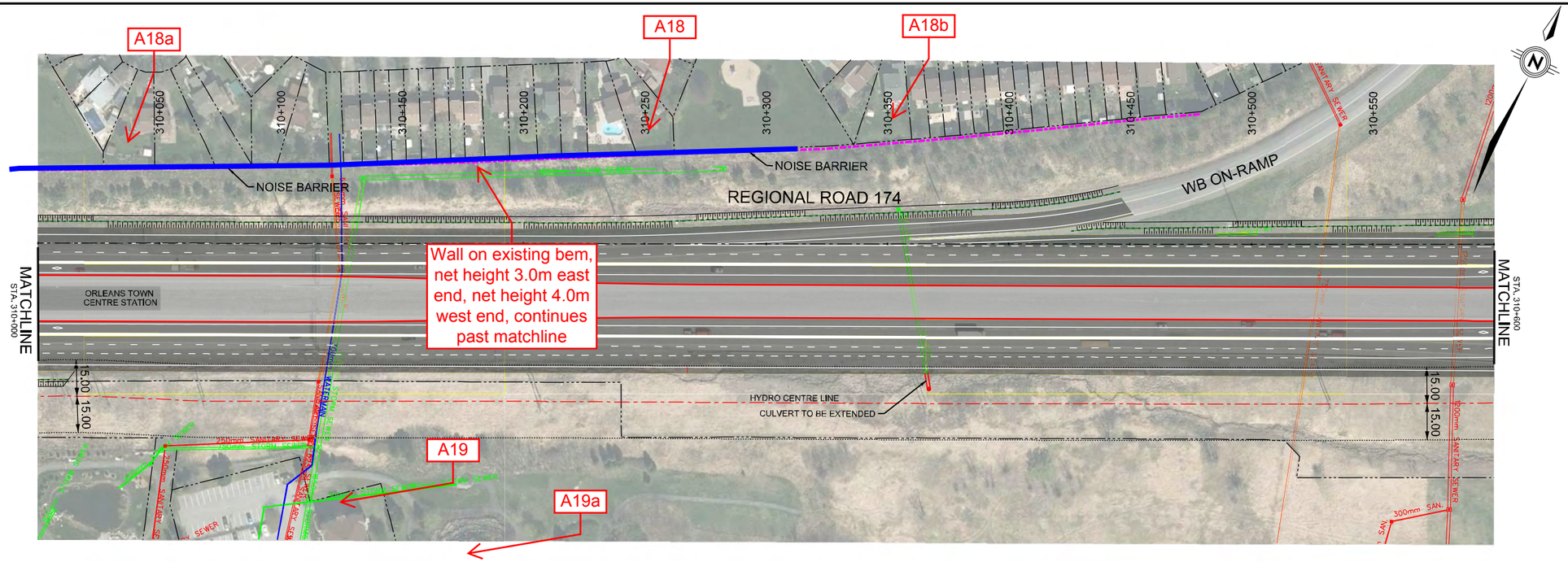
Ottawa

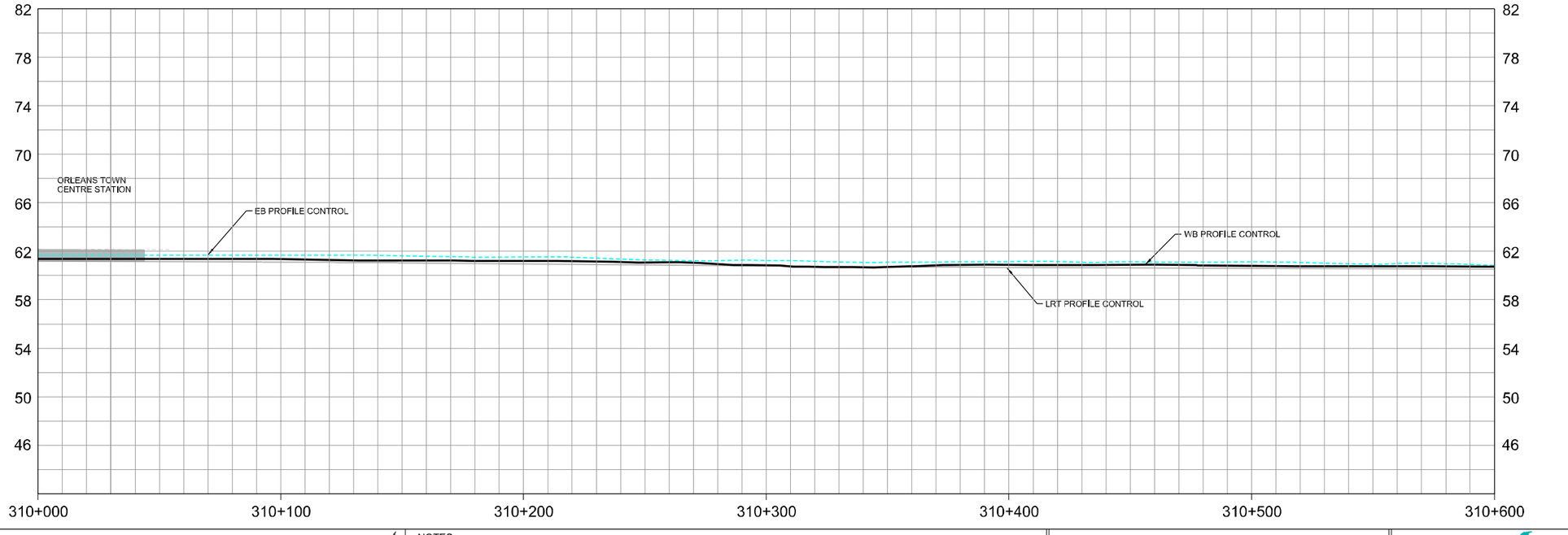
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 309+400 to STA. 310+000

Drawings No.:

Revision: 00

Sheet No.: 18





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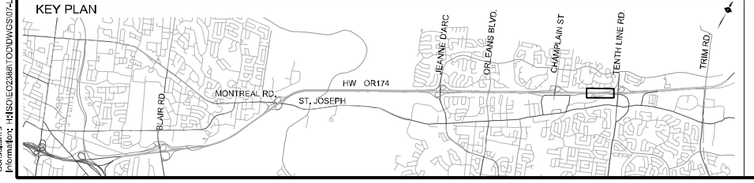


NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

CAD File Name: EO2388TOD- 01-PDR-19.DGN

Plot Date: XX/XX/XXXX

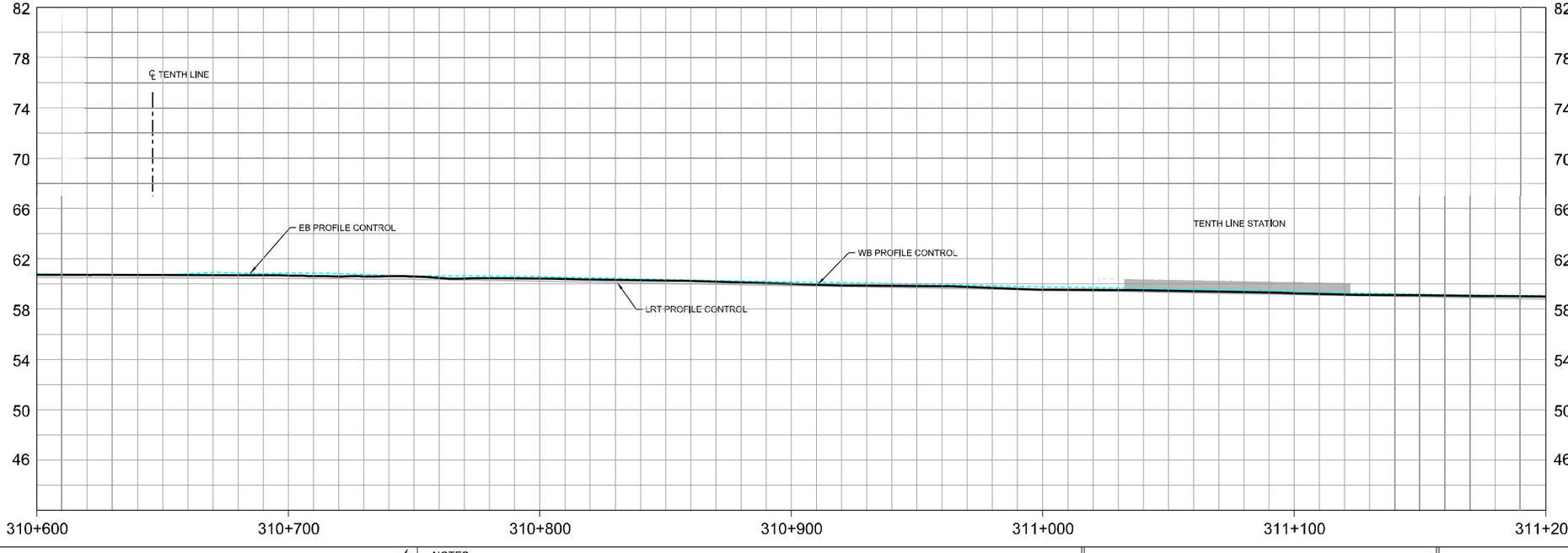
Ottawa

HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 310+000 to STA 310+600

Drawings No.:

Revision: 00

Sheet No.: 19



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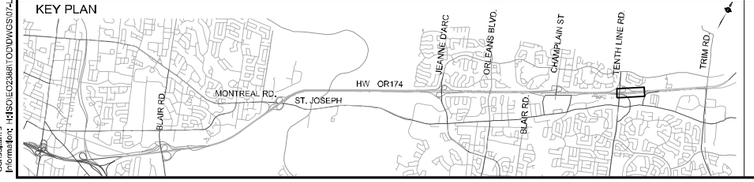


NOTES:

1. SLOPE PAVING TO BE MODIFIED ON NORTH SIDE OF STRUCTURE

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

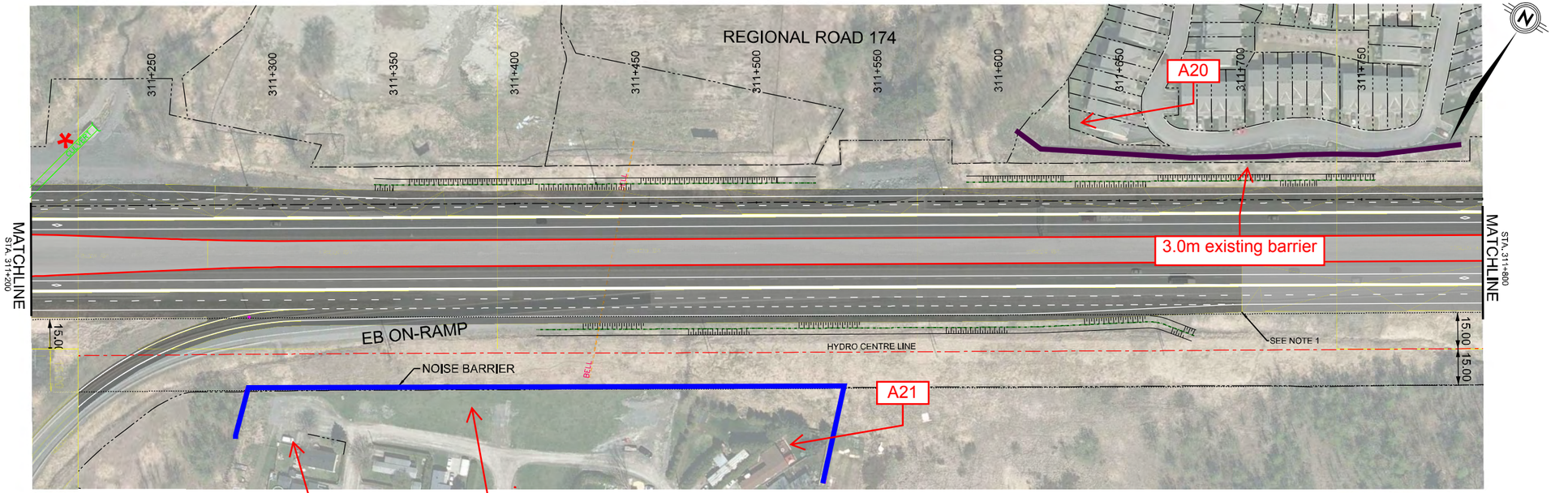
Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

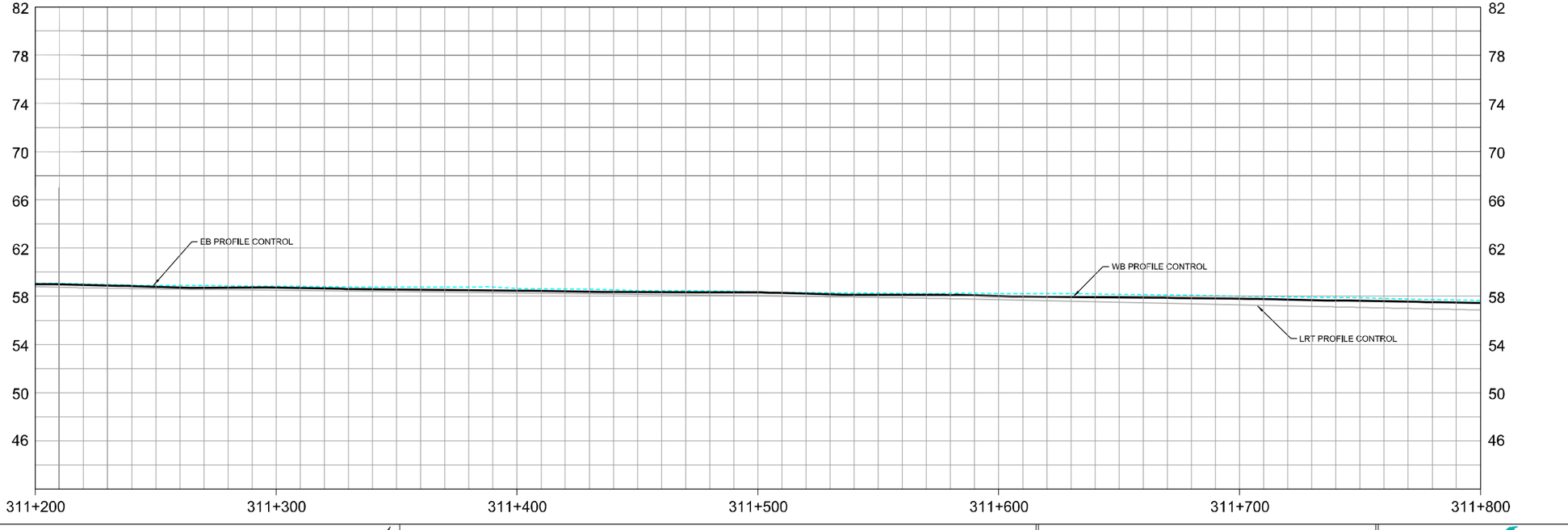
CAD File Name: EO2388TOD- 01-PDR-20.DGN | Plot Date: XX/XX/XXXX

Ottawa

HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 310+600to STA 311+200

Drawings No.: | Revision: 00 | Sheet No.: 20





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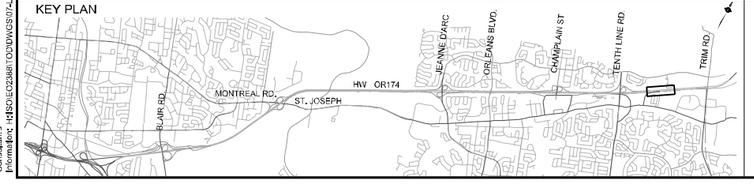


NOTES:

1. APPROXIMATE EASTBOUND TIE IN TO TRIM ROAD INTERCHANGE AT STA. 311+700

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

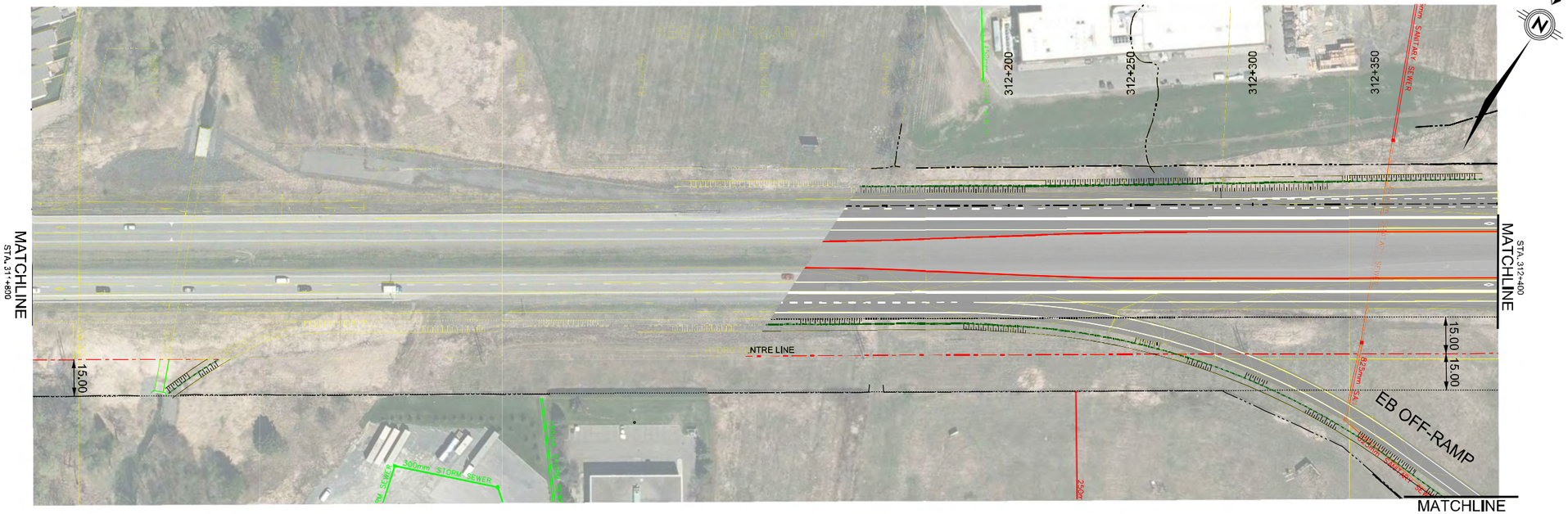
Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

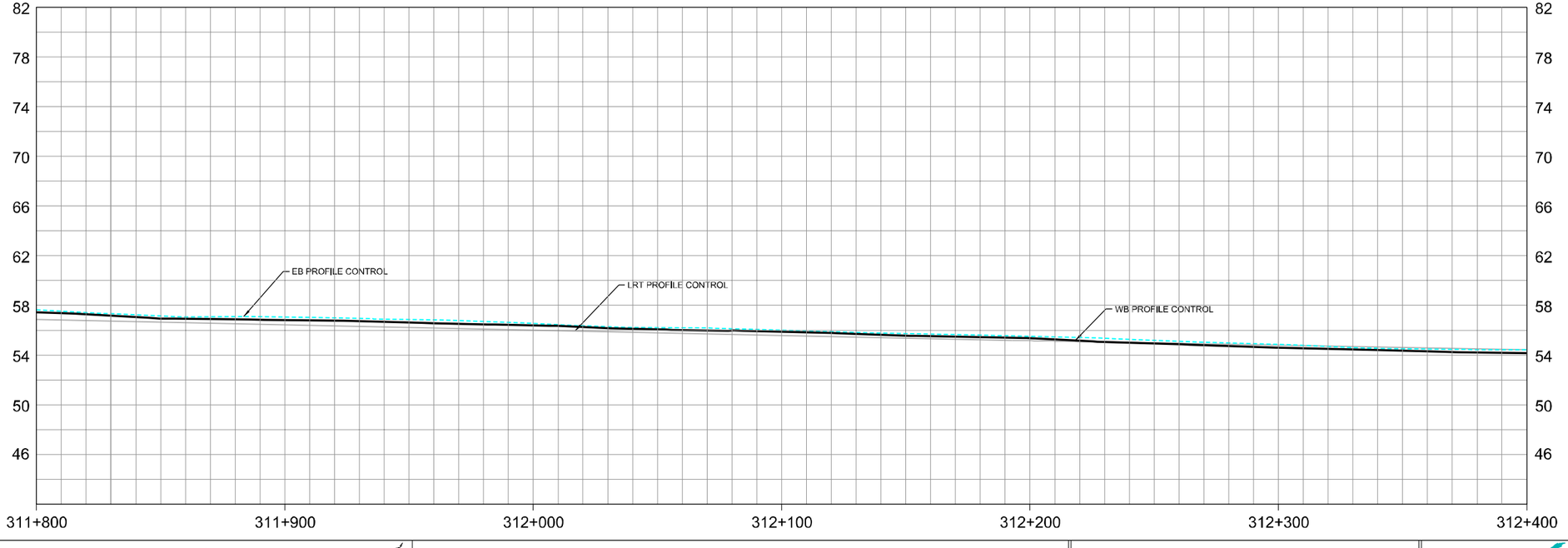
CAD File Name: EO2388TOD-01-PDR-21.DGN | Plot Date: XX/XX/XXXX

Ottawa

HWY OR174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 311+200 to STA. 311+800

Drawings No.: | Revision: 00 | Sheet No.: 21





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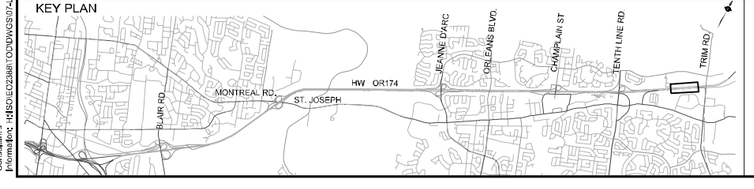

NOTES:

1. APPROXIMATE WESTBOUND TIE IN TO TRIM ROAD INTERCHANGE AT STA. 311+935

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

CAD File Name: EO2388TOD- 01-PDR-22.DGN

Plot Date: XX/XX/XXXX

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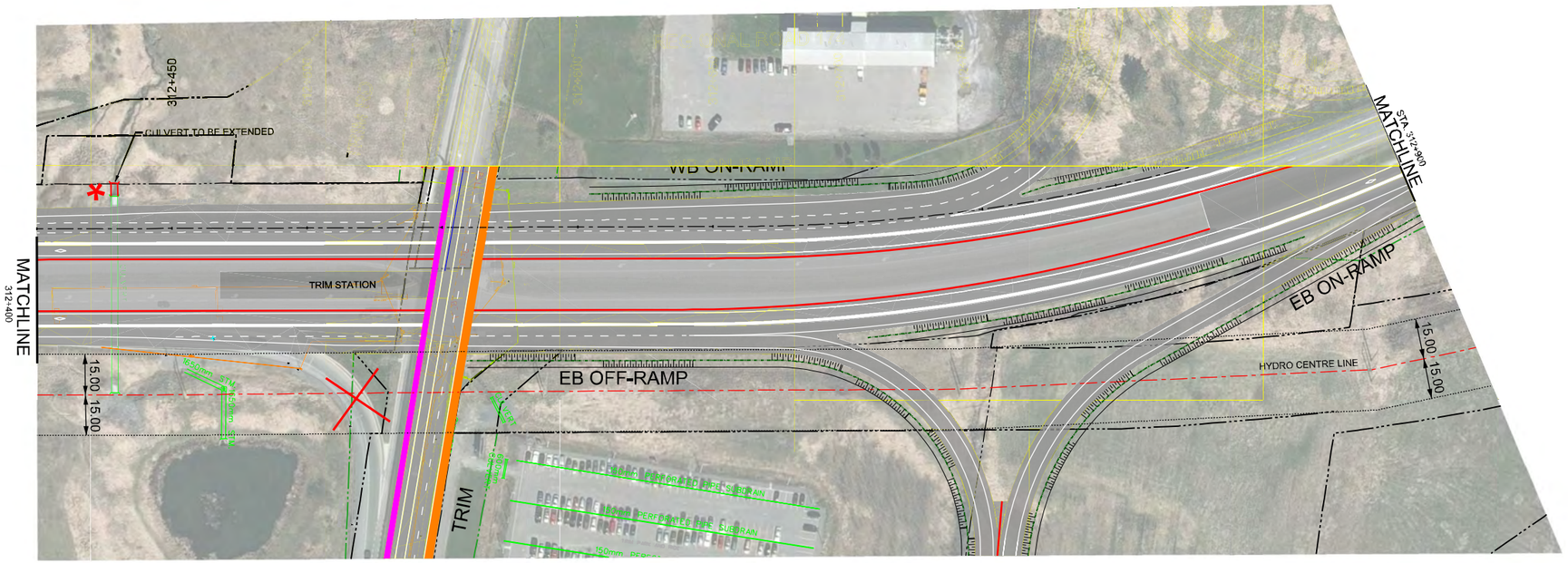
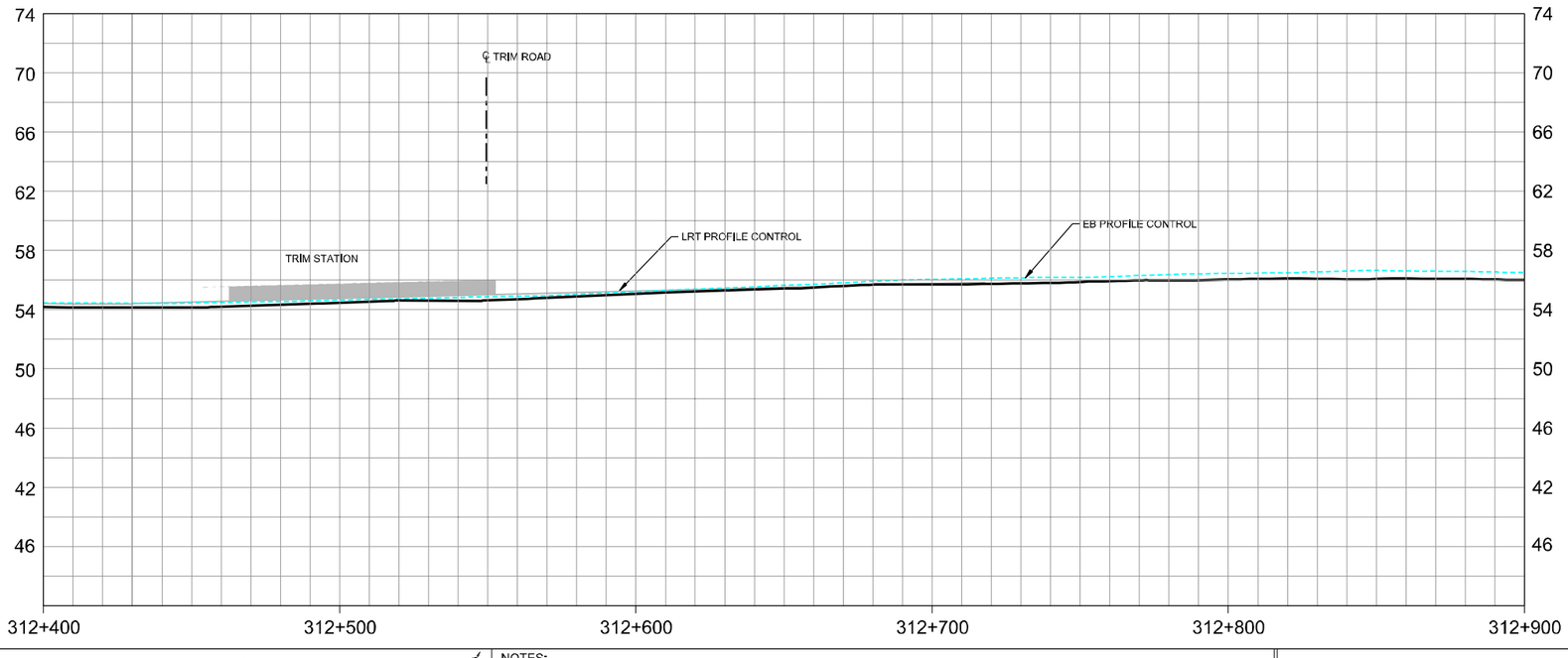
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 311+800 to STA. 312+400

Drawings No.:

Revision: 00

Sheet No.: 22





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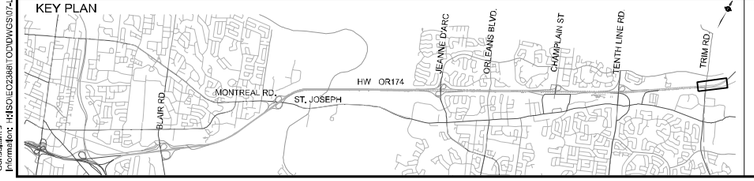


NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

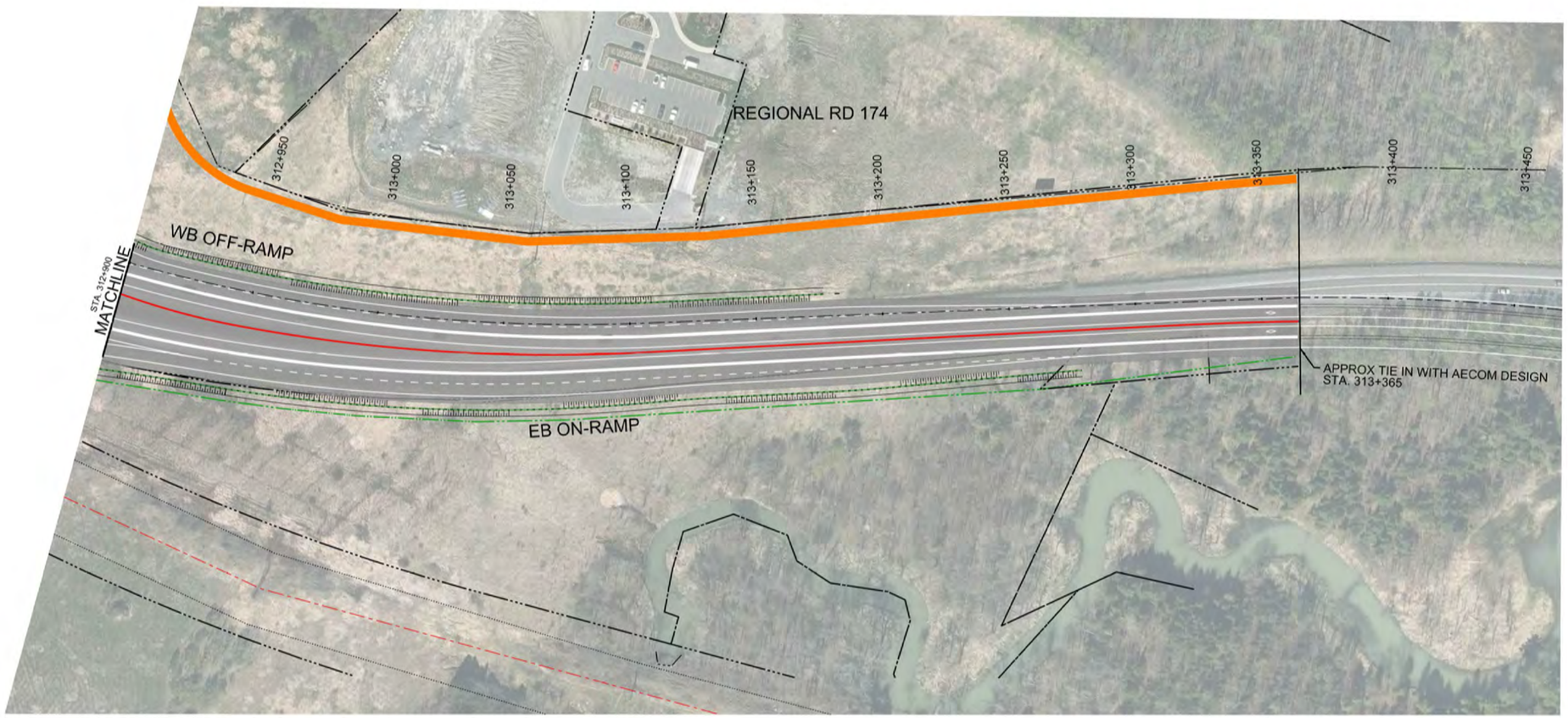
Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

CAD File Name: EO2388TOD-01-PDR-23.DGN	Plot Date: XX/XX/XXXX

Ottawa

HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 312+400 to STA. 312+900

Drawings No.:	Revision 00	Sheet No. 23



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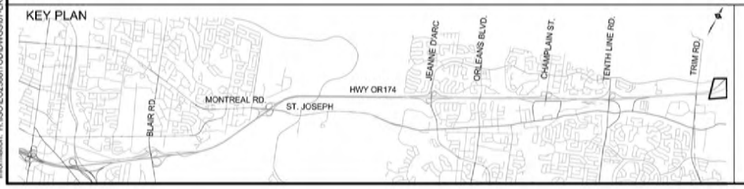


NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By

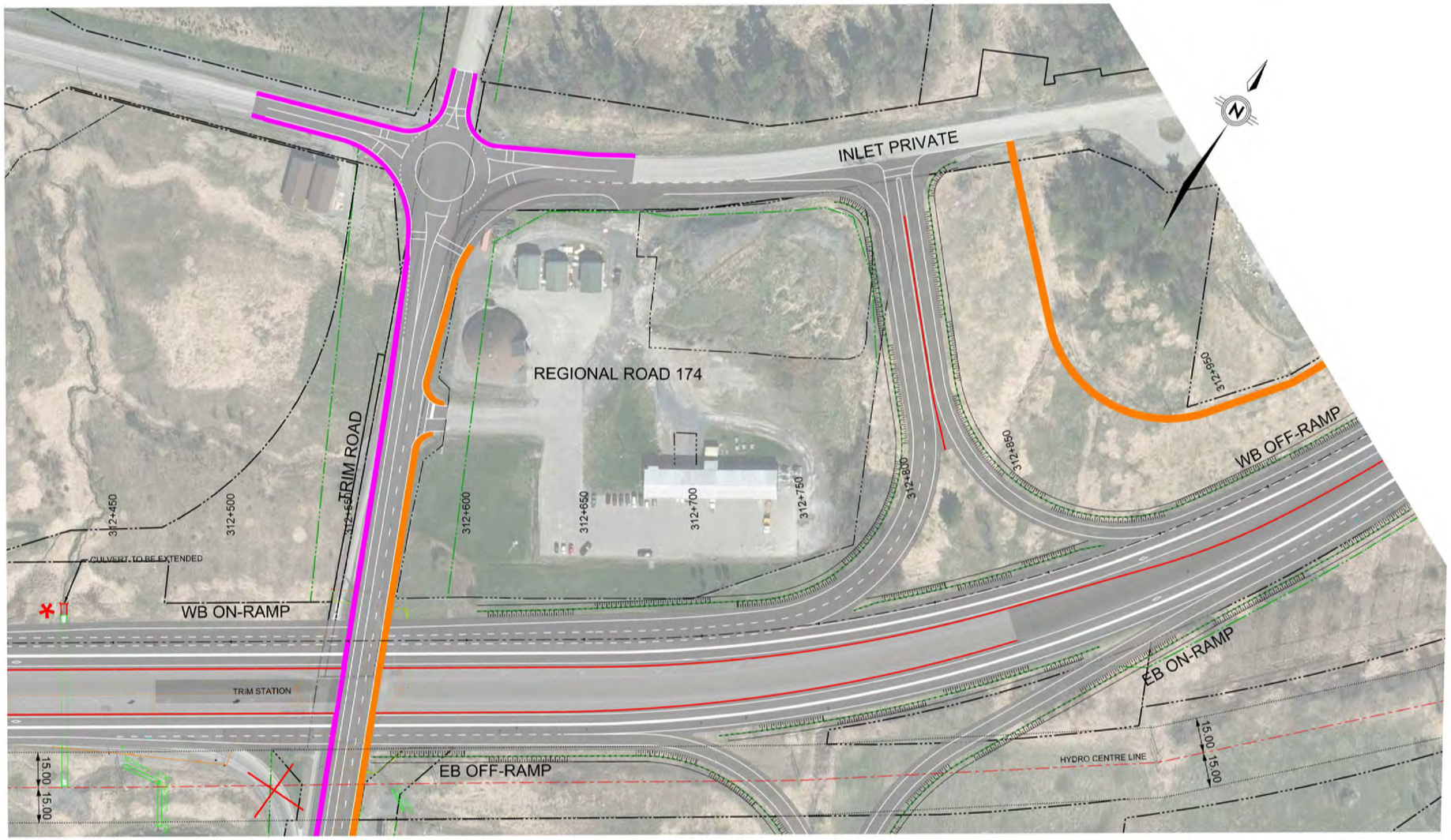
Scale: HORIZONTAL 1in 10 20 50 100; 1in 2.5 5 10 25; VERTICAL

CAD File Name: EO2388TOD- 01-PDR-24.DGN	Plot Date: XX/XX/XXXX

Ottawa

HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 312+900 to STA 313+450

Drawings No.:	Revision	Sheet No.
	00	24



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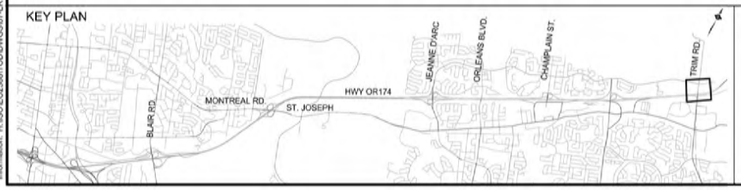


NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By

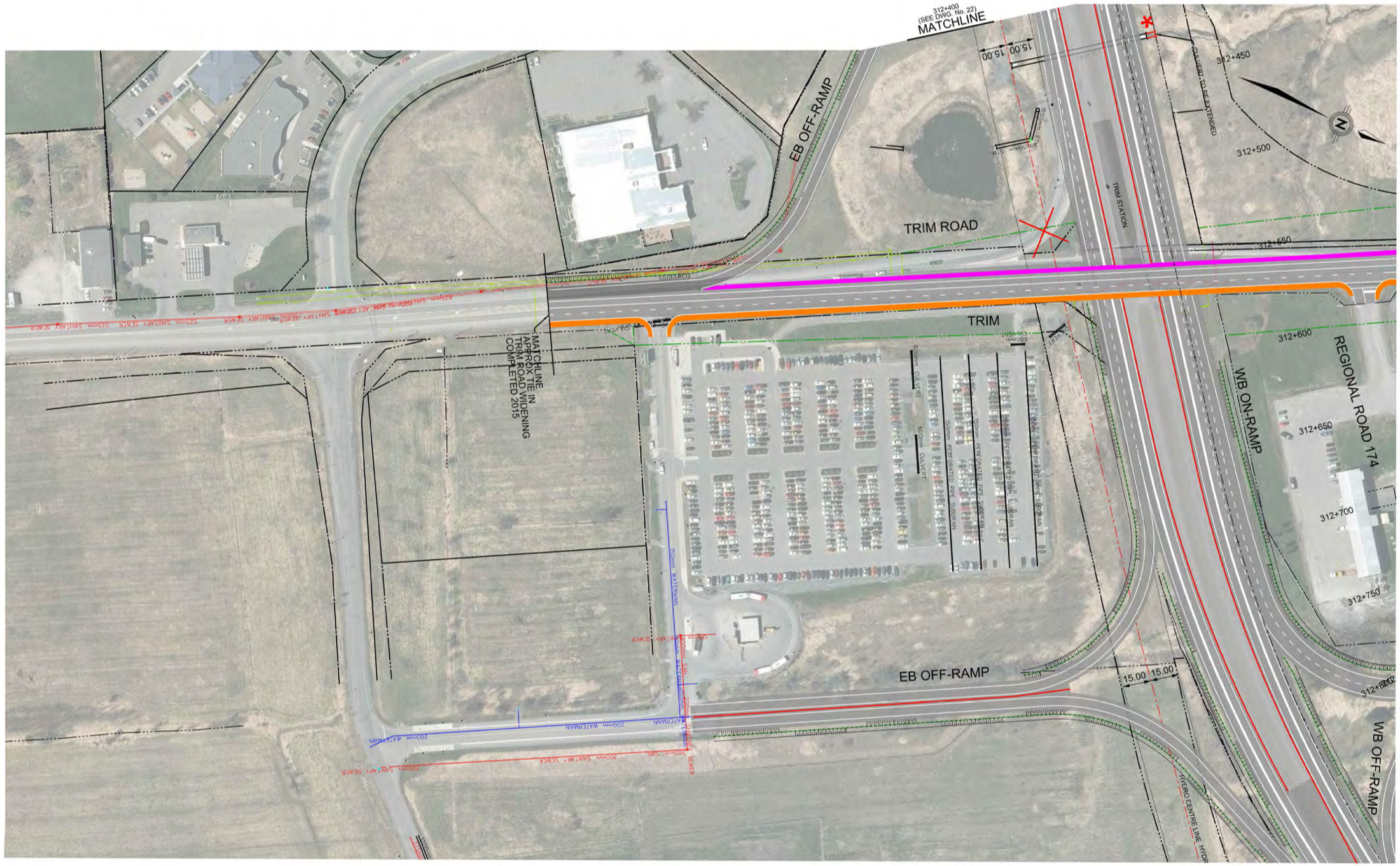
Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

CAD File Name: EO2388TOD- 01-PDR-25.DGN | Plot Date: XX/XX/XXXX

Ottawa

TRIM ROAD INTERCHANGE NORTH

Drawings No.: | Revision: 00 | Sheet No.: 25



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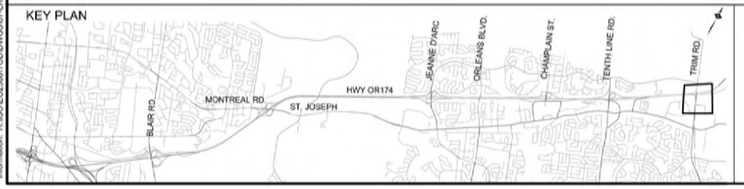

NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By

Scale: HORIZONTAL 1in 10 20 50 100; 1m 2.5 5 10 25; VERTICAL

CAD File Name: EO2388TOD- 01-PDR-26.DGN	Plot Date: XX/XX/XXXX

Ottawa

TRIM ROAD INTERCHANGE SOUTH

Drawings No.:	Revision 00	Sheet No. 26

Appendix D

Appendix D: Traffic Data

LRT Characteristics 78 dBA @ 100 km/hr 178mm above ground src height

68 dBA stationary 3800 mm above rail

	Existing		2031						Road Only Parameters		
Source	Year	AADTe or 1hr or #Trains	Growth Rate/ Year	Over # Years	AADTI or #Autos or #Trains	%M.T. or #MT or #Loc	%H.T. or #HT or #Cars	Speed Limit (kph)	Grade %	Pavement Type	Day/Night Split
LRT EB	-	-	2031	-	159			100	<2	1	Total Day-318 Night - 63
LRT WB	-	-	2031	-	159			100	<2	1	Total Day-318 Night - 63
OR174-417-blairEB	2013	40460	2031	-	38450	1.5	0.2	100	<2	1	66/33
OR174-417-blairWB	2013	42940	2031	-	38450	1.5	0.2	100	<2	1	66/33
OR174-Blair-MontrealEB	2013	37790	2031	-	33615	1.5	0.2	100	<2	1	66/33
OR174-Blair-MontrealWB	2013	38050	2031	-	33615	1.5	0.2	100	<2	1	66/33
OR174-Montreal-JeanEB	2013	40090	2031	-	34810	1.5	0.2	100	<2	1	66/33
OR174-Montreal-JeanWB	2013	38650	2031	-	34810	1.5	0.2	100	<2	1	66/33
OR174-Jean-ChampEB	2013	33490	2031	-	26445	1.7	0.2	100	<2	1	66/33
OR174-Jean-ChampWB	2013	30920	2031	-	26445	1.7	0.2	100	<2	1	66/33
OR174-Champ-10thEB	2013	30350	2031	-	22690	1.7	0.2	100	<2	1	66/33
OR174-Champ-10thWB	2013	29830	2031	-	22690	1.7	0.2	100	<2	1	66/33
OR174-10th-trimEB	2013	18390	2031	-	18235	1.7	0.2	100	<2	1	66/33
OR174-10th-trimWB	2013	18900	2031	-	18235	1.7	0.2	100	<2	1	66/33
OR174-trim-endEB	2013	12320	2031	-	13305	3.4	0.5	100	<2	1	66/33
OR174-trim-endWB	2013	14000	2031	-	13305	3.4	0.5	100	<2	1	66/33
Blair-N174	2013	23628	2031	-	9080	1.5	0.2	50	<2	1	90/10
Blair-S174	2013	18608	2031	-	13370	1.5	0.2	70	<2	1	90/10
Ogilive-Eblair	2013		2031	-	16440	1.5	0.2	60	<2	1	90/10
Ogilive-Wblair	2013		2031	-	19600	1.5	0.2	60	<2	1	90/10
Montreal	2013	36127	2031	-	23320	1.5	0.2	70	4	1	90/10
Cartier-N174	2013		2031	-	8540	1.5	0.2	60	<2	1	90/10
Cartier-S174	2013		2031	-	7970	1.5	0.2	60	<2	1	90/10
StJo-174-cartier	2013		2031	-	23730	1.5	0.2	70	<2	1	90/10
StJo-Cartier-Jean	2013	19482	2031	-	25040	1.5	0.2	70	<2	1	90/10
StJo-Jean-Orleans	2013		2031	-	10480	1.7	0.2	60	<2	1	90/10
StJo-Orleans-10th	2013		2031	-	11050	1.7	0.2	50	<2	1	90/10
StJo-10th-trim	2013		2031	-	10670	1.7	0.2	60	<2	1	90/10
StJo-trim-end	2013	18949	2031	-	7520	1.7	0.2	60	<2	1	90/10
Orleans-N174	2013	9350	2031	-	4260	1.7	0.2	50	<2	1	90/10
Orleans-S174	2013	10715	2031	-	6770	1.7	0.2	50	<2	1	90/10
Jean-N174	2013	13717	2031	-	6250	1.7	0.2	50	<2	1	90/10
Jean-S174	2013	18075	2031	-	11420	1.7	0.2	60	<2	1	90/10
Champlain	2013	11393	2031	-	7580	1.7	0.2	40	<2	1	90/10
10th-N174	2013		2031	-		1.7	0.2	60	<2	1	90/10
10th-S174	2013	19004	2031	-	16550	1.7	0.2	60	<2	1	90/10
Trim-N174	2013		2031	-		1.7	0.2	60	<2	1	85/15
Trim-S174	2013	13284	2031	-	14910	1.7	0.2	60	<2	1	85/15

Orleans 2013 data appoximated using same ratio as future to 2013 as parallel Jean

Appendix E

Appendix E: Traffic Noise Calculations

Initial Analysis

PROJECT NAME: Confederation Line East LRT Extension EA Study

PAGE 1 OF 21

PROJECT NUMBER: 60323982

ENGINEER: JAU

BASE DRAWING:

DATE: September 9, 2015

		No Project																		With Project																	
RECEIVER	SOURCE	θ1	θ2	TOPO	WOODS	No. Rows	@ Density	Ground Surface Type	Receiver Height (r) (m)	Source Receiver Dist (m)	Barr θ1	Barr θ2	Barrier Height (m)	Barrier Receiver Distance (m)	Elevation Change (e) (m)	Source Ground Elevation (m)	Receiver Ground Elevation (m)	Base of Barrier Elevation (m)	Leq(Day) or Leq(1hr) (dBA)	Leq (Night) (dBA)	θ1	θ2	TOPO	WOODS	No. Rows	@ Density	Ground Surface Type	Receiver Height (r) (m)	Source Receiver Dist (m)	Barr θ1	Barr θ2	Barrier Height (m)	Barrier Receiver Distance (m)	Elevation Change (e) (m)	Source Ground Elevation (m)	Receiver Ground Elevation (m)	Base of Barrier Elevation (m)	Leq(Day) or Leq(1hr) (dBA)	Leq (Night) (dBA)
A01	OR174_Blair_montreal_EB	-90	90	1	-	-	-	1	1.5	143	-	-	-	-	-	-	-	-	55.6		-90	90	1	-	-	-	1	1.5	143	-	-	-	-	-	-	-	-	55.09	
	OR174_Blair_montreal_WB	-90	90	1	-	-	-	1	1.5	125	-	-	-	-	-	-	-	-	56.6		-90	90	1	-	-	-	1	1.5	125	-	-	-	-	-	-	-	-	56.06	
	FU_LRT_EB									109											-90	90	1	-	-	-	1	1.5	109	-	-	-	-	-	-	-	-	38.98	
	FU_LRT_WB									104											-90	90	1	-	-	-	1	1.5	104	-	-	-	-	-	-	-	-	39.32	
	Total																		59.14																		58.71	
	Impact																																					-0.43	
A02	OR174_Blair_montreal_EB	-90	90	1	-	-	-	1	1.5	100	-	-	-	-	-	-	-	-	58.18		-90	90	1	-	-	-	1	1.5	100	-	-	-	-	-	-	-	-	57.67	
	OR174_Blair_montreal_WB	-90	90	1	-	-	-	1	1.5	83	-	-	-	-	-	-	-	-	59.55		-90	90	1	-	-	-	1	1.5	83	-	-	-	-	-	-	-	-	59.01	
	FU_LRT_EB									67											-90	90	1	-	-	-	1	1.5	67	-	-	-	-	-	-	-	-	42.49	
	FU_LRT_WB									62											-90	90	1	-	-	-	1	1.5	62	-	-	-	-	-	-	-	-	43.05	
	Total																		61.93																		61.52	
	Impact																																					-0.41	
A03	OR174_Blair_montreal_EB	-90	90	2	-	-	-	2	1.5	65	-90	30	3.5	10.5	-	-	-	-	62.97		-90	90	2	-	-	-	2	1.5	65	-90	30	5	10.5	-	-	-	-	62.06	
	OR174_Blair_montreal_WB	-90	90	2	-	-	-	1	1.5	46	-90	30	3.5	10.5	-	-	-	-	59.38		-90	90	2	-	-	-	1	1.5	46	-90	30	5	10.5	-	-	-	-	58.33	
	FU_LRT_EB									29.5											-90	90	2	-	-	-	1	1.5	29.5	-90	30	5	10.5	-	-	-	-	43.26	
	FU_LRT_WB									25											-90	90	2	-	-	-	1	1.5	25	-90	30	5	10.5	-	-	-	-	44.38	
	Total																		64.55																		63.69	
	Impact																																					-0.86	

Initial Analysis

PROJECT NAME: Confederation Line East LRT Extension EA Study

PAGE 2 OF 21

PROJECT NUMBER: 60323982

ENGINEER: JAU

BASE DRAWING:

DATE: September 9, 2015

		No Project																		With Project																	
RECEIVER	SOURCE	θ1	θ2	TOPO	WOODS	No. Rows	@ Density	Ground Surface Type	Receiver Height (r) (m)	Source Receiver Dist (m)	Barr θ1	Barr θ2	Barrier Height (m)	Barrier Receiver Distance (m)	Elevation Change (e) (m)	Source Ground Elevation (m)	Receiver Ground Elevation (m)	Base of Barrier Elevation (m)	Leq(Day) or Leq(1hr) (dBA)	Leq (Night) (dBA)	θ1	θ2	TOPO	WOODS	No. Rows	@ Density	Ground Surface Type	Receiver Height (r) (m)	Source Receiver Dist (m)	Barr θ1	Barr θ2	Barrier Height (m)	Barrier Receiver Distance (m)	Elevation Change (e) (m)	Source Ground Elevation (m)	Receiver Ground Elevation (m)	Base of Barrier Elevation (m)	Leq(Day) or Leq(1hr) (dBA)	Leq (Night) (dBA)
A04	OR174_Blair_montreal_EB	-90	90	2	-	-	-	2	1.5	62	-90	90	5	6.5	-	-	-	-	53.41		-90	90	2	-	-	-	2	1.5	62	-90	90	5	6.5	-	-	-	-	52.9	
	OR174_Blair_montreal_WB	-90	90	2	-	-	-	1	1.5	42	-90	90	5	6.5	-	-	-	-	52.18		-90	90	2	-	-	-	1	1.5	42	-90	90	5	6.5	-	-	-	-	51.64	
	FU_LRT_EB									22.5											-90	90	2	-	-	-	1	1.5	22.5	-90	90	5	6.5	-	-	-	-	36.18	
	FU_LRT_WB									18											-90	90	2	-	-	-	1	1.5	18	-90	90	5	6.5	-	-	-	-	37.14	
	Future frog/crossover																																				39.6	
	Total																		55.85																		55.55	
	Impact																																				-0.29	
A05	OR174_Blair_montreal_EB	-90	-30	1	-	-	-	1	1.5	210	-	-	-	-	-	-	-	-	47.2		-90	-30	1	-	-	-	1	1.5	210	-	-	-	-	-	-	-	-	46.7	
ignore intermediate terrain - end result closest pt level with road	OR174_Blair_montreal_WB	-90	-30	1	-	-	-	1	1.5	193	-	-	-	-	-	-	-	-	47.85		-90	-30	1	-	-	-	1	1.5	193	-	-	-	-	-	-	-	-	47.31	
	OR174_montreal_Jean_EB	-30	90	2	-	-	-	1	1.5	210	45	90	5	157	-	-	-	-	51.08		-30	90	2	-	-	-	1	1.5	210	45	90	5	157	-	-	-	-	50.46	
	OR174_montreal_Jean_WB	-30	90	2	-	-	-	1	1.5	193	45	90	5	157	-	-	-	-	51.44		-30	90	2	-	-	-	1	1.5	193	45	90	5	157	-	-	-	-	50.98	
	Montreal	-90	90	1	-	-	-	2	1.5	35	-	-	-	-	-	-	-	-	70.74		-90	90	1	-	-	-	2	1.5	35	-	-	-	-	-	-	-	-	68.84	
	FU_LRT_EB									154											-90	90	3	-	-	-	1	1.5	154	-	-	-	-	3	68	65	-	37.09	
	FU_LRT_WB									141											-90	90	3	-	-	-	1	1.5	141	-	-	-	-	3	68	65	-	37.71	
	Future potential frog/crossover																																				29.9	
	Total																		70.88																		69.03	
	Impact																																				-1.84	

Impact due to Montreal Road, not part of this project, Mitigation not considered as part of section 2.4 of Ottawa Noise Guideline

Initial Analysis

PROJECT NAME: Confederation Line East LRT Extension EA Study

PAGE 3 OF 21

PROJECT NUMBER: 60323982

ENGINEER: JAU

BASE DRAWING:

DATE: September 9, 2015

		No Project																		With Project																	
RECEIVER	SOURCE	θ1	θ2	TOPO	WOODS	No. Rows	@ Density	Ground Surface Type	Receiver Height (r) (m)	Source Receiver Dist (m)	Barr θ1	Barr θ2	Barrier Height (m)	Barrier Receiver Distance (m)	Elevation Change (e) (m)	Source Ground Elevation (m)	Receiver Ground Elevation (m)	Base of Barrier Elevation (m)	Leq(Day) or Leq(1hr) (dBA)	Leq (Night) (dBA)	θ1	θ2	TOPO	WOODS	No. Rows	@ Density	Ground Surface Type	Receiver Height (r) (m)	Source Receiver Dist (m)	Barr θ1	Barr θ2	Barrier Height (m)	Barrier Receiver Distance (m)	Elevation Change (e) (m)	Source Ground Elevation (m)	Receiver Ground Elevation (m)	Base of Barrier Elevation (m)	Leq(Day) or Leq(1hr) (dBA)	Leq (Night) (dBA)
A06	OR174_Blair_montreal_EB	-90	0	1	-	-	-	1	1.5	200	-	-	-	-	-	-	-	-	50.17		-90	0	1	-	-	-	1	1.5	200	-	-	-	-	-	-	-	-	49.66	
Consider gentle sloping	OR174_Blair_montreal_WB	-90	0	1	-	-	-	1	1.5	181	-	-	-	-	-	-	-	-	50.92		-90	0	1	-	-	-	1	1.5	181	-	-	-	-	-	-	-	-	50.38	
	OR174_montreal_Jean_EB	0	90	2	-	-	-	1	1.5	200	60	90	5	146	-	-	-	-	50.08		0	90	2	-	-	-	1	1.5	200	60	90	5	146	-	-	-	-	49.46	
	OR174_montreal_Jean_WB	0	90	2	-	-	-	1	1.5	181	60	90	5	146	-	-	-	-	50.56		0	90	2	-	-	-	1	1.5	181	60	90	5	146	-	-	-	-	50.1	
	Montreal	-45	90	1	-	-	-	1	1.5	141	-	-	-	-	-	-	-	-	51.83		-45	90	1	-	-	-	1	1.5	141	-	-	-	-	-	-	-	-	49.93	
	StJo_174_Cartier	-90	-45	1	-	-	-	1	1.5	141	-	-	-	-	-	-	-	-	42.38		-90	-45	1	-	-	-	1	1.5	141	-	-	-	-	-	-	-	-	43.24	
	FU_LRT_EB									123											-90	90	3	-	-	-	1	1.5	123	-	-	-	-	10.5	68	57.5	-	41.14	
	FU_LRT_WB									110											-90	90	3	-	-	-	1	1.5	110	-	-	-	-	10.5	68	57.5	-	41.81	
	Future potential frog/crossover																																				35.84	
	Total																		57.87																		57.35	
	Impact																																				-0.52	
A07	OR174_montreal_Jean_EB	-90	90	3	-	-	-	1	1.5	251	-	-	-	-	20	55	75	-	60.05		-90	90	3	-	-	-	1	1.5	251	-	-	-	-	20	55	75	-	59.44	
160 residents nursing home	OR174_montreal_Jean_WB	-90	90	3	-	-	-	1	1.5	276	-	-	-	-	20	55	75	-	59.45		-90	90	3	-	-	-	1	1.5	276	-	-	-	-	20	55	75	-	58.99	
	FU_LRT_EB			3						261					20	55	75	-			-90	90	3	-	-	-	1	1.5	261	-	-	-	-	20	55	75	-	40.82	
	FU_LRT_WB			3						266					20	55	75	-			-90	90	3	-	-	-	1	1.5	266	-	-	-	-	20	55	75	-	40.73	
	Total																		62.77																		62.29	
	Impact																																				-0.48	
A08	OR174_montreal_Jean_EB	-90	90	2	-	-	-	2	1.5	72	-90	90	5	10	-	-	-	-	54.15		-90	90	2	-	-	-	2	1.5	72	-90	90	5	10	-	-	-	-	53.53	
	OR174_montreal_Jean_WB	-90	90	2	-	-	-	1	1.5	44	-90	90	5	10	-	-	-	-	52.9		-90	90	2	-	-	-	1	1.5	44	-90	90	5	10	-	-	-	-	52.43	
	FU_LRT_EB									61	-90	90	5					-			-90	90	2	-	-	-	2	1.5	61	-90	90	5	10	-	-	-	-	35.76	
	FU_LRT_WB									56	-90	90	5					-			-90	90	2	-	-	-	2	1.5	56	-90	90	5	10	-	-	-	-	36.04	
	Total																		56.58																		56.11	
	Impact																																				-0.47	

Initial Analysis

PROJECT NAME: Confederation Line East LRT Extension EA Study

PAGE 4 OF 21

PROJECT NUMBER: 60323982

ENGINEER: JAU

BASE DRAWING:

DATE: September 9, 2015

		No Project																		With Project																	
RECEIVER	SOURCE	θ1	θ2	TOPO	WOODS	No. Rows	@ Density	Ground Surface Type	Receiver Height (r) (m)	Source Receiver Dist (m)	Barr θ1	Barr θ2	Barrier Height (m)	Barrier Receiver Distance (m)	Elevation Change (e) (m)	Source Ground Elevation (m)	Receiver Ground Elevation (m)	Base of Barrier Elevation (m)	Leq(Day) or Leq(1hr) (dBA)	Leq (Night) (dBA)	θ1	θ2	TOPO	WOODS	No. Rows	@ Density	Ground Surface Type	Receiver Height (r) (m)	Source Receiver Dist (m)	Barr θ1	Barr θ2	Barrier Height (m)	Barrier Receiver Distance (m)	Elevation Change (e) (m)	Source Ground Elevation (m)	Receiver Ground Elevation (m)	Base of Barrier Elevation (m)	Leq(Day) or Leq(1hr) (dBA)	Leq (Night) (dBA)
A09	OR174_montreal_Jean_EB	-45	90	2	-	-	-	2	1.5	88	-45	90	5	11	-	-	-	-	51.58		-45	90	2	-	-	-	2	1.5	88	-45	90	5	11	-	-	-	-	50.97	
	OR174_montreal_Jean_WB	-45	90	2	-	-	-	2	1.5	56	-45	90	5	11	-	-	-	-	52.99		-45	90	2	-	-	-	2	1.5	56	-45	90	5	11	-	-	-	-	52.53	
	OR174_Jean-Champ_EB	-90	-45	2	-	-	-	2	1.5	88	-90	-45	5	11	-	-	-	-	48.72		-90	-45	2	-	-	-	2	1.5	88	-90	-45	5	11	-	-	-	-	47.69	
	OR174_Jean-Champ_WB	-90	-45	2	-	-	-	2	1.5	56	-90	-45	5	11	-	-	-	-	50		-90	-45	2	-	-	-	2	1.5	56	-90	-45	5	11	-	-	-	-	49.32	
	Jean_N174	-30	30	4	-	-	-	1	1.5	138	-30	30	5	65	5	60	55	55	39.06		-30	30	4	-	-	-	1	1.5	138	-30	30	5	65	5	60	55	55	35.63	
	Jean_S174	30	90	4	-	-	-	1	1.5	138	30	90	5	65	5	60	55	55	42.19		30	90	4	-	-	-	1	1.5	138	30	90	5	65	5	60	55	55	40.2	
	FU_LRT_EB							2		78	-90	90	5	11				-			-90	90	2	-	-	-	2	1.5	78	-90	90	5	11	-	-	-	-	35.13	
	FU_LRT_WB							2		66	-90	90	5	11				-			-90	90	2	-	-	-	2	1.5	66	-90	90	5	11	-	-	-	-	35.7	
	Total																		57.34																		56.72	
	Impact																																					-0.62	
A10	OR174_montreal_Jean_EB	-45	90	1	-	-	-	1	1.5	66	-45	90	3	17	-	-	-	-	54.74		-45	90	1	-	-	-	1	1.5	66	-45	90	2.5	17	-	-	-	-	54.13	
2.5 m berm	OR174_montreal_Jean_WB	-45	90	1	-	-	-	1	1.5	98	-45	90	3	17	-	-	-	-	52.27		-45	90	1	-	-	-	1	1.5	98	-45	90	2.5	17	-	-	-	-	51.81	
	OR174_Jean-Champ_EB	-90	-45	1	-	-	-	1	1.5	66	-90	-45	3	17	-	-	-	-	48.44		-90	-45	1	-	-	-	1	1.5	66	-90	-45	2.5	17	-	-	-	-	47.41	
	OR174_Jean-Champ_WB	-90	-45	1	-	-	-	1	1.5	98	-90	-45	3	17	-	-	-	-	45.63		-90	-45	1	-	-	-	1	1.5	98	-90	-45	2.5	17	-	-	-	-	44.95	
	Jean_N174	30	60	3	-	-	-	1	1.5	131	-	-	-	-	5	60	55	55	39.23		30	60	3	-	-	-	1	1.5	131	-	-	-	-	5	60	55	55	35.8	
	Jean_S174	0	30	3	-	-	-	1	1.5	131	-	-	-	-	5	60	55	55	43.24		0	30	3	-	-	-	1	1.5	131	-	-	-	-	5	60	55	55	41.25	
	FU_LRT_EB									81								-			-90	90	1	-	-	-	1	1.5	81	-90	90	2.5	17	-	-	-	-	35.49	
	FU_LRT_WB									86								-			-90	90	1	-	-	-	1	1.5	86	-90	90	2.5	17	-	-	-	-	35.14	
	Total																		57.80																		57.17	
	Impact																																					-0.63	

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PROJECT NUMBER: 60323982

ENGINEER: JAU

BASE DRAWING:

DATE: September 9, 2015

		No Project																		With Project																	
RECEIVER	SOURCE	θ1	θ2	TOPO	WOODS	No. Rows	@ Density	Ground Surface Type	Receiver Height (r) (m)	Source Receiver Dist (m)	Barr θ1	Barr θ2	Barrier Height (m)	Barrier Receiver Distance (m)	Elevation Change (e) (m)	Source Ground Elevation (m)	Receiver Ground Elevation (m)	Base of Barrier Elevation (m)	Leq(Day) or Leq(1hr) (dBA)	Leq (Night) (dBA)	θ1	θ2	TOPO	WOODS	No. Rows	@ Density	Ground Surface Type	Receiver Height (r) (m)	Source Receiver Dist (m)	Barr θ1	Barr θ2	Barrier Height (m)	Barrier Receiver Distance (m)	Elevation Change (e) (m)	Source Ground Elevation (m)	Receiver Ground Elevation (m)	Base of Barrier Elevation (m)	Leq(Day) or Leq(1hr) (dBA)	Leq (Night) (dBA)
A11	OR174_montreal_Jean_EB	60	90	1	-	-	-	2	1.5	77	60	90	2	13	-	-	-	-	53.43		60	90	1	-	-	-	2	1.5	77	60	90	2	13	-	-	-	-	52.82	
2m berm	OR174_montreal_Jean_WB	60	90	1	-	-	-	1	1.5	50	60	90	2	13	-	-	-	-	48.52		60	90	1	-	-	-	1	1.5	50	60	90	2	13	-	-	-	-	48.06	
	OR174_Jean-Champ_EB	-90	60	1	-	-	-	2	1.5	77	-90	60	2	13	-	-	-	-	59.3		-90	60	1	-	-	-	2	1.5	77	-90	60	2	13	-	-	-	-	58.27	
	OR174_Jean-Champ_WB	-90	60	1	-	-	-	1	1.5	50	-90	60	2	13	-	-	-	-	56.67		-90	60	1	-	-	-	1	1.5	50	-90	60	2	13	-	-	-	-	56	
	Jean_N174	-30	30	3	-	-	-	1	1.5	270	-	-	-	-	5	60	55	-	38.16		-30	30	3	-	-	-	1	1.5	270	-	-	-	-	5	60	55	-	34.73	
	Jean_S174	-45	-30	3	-	-	-	1	1.5	270	-	-	-	-	5	60	55	-	34.97		-45	-30	3	-	-	-	1	1.5	270	-	-	-	-	5	60	55	-	32.98	
	FU_LRT_EB									65								-			-90	90	1	-	-	-	2	1.5	65	-90	90	2	13	-	-	-	-	42.53	
	FU_LRT_WB									60								-			-90	90	1	-	-	-	2	1.5	60	-90	90	2	13	-	-	-	-	42.81	
	Total																		62.09																		61.36	
	Impact																																					-0.73	
A12	OR174_Jean-Champ_EB	-90	90	2	-	-	-	2	1.5	71	-90	90	2.5	10	-	-	-	-	61.08		-90	90	2	-	-	-	2	1.5	71	-90	90	1.5	10	-	-	-	-	60.05	
1.5 m berm on dwgs	OR174_Jean-Champ_WB	-90	90	2	-	-	-	1	1.5	45	-90	90	2.5	10	-	-	-	-	58.48		-90	90	2	-	-	-	1	1.5	45	-90	90	1.5	10	-	-	-	-	57.8	
	OrleansN-174	-30	30	3	-	-	-	1	1.5	87	-	-	-	-	5	55	50	-	44.04		-30	30	3	-	-	-	1	1.5	87	-	-	-	-	5	55	50	-	40.64	
	OrleansS-174	30	60	3	-	-	-	1	1.5	87	-	-	-	-	5	55	50	-	40.87		30	60	3		-	-	1	1.5	87	-	-	-	-	5	55	50	-	38.88	
	FU_LRT_EB									65								-			-90	90	1	-	-	-	1	1.5	65	-90	90	1.5	10	-	-	-	-	38.04	
	FU_LRT_WB									52								-			-90	90	1	-	-	-	1	1.5	52	-90	90	1.5	10	-	-	-	-	39.55	
	Total																		63.06																		62.17	
	Impact																																					-0.89	

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PROJECT NAME: Confederation Line East LRT Extension EA Study

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PROJECT NUMBER: 60323982

ENGINEER: JAU

BASE DRAWING:

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		No Project																		With Project																	
RECEIVER	SOURCE	θ1	θ2	TOPO	WOODS	No. Rows	@ Density	Ground Surface Type	Receiver Height (r) (m)	Source Receiver Dist (m)	Barr θ1	Barr θ2	Barrier Height (m)	Barrier Receiver Distance (m)	Elevation Change (e) (m)	Source Ground Elevation (m)	Receiver Ground Elevation (m)	Base of Barrier Elevation (m)	Leq(Day) or Leq(1hr) (dBA)	Leq (Night) (dBA)	θ1	θ2	TOPO	WOODS	No. Rows	@ Density	Ground Surface Type	Receiver Height (r) (m)	Source Receiver Dist (m)	Barr θ1	Barr θ2	Barrier Height (m)	Barrier Receiver Distance (m)	Elevation Change (e) (m)	Source Ground Elevation (m)	Receiver Ground Elevation (m)	Base of Barrier Elevation (m)	Leq(Day) or Leq(1hr) (dBA)	Leq (Night) (dBA)
A13	OR174_Jean-Champ_EB	-90	90	2	-	-	-	1	1.5	64	-90	90	1.5	17	-	-	-	-	56.4		-90	90	2	-	-	-	1	1.5	64	-90	90	1.5	17	-	-	-	-	55.37	
1.5 m berm as per drawing	OR174_Jean-Champ_WB	-90	90	2	-	-	-	1	1.5	90	-90	90	1.5	17	-	-	-	-	53.72		-90	90	2	-	-	-	1	1.5	90	-90	90	1.5	17	-	-	-	-	53.05	
	OrleansN-174	45	90	3	-	-	-	1	1.5	62	-	-	-	-	5	55	50	-	42.63		45	90	3	-	-	-	1	1.5	62	-	-	-	-	5	55	50	-	39.23	
	OrleansS-174	-60	45	3	-	-	-	1	1.5	62	-	-	-	-	5	55	50	-	49.05		-60	45	3	-	-	-	1	1.5	62	-	-	-	-	5	55	50	-	47.06	
	FU_LRT_EB									70								-			-90	90	2	-	-	-	1	1.5	70	-90	90	1.5	17	-	-	-	-	37.47	
	FU_LRT_WB									83								-			-90	90	2	-	-	-	1	1.5	83	-90	90	1.5	17	-	-	-	-	36.32	
	Total																		58.87																		57.89	
	Impact																																				-0.98	
A14	OR174_Jean-Champ_EB	-90	90	1	-	-	-	1	1.5	56	-	-	-	-	-	-	-	-	61.91		-90	90	1	-	-	-	1	1.5	56	-	-	-	-	-	-	-	-	60.88	
	OR174_Jean-Champ_WB	-90	90	1	-	-	-	1	1.5	82	-	-	-	-	-	-	-	-	58.81		-90	90	1	-	-	-	1	1.5	82	-	-	-	-	-	-	-	-	58.13	
	FU_LRT_EB									67								-			-90	90	1	-	-	-	1	1.5	67	-	-	-	-	-	-	-	-	42.49	
	FU_LRT_WB									72								-			-90	90	1	-	-	-	1	1.5	72	-	-	-	-	-	-	-	-	41.97	
	Total																		63.64																		62.81	
	Impact																																				-0.83	
A15	OR174_Jean-Champ_EB	-90	90	1	-	-	-	1	1.5	73	-45	90	2	17	-	-	-	-	56.45		-90	90	1	-	-	-	1	1.5	73	-45	90	2	17	-	-	-	-	55.42	
Berm 2 m	OR174_Jean-Champ_WB	-90	90	1	-	-	-	1	1.5	47	-45	90	2	17	-	-	-	-	58.96		-90	90	1	-	-	-	1	1.5	47	-45	90	2	17	-	-	-	-	58.28	
	FU_LRT_EB									62								-			-90	90	1	-	-	-	1	1.5	62	-45	90	2	17	-	-	-	-	39.19	
	FU_LRT_WB									58								-			-90	90	1	-	-	-	1	1.5	58	-45	90	2	17	-	-	-	-	39.61	
	Total																		60.89																		60.17	
	Impact																																				-0.73	

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ENGINEER: JAU

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RECEIVER	SOURCE	θ1	θ2	TOPO	WOODS	No. Rows	@ Density	Ground Surface Type	Receiver Height (r) (m)	Source Receiver Dist (m)	Barr θ1	Barr θ2	Barrier Height (m)	Barrier Receiver Distance (m)	Elevation Change (e) (m)	Source Ground Elevation (m)	Receiver Ground Elevation (m)	Base of Barrier Elevation (m)	Leq(Day) or Leq(1hr) (dBA)	Leq (Night) (dBA)	θ1	θ2	TOPO	WOODS	No. Rows	@ Density	Ground Surface Type	Receiver Height (r) (m)	Source Receiver Dist (m)	Barr θ1	Barr θ2	Barrier Height (m)	Barrier Receiver Distance (m)	Elevation Change (e) (m)	Source Ground Elevation (m)	Receiver Ground Elevation (m)	Base of Barrier Elevation (m)	Leq(Day) or Leq(1hr) (dBA)	Leq (Night) (dBA)
A16	OR174_Jean-Champ_EB	-90	90	3	-	-	-	1	1.5	87	-	-	-	-	2	62.5	64.5	-	59.06		-90	90	3	-	-	-	1	1.5	87	-	-	-	-	2	62.5	64.5	-	58.03	
	OR174_Jean-Champ_WB	-90	90	3	-	-	-	1	1.5	63	-	-	-	-	2	62.5	64.5	-	60.99		-90	90	3	-	-	-	1	1.5	63	-	-	-	-	2	62.5	64.5	-	60.31	
	FU_LRT_EB									79								-			-90	90	3	-	-	-	1	1.5	79	-	-	-	-	2	62.5	64.5	-	41.49	
	FU_LRT_WB									74								-			-90	90	3	-	-	-	1	1.5	74	-	-	-	-	2	62.5	64.5	-	41.95	
	Total																		63.14																		62.40	
	Impact																																					-0.74	
A17	OR174_Champ-10th_EB	-90	90	4	-	-	-	1	1.5	69	-90	90	1	17	3	60	63	63	55.77		-90	90	4	-	-	-	1	1.5	69	-90	90	1	17	3	60	63	63	54.5	
1 m berm	OR174_Champ-10th_WB	-90	90	4	-	-	-	1	1.5	45	-90	90	1	17	3	60	63	63	56.72		-90	90	4	-	-	-	1	1.5	45	-90	90	1	17	3	60	63	63	56.39	
	FU_LRT_EB									60								-			-90	90	4	-	-	-	1	1.5	60	-90	90	1	17	3	60	63	63	38.49	
	FU_LRT_WB									55								-			-90	90	4	-	-	-	1	1.5	55	-90	90	1	17	3	60	63	63	38.85	
	Total																		59.28																		58.65	
	Impact																																					-0.64	
A18	OR174_Champ-10th_EB	-90	90	4	-	-	-	1	1.5	84	-90	90	1	22	1.5	61	61.5	61.5	58.74		-90	90	2	-	-	-	1	1.5	84	-90	90	1	22	1.5	61	61.5	61.5	57.47	
1m berm from dwg	OR174_Champ-10th_WB	-90	90	4	-	-	-	1	1.5	60	-90	90	1	22	1.5	61	61.5	61.5	61.06		-90	90	2	-	-	-	1	1.5	60	-90	90	1	22	1.5	61	61.5	61.5	59.87	
	FU_LRT_EB									77								-			-90	90	2	-	-	-	1	1.5	77	-90	90	1	22	1.5	61	61.5	61.5	37.07	
	FU_LRT_WB									65								-			-90	90	2	-	-	-	1	1.5	65	-90	90	1	22	1.5	61	61.5	61.5	38.22	
	Total																		63.06																		61.88	
	Impact																																					-1.19	

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RECEIVER	SOURCE	θ1	θ2	TOPO	WOODS	No. Rows	@ Density	Ground Surface Type	Receiver Height (r) (m)	Source Receiver Dist (m)	Barr θ1	Barr θ2	Barrier Height (m)	Barrier Receiver Distance (m)	Elevation Change (e) (m)	Source Ground Elevation (m)	Receiver Ground Elevation (m)	Base of Barrier Elevation (m)	Leq(Day) or Leq(1hr) (dBA)	Leq (Night) (dBA)	θ1	θ2	TOPO	WOODS	No. Rows	@ Density	Ground Surface Type	Receiver Height (r) (m)	Source Receiver Dist (m)	Barr θ1	Barr θ2	Barrier Height (m)	Barrier Receiver Distance (m)	Elevation Change (e) (m)	Source Ground Elevation (m)	Receiver Ground Elevation (m)	Base of Barrier Elevation (m)	Leq(Day) or Leq(1hr) (dBA)	Leq (Night) (dBA)
A19	OR174_Champ-10th_EB	-90	90	3	-	-	-	1	1.5	70	-	-	-	-	3	62	65	-	60.41		-90	90	3	-	-	-	1	1.5	70	-	-	-	-	3	62	65	-	59.15	
	OR174_Champ-10th_WB	-90	90	3	-	-	-	1	1.5	95	-	-	-	-	3	62	65	-	58.23		-90	90	3	-	-	-	1	1.5	95	-	-	-	-	3	62	65	-	57.03	
	FU_LRT_EB			3						76					3	62	65	-			-90	90	3	-	-	-	1	1.5	76	-	-	-	-	3	62	65	-	42.02	
	FU_LRT_WB			3						89					3	62	65	-			-90	90	3	-	-	-	1	1.5	89	-	-	-	-	3	62	65	-	40.92	
	Total																		62.47																		not reviewed as per City of Ottawa Administrative Feasibility	61.32	
	Impact																																					-1.15	
A20	OR174_10th-trim_EB	-90	90	2	-	-	-	1	1.5	64	-90	90	3	10	-	-	-	-	51.27		-90	90	2	-	-	-	1	1.5	64	-90	90	3	10	-	-	-	-	49.86	
detiorating wooden wall	OR174_10th-trim_WB	-90	90	2	-	-	-	1	1.5	41	-90	90	3	10	-	-	-	-	53.84		-90	90	2	-	-	-	1	1.5	41	-90	90	3	10	-	-	-	-	52.32	
residential new construction to west not yet subdivided	FU_LRT_EB			1						58								-			-90	90	2	-	-	-	1	1.5	58	-90	90	3	10	-	-	-	-	35.98	
	FU_LRT_WB			1						45								-			-90	90	2	-	-	-	1	1.5	45	-90	90	3	10	-	-	-	-	37.33	
	Total																		55.75																			54.42	
	Impact																																					-1.33	
A21	OR174_10th-trim_EB	-90	90	1	-	-	-	1	1.5	68	-	-	-	-	-	-	-	-	57.91		-90	90	1	-	-	-	1	1.5	68	-	-	-	-	-	-	-	-	57.86	
	OR174_10th-trim_WB	-90	90	1	-	-	-	1	1.5	90	-	-	-	-	-	-	-	-	56		-90	90	1	-	-	-	1	1.5	90	-	-	-	-	-	-	-	-	55.84	
	FU_LRT_EB			1						72								-			-90	90	1	-	-	-	1	1.5	72	-	-	-	-	-	-	-	-	41.97	
	FU_LRT_WB			1						85								-			-90	90	1	-	-	-	1	1.5	85	-	-	-	-	-	-	-	-	40.77	
	Total																		60.07																			60.10	
	Impact																																					0.03	

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DATE: September 9, 2015

		No Project																		With Project																			
RECEIVER	SOURCE	θ1	θ2	TOPO	WOODS	No. Rows	@ Density	Ground Surface Type	Receiver Height (r) (m)	Source Receiver Dist (m)	Barr θ1	Barr θ2	Barrier Height (m)	Barrier Receiver Distance (m)	Elevation Change (e) (m)	Source Ground Elevation (m)	Receiver Ground Elevation (m)	Base of Barrier Elevation (m)	Leq(Day) or Leq(1hr) (dBA)	Leq (Night) (dBA)	θ1	θ2	TOPO	WOODS	No. Rows	@ Density	Ground Surface Type	Receiver Height (r) (m)	Source Receiver Dist (m)	Barr θ1	Barr θ2	Barrier Height (m)	Barrier Receiver Distance (m)	Elevation Change (e) (m)	Source Ground Elevation (m)	Receiver Ground Elevation (m)	Base of Barrier Elevation (m)	Leq(Day) or Leq(1hr) (dBA)	Leq (Night) (dBA)
A03a	OR174_Blair_montreal_EB	-90	90	2	-	-	-	2	1.5	65	-90	90	3.5	10.5	-	-	-	-	57.43		-90	90	2	-	-	-	2	1.5	65	-90	90	5	10.5	-	-	-	-	53.86	
	OR174_Blair_montreal_WB	-90	90	2	-	-	-	1	1.5	46	-90	90	3.5	10.5	-	-	-	-	55.17		-90	90	2	-	-	-	1	1.5	46	-90	90	5	10.5	-	-	-	-	52.17	
	FU_LRT_EB									29.5											-90	90	2	-	-	-	1	1.5	29.5	-90	90	5	10.5	-	-	-	-	35.62	
	FU_LRT_WB									25											-90	90	2	-	-	-	1	1.5	25	-90	90	5	10.5	-	-	-	-	36.14	
	Total																		59.46																		56.19	
	Impact																																						-3.27	
A03b	OR174_Blair_montreal_EB	-90	90	2	-	-	-	2	1.5	65	-90	60	3.5	10.5	-	-	-	-	60.89		-90	90	2	-	-	-	2	1.5	65	-90	60	5	10.5	-	-	-	-	59.53	
	OR174_Blair_montreal_WB	-90	90	2	-	-	-	1	1.5	46	-90	60	3.5	10.5	-	-	-	-	56.74		-90	90	2	-	-	-	1	1.5	46	-90	60	5	10.5	-	-	-	-	54.91	
	FU_LRT_EB									29.5											-90	90	2	-	-	-	1	1.5	29.5	-90	60	5	10.5	-	-	-	-	39.46	
	FU_LRT_WB									25											-90	90	2	-	-	-	1	1.5	25	-90	60	5	10.5	-	-	-	-	40.46	
	Total																		62.30																		60.89	
	Impact																																						-1.41	

Initial Analysis

PROJECT NAME: Confederation Line East LRT Extension EA Study

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PROJECT NUMBER: 60323982

ENGINEER: JAU

BASE DRAWING:

DATE: September 9, 2015

		No Project																			With Project																			
RECEIVER	SOURCE	θ1	θ2	TOPO	WOODS	No. Rows	@ Density	Ground Surface Type	Receiver Height (r) (m)	Source Receiver Dist (m)	Barr θ1	Barr θ2	Barrier Height (m)	Barrier Receiver Distance (m)	Elevation Change (e) (m)	Source Ground Elevation (m)	Receiver Ground Elevation (m)	Base of Barrier Elevation (m)	Leq(Day) or Leq(1hr) (dBA)	Leq (Night) (dBA)	θ1	θ2	TOPO	WOODS	No. Rows	@ Density	Ground Surface Type	Receiver Height (r) (m)	Source Receiver Dist (m)	Barr θ1	Barr θ2	Barrier Height (m)	Barrier Receiver Distance (m)	Elevation Change (e) (m)	Source Ground Elevation (m)	Receiver Ground Elevation (m)	Base of Barrier Elevation (m)	Leq(Day) or Leq(1hr) (dBA)	Leq (Night) (dBA)
A11a	OR174_montreal_Jean_EB	60	90	1	-	-	-	1	1.5	108	-	-	-	-	-	-	-	-	47.44		60	90	1	-	-	-	1	1.5	108	-	-	-	-	-	-	-	-	46.83	
	OR174_montreal_Jean_WB	60	90	1	-	-	-	1	1.5	78	-	-	-	-	-	-	-	-	49.63		60	90	1	-	-	-	1	1.5	78	-	-	-	-	-	-	-	-	49.17	
	OR174_Jean-Champ_EB	-90	60	2	-	-	-	1	1.5	108	-90	-60	2	36	-	-	-	-	56.5		-90	60	2	-	-	-	1	1.5	108	-90	-60	2	36	-	-	-	-	55.47	
	OR174_Jean-Champ_WB	-90	60	2	-	-	-	1	1.5	78	-90	-60	2	36	-	-	-	-	58.49		-90	60	2	-	-	-	1	1.5	78	-90	-60	2	36	-	-	-	-	57.81	
	Jean_N174	-45	30	3	-	-	-	1	1.5	186	-	-	-	-	5	60	55	-	41.53		-45	30	3	-	-	-	1	1.5	186	-	-	-	-	5	60	55	-	38.1	
	Jean_S174	-60	-45	3	-	-	-	1	1.5	186	-	-	-	-	5	60	55	-	36.84		-60	-45	3	-	-	-	1	1.5	186	-	-	-	-	5	60	55	-	34.85	
	FU_LRT_EB									95								-			-90	90	1	-	-	-	1	1.5	95	-90	-60	2	36	-	-	-	-	39.72	
	FU_LRT_WB									91								-			-90	90	1	-	-	-	1	1.5	91	-90	-60	2	36	-	-	-	-	40.03	
	Total																		61.20																			60.48	
	Impact																																						-0.73	
A12a	OR174_Jean-Champ_EB	-90	90	1	-	-	-	1	1.5	74	-90	90	1.5	15	-	-	-	-	59.9		-90	90	1	-	-	-	1	1.5	74	-90	90	1.25	15	-	-	-	-	58.87	
1.25 m berm on dwgs	OR174_Jean-Champ_WB	-90	90	1	-	-	-	1	1.5	49	-90	90	1.5	15	-	-	-	-	57.86		-90	90	1	-	-	-	1	1.5	49	-90	90	1.25	15	-	-	-	-	57.18	
	OrleansN-174	-30	30	3	-	-	-	1	1.5	90	-	-	-	-	5	55	50	-	43.81		-30	30	3	-	-	-	1	1.5	90	-	-	-	-	5	55	50	-	40.41	
	OrleansS-174	-60	-30	3	-	-	-	1	1.5	90	-	-	-	-	5	55	50	-	40.65		30	60	3		-	-	1	1.5	90	-	-	-	-	5	55	50	-	38.66	
	FU_LRT_EB									68								-			-90	90	1	-	-	-	1	1.5	68	-90	90	1.25	15	-	-	-	-	37.68	
	FU_LRT_WB									56								-			-90	90	1	-	-	-	1	1.5	56	-90	90	1.25	15	-	-	-	-	39.03	
	Total																		62.11																			61.22	
	Impact																																						-0.88	

Initial Analysis

PROJECT NAME: Confederation Line East LRT Extension EA Study

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PROJECT NUMBER: 60323982

ENGINEER: JAU

BASE DRAWING:

DATE: September 9, 2015

		No Project																		With Project																	
RECEIVER	SOURCE	θ1	θ2	TOPO	WOODS	No. Rows	@ Density	Ground Surface Type	Receiver Height (r) (m)	Source Receiver Dist (m)	Barr θ1	Barr θ2	Barrier Height (m)	Barrier Receiver Distance (m)	Elevation Change (e) (m)	Source Ground Elevation (m)	Receiver Ground Elevation (m)	Base of Barrier Elevation (m)	Leq(Day) or Leq(1hr) (dBA)	Leq (Night) (dBA)	θ1	θ2	TOPO	WOODS	No. Rows	@ Density	Ground Surface Type	Receiver Height (r) (m)	Source Receiver Dist (m)	Barr θ1	Barr θ2	Barrier Height (m)	Barrier Receiver Distance (m)	Elevation Change (e) (m)	Source Ground Elevation (m)	Receiver Ground Elevation (m)	Base of Barrier Elevation (m)	Leq(Day) or Leq(1hr) (dBA)	Leq (Night) (dBA)
A13a	OR174_Jean-Champ_EB	-90	90	2	-	-	-	1	1.5	64	-90	90	1.5	13	-	-	-	-	56.42		-90	90	2	-	-	-	1	1.5	64	-90	90	1.5	13	-	-	-	-	55.39	
1.5 m berm as per drawing	OR174_Jean-Champ_WB	-90	90	2	-	-	-	1	1.5	89	-90	90	1.5	13	-	-	-	-	53.81		-90	90	2	-	-	-	1	1.5	89	-90	90	1.5	13	-	-	-	-	53.13	
	OrleansN-174	-90	-45	3	-	-	-	1	1.5	102	-	-	-	-	5	55	50	-	39.31		-90	-45	3	-	-	-	1	1.5	102	-	-	-	-	5	55	50	-	35.91	
	OrleansS-174	-45	0	3	-	-	-	1	1.5	102	-	-	-	-	5	55	50	-	42.17		-45	0	3	-	-	-	1	1.5	102	-	-	-	-	5	55	50	-	40.18	
	FU_LRT_EB									71								-			-90	90	2	-	-	-	1	1.5	71	-90	90	1.5	13	-	-	-	-	37.41	
	FU_LRT_WB									82								-			-90	90	2	-	-	-	1	1.5	82	-90	90	1.5	13	-	-	-	-	36.43	
	Total																		58.48																		57.60	
	Impact																																				-0.87	
A14a	OR174_Jean-Champ_EB	-90	90	2	-	-	-	1	1.5	48	-45	45	1	10	-	-	-	-	63.02		-90	90	2	-	-	-	1	1.5	48	-45	45	1	10	-	-	-	-	61.99	
1m berm	OR174_Jean-Champ_WB	-90	90	2	-	-	-	1	1.5	73	-45	45	1	10	-	-	-	-	59.65		-90	90	2	-	-	-	1	1.5	73	-45	45	1	10	-	-	-	-	58.97	
	FU_LRT_EB									58								-			-90	90	2	-	-	-	1	1.5	58	-45	45	1	10	-	-	-	-	43.53	
	FU_LRT_WB									63								-			-90	90	2	-	-	-	1	1.5	63	-45	45	1	10	-	-	-	-	42.93	
	Total																		64.66																		63.82	
	Impact																																				-0.84	
A14b	OR174_Jean-Champ_EB	-90	90	2	-	-	-	1	1.5	55	-90	90	2.5	8.5	-	-	-	-	55.75		-90	90	2	-	-	-	1	1.5	55	-90	90	2.5	8.5	-	-	-	-	54.72	
2.5 m exist barr	OR174_Jean-Champ_WB	-90	90	2	-	-	-	1	1.5	80	-90	90	2.5	8.5	-	-	-	-	53.11		-90	90	2	-	-	-	1	1.5	80	-90	90	2.5	8.5	-	-	-	-	52.43	
	FU_LRT_EB									65								-			-90	90	2	-	-	-	1	1.5	65	-90	90	2.5	8.5	-	-	-	-	36.32	
	FU_LRT_WB									69								-			-90	90	2	-	-	-	1	1.5	69	-90	90	2.5	8.5	-	-	-	-	35.96	
	Total																		57.64																		56.81	
	Impact																																				-0.83	

PROJECT NAME: Confederation Line East LRT Extension EA Study

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PROJECT NUMBER: 60323982

ENGINEER: JAU

BASE DRAWING:

DATE: September 9, 2015

Initial Analysis

		No Project																		With Project																	
RECEIVER	SOURCE	θ1	θ2	TOPO	WOODS	No. Rows	@ Density	Ground Surface Type	Receiver Height (r) (m)	Source Receiver Dist (m)	Barr θ1	Barr θ2	Barrier Height (m)	Barrier Receiver Distance (m)	Elevation Change (e) (m)	Source Ground Elevation (m)	Receiver Ground Elevation (m)	Base of Barrier Elevation (m)	Leq(Day) or Leq(1hr) (dBA)	Leq (Night) (dBA)	θ1	θ2	TOPO	WOODS	No. Rows	@ Density	Ground Surface Type	Receiver Height (r) (m)	Source Receiver Dist (m)	Barr θ1	Barr θ2	Barrier Height (m)	Barrier Receiver Distance (m)	Elevation Change (e) (m)	Source Ground Elevation (m)	Receiver Ground Elevation (m)	Base of Barrier Elevation (m)	Leq(Day) or Leq(1hr) (dBA)	Leq (Night) (dBA)
A16a	OR174_Jean-Champ_EB	-90	90	3	-	-	-	1	1.5	102	-	-	-	-	4.5	62	66.5	-	58.69		-90	90	3	-	-	-	1	1.5	102	-	-	-	-	4.5	62	66.5	-	57.66	
	OR174_Jean-Champ_WB	-90	90	3	-	-	-	1	1.5	80	-	-	-	-	4.5	62	66.5	-	59.98		-90	90	3	-	-	-	1	1.5	80	-	-	-	-	4.5	62	66.5	-	59.3	
	FU_LRT_EB									97								-			-90	90	3	-	-	-	1	1.5	97	-	-	-	-	4.5	62	66.5	-	40.76	
	FU_LRT_WB									88								-			-90	90	3	-	-	-	1	1.5	88	-	-	-	-	4.5	62	66.5	-	41.42	
	Total																		62.39																		61.64	
	Impact																																				-0.75	
A16b	OR174_Jean-Champ_EB	-90	90	1	-	-	-	1	1.5	83	-	-	-	-	-	-	-	-	59.07		-90	90	1	-	-	-	1	1.5	83	-	-	-	-	-	-	-	-	58.04	
	OR174_Jean-Champ_WB	-90	90	1	-	-	-	1	1.5	59	-	-	-	-	-	-	-	-	61.18		-90	90	1	-	-	-	1	1.5	59	-	-	-	-	-	-	-	-	60.5	
	FU_LRT_EB									73								-			-90	90	1	-	-	-	1	1.5	73	-	-	-	-	-	-	-	-	41.87	
	FU_LRT_WB									69								-			-90	90	1	-	-	-	1	1.5	69	-	-	-	-	-	-	-	-	42.28	
	Total																		63.26																		62.53	
	Impact																																				-0.73	
A16c	OR174_Jean-Champ_EB	-90	90	1	-	-	-	1	1.5	138	-	-	-	-	-	-	-	-	55.41		-90	90	1	-	-	-	1	1.5	138	-	-	-	-	-	-	-	-	54.38	
	OR174_Jean-Champ_WB	-90	90	1	-	-	-	1	1.5	113	-	-	-	-	-	-	-	-	56.5		-90	90	1	-	-	-	1	1.5	113	-	-	-	-	-	-	-	-	55.82	
	FU_LRT_EB									128								-			-90	90	1	-	-	-	1	1.5	128	-	-	-	-	-	-	-	-	37.82	
	FU_LRT_WB									124								-			-90	90	1	-	-	-	1	1.5	124	-	-	-	-	-	-	-	-	38.05	
	Total																		59.00																		58.25	
	Impact																																				-0.75	

PROJECT NAME: Confederation Line East LRT Extension EA Study

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PROJECT NUMBER: 60323982

ENGINEER: JAU

BASE DRAWING:

DATE: September 9, 2015

Initial Analysis

		No Project																		With Project																	
RECEIVER	SOURCE	θ1	θ2	TOPO	WOODS	No. Rows	@ Density	Ground Surface Type	Receiver Height (r) (m)	Source Receiver Dist (m)	Barr θ1	Barr θ2	Barrier Height (m)	Barrier Receiver Distance (m)	Elevation Change (e) (m)	Source Ground Elevation (m)	Receiver Ground Elevation (m)	Base of Barrier Elevation (m)	Leq(Day) or Leq(1hr) (dBA)	Leq (Night) (dBA)	θ1	θ2	TOPO	WOODS	No. Rows	@ Density	Ground Surface Type	Receiver Height (r) (m)	Source Receiver Dist (m)	Barr θ1	Barr θ2	Barrier Height (m)	Barrier Receiver Distance (m)	Elevation Change (e) (m)	Source Ground Elevation (m)	Receiver Ground Elevation (m)	Base of Barrier Elevation (m)	Leq(Day) or Leq(1hr) (dBA)	Leq (Night) (dBA)
A16d	OR174_Jean-Champ_EB	-90	90	1	-	-	-	1	1.5	110	-	-	-	-	-	-	-	-	57.04		-90	90	1	-	-	-	1	1.5	110	-	-	-	-	-	-	-	-	56.01	
	OR174_Jean-Champ_WB	-90	90	1	-	-	-	1	1.5	86	-	-	-	-	-	-	-	-	58.46		-90	90	1	-	-	-	1	1.5	86	-	-	-	-	-	-	-	-	57.79	
	FU_LRT_EB									101								-			-90	90	1	-	-	-	1	1.5	101	-	-	-	-	-	-	-	-	39.53	
	FU_LRT_WB									96								-			-90	90	1	-	-	-	1	1.5	96	-	-	-	-	-	-	-	-	39.89	
	Total																		60.82																		60.08	
	Impact																																				-0.74	
A18a	OR174_Champ-10th_EB	-90	90	4	-	-	-	1	1.5	77	-90	90	1	20	1	61	62	62	59.22		-90	90	2	-	-	-	1	1.5	77	-90	90	1	20	1	61	62	62	57.96	
1m berm from dwg	OR174_Champ-10th_WB	-90	90	4	-	-	-	1	1.5	54	-90	90	1	20	1	61	62	62	57.1		-90	90	2	-	-	-	1	1.5	54	-90	90	1	20	1	61	62	62	55.91	
	FU_LRT_EB									72								-			-90	90	2	-	-	-	1	1.5	72	-90	90	1	20	1	61	62	62	37.38	
	FU_LRT_WB									59								-			-90	90	2	-	-	-	1	1.5	59	-90	90	1	20	1	61	62	62	38.64	
	Total																		61.30																		60.12	
	Impact																																				-1.18	
A19a	OR174_Champ-10th_EB	-90	90	3	-	-	-	1	1.5	96	-	-	-	-	9	62	71	-	60.01		-90	90	3	-	-	-	1	1.5	96	-	-	-	-	9	62	71	-	58.75	
	OR174_Champ-10th_WB	-90	90	3	-	-	-	1	1.5	118	-	-	-	-	9	62	71	-	58.67		-90	90	3	-	-	-	1	1.5	118	-	-	-	-	9	62	71	-	57.48	
	FU_LRT_EB			3						100					9	62	71	-			-90	90	3	-	-	-	1	1.5	100	-	-	-	-	9	62	71	-	41.92	
	FU_LRT_WB			3						113					9	62	71	-			-90	90	3	-	-	-	1	1.5	113	-	-	-	-	9	62	71	-	41.16	
	Total																		62.40															not reviewed as per City of Ottawa Administrative Feasibility					61.27	
	Impact																																				-1.14	
A21a	OR174_10th-trim_EB	-90	90	1	-	-	-	1	1.5	65	-	-	-	-	-	-	-	-	58.23		-90	90	1	-	-	-	1	1.5	65	-	-	-	-	-	-	-	-	58.19	
	OR174_10th-trim_WB	-90	90	1	-	-	-	1	1.5	87	-	-	-	-	-	-	-	-	56.24		-90	90	1	-	-	-	1	1.5	87	-	-	-	-	-	-	-	-	56.09	
	FU_LRT_EB			1						69								-			-90	90	1	-	-	-	1	1.5	69	-	-	-	-	-	-	-	-	42.28	
	FU_LRT_WB			1						82								-			-90	90	1	-	-	-	1	1.5	82	-	-	-	-	-	-	-	-	41.03	
	Total													20					60.36																		60.39	
	Impact																																				0.04	

PROJECT NAME: Confederation Line East LRT Extension EA Study

PROJECT NUMBER: 60323982

ENGINEER: JAU

BASE DRAWING:

DATE: September 9, 2015

Initial Analysis

No Project

RECEIVER	SOURCE	θ1	θ2	TOPO	WOODS	No. Rows	@ Density	Ground Surface Type	Receiver Height (r) (m)	Source Receiver Dist (m)	Barr θ1	Barr θ2	Barrier Height (m)	Barrier Receiver Distance (m)	Elevation Change (e) (m)	Source Ground Elevation (m)	Receiver Ground Elevation (m)	Base of Barrier Elevation (m)	Leq(Day) or Leq(1hr) (dBA)	Leq (Night) (dBA)
A18b	OR174_Champ-10th_EB	-90	90	4	-	-	-	1	1.5	90	-90	90	1	20	1	60	61	61	58.1	
1m berm from dwg	OR174_Champ-10th_WB	-90	90	4	-	-	-	1	1.5	64	-90	90	1	20	1	60	61	61	55.96	
	10thN	-30	30	3	-	-	-	1	1.5	295	-	-	-	-	6	67	61	-	41.44	
	10thS	30	90	3	-	-	-	1	1.5	295	-	-	-	-	6	67	61	-	38.26	
	FU_LRT_EB									82								-		
	FU_LRT_WB									69								-		
	Total																		60.26	
	Impact																			

With Project

RECEIVER	SOURCE	θ1	θ2	TOPO	WOODS	No. Rows	@ Density	Ground Surface Type	Receiver Height (r) (m)	Source Receiver Dist (m)	Barr θ1	Barr θ2	Barrier Height (m)	Barrier Receiver Distance (m)	Elevation Change (e) (m)	Source Ground Elevation (m)	Receiver Ground Elevation (m)	Base of Barrier Elevation (m)	Leq(Day) or Leq(1hr) (dBA)	Leq (Night) (dBA)
A18b	OR174_Champ-10th_EB	-90	90	2	-	-	-	1	1.5	90	-90	90	1	20	1	60	61	61	56.84	
1m berm from dwg	OR174_Champ-10th_WB	-90	90	2	-	-	-	1	1.5	64	-90	90	1	20	1	60	61	61	54.76	
	10thN	-30	30	3	-	-	-	1	1.5	295	-	-	-	-	6	67	61	-	40.85	
	10thS	30	90	3	-	-	-	1	1.5	295	-	-	-	-	6	67	61	-	39.1	
	FU_LRT_EB	-90	90	2	-	-	-	1	1.5	82	-90	90	1	20	1	60	61	61	36.49	
	FU_LRT_WB	-90	90	2	-	-	-	1	1.5	69	-90	90	1	20	1	60	61	61	37.67	
	Total																		59.10	
	Impact																		-1.16	

Mitigation Analysis

PROJECT NAME: Confederation Line East LRT Extension EA Study

PROJECT NUMBER: 60323982

BASE DRAWING:

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DATE: September 9, 2015

		Unmitigated																		Mitigated																	
RECEIVER	SOURCE	θ1	θ2	TOPO	WOODS	No. Rows	@ Density	Ground Surface Type	Receiver Height (r) (m)	Source Receiver Dist (m)	Barr θ1	Barr θ2	Barrier Height (m)	Barrier Receiver Distance (m)	Elevation Change (e) (m)	Source Ground Elevation (m)	Receiver Ground Elevation (m)	Base of Barrier Elevation (m)	Leq(Day) or Leq(1hr) (dBA)	Leq (Night) (dBA)	θ1	θ2	TOPO	WOODS	No. Rows	@ Density	Ground Surface Type	Receiver Height (r) (m)	Source Receiver Dist (m)	Barr θ1	Barr θ2	Barrier Height (m)	Barrier Receiver Distance (m)	Elevation Change (e) (m)	Source Ground Elevation (m)	Receiver Ground Elevation (m)	Base of Barrier Elevation (m)	Leq(Day) or Leq(1hr) (dBA)	Leq (Night) (dBA)
A02	OR174_Blair_montreal_EB	-90	90	1	-	-	-	1	1.5	100	-	-	-	-	-	-	-	-	57.67		-90	90	2	-	-	-	1	1.5	100	-90	90	4	60	-	-	-	-	51.2	
	OR174_Blair_montreal_WB	-90	90	1	-	-	-	1	1.5	83	-	-	-	-	-	-	-	-	59.01		-90	90	2	-	-	-	1	1.5	83	-90	90	4	60	-	-	-	-	52.06	
	FU_LRT_EB	-90	90	1	-	-	-	1	1.5	67	-	-	-	-	-	-	-	-	42.49		-90	90	2	-	-	-	1	1.5	67	-90	90	4	60	-	-	-	-	30.55	
	FU_LRT_WB	-90	90	1	-	-	-	1	1.5	62	-	-	-	-	-	-	-	-	43.05		-90	90	2	-	-	-	1	1.5	62	-90	90	4	60	-	-	-	-	28.4	
	Total																		61.52														Not feasible, estimated cost of 1,440,000 for single household					54.69	
	Change																																						-6.83	
A03	OR174_Blair_montreal_EB1	-90	90	2	-	-	-	2	1.5	65	-90	30	5	10.5	-	-	-	-	62.06		-90	30	2	-	-	-	2	1.5	65	-90	30	5	10.5	-	-	-	-	51.46	
	OR174_Blair_montreal_WB1	-90	90	2	-	-	-	1	1.5	46	-90	30	5	10.5	-	-	-	-	58.33		-90	30	2	-	-	-	1	1.5	46	-90	30	5	10.5	-	-	-	-	49.99	
	OR174_Blair_montreal_EB2																				30	90	2	-	-	-	2	1.5	65	-90	30	3.5	10.5	-	-	-	-	52.95	
	OR174_Blair_montreal_WB2																				30	90	2	-	-	-	1	1.5	46	-90	30	3.5	10.5	-	-	-	-	50.07	
	FU_LRT_EB1	-90	90	2	-	-	-	1	1.5	29.5	-90	30	5	10.5	-	-	-	-	43.26		-90	30	2	-	-	-	1	1.5	29.5	-90	30	5	10.5	-	-	-	-	33.44	
	FU_LRT_WB1	-90	90	2	-	-	-	1	1.5	25	-90	30	5	10.5	-	-	-	-	44.38		-90	30	2	-	-	-	1	1.5	25	-90	30	5	10.5	-	-	-	-	33.95	
	FU_LRT_EB2																				30	90	2	-	-	-	1	1.5	29.5	-90	30	3.5	10.5	-	-	-	-	33.71	
	FU_LRT_WB2																				30	90	2	-	-	-	1	1.5	25	-90	30	3.5	10.5	-	-	-	-	34.32	
	Total																		63.69																		57.39	
	Impact																																						-6.29	

Mitigation Analysis

PROJECT NAME: Confederation Line East LRT Extension EA Study

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PROJECT NUMBER: 60323982

ENGINEER: JAU

BASE DRAWING:

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		Unmitigated																		Mitigated																	
RECEIVER	SOURCE	θ1	θ2	TOPO	WOODS	No. Rows	@ Density	Ground Surface Type	Receiver Height (r) (m)	Source Receiver Dist (m)	Barr θ1	Barr θ2	Barrier Height (m)	Barrier Receiver Distance (m)	Elevation Change (e) (m)	Source Ground Elevation (m)	Receiver Ground Elevation (m)	Base of Barrier Elevation (m)	Leq(Day) or Leq(1hr) (dBA)	Leq (Night) (dBA)	θ1	θ2	TOPO	WOODS	No. Rows	@ Density	Ground Surface Type	Receiver Height (r) (m)	Source Receiver Dist (m)	Barr θ1	Barr θ2	Barrier Height (m)	Barrier Receiver Distance (m)	Elevation Change (e) (m)	Source Ground Elevation (m)	Receiver Ground Elevation (m)	Base of Barrier Elevation (m)	Leq(Day) or Leq(1hr) (dBA)	Leq (Night) (dBA)
A03b	OR174_Blair_montreal_EB	-90	90	2	-	-	-	2	1.5	65	-90	60	5	10.5	-	-	-	-	59.53		-90	90	2	-	-	-	2	1.5	65	-90	90	5	10.5	-	-	-	-	53.86	
	OR174_Blair_montreal_WB	-90	90	2	-	-	-	1	1.5	46	-90	60	5	10.5	-	-	-	-	54.91		-90	90	2	-	-	-	1	1.5	46	-90	90	5	10.5	-	-	-	-	52.17	
	FU_LRT_EB	-90	90	2	-	-	-	1	1.5	29.5	-90	60	5	10.5	-	-	-	-	39.46		-90	90	2	-	-	-	1	1.5	29.5	-90	90	5	10.5	-	-	-	-	35.62	
	FU_LRT_WB	-90	90	2	-	-	-	1	1.5	25	-90	60	5	10.5	-	-	-	-	40.46		-90	90	2	-	-	-	1	1.5	25	-90	90	5	10.5	-	-	-	-	36.14	
	Total																		60.89																		56.19	
	Impact																																	does not meet minimum reduction requirement				-4.70	
A07	OR174_montreal_Jean_EB	-90	90	3	-	-	-	1	1.5	251	-	-	-	-	20	55	75	-	59.44		-90	90	4	-	-	-	1	1.5	151	-90	90	5	230	20	55	75	55	51.48	
160 residents nursing home	OR174_montreal_Jean_WB	-90	90	3	-	-	-	1	1.5	276	-	-	-	-	20	55	75	-	58.99		-90	90	4	-	-	-	1	1.5	276	-90	90	5	230	20	55	75	55	54.99	
	FU_LRT_EB	-90	90	3	-	-	-	1	1.5	261	-	-	-	-	20	55	75	-	40.82		-90	90	4	-	-	-	1	1.5	261	-90	90	5	230	20	55	75	55	35.03	
	FU_LRT_WB	-90	90	3	-	-	-	1	1.5	266	-	-	-	-	20	55	75	-	40.73		-90	90	4	-	-	-	1	1.5	266	-90	90	5	230	20	55	75	55	35.65	
	Total																		62.29																		56.66	
	Change																																Not Feasible, does not meet 6 dB reduction at limit of constructability of 5m.				-5.64	
A11	OR174_montreal_Jean_EB	60	90	2	-	-	-	2	1.5	77	60	90	2	13	-	-	-	-	52.82		60	90	2	-	-	-	2	1.5	77	60	90	5.5	13	-	-	-	-	48.55	
2m berm	OR174_montreal_Jean_WB	60	90	2	-	-	-	1	1.5	50	60	90	2	13	-	-	-	-	48.06		60	90	2	-	-	-	1	1.5	50	60	90	5.5	13	-	-	-	-	45.65	
	OR174_Jean-Champ_EB	-90	60	2	-	-	-	2	1.5	77	-90	60	2	13	-	-	-	-	58.27		-90	60	2	-	-	-	2	1.5	77	-90	60	5.5	13	-	-	-	-	50.68	
	OR174_Jean-Champ_WB	-90	60	2	-	-	-	1	1.5	50	-90	60	2	13	-	-	-	-	56		-90	60	2	-	-	-	1	1.5	50	-90	60	5.5	13	-	-	-	-	49.41	
	Jean_N174	-30	30	3	-	-	-	1	1.5	270	-	-	-	-	5	60	55	-	34.73		-30	30	3	-	-	-	1	1.5	270	-	-	-	-	5	60	55	-	34.73	
	Jean_S174	-45	-30	3	-	-	-	1	1.5	270	-	-	-	-	5	60	55	-	32.98		-45	-30	3	-	-	-	1	1.5	270	-	-	-	-	5	60	55	-	32.98	
	FU_LRT_EB	-90	90	2	-	-	-	2	1.5	65	-90	90	2	13	-	-	-	-	42.53		-90	90	2	-	-	-	2	1.5	65	-90	90	5.5	13	-	-	-	-	35.67	
	FU_LRT_WB	-90	90	2	-	-	-	2	1.5	60	-90	90	2	13	-	-	-	-	42.81		-90	90	2	-	-	-	2	1.5	60	-90	90	5.5	13	-	-	-	-	35.91	
	Total																		61.36																		55.12	
	Change																																	additional 3.5 metre height on top of berm				-6.24	

Mitigation Analysis

PROJECT NAME: Confederation Line East LRT Extension EA Study

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PROJECT NUMBER: 60323982

ENGINEER: JAU

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		Unmitigated																		Mitigated																	
RECEIVER	SOURCE	θ1	θ2	TOPO	WOODS	No. Rows	@ Density	Ground Surface Type	Receiver Height (r) (m)	Source Receiver Dist (m)	Barr θ1	Barr θ2	Barrier Height (m)	Barrier Receiver Distance (m)	Elevation Change (e) (m)	Source Ground Elevation (m)	Receiver Ground Elevation (m)	Base of Barrier Elevation (m)	Leq(Day) or Leq(1hr) (dBA)	Leq (Night) (dBA)	θ1	θ2	TOPO	WOODS	No. Rows	@ Density	Ground Surface Type	Receiver Height (r) (m)	Source Receiver Dist (m)	Barr θ1	Barr θ2	Barrier Height (m)	Barrier Receiver Distance (m)	Elevation Change (e) (m)	Source Ground Elevation (m)	Receiver Ground Elevation (m)	Base of Barrier Elevation (m)	Leq(Day) or Leq(1hr) (dBA)	Leq (Night) (dBA)
A11a	OR174_montreal_Jean_EB	60	90	1	-	-	-	1	1.5	108	-	-	-	-	-	-	-	-	46.83		60	90	2	-	-	-	1	1.5	108	60	60	4	36	-	-	-	-	43.21	
	OR174_montreal_Jean_WB	60	90	1	-	-	-	1	1.5	78	-	-	-	-	-	-	-	-	49.17		60	90	2	-	-	-	1	1.5	78	60	90	4	36	-	-	-	-	44.83	
	OR174_Jean-Champ_EB	-90	60	2	-	-	-	1	1.5	108	-90	-60	2	36	-	-	-	-	55.47		-90	60	2	-	-	-	1	1.5	108	-90	60	4	36	-	-	-	-	49.06	
	OR174_Jean-Champ_WB	-90	60	2	-	-	-	1	1.5	78	-90	-60	2	36	-	-	-	-	57.81		-90	60	2	-	-	-	1	1.5	78	-90	60	4	36	-	-	-	-	50.34	
	Jean_N174	-45	30	3	-	-	-	1	1.5	186	-	-	-	-	5	60	55	-	38.1		-45	30	3	-	-	-	1	1.5	186	-	-	-	-	5	60	55	-	38.1	
	Jean_S174	-60	-45	3	-	-	-	1	1.5	186	-	-	-	-	5	60	55	-	34.85		-60	-45	3	-	-	-	1	1.5	186	-	-	-	-	5	60	55	-	34.85	
	FU_LRT_EB	-90	90	2	-	-	-	1	1.5	95	-90	-60	2	36	-	-	-	-	39.72		-90	90	2	-	-	-	1	1.5	95	-90	60	4	36	-	-	-	-	33.99	
	FU_LRT_WB	-90	90	2	-	-	-	1	1.5	91	-90	-60	2	36	-	-	-	-	40.03		-90	90	2	-	-	-	1	1.5	91	-90	60	4	36	-	-	-	-	34.2	
	Total																		60.48																		54.06	
	Change																																					-6.42	
A12	OR174_Jean-Champ_EB	-90	90	2	-	-	-	2	1.5	71	-90	90	1.5	10	-	-	-	-	60.05		-90	90	2	-	-	-	2	1.5	71	-90	90	4.5	10	-	-	-	-	53.38	
1.5 m berm on dwgs	OR174_Jean-Champ_WB	-90	90	2	-	-	-	1	1.5	45	-90	90	1.5	10	-	-	-	-	57.8		-90	90	2	-	-	-	1	1.5	45	-90	90	4.5	10	-	-	-	-	51.92	
	OrleansN-174	-30	30	3	-	-	-	1	1.5	87	-	-	-	-	5	55	50	-	40.64		-30	30	3	-	-	-	1	1.5	87	-	-	-	-	5	55	50	-	40.64	
	OrleansS-174	30	60	3		-	-	1	1.5	87	-	-	-	-	5	55	50	-	38.88		30	60	3		-	-	1	1.5	87	-	-	-	-	5	55	50	-	38.88	
	FU_LRT_EB	-90	90	2	-	-	-	1	1.5	65	-90	90	1.5	10	-	-	-	-	38.04		-90	90	2	-	-	-	1	1.5	65	-90	90	4.5	10	-	-	-	-	32.68	
	FU_LRT_WB	-90	90	2	-	-	-	1	1.5	52	-90	90	1.5	10	-	-	-	-	39.55		-90	90	2	-	-	-	1	1.5	52	-90	90	4.5	10	-	-	-	-	33.82	
	Total																		62.17																		55.99	
	Change																																					-6.18	

Mitigation Analysis

PROJECT NAME: Confederation Line East LRT Extension EA Study

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ENGINEER: JAU

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		Unmitigated																		Mitigated																	
RECEIVER	SOURCE	θ1	θ2	TOPO	WOODS	No. Rows	@ Density	Ground Surface Type	Receiver Height (r) (m)	Source Receiver Dist (m)	Barr θ1	Barr θ2	Barrier Height (m)	Barrier Receiver Distance (m)	Elevation Change (e) (m)	Source Ground Elevation (m)	Receiver Ground Elevation (m)	Base of Barrier Elevation (m)	Leq(Day) or Leq(1hr) (dBA)	Leq (Night) (dBA)	θ1	θ2	TOPO	WOODS	No. Rows	@ Density	Ground Surface Type	Receiver Height (r) (m)	Source Receiver Dist (m)	Barr θ1	Barr θ2	Barrier Height (m)	Barrier Receiver Distance (m)	Elevation Change (e) (m)	Source Ground Elevation (m)	Receiver Ground Elevation (m)	Base of Barrier Elevation (m)	Leq(Day) or Leq(1hr) (dBA)	Leq (Night) (dBA)
A12a	OR174_Jean-Champ_EB	-90	90	1	-	-	-	1	1.5	74	-90	90	1.25	15	-	-	-	-	58.87		-90	90	2	-	-	-	1	1.5	74	-90	90	4.25	15	-	-	-	-	50.5	
1.25 m berm on dwgs	OR174_Jean-Champ_WB	-90	90	1	-	-	-	1	1.5	49	-90	90	1.25	15	-	-	-	-	57.18		-90	90	2	-	-	-	1	1.5	49	-90	90	4.25	15	-	-	-	-	52.5	
	OrleansN-174	-30	30	3	-	-	-	1	1.5	90	-	-	-	-	5	55	50	-	40.41		-30	30	3	-	-	-	1	1.5	90	-	-	-	-	5	55	50	-	40.41	
	OrleansS-174	30	60	3		-	-	1	1.5	90	-	-	-	-	5	55	50	-	38.66		30	60	3		-	-	1	1.5	90	-	-	-	-	5	55	50	-	38.66	
	FU_LRT_EB	-90	90	1	-	-	-	1	1.5	68	-90	90	1.25	15	-	-	-	-	37.68		-90	90	2	-	-	-	1	1.5	68	-90	90	4.25	15	-	-	-	-	33.52	
	FU_LRT_WB	-90	90	1	-	-	-	1	1.5	56	-90	90	1.25	15	-	-	-	-	39.03		-90	90	2	-	-	-	1	1.5	56	-90	90	4.25	15	-	-	-	-	34.44	
	Total																		61.22																		54.96	
	Change																																			3 m barrier on top of berm		-6.26	
A15	OR174_Jean-Champ_EB	-90	90	1	-	-	-	1	1.5	73	-45	90	2	17	-	-	-	-	55.42		-90	90	2	-	-	-	1	1.5	73	-90	90	5	17	-	-	-	-	49.87	
Berm 2 m	OR174_Jean-Champ_WB	-90	90	1	-	-	-	1	1.5	47	-45	90	2	17	-	-	-	-	58.28		-90	90	2	-	-	-	1	1.5	47	-90	90	5	17	-	-	-	-	51.77	
	FU_LRT_EB	-90	90	1	-	-	-	1	1.5	62	-45	90	2	17	-	-	-	-	39.19		-90	90	2	-	-	-	1	1.5	62	-90	90	5	17	-	-	-	-	33.2	
	FU_LRT_WB	-90	90	1	-	-	-	1	1.5	58	-45	90	2	17	-	-	-	-	39.61		-90	90	2	-	-	-	1	1.5	58	-90	90	5	17	-	-	-	-	33.49	
	Total																		60.17																		54.01	
	Change																																			3 m on top of berm plus return		-6.16	
A14	OR174_Jean-Champ_EB	-90	90	1	-	-	-	1	1.5	56	-	-	-	-	-	-	-	-	60.88		-90	90	2	-	-	-	1	1.5	56	-90	90	2.5	7	-	-	-	-	54.4	
	OR174_Jean-Champ_WB	-90	90	1	-	-	-	1	1.5	82	-	-	-	-	-	-	-	-	58.13		-90	90	2	-	-	-	1	1.5	82	-90	90	2.5	7	-	-	-	-	52.04	
	FU_LRT_EB	-90	90	1	-	-	-	1	1.5	67	-	-	-	-	-	-	-	-	42.49		-90	90	2	-	-	-	1	1.5	67	-90	90	2.5	7	-	-	-	-	35.93	
	FU_LRT_WB	-90	90	1	-	-	-	1	1.5	72	-	-	-	-	-	-	-	-	41.97		-90	90	2	-	-	-	1	1.5	72	-90	90	2.5	7	-	-	-	-	35.49	
	Total																		62.81																		56.46	
	Change																																				-6.34	

Mitigation Analysis

PROJECT NAME: Confederation Line East LRT Extension EA Study

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PROJECT NUMBER: 60323982

ENGINEER: JAU

BASE DRAWING:

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		Unmitigated																		Mitigated																	
RECEIVER	SOURCE	θ1	θ2	TOPO	WOODS	No. Rows	@ Density	Ground Surface Type	Receiver Height (r) (m)	Source Receiver Dist (m)	Barr θ1	Barr θ2	Barrier Height (m)	Barrier Receiver Distance (m)	Elevation Change (e) (m)	Source Ground Elevation (m)	Receiver Ground Elevation (m)	Base of Barrier Elevation (m)	Leq(Day) or Leq(1hr) (dBA)	Leq (Night) (dBA)	θ1	θ2	TOPO	WOODS	No. Rows	@ Density	Ground Surface Type	Receiver Height (r) (m)	Source Receiver Dist (m)	Barr θ1	Barr θ2	Barrier Height (m)	Barrier Receiver Distance (m)	Elevation Change (e) (m)	Source Ground Elevation (m)	Receiver Ground Elevation (m)	Base of Barrier Elevation (m)	Leq(Day) or Leq(1hr) (dBA)	Leq (Night) (dBA)
A14a	OR174_Jean-Champ_EB	-90	90	2	-	-	-	1	1.5	48	-45	45	1	10	-	-	-	-	61.99		-90	90	2	-	-	-	1	1.5	48	-90	90	2.5	10	-	-	-	-	55.66	
1m berm	OR174_Jean-Champ_WB	-90	90	2	-	-	-	1	1.5	73	-45	45	1	10	-	-	-	-	58.97		-90	90	2	-	-	-	1	1.5	73	-90	90	2.5	10	-	-	-	-	53.16	
	FU_LRT_EB	-90	90	2	-	-	-	1	1.5	58	-45	45	1	10	-	-	-	-	43.53		-90	90	2	-	-	-	1	1.5	58	-90	90	2.5	10	-	-	-	-	37.12	
	FU_LRT_WB	-90	90	2	-	-	-	1	1.5	63	-45	45	1	10	-	-	-	-	42.93		-90	90	2	-	-	-	1	1.5	63	-90	90	2.5	10	-	-	-	-	36.64	
	Total																		63.82																		57.67	
	Change																																				-6.15	
A16	OR174_Jean-Champ_EB	-90	90	3	-	-	-	1	1.5	87	-	-	-	-	2	62.5	64.5	-	58.03		-90	90	4	-	-	-	1	1.5	87	-90	90	4.75	43	2	62.5	64.5	62	53.21	
	OR174_Jean-Champ_WB	-90	90	3	-	-	-	1	1.5	63	-	-	-	-	2	62.5	64.5	-	60.31		-90	90	4	-	-	-	1	1.5	63	-90	90	4.75	43	2	62.5	64.5	62	53.07	
	FU_LRT_EB	-90	90	3	-	-	-	1	1.5	79	-	-	-	-	2	62.5	64.5	-	41.49		-90	90	4	-	-	-	1	1.5	79	-90	90	4.75	43	2	62.5	64.5	62	35.64	
	FU_LRT_WB	-90	90	3	-	-	-	1	1.5	74	-	-	-	-	2	62.5	64.5	-	41.95		-90	90	4	-	-	-	1	1.5	74	-90	90	4.75	43	2	62.5	64.5	62	35.62	
	Total																		62.40																		56.23	
	Change																																				-6.18	
A16a	OR174_Jean-Champ_EB	-90	90	3	-	-	-	1	1.5	102	-	-	-	-	4.5	62	66.5	-	57.66		-90	90	4	-	-	-	1	1.5	102	-	-	5	54	4.5	62	66.5	62	54.03	
	OR174_Jean-Champ_WB	-90	90	3	-	-	-	1	1.5	80	-	-	-	-	4.5	62	66.5	-	59.3		-90	90	4	-	-	-	1	1.5	80	-	-	5	54	4.5	62	66.5	62	53.32	
	FU_LRT_EB	-90	90	3	-	-	-	1	1.5	97	-	-	-	-	4.5	62	66.5	-	40.76		-90	90	4	-	-	-	1	1.5	97	-	-	5	54	4.5	62	66.5	62	36.32	
	FU_LRT_WB	-90	90	3	-	-	-	1	1.5	88	-	-	-	-	4.5	62	66.5	-	41.42		-90	90	4	-	-	-	1	1.5	88	-	-	5	54	4.5	62	66.5	62	36.03	
	Total																		61.64																		56.78	
	Change																																			not feasible for receptors on plateau		-4.87	
A16b	OR174_Jean-Champ_EB	-90	90	1	-	-	-	1	1.5	83	-	-	-	-	-	-	-	-	58.04		-90	90	2	-	-	-	1	1.5	83	-60	60	5	43	-	-	-	-	52.16	
	OR174_Jean-Champ_WB	-90	90	1	-	-	-	1	1.5	59	-	-	-	-	-	-	-	-	60.5		-90	90	2	-	-	-	1	1.5	59	-60	60	5	43	-	-	-	-	53.9	
	FU_LRT_EB	-90	90	1	-	-	-	1	1.5	73	-	-	-	-	-	-	-	-	41.87		-90	90	2	-	-	-	1	1.5	73	-60	60	5	43	-	-	-	-	36.57	
	FU_LRT_WB	-90	90	1	-	-	-	1	1.5	69	-	-	-	-	-	-	-	-	42.28		-90	90	2	-	-	-	1	1.5	69	-60	60	5	43	-	-	-	-	35.87	
	Total																		62.53																		56.21	
	Change																																				-6.32	

Mitigation Analysis

PROJECT NAME: Confederation Line East LRT Extension EA Study

PAGE 20 OF 21

PROJECT NUMBER: 60323982

ENGINEER: JAU

BASE DRAWING:

DATE: September 9, 2015

		Unmitigated																		Mitigated																	
RECEIVER	SOURCE	θ1	θ2	TOPO	WOODS	No. Rows	@ Density	Ground Surface Type	Receiver Height (r) (m)	Source Receiver Dist (m)	Barr θ1	Barr θ2	Barrier Height (m)	Barrier Receiver Distance (m)	Elevation Change (e) (m)	Source Ground Elevation (m)	Receiver Ground Elevation (m)	Base of Barrier Elevation (m)	Leq(Day) or Leq(1hr) (dBA)	Leq (Night) (dBA)	θ1	θ2	TOPO	WOODS	No. Rows	@ Density	Ground Surface Type	Receiver Height (r) (m)	Source Receiver Dist (m)	Barr θ1	Barr θ2	Barrier Height (m)	Barrier Receiver Distance (m)	Elevation Change (e) (m)	Source Ground Elevation (m)	Receiver Ground Elevation (m)	Base of Barrier Elevation (m)	Leq(Day) or Leq(1hr) (dBA)	Leq (Night) (dBA)
A16d	OR174_Jean-Champ_EB	-90	90	1	-	-	-	1	1.5	110	-	-	-	-	-	-	-	-	56.01		-90	90	2	-	-	-	1	1.5	110	-60	60	5	72	-	-	-	-	50.39	
	OR174_Jean-Champ_WB	-90	90	1	-	-	-	1	1.5	86	-	-	-	-	-	-	-	-	57.79		-90	90	2	-	-	-	1	1.5	86	-60	60	5	72	-	-	-	-	51.24	
	FU_LRT_EB	-90	90	1	-	-	-	1	1.5	101	-	-	-	-	-	-	-	-	39.53		-90	90	2	-	-	-	1	1.5	101	-60	60	5	72	-	-	-	-	33.41	
	FU_LRT_WB	-90	90	1	-	-	-	1	1.5	96	-	-	-	-	-	-	-	-	39.89		-90	90	2	-	-	-	1	1.5	96	-60	60	5	72	-	-	-	-	33.6	
	Total																		60.08																		53.93	
	change																																				Not feasible due to cost	-6.16	
A18	OR174_Champ-10th_EB	-90	90	2	-	-	-	1	1.5	84	-90	90	1	22	1.5	61	61.5	61.5	57.47		-90	90	2	-	-	-	1	1.5	84	-90	90	3	22	1.5	61	61.5	61.5	51.63	
1m berm from dwg	OR174_Champ-10th_WB	-90	90	2	-	-	-	1	1.5	60	-90	90	1	22	1.5	61	61.5	61.5	59.87		-90	90	2	-	-	-	1	1.5	60	-90	90	3	22	1.5	61	61.5	61.5	53.17	
	FU_LRT_EB	-90	90	2	-	-	-	1	1.5	77	-90	90	1	22	1.5	61	61.5	61.5	37.07		-90	90	2	-	-	-	1	1.5	77	-90	90	3	22	1.5	61	61.5	61.5	35.23	
	FU_LRT_WB	-90	90	2	-	-	-	1	1.5	65	-90	90	1	22	1.5	61	61.5	61.5	38.22		-90	90	2	-	-	-	1	1.5	65	-90	90	3	22	1.5	61	61.5	61.5	35.96	
	Total																		61.88																		55.57	
	Change																																					-6.31	
A18a	OR174_Champ-10th_EB	-90	90	2	-	-	-	1	1.5	77	-90	90	1	20	1	61	62	62	57.96		-90	90	2	-	-	-	1	1.5	77	-90	90	4	20	1	61	62	62	50.2	
1m berm from dwg	OR174_Champ-10th_WB	-90	90	2	-	-	-	1	1.5	54	-90	90	1	20	1	61	62	62	55.91		-90	90	2	-	-	-	1	1.5	54	-90	90	4	20	1	61	62	62	51.56	
	FU_LRT_EB	-90	90	2	-	-	-	1	1.5	72	-90	90	1	20	1	61	62	62	37.38		-90	90	2	-	-	-	1	1.5	72	-90	90	4	20	1	61	62	62	33.69	
	FU_LRT_WB	-90	90	2	-	-	-	1	1.5	59	-90	90	1	20	1	61	62	62	38.64		-90	90	2	-	-	-	1	1.5	59	-90	90	4	20	1	61	62	62	34.42	
	Total																		60.12																		54.03	
	Change																																				3 m on top of berm	-6.09	

Mitigation Analysis

PROJECT NAME: Confederation Line East LRT Extension EA Study

PAGE 21 OF 21

PROJECT NUMBER: 60323982

ENGINEER: JAU

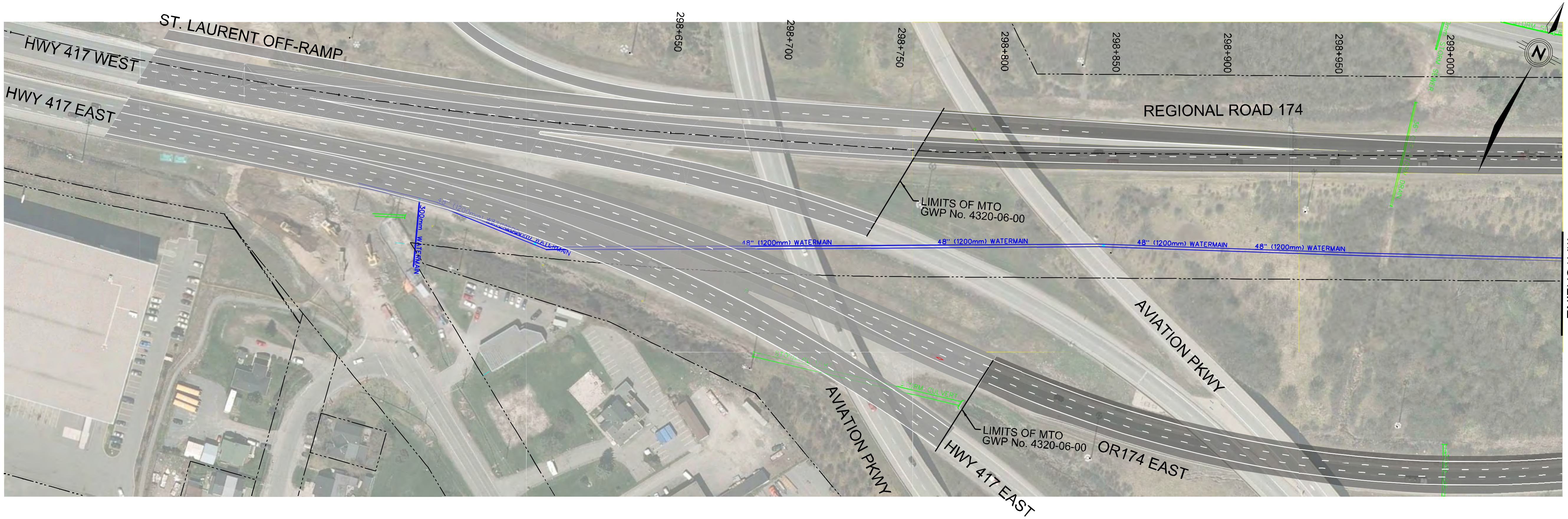
BASE DRAWING:

DATE: September 9, 2015

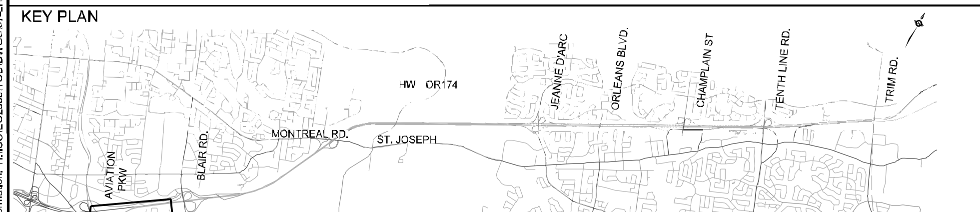
		Unmitigated																		Mitigated																	
RECEIVER	SOURCE	θ1	θ2	TOPO	WOODS	No. Rows	@ Density	Ground Surface Type	Receiver Height (r) (m)	Source Receiver Dist (m)	Barr θ1	Barr θ2	Barrier Height (m)	Barrier Receiver Distance (m)	Elevation Change (e) (m)	Source Ground Elevation (m)	Receiver Ground Elevation (m)	Base of Barrier Elevation (m)	Leq(Day) or Leq(1hr) (dBA)	Leq (Night) (dBA)	θ1	θ2	TOPO	WOODS	No. Rows	@ Density	Ground Surface Type	Receiver Height (r) (m)	Source Receiver Dist (m)	Barr θ1	Barr θ2	Barrier Height (m)	Barrier Receiver Distance (m)	Elevation Change (e) (m)	Source Ground Elevation (m)	Receiver Ground Elevation (m)	Base of Barrier Elevation (m)	Leq(Day) or Leq(1hr) (dBA)	Leq (Night) (dBA)
A21	OR174_10th-trim_EB	-90	90	1	-	-	-	1	1.5	68	-	-	-	-	-	-	-	-	57.86		-90	90	2	-	-	-	1	1.5	68	-90	90	3	22	-	-	-	-	51.64	
	OR174_10th-trim_WB	-90	90	1	-	-	-	1	1.5	90	-	-	-	-	-	-	-	-	55.84		-90	90	2	-	-	-	1	1.5	90	-90	90	3	22	-	-	-	-	50.13	
	FU_LRT_EB	-90	90	1	-	-	-	1	1.5	72	-	-	-	-	-	-	-	-	41.97		-90	90	2	-	-	-	1	1.5	72	-	-	3	22	-	-	-	-	35.45	
	FU_LRT_WB	-90	90	1	-	-	-	1	1.5	85	-	-	-	-	-	-	-	-	40.77		-90	90	2	-	-	-	1	1.5	85	-	-	3	22	-	-	-	-	34.6	
	Total																		60.10																		54.07	
	Change																																					-6.03	
A21a	OR174_10th-trim_EB	-90	90	1	-	-	-	1	1.5	65	-	-	-	-	-	-	-	-	58.19		-90	90	2	-	-	-	1	1.5	65	-90	90	3	20	-	-	-	-	51.83	
	OR174_10th-trim_WB	-90	90	1	-	-	-	1	1.5	87	-	-	-	-	-	-	-	-	56.09		-90	90	2	-	-	-	1	1.5	87	-90	90	3	20	-	-	-	-	50.25	
	FU_LRT_EB	-90	90	1	-	-	-	1	1.5	69	-	-	-	-	-	-	-	-	42.28		-90	90	2	-	-	-	1	1.5	69	-90	90	3	20	-	-	-	-	35.63	
	FU_LRT_WB	-90	90	1	-	-	-	1	1.5	82	-	-	-	-	-	-	-	-	41.03		-90	90	2	-	-	-	1	1.5	82	-90	90	3	20	-	-	-	-	34.73	
	Total																		60.39																		54.23	
	Impact																																					-6.16	

Appendix F

Appendix F: Vibration Mitigation



KEY PLAN



NOTES:

PARSONS

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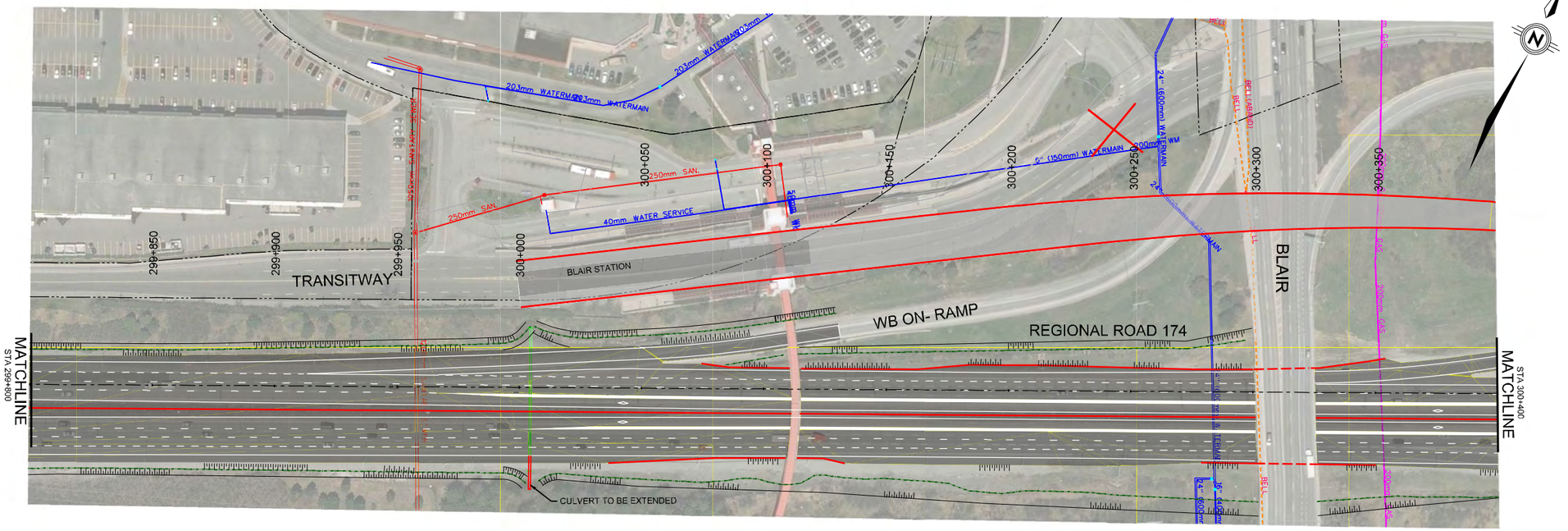
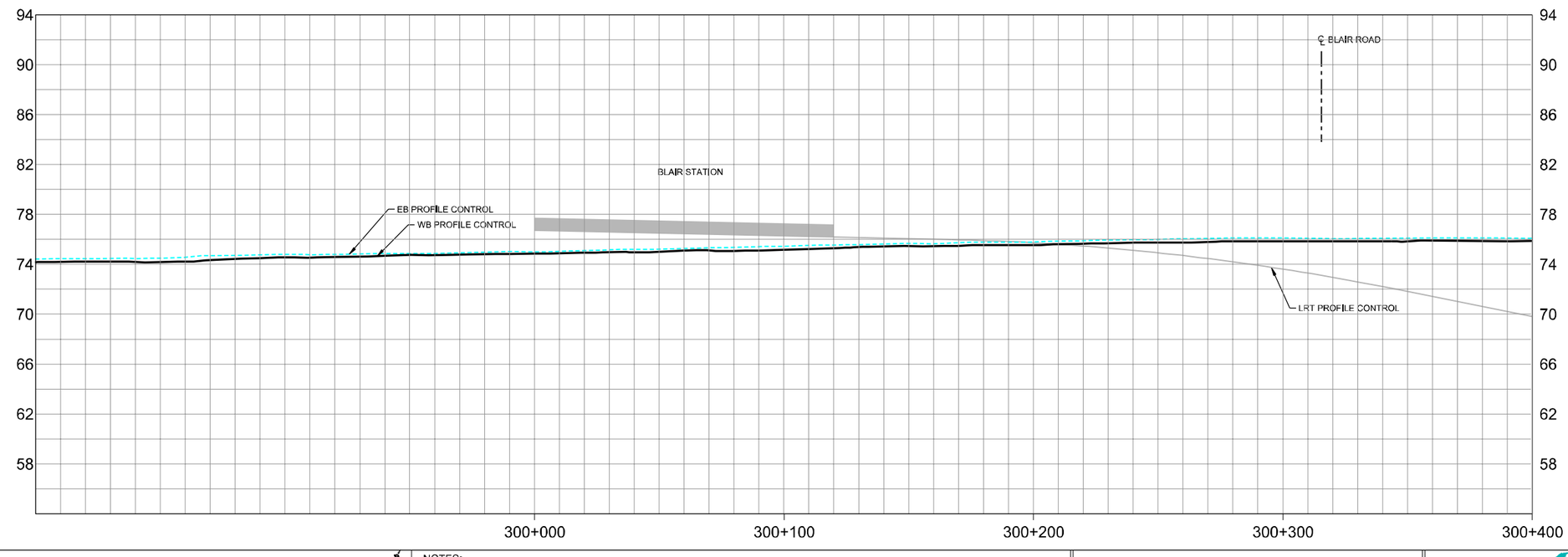
Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:
Scale: HORIZONTAL		
CAD File Name: EO2388TOD-01-PDR-01.DGN		Plot Date: XX/XX/XXXX

HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 298+450 to STA 299+800

Drawings No.:

Revision 00 | Sheet No. 01





KEY PLAN

NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 0.5 5 10 20

CAD File Name: EO2388TOD-01-PDR-02.DGN | Plot Date: XX/XX/XXXX

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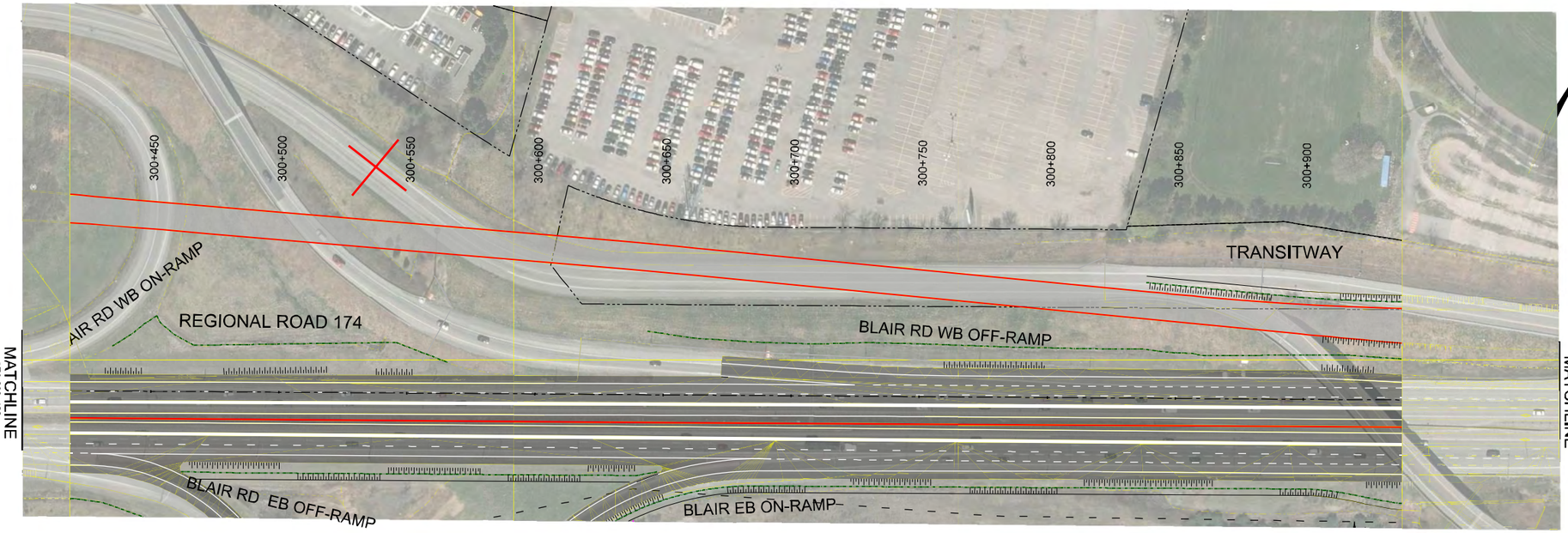
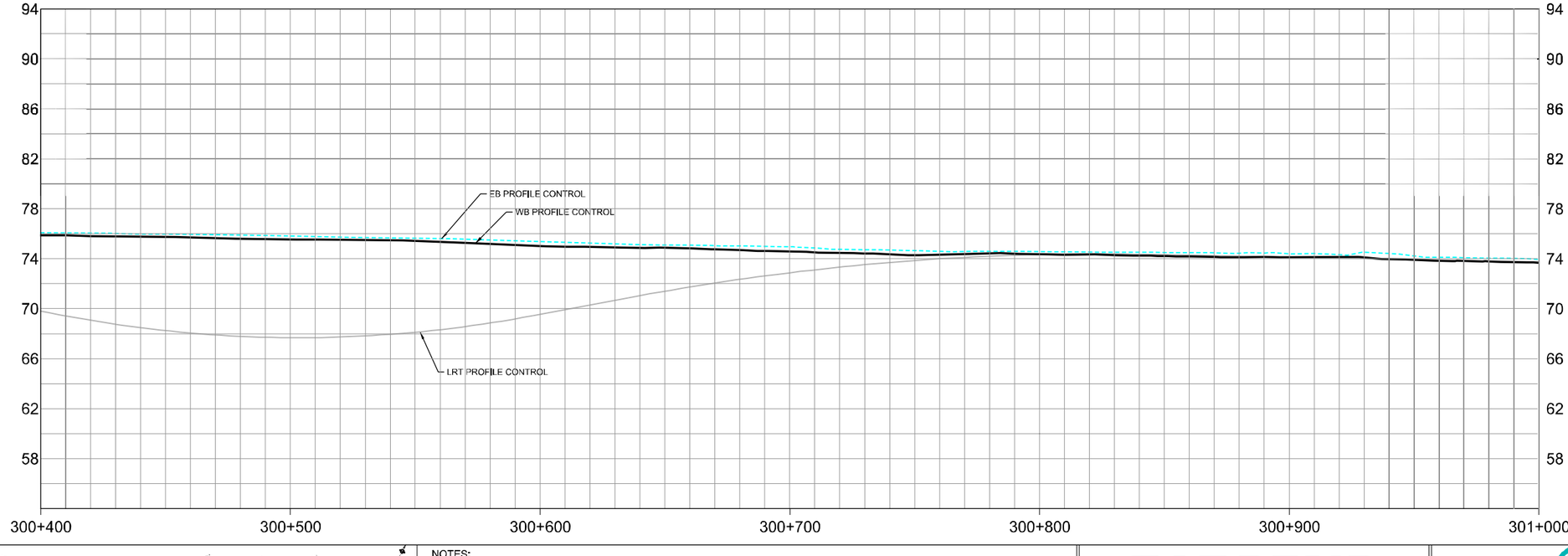
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 299+800 to STA 300+400

Drawings No.: | Revision 00 | Sheet No. 02





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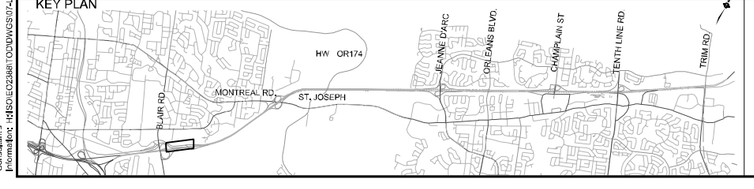

NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100 — VERTICAL 0m 0.5 5 10 20

CAD File Name: EO2388TOD-01-PDR-03.DGN

Plot Date: XX/XX/XXXX

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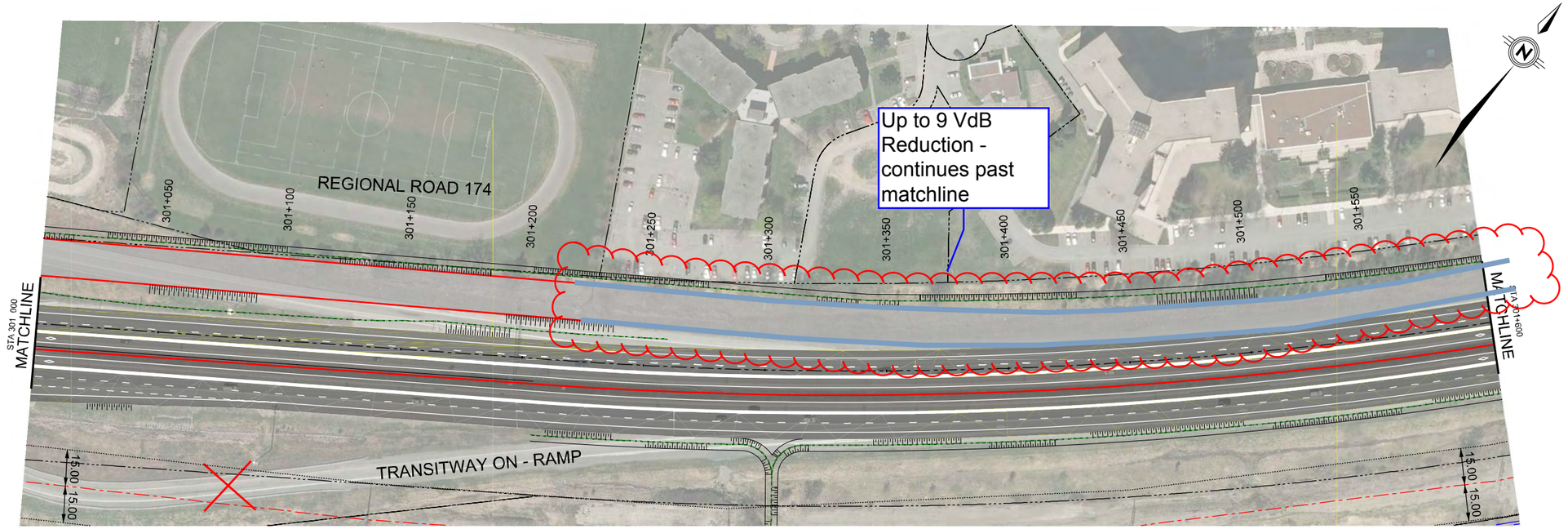
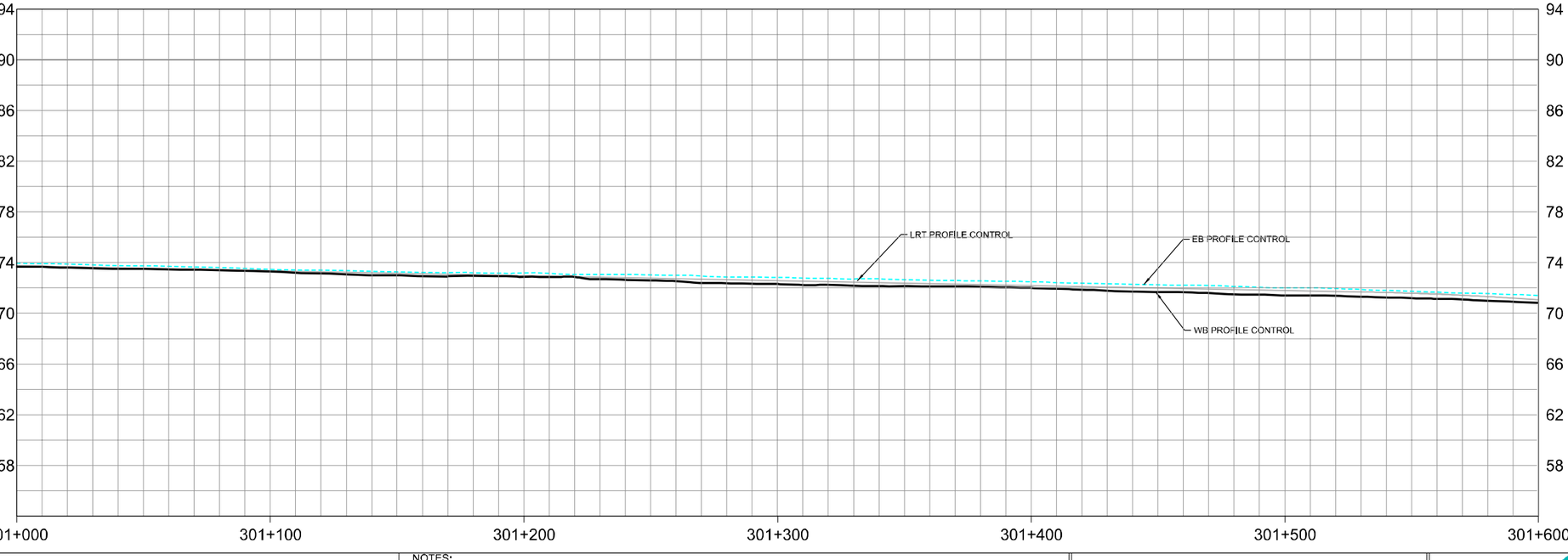
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 300+400 to STA 301+000

Drawings No.: | Revision 00 | Sheet No. 03





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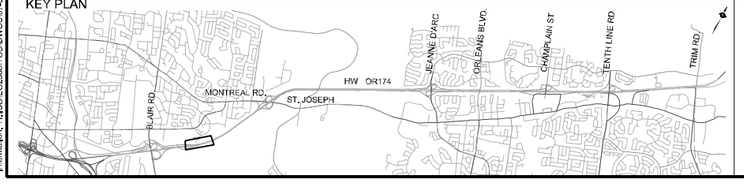

NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 0.5 5 10 20

CAD File Name: EO2388TOD-01-PDR-04.DGN | Plot Date: XX/XX/XXXX

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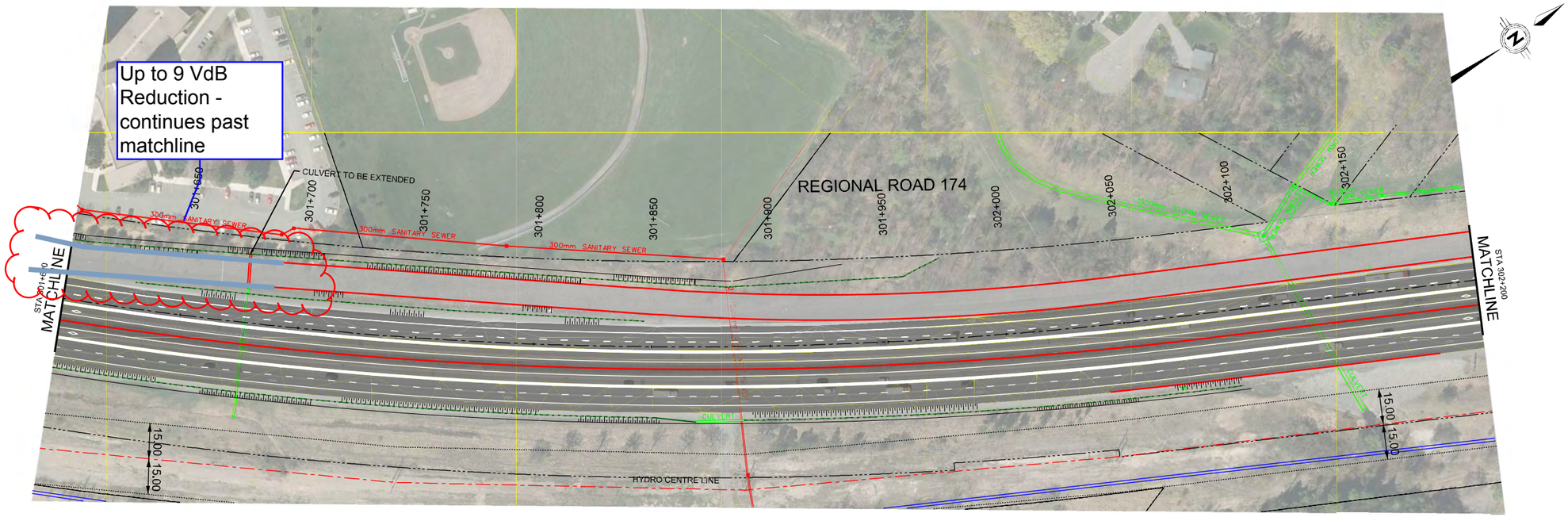
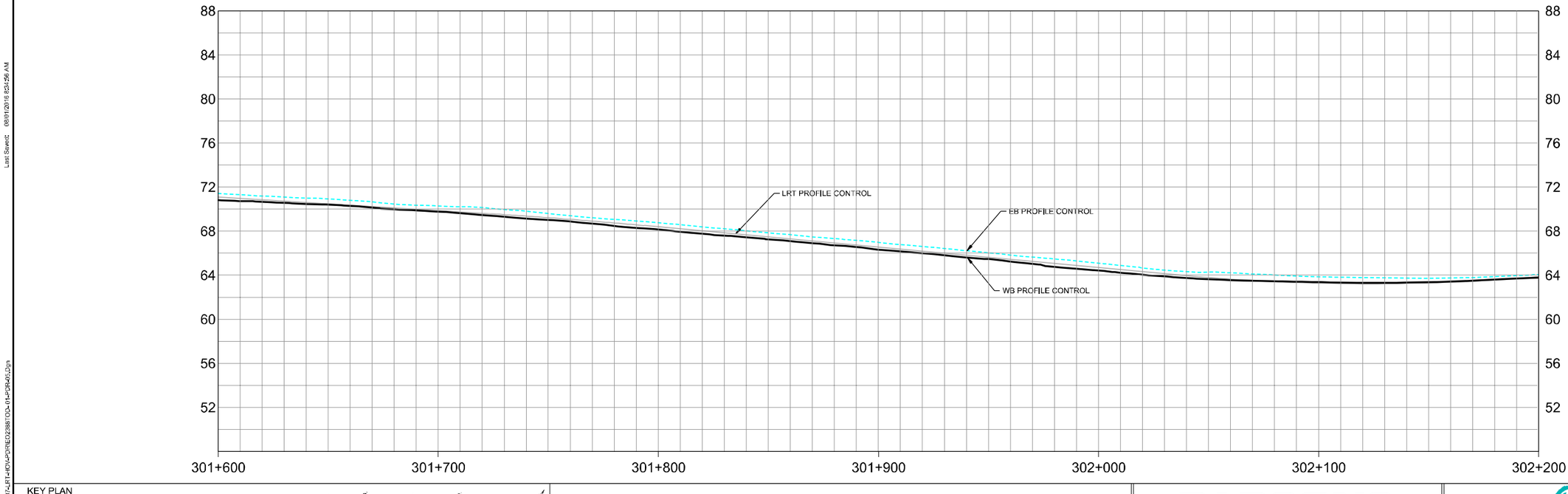
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 301+000 to STA 301+600

Drawings No.: | Revision: 00 | Sheet No.: 04





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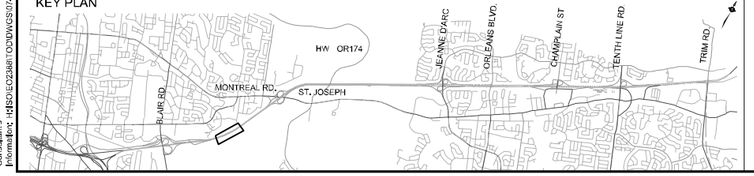

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 0.5 5 10 20

CAD File Name: EO2388TOD-01-PDR-05.DGN | Plot Date: XX/XX/XXXX

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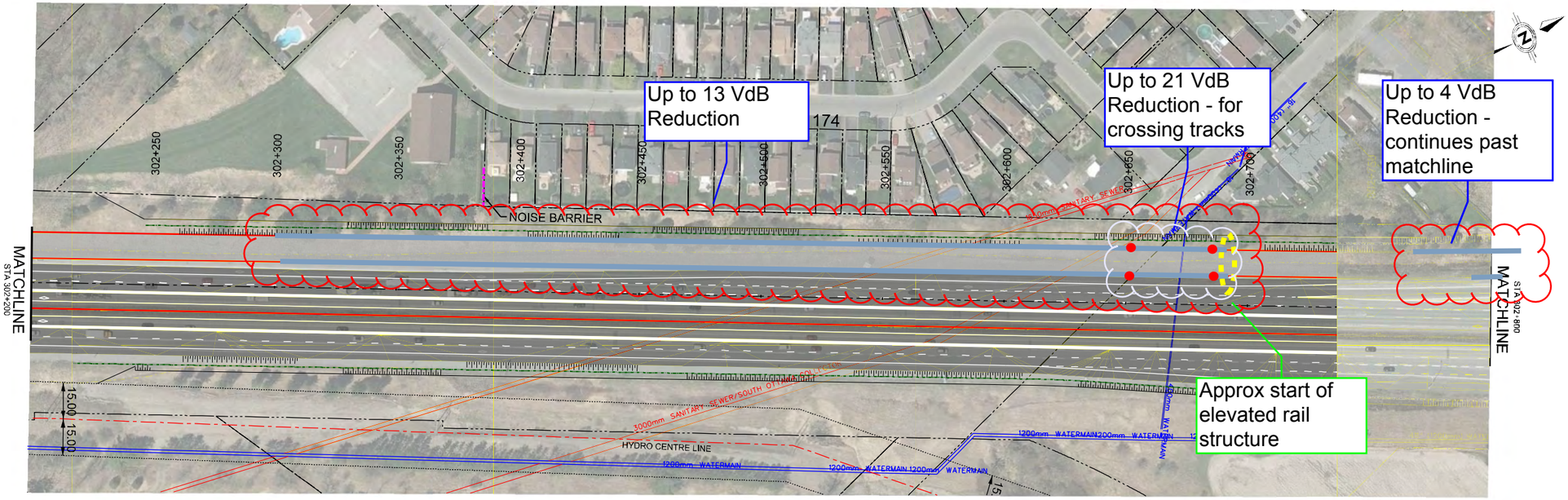
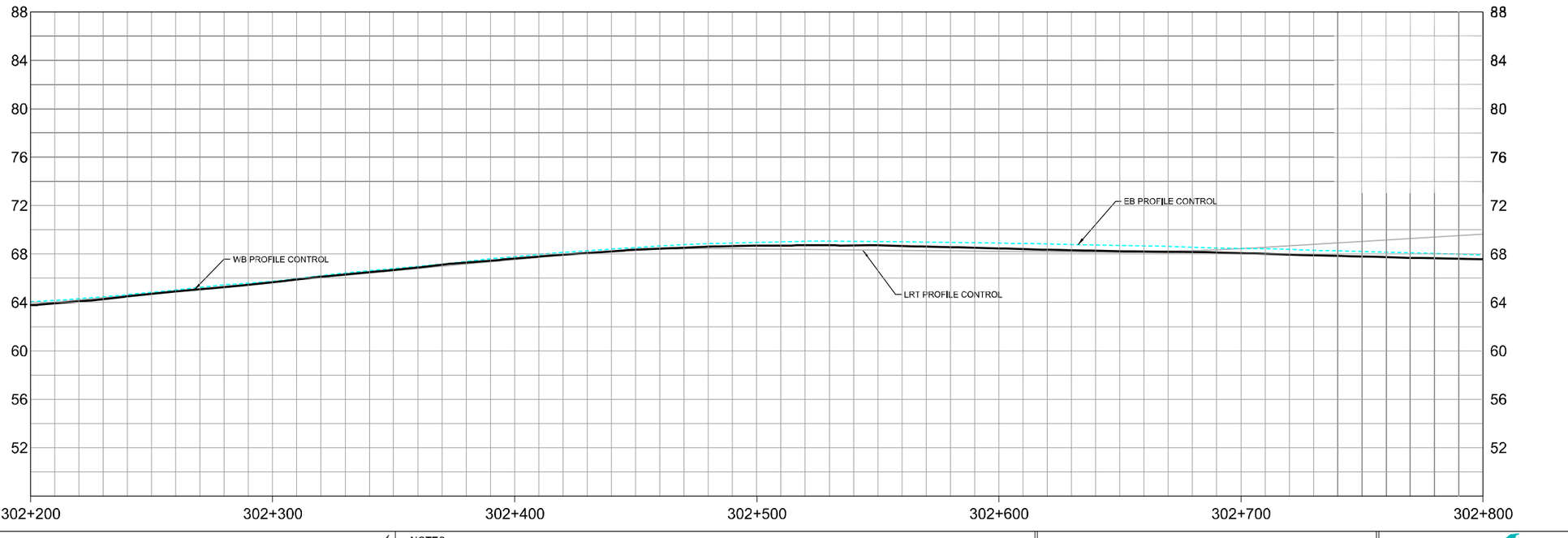
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 301+600 to STA 302+200

Drawings No.: | Revision 00 | Sheet No. 05





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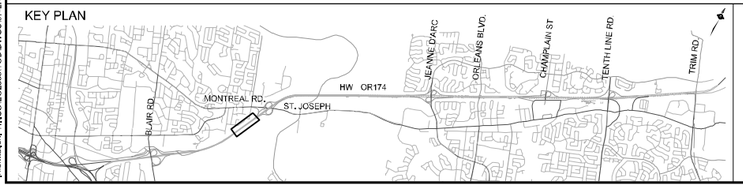


NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

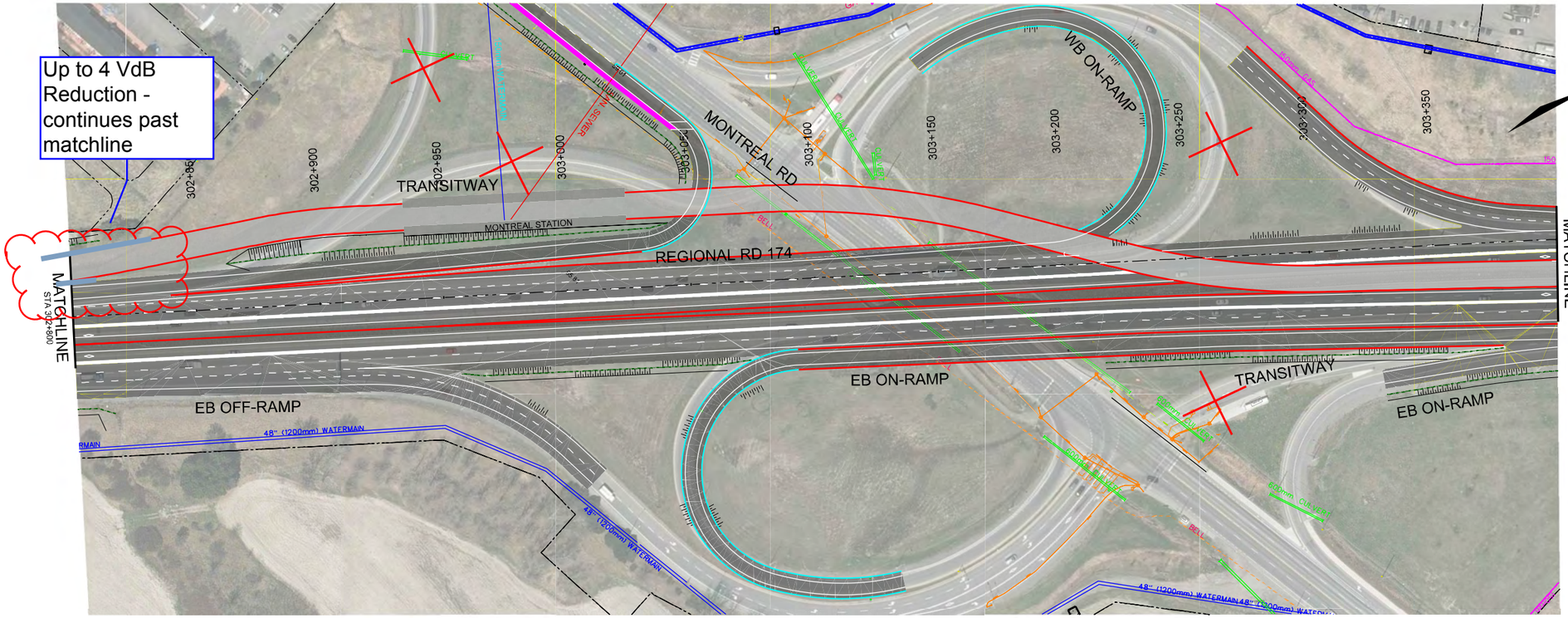
Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 0.5 5 10 20

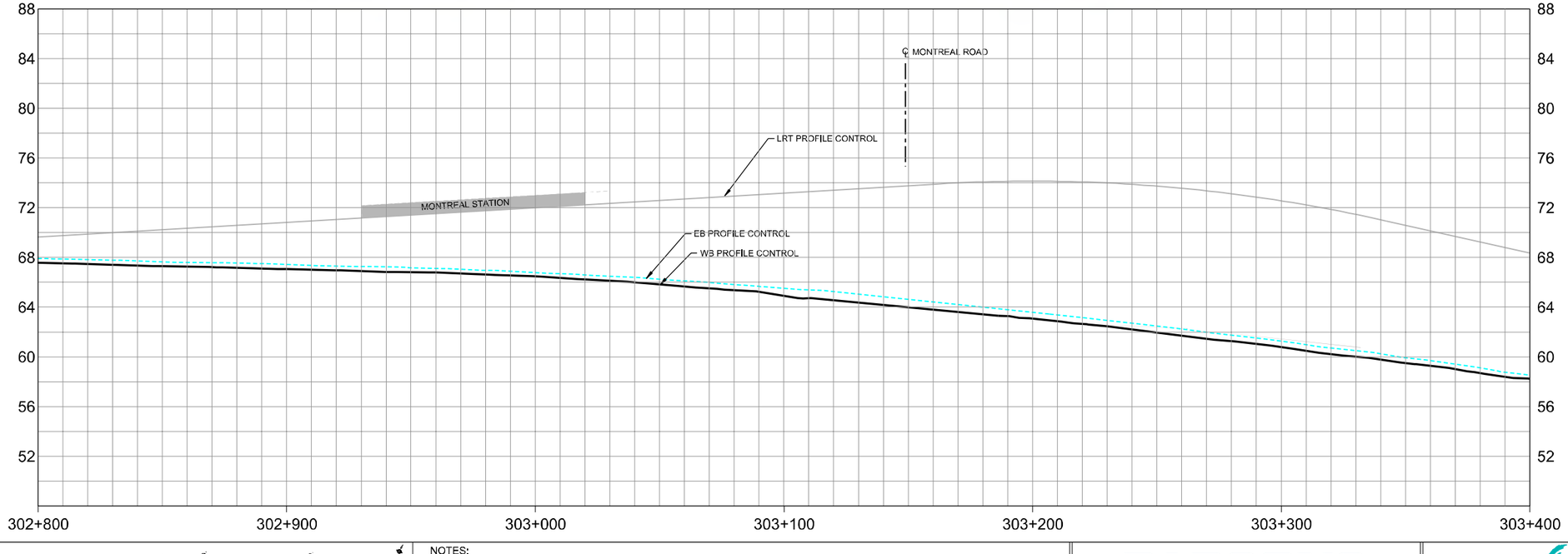
CAD File Name: EO2388TOD-01-PDR-06.DGN | Plot Date: XX/XX/XXXX

Ottawa

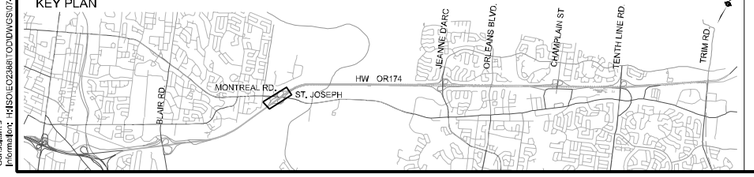
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 302+200 to STA 302+800

Drawings No.: | Revision 00 | Sheet No. 06





KEY PLAN



NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

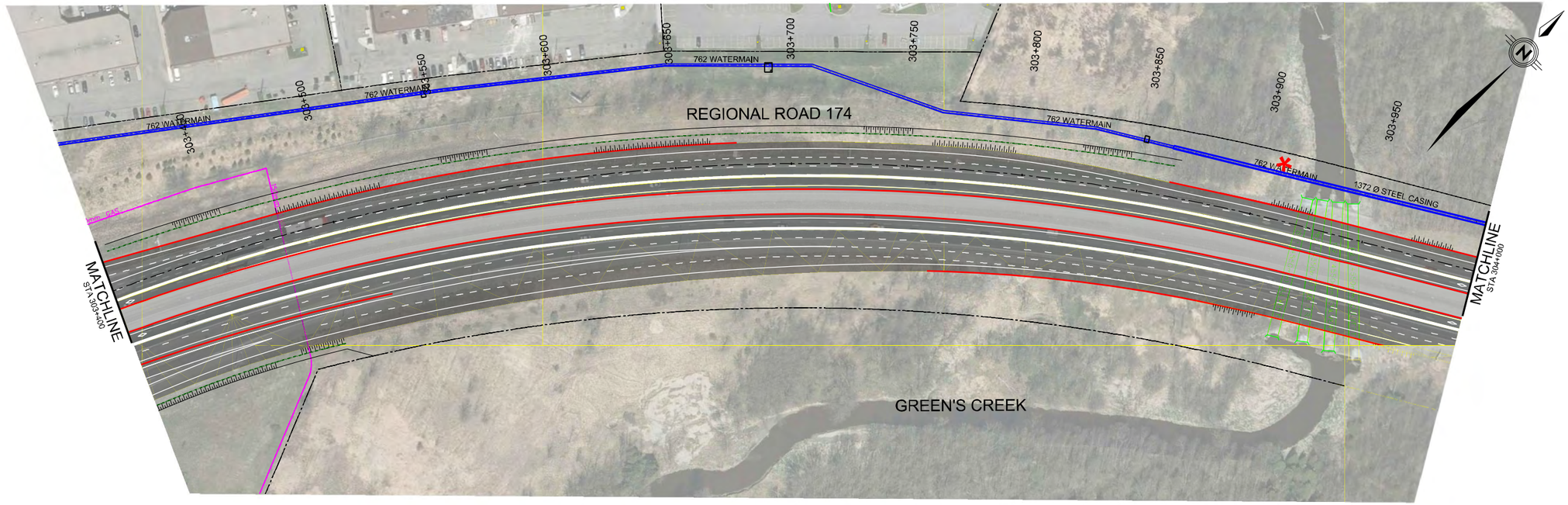
Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

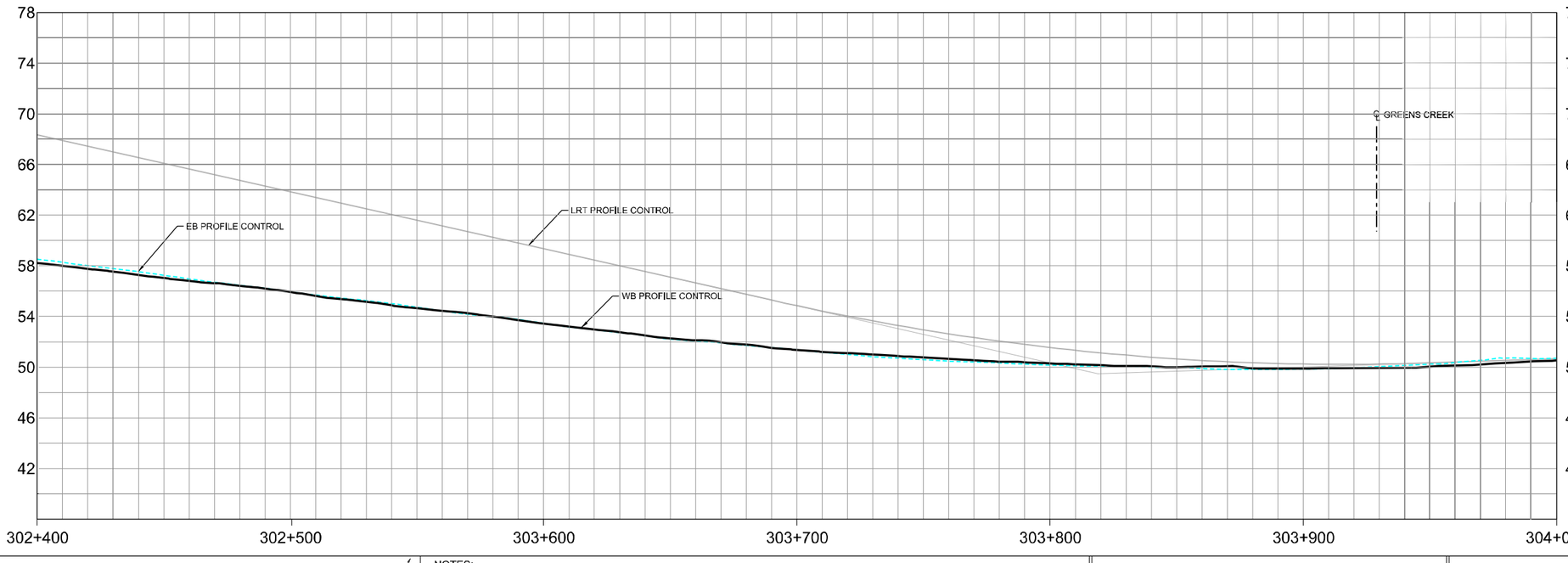
CAD File Name: EO2388TOD-01-PDR-07.DGN | Plot Date: XX/XX/XXXX

Ottawa

HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 302+800 to STA 303+400

Drawings No.: | Revision 00 | Sheet No. 07





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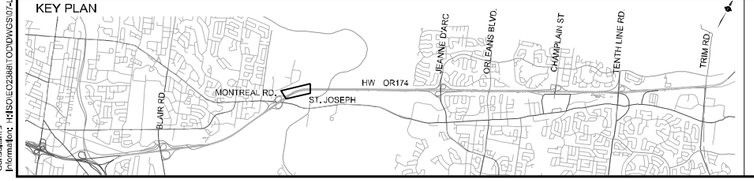


NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

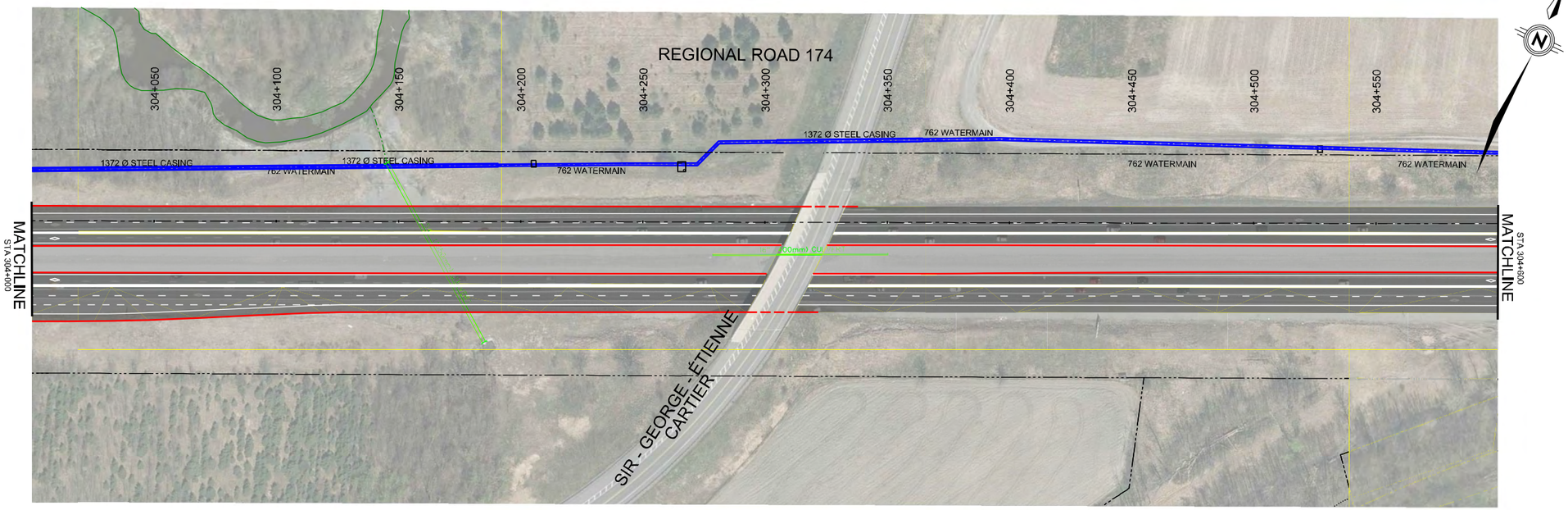
Scale: HORIZONTAL 0m 10 20 50 100 — VERTICAL 0m 0.5 5 10 20

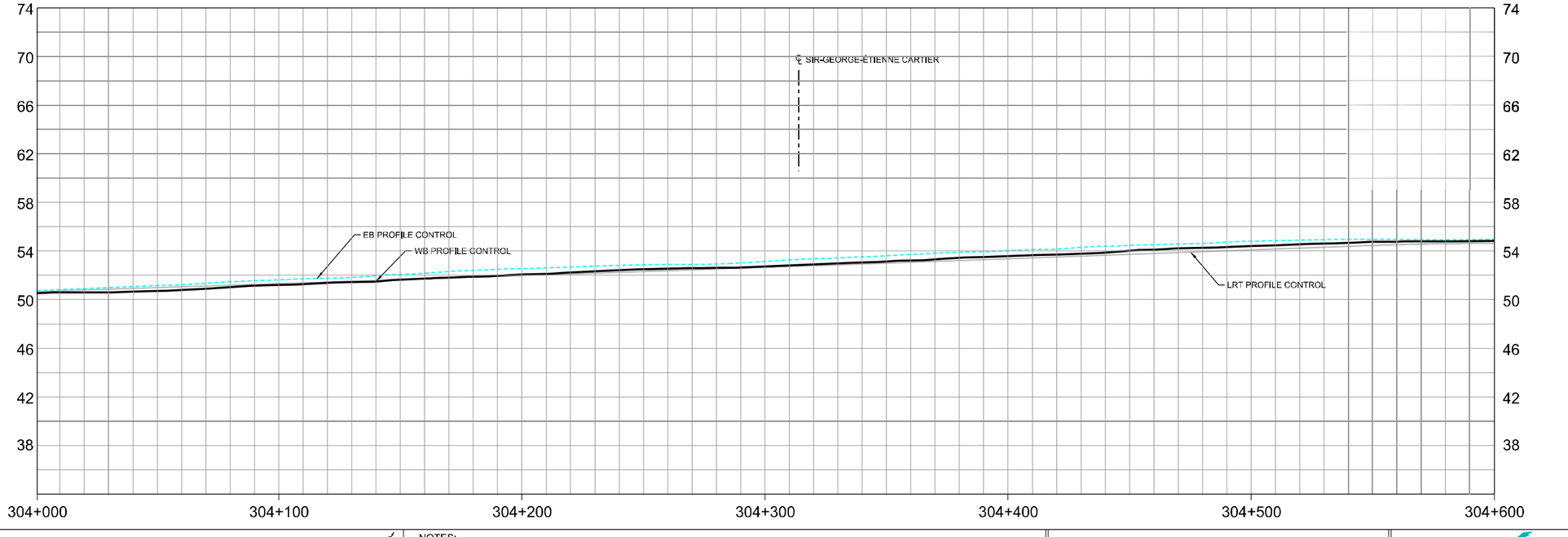
CAD File Name: EO2388TOD-01-PDR-08.DGN | Plot Date: XX/XX/XXXX

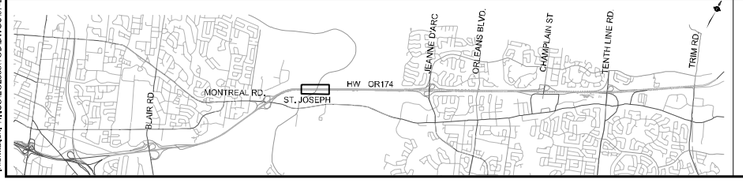
Ottawa

HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 303+400 to STA 304+000

Drawings No.: | Revision 00 | Sheet No. 08







NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

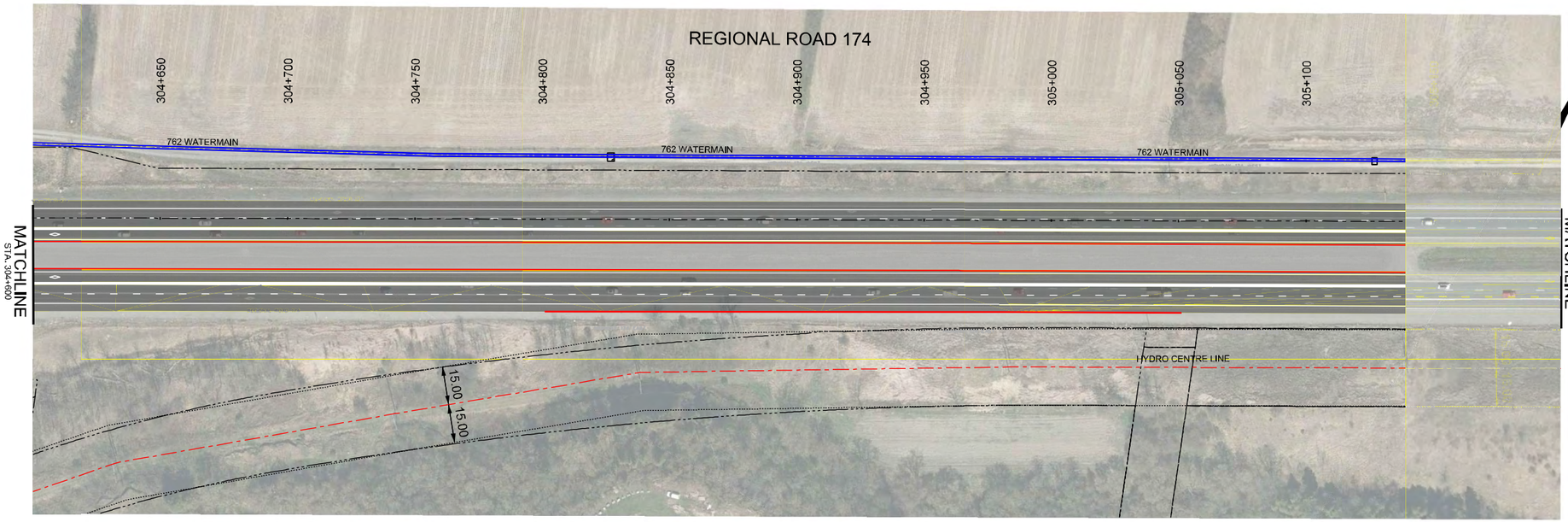
Scale: HORIZONTAL 0m 10 20 50 100 — VERTICAL 0m 2.5 5 10 20

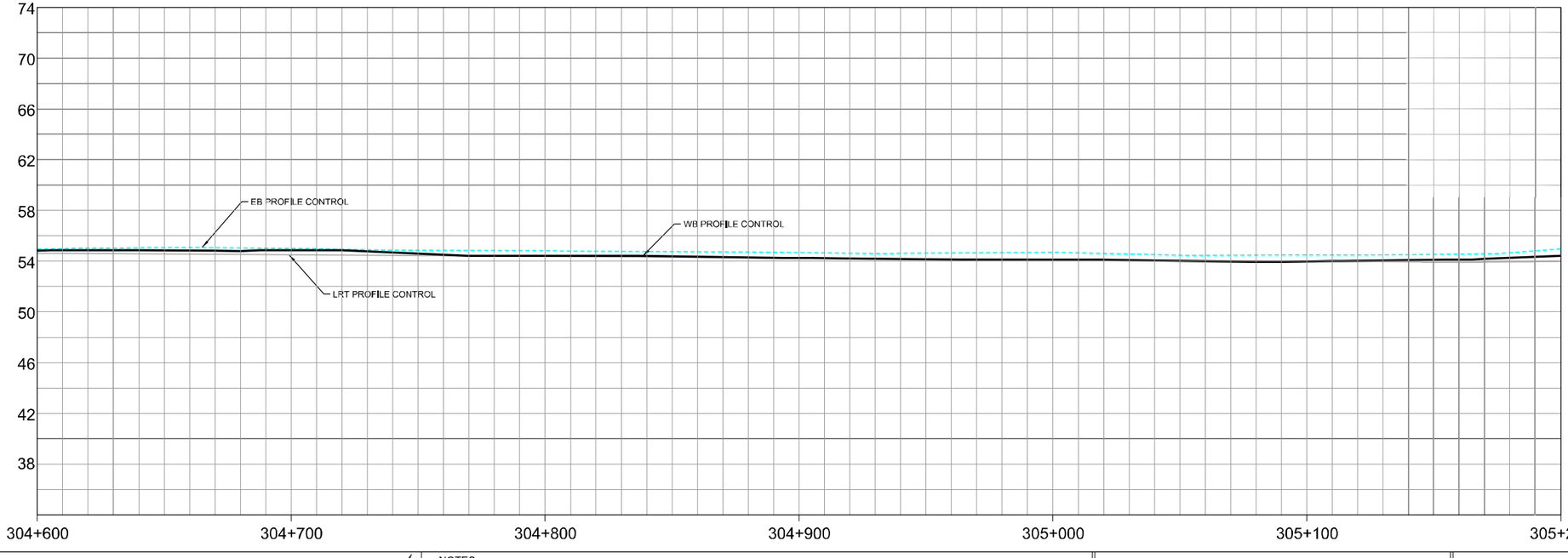
CAD File Name: EO2388TOD- 01-PDR-09.DGN | Plot Date: XX/XX/XXXX

Ottawa

HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 304+000 to STA 304+600

Drawings No.: | Revision: 00 | Sheet No.: 09





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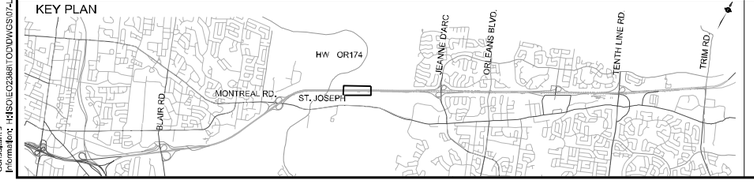


NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

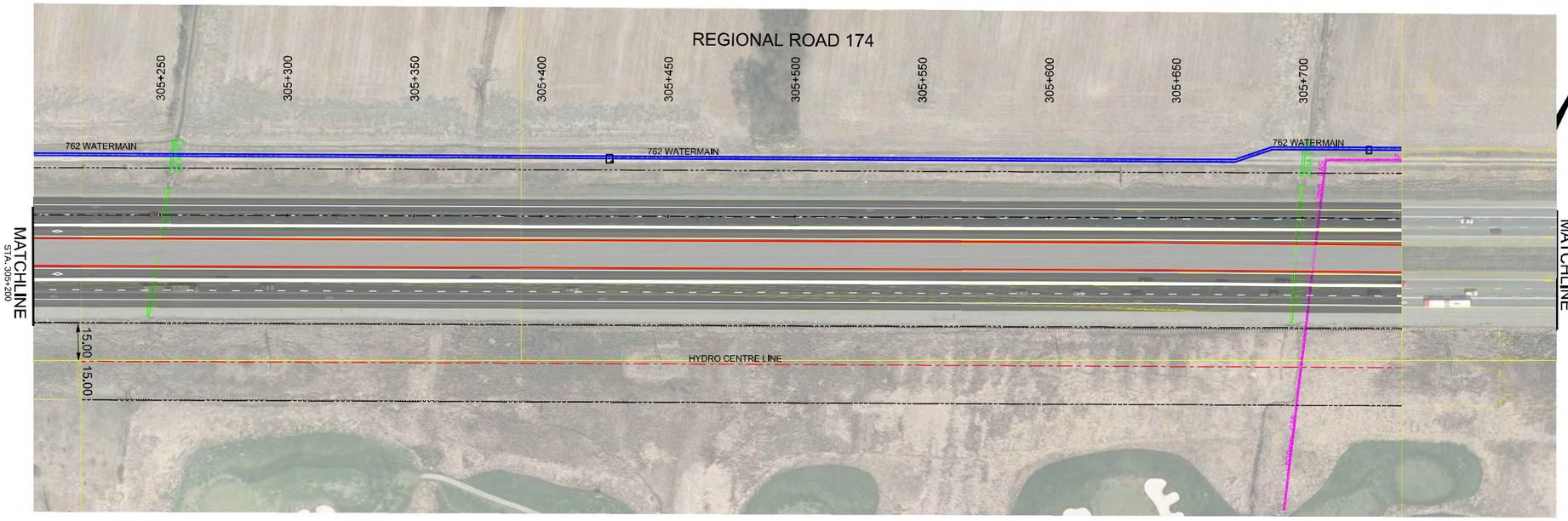
Scale: HORIZONTAL 0m 10 20 50 100 / 0m 2.5 5 10 20 VERTICAL

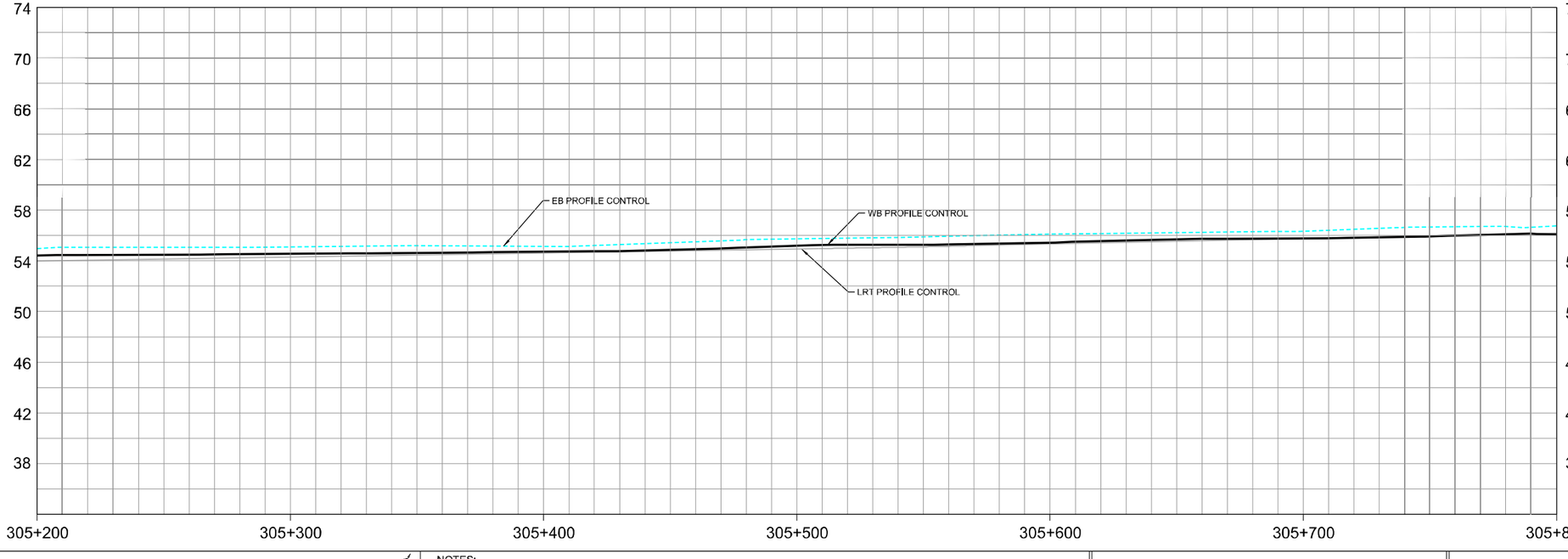
CAD File Name:	Plot Date:
EO2388TOD- 01-PDR-10.DGN	XX/XX/XXXX

Ottawa

HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 304+600 to STA 305+200

Drawings No.:	Revision	Sheet No.
	00	10





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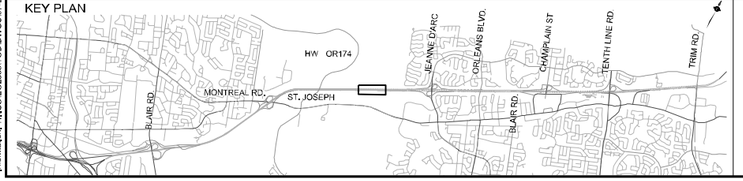


NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

CAD File Name: EO2388TOD-01-PDR-11.DGN

Plot Date: XX/XX/XXXX

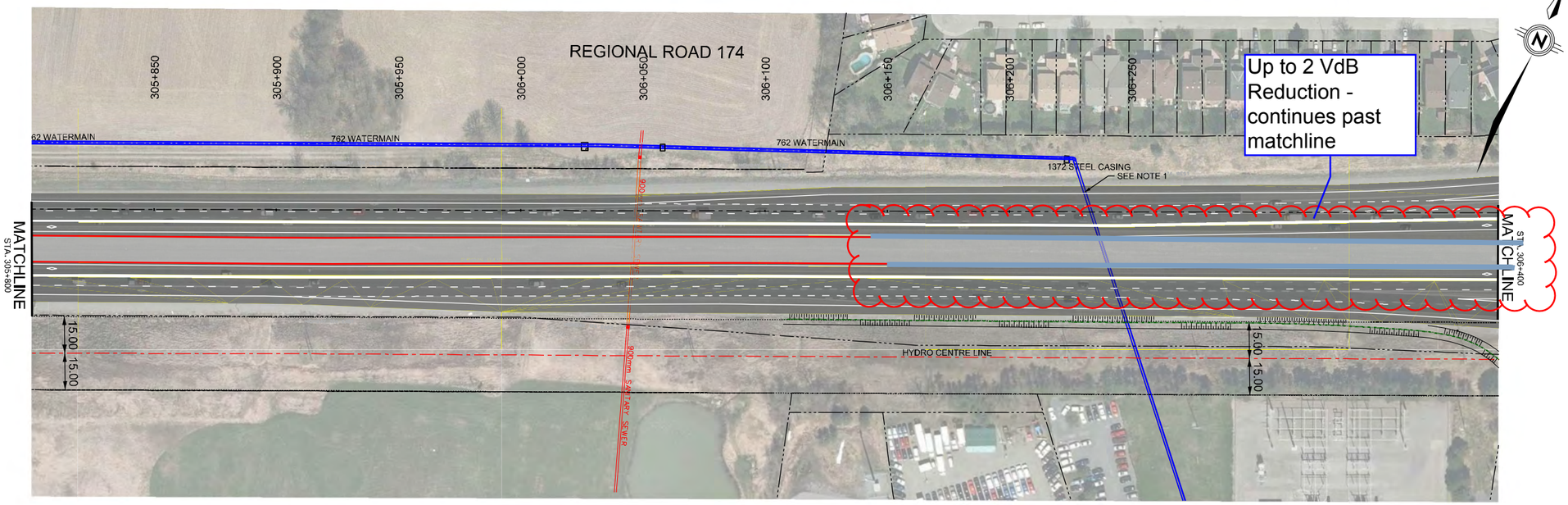
Ottawa

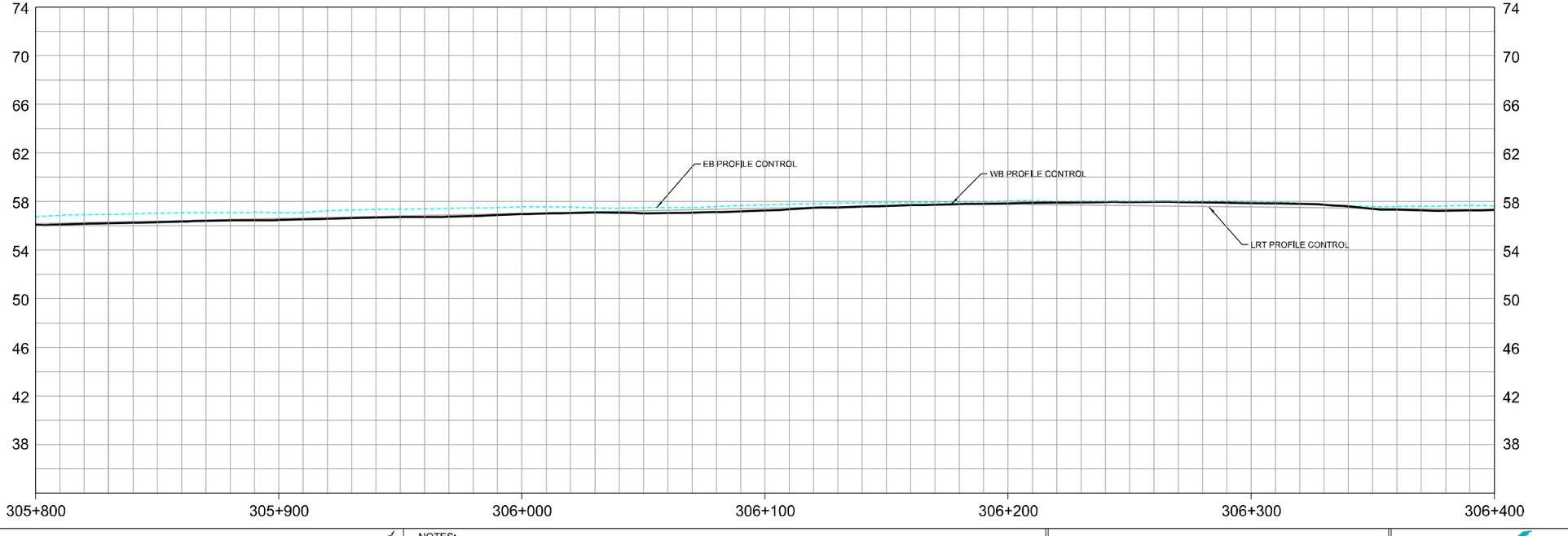
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 305+200 to STA 305+800

Drawings No.:

Revision: 00

Sheet No.: 11





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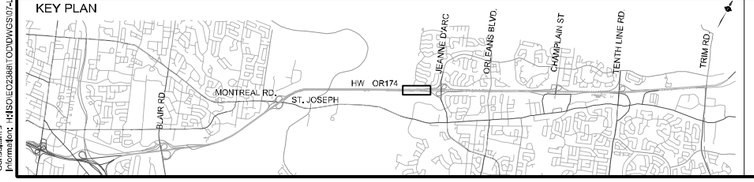


NOTES:

1. LOCATION OF NORTH-SOUTH WATERMAIN CROSSING OF OR174 IS APPROXIMATE AND IS TO BE CONFIRMED WHEN AS-BUILT INFORMATION IS AVALIABLE.

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

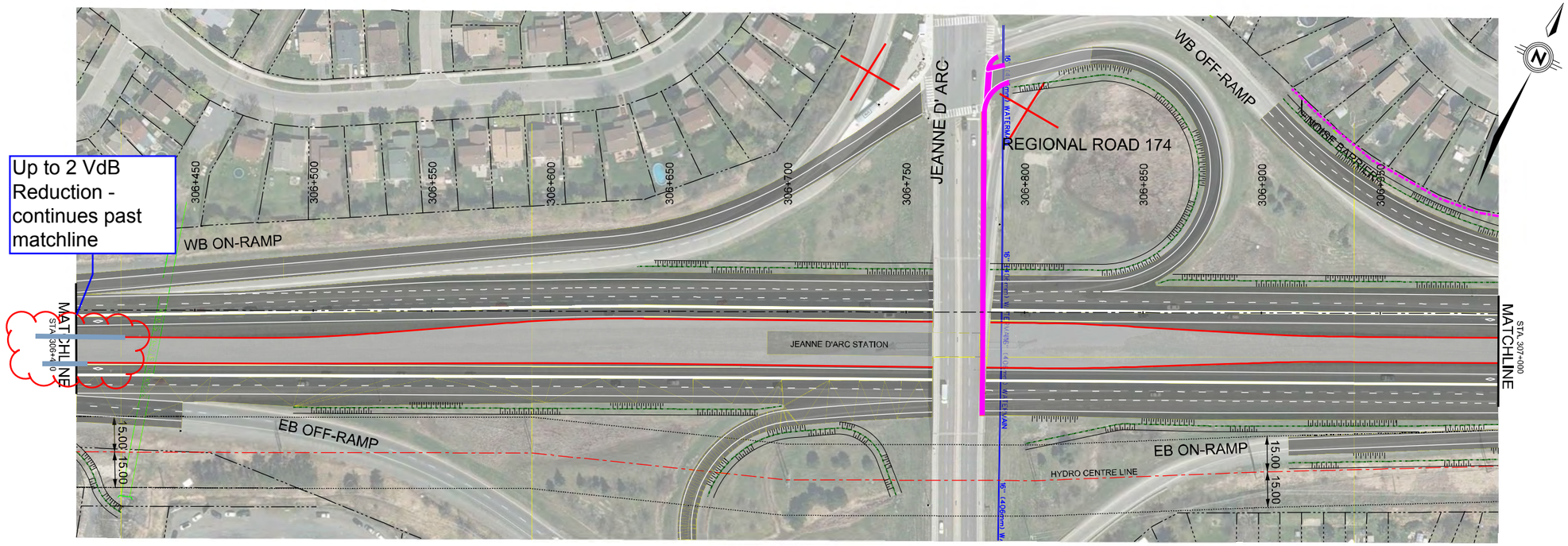
Scale:
HORIZONTAL 0m 10 20 50 100
VERTICAL 0m 2.5 5 10 20

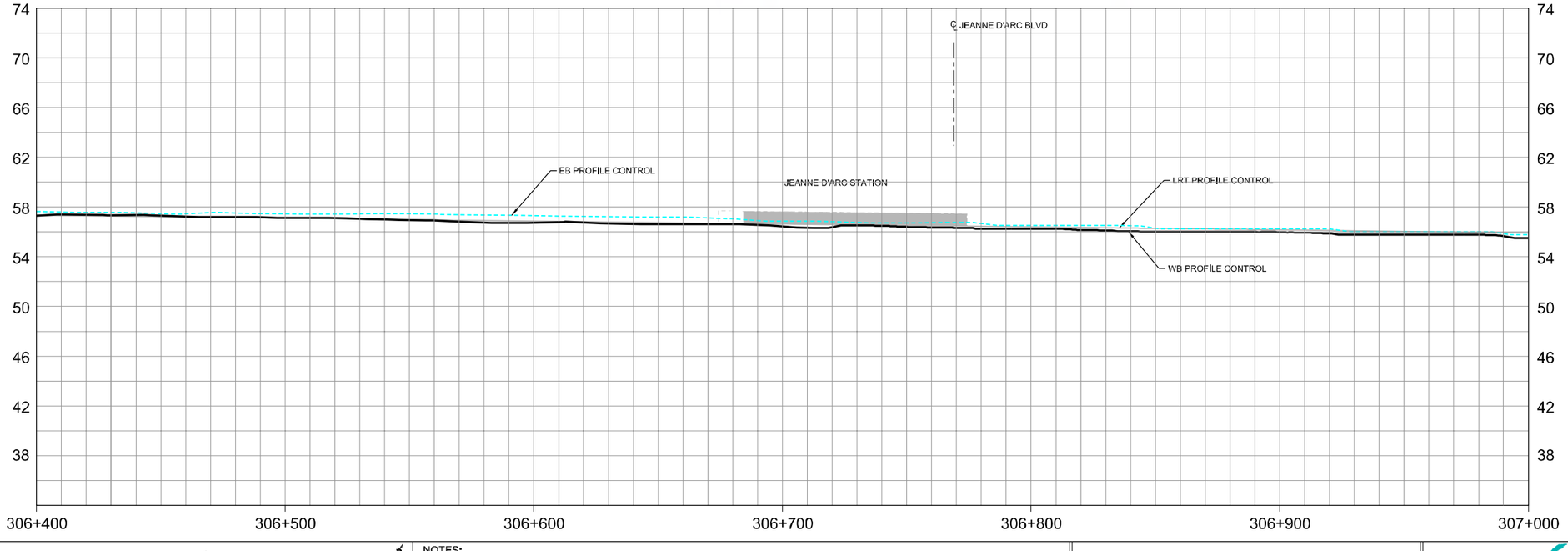
CAD File Name:	Plot Date:
EO2388TOD- 01-PDR-12.DGN	XX/XX/XXXX

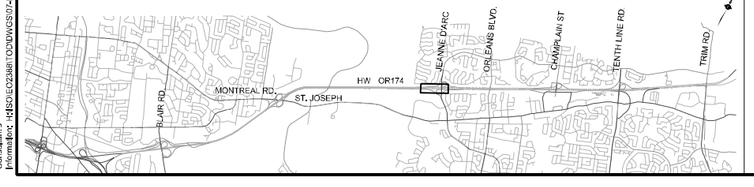
Ottawa

HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 305+800 to STA 306+400

Drawings No.:	Revision	Sheet No.
	00	12







NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

CAD File Name: EO2388TOD- 01-PDR-13.DGN

Plot Date: XX/XX/XXXX

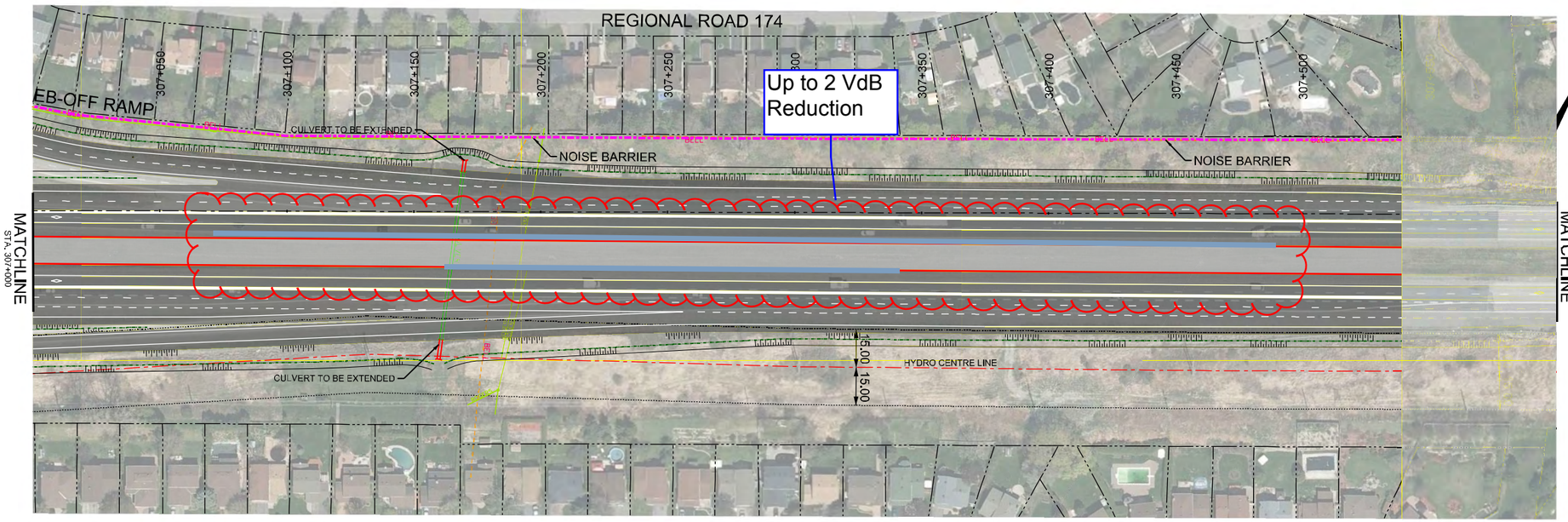
Ottawa

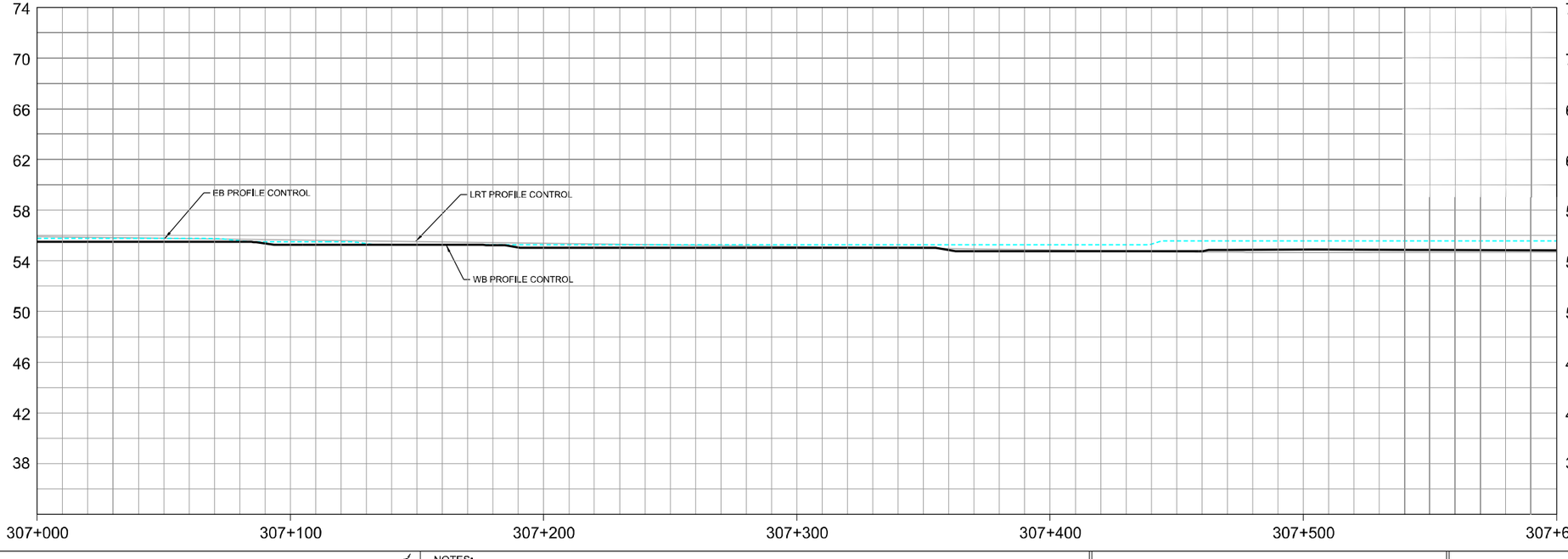
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 306+400 to STA 307+000

Drawings No.:

Revision: 00

Sheet No.: 13





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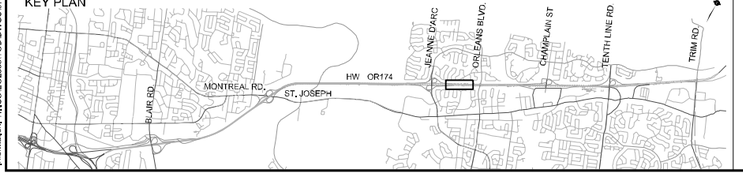


NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

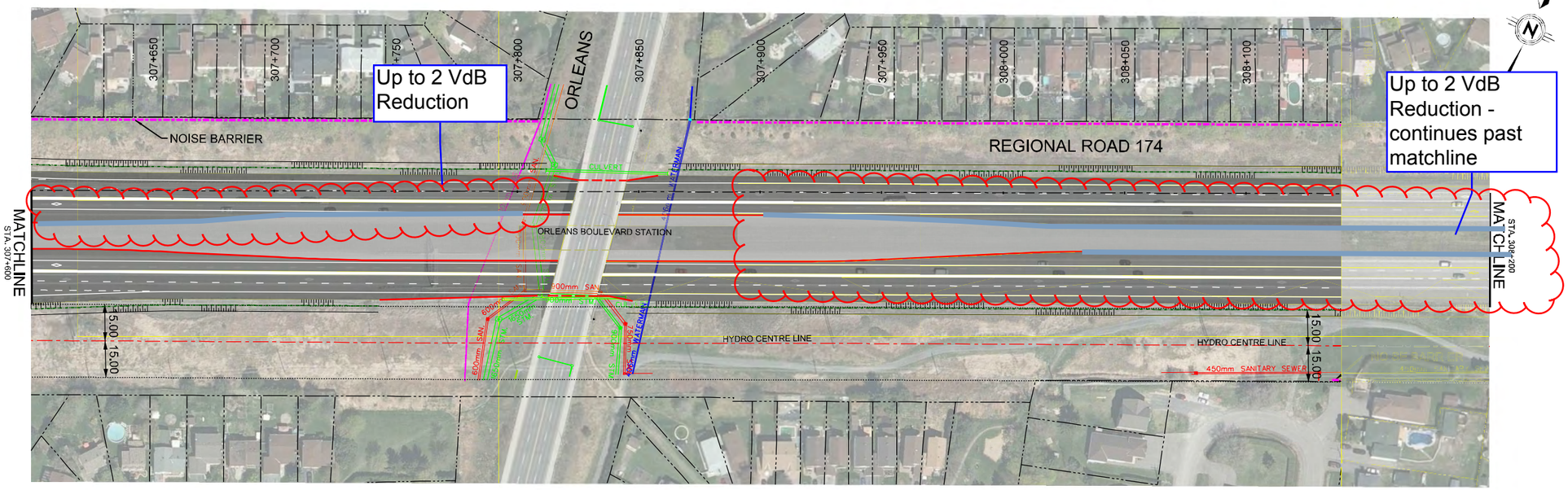
Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

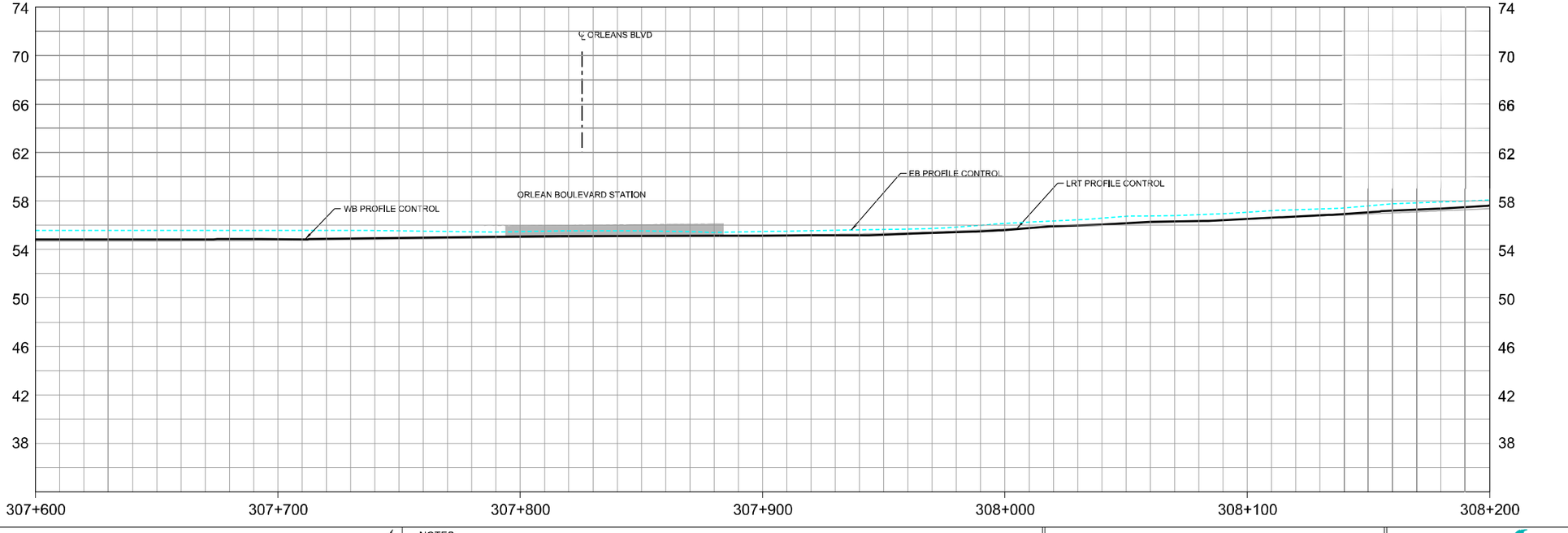
CAD File Name: EO2388TOD-01-PDR-14.DGN	Plot Date: XX/XX/XXXX

Ottawa

HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 307+000 to STA 307+600

Drawings No.:	Revision 00	Sheet No. 14





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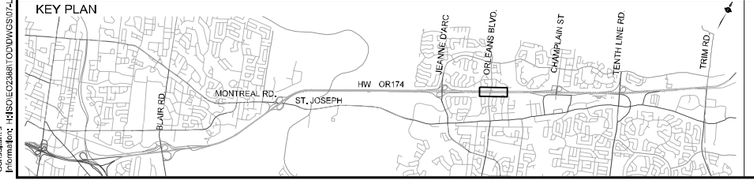


NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

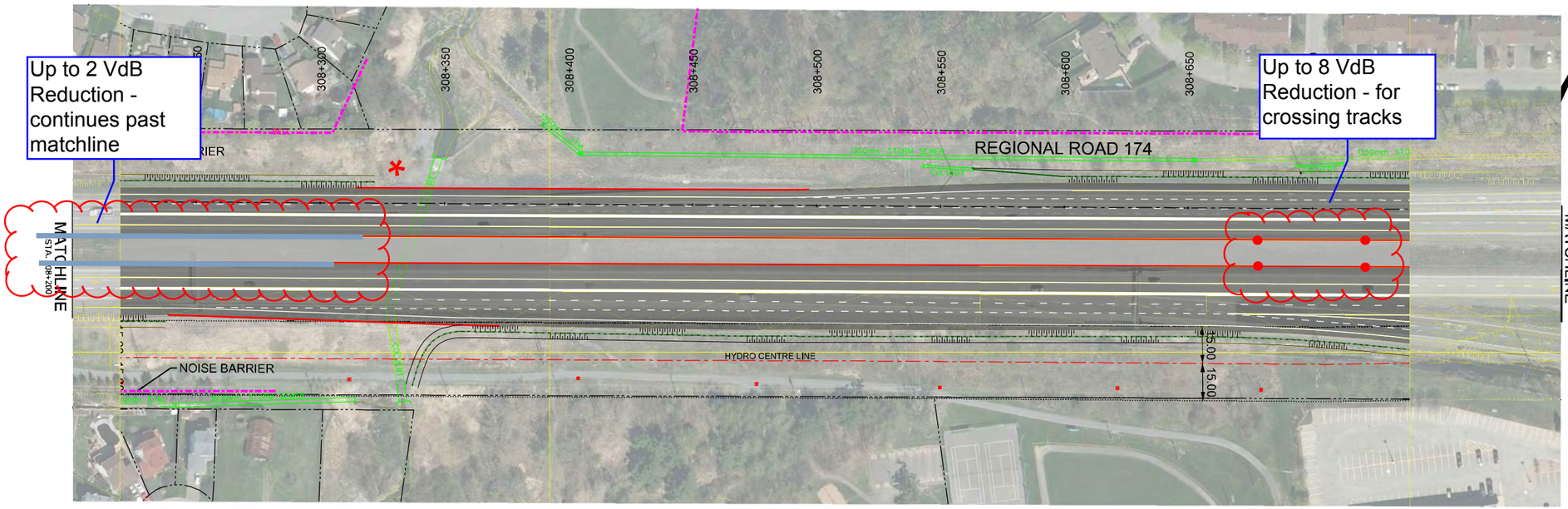
CAD File Name: EO2388TOD- 01-PDR-15.DGN

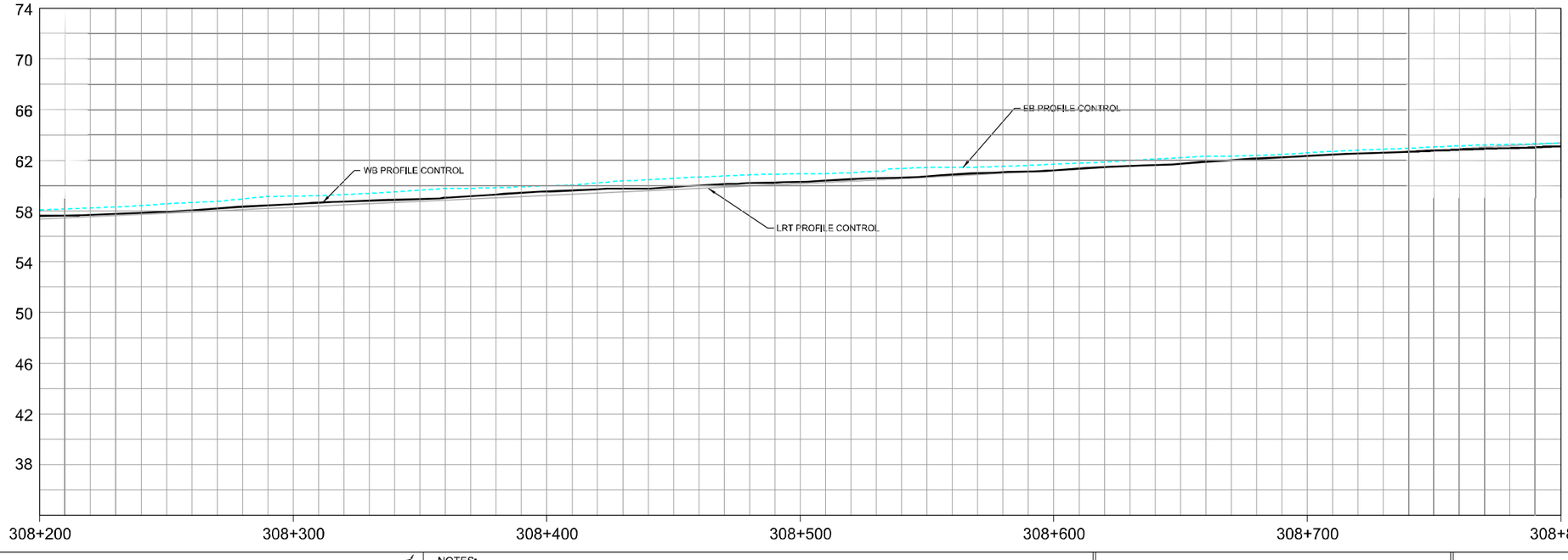
Plot Date: XX/XX/XXXX

Ottawa

HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 307+600 to STA 308+200

Drawings No.: | Revision: 00 | Sheet No.: 15





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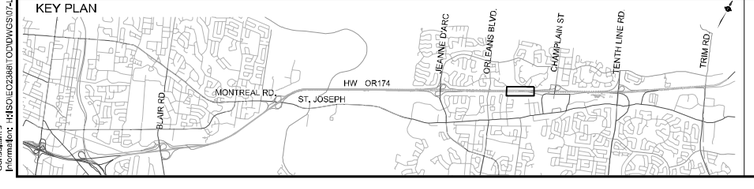


NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

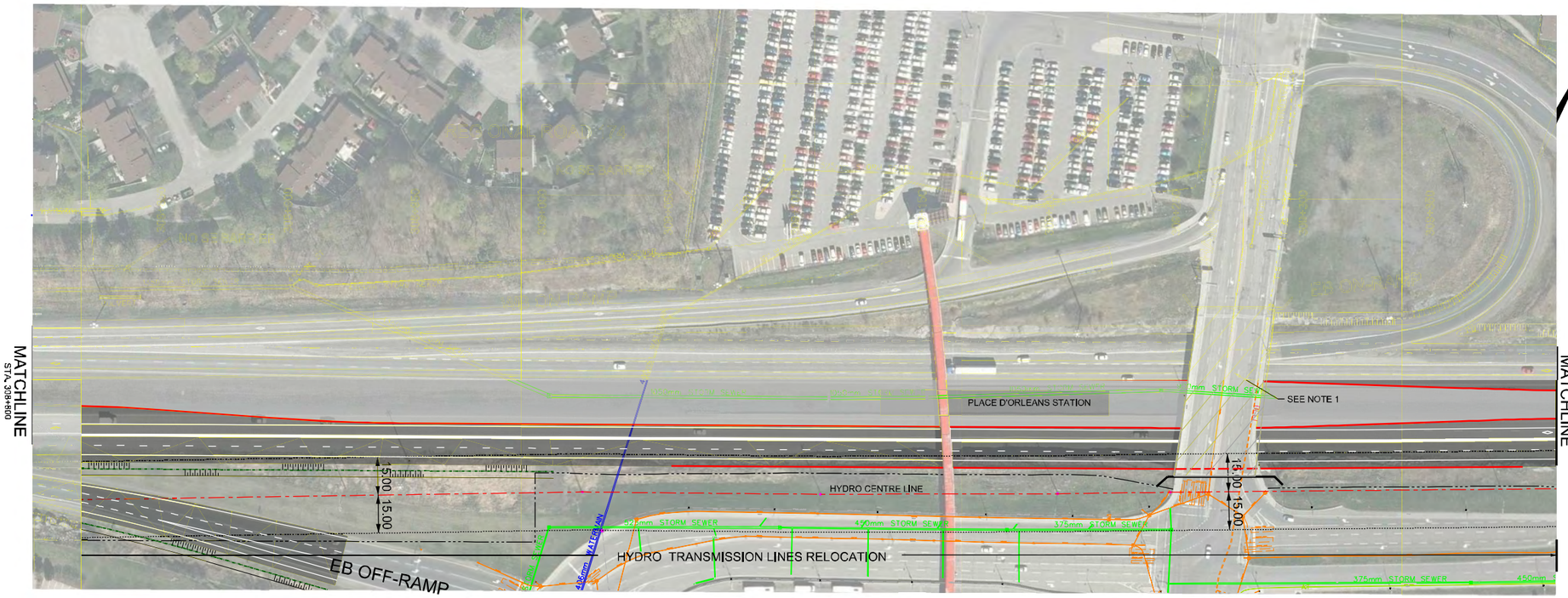
CAD File Name: EO2388TOD-01-PDR-16.DGN

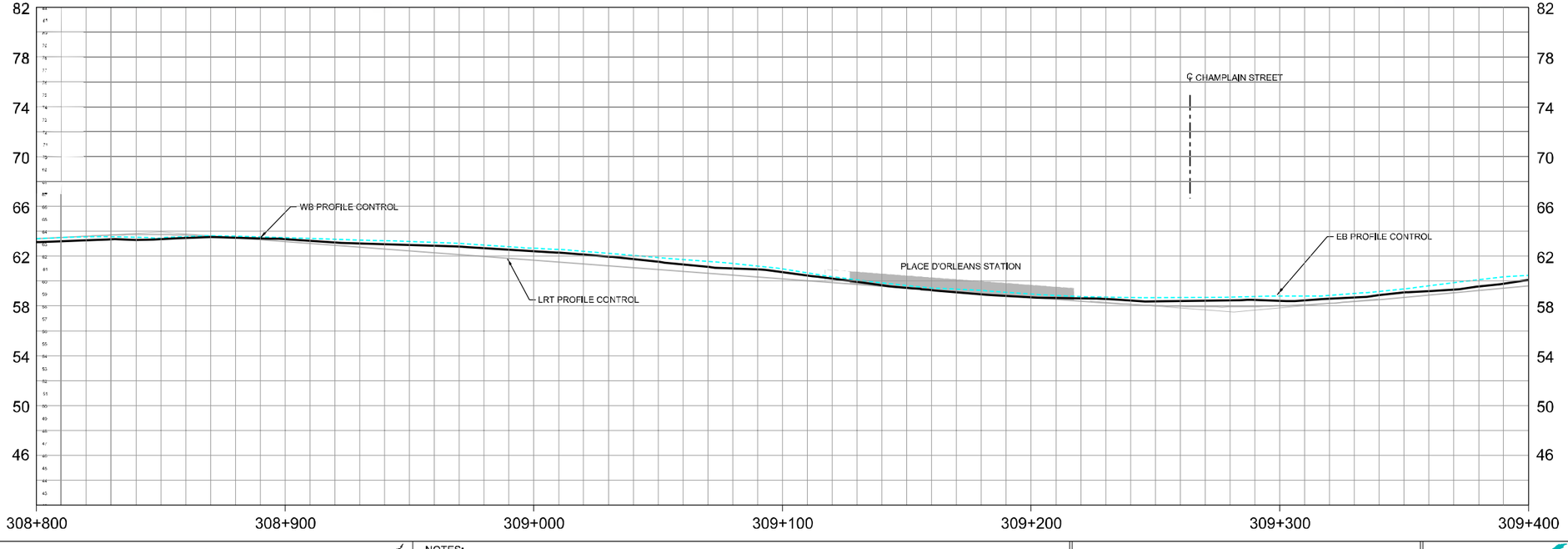
Plot Date: XX/XX/XXXX

Ottawa

HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 308+200 to STA 308+800

Drawings No.: | Revision: 00 | Sheet No.: 16





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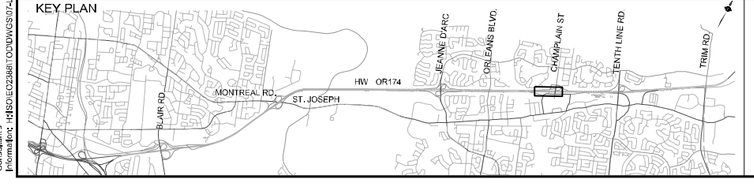


NOTES:

1. CHAMPLAIN BRIDGE TO BE REPLACED

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

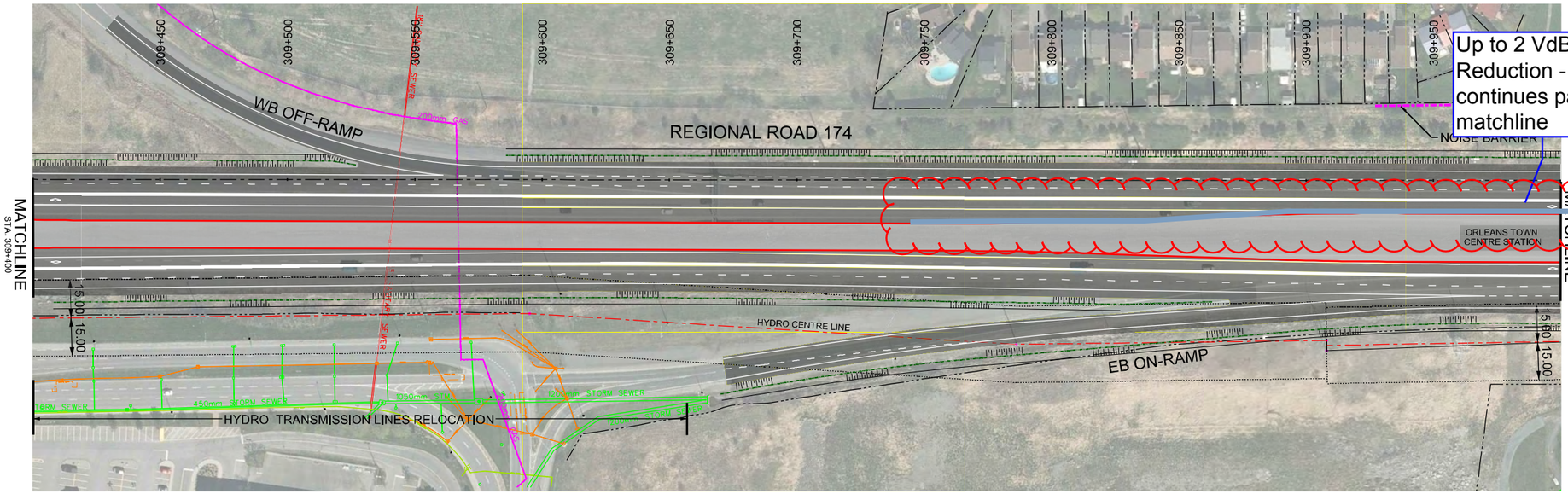
CAD File Name: EO2388TOD- 01-PDR-17.DGN

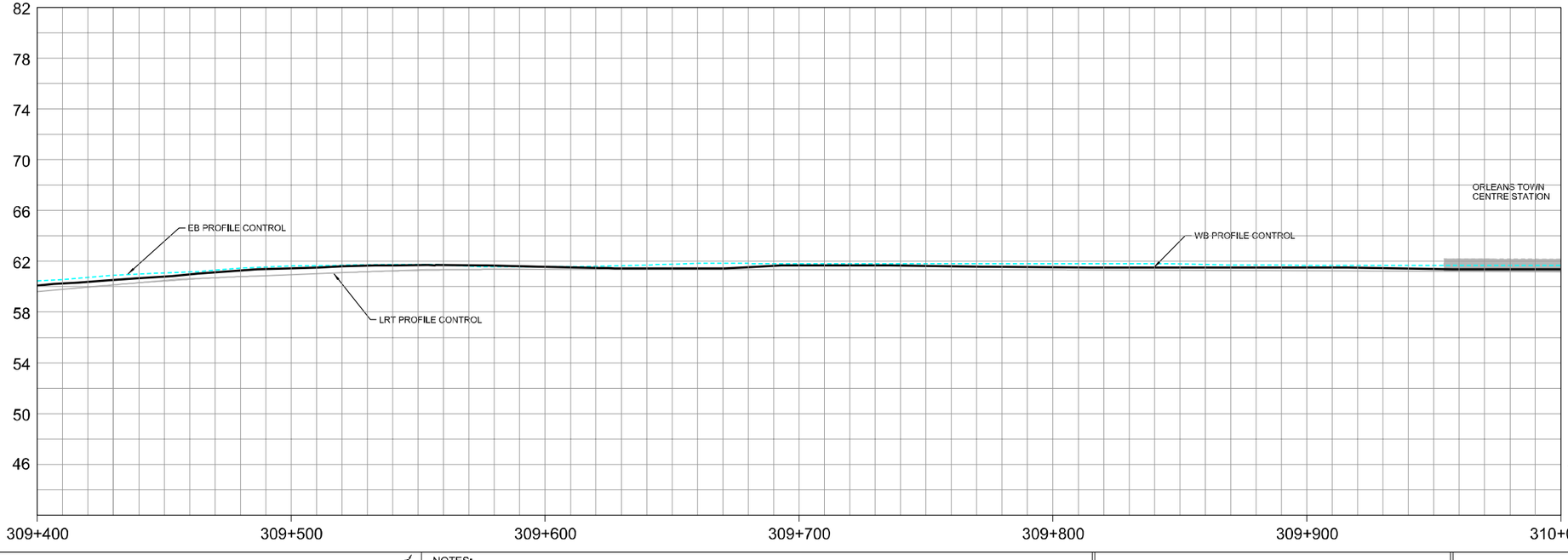
Plot Date: XX/XX/XXXX

Ottawa

HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 308+800 to STA309+400

Drawings No.: | Revision: 00 | Sheet No.: 17





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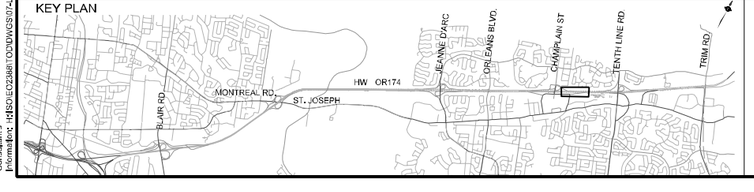


NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

CAD File Name: EO2388TOD- 01-PDR-18.DGN

Plot Date: XX/XX/XXXX

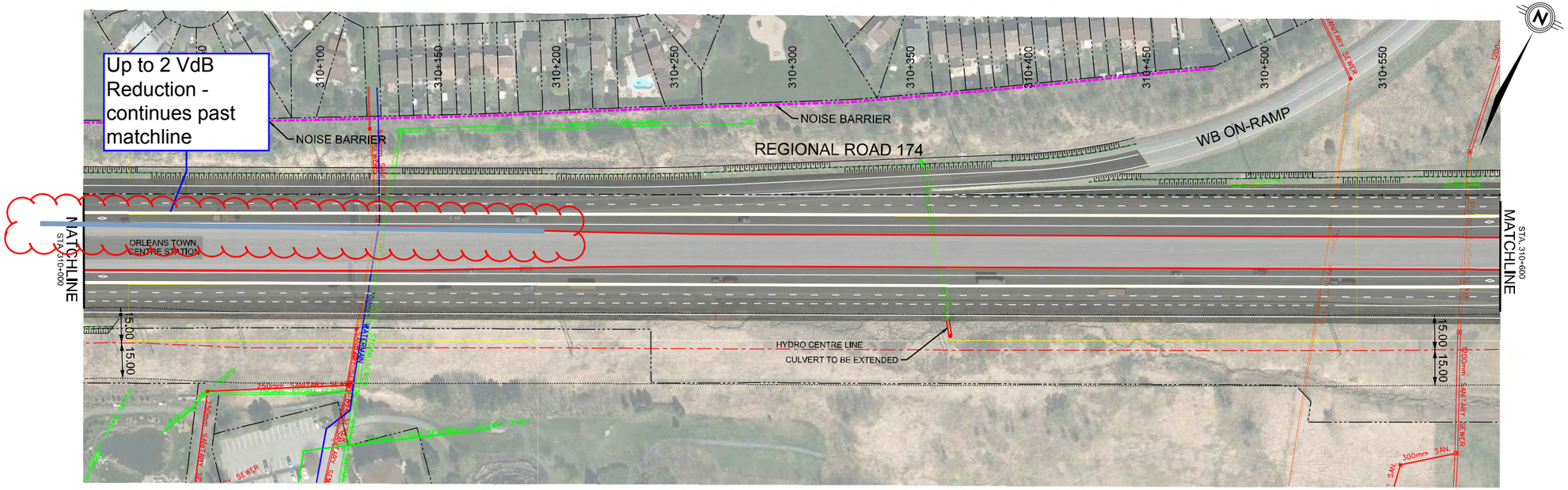
Ottawa

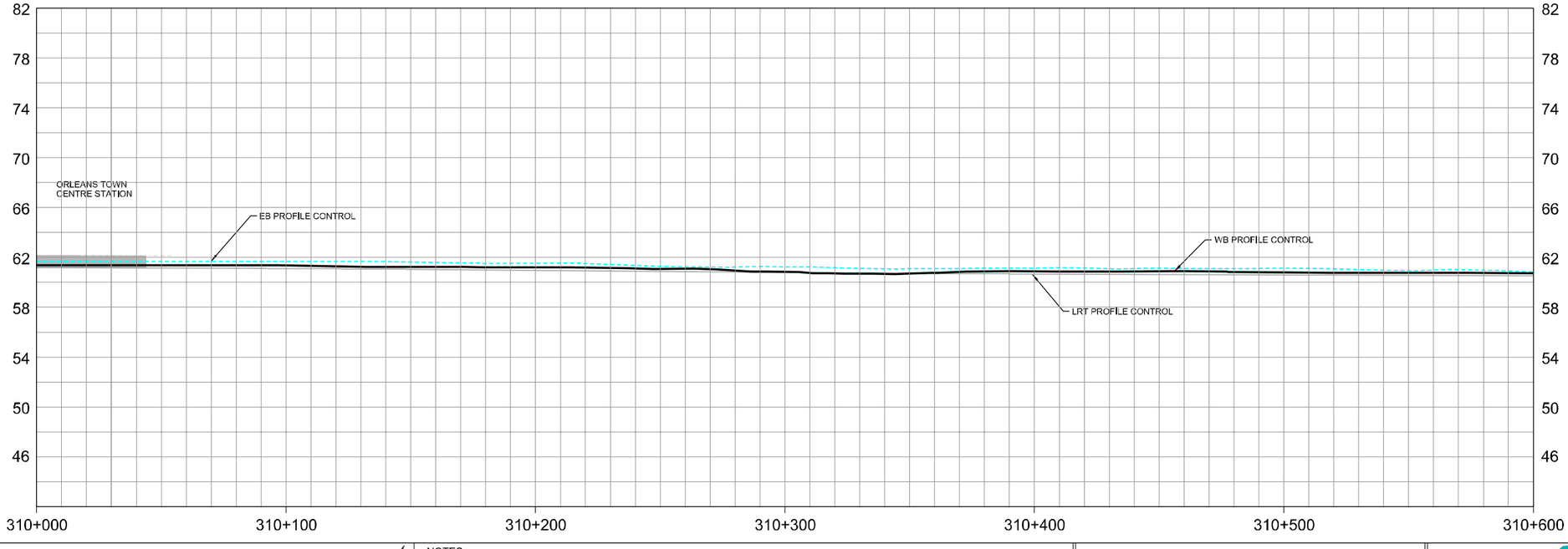
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 309+400 to STA. 310+000

Drawings No.:

Revision 00

Sheet No. 18





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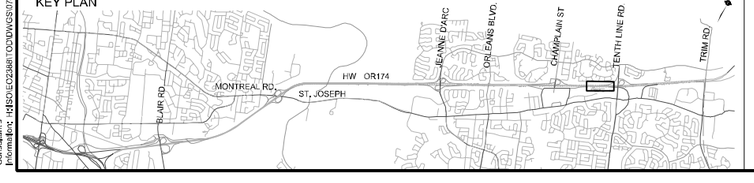


NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

CAD File Name: EO2388TOD- 01-PDR-19.DGN

Plot Date: XX/XX/XXXX

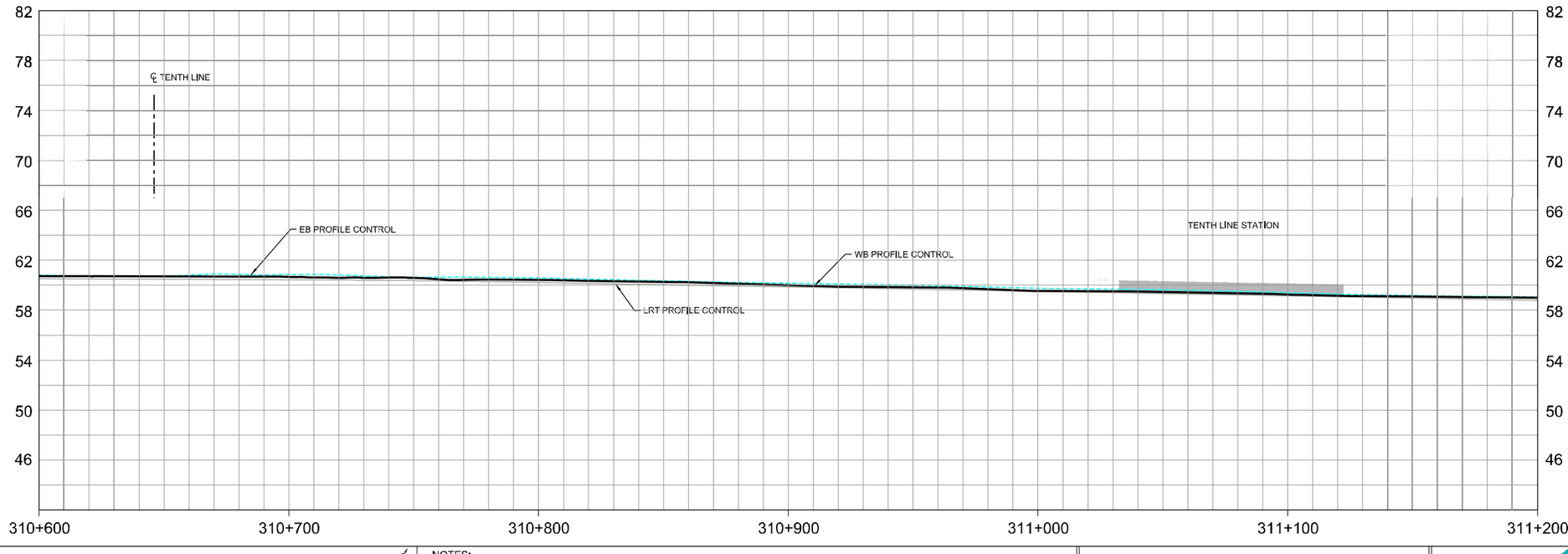
Ottawa

HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 310+000 to STA 310+600

Drawings No.:

Revision: 00

Sheet No.: 19



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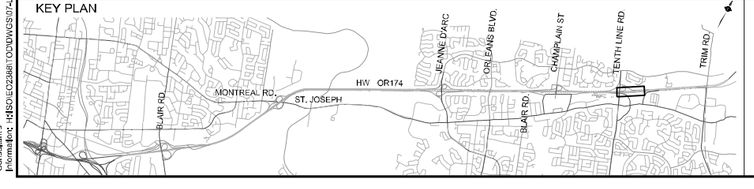


NOTES:

1. SLOPE PAVING TO BE MODIFIED ON NORTH SIDE OF STRUCTURE

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

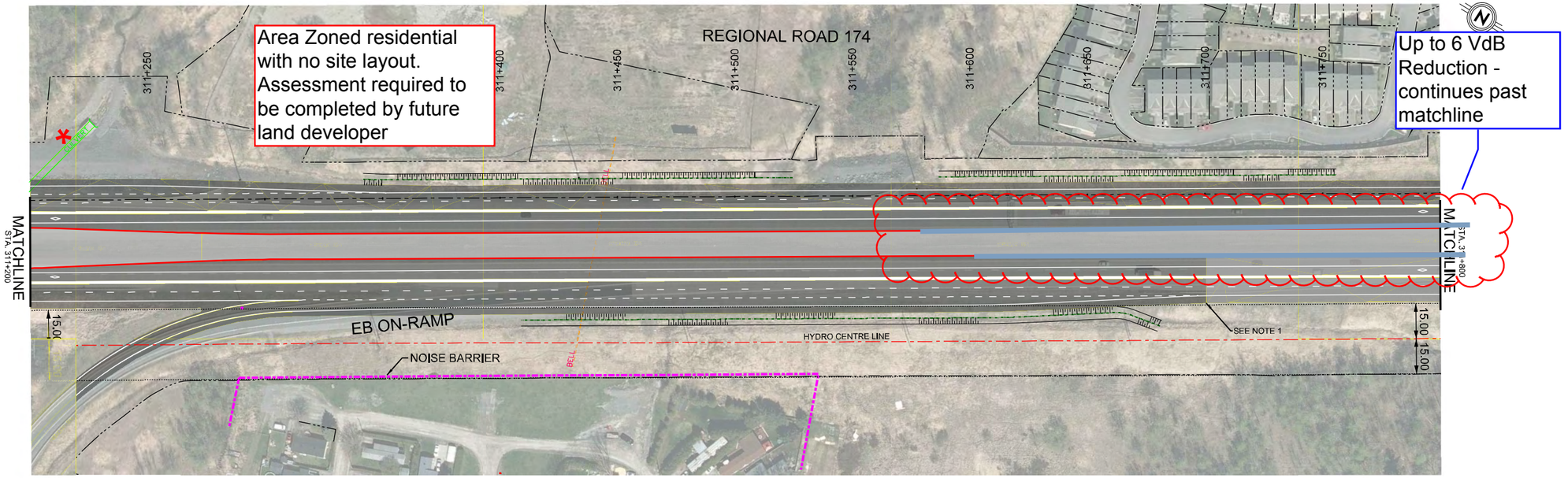
CAD File Name: EO2388TOD- 01-PDR-20.DGN

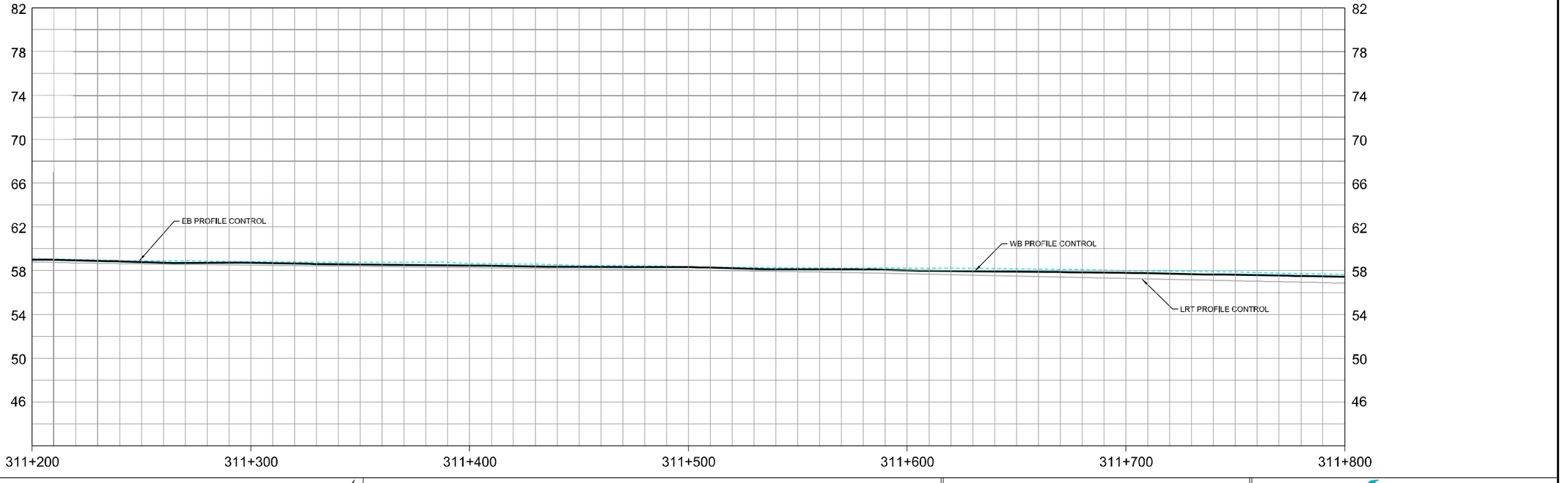
Plot Date: XX/XX/XXXX

Ottawa

HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 310+600to STA 311+200

Drawings No.: | Revision: 00 | Sheet No.: 20





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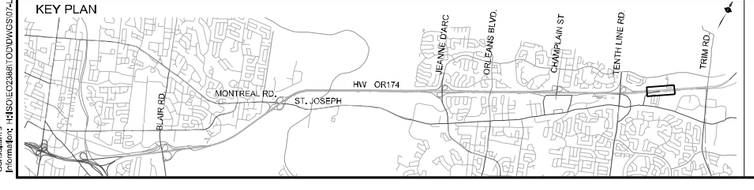


NOTES:

1. APPROXIMATE EASTBOUND TIE IN TO TRIM ROAD INTERCHANGE AT STA. 311+700

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

CAD File Name: EO2388TOD-01-PDR-21.DGN

Plot Date: XX/XX/XXXX

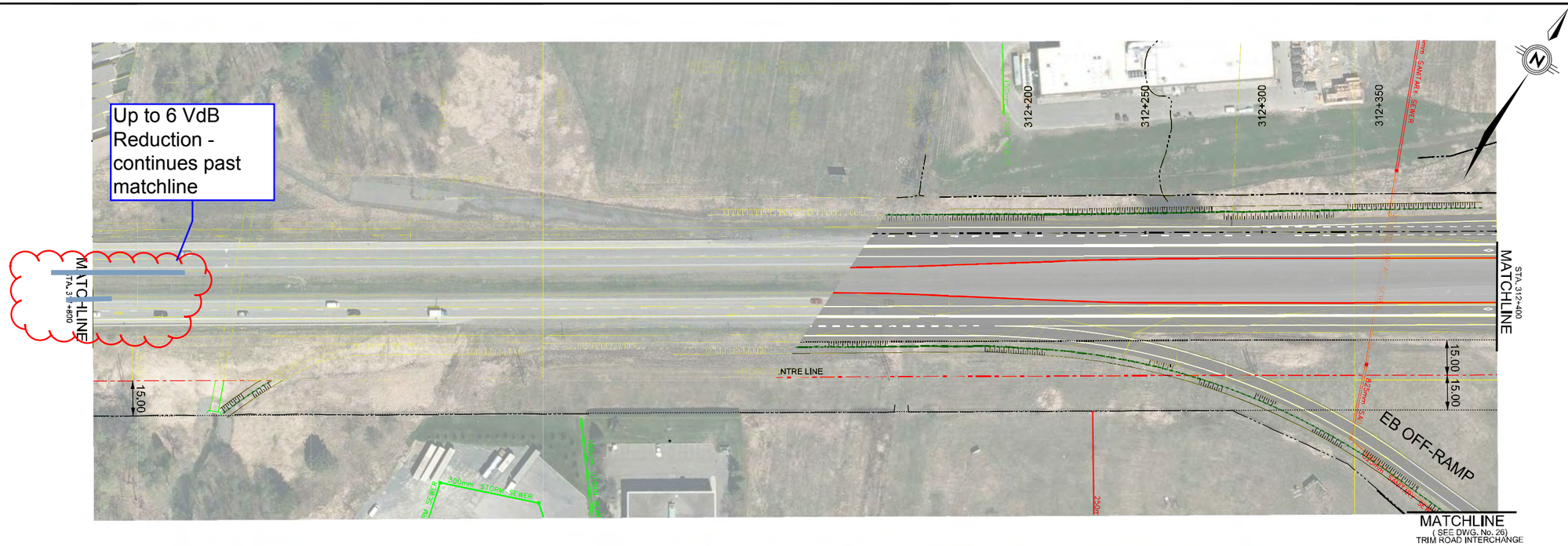
Ottawa

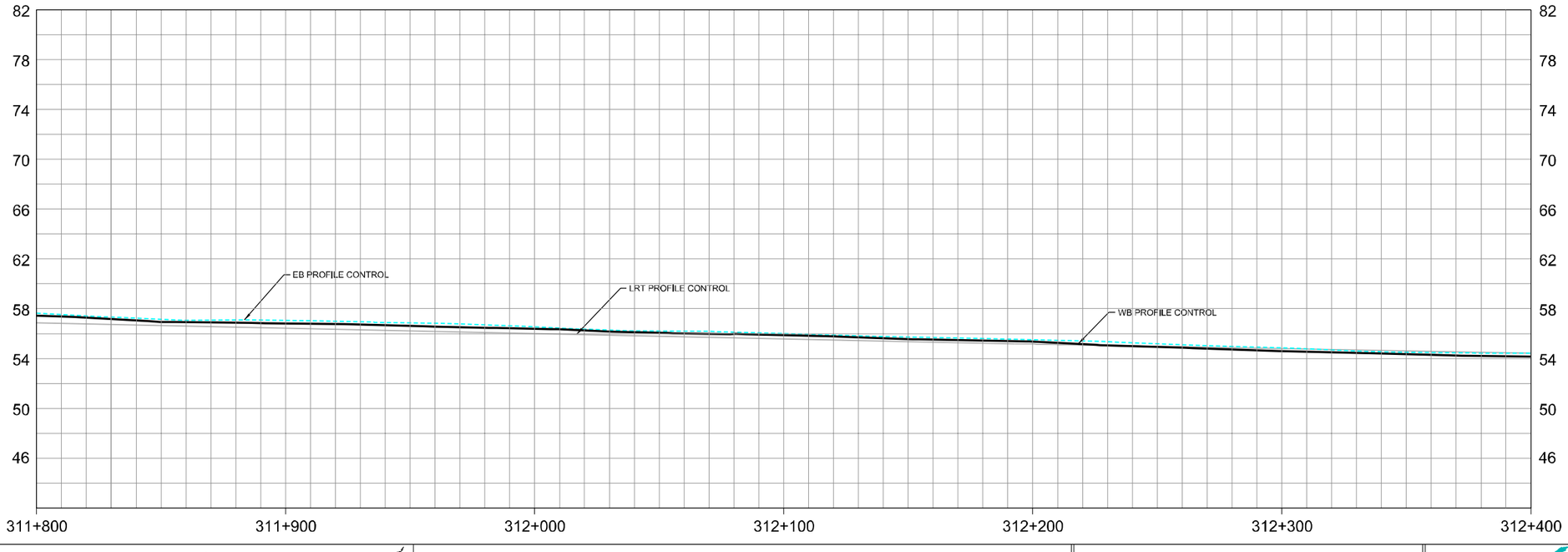
HWY OR174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 311+200 to STA. 311+800

Drawings No.:

Revision: 00

Sheet No.: 21





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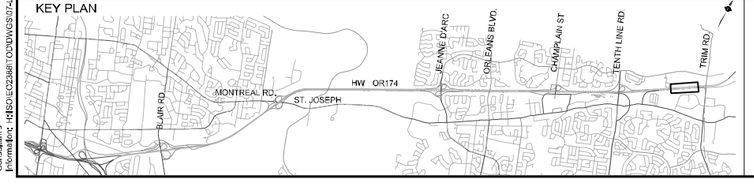

NOTES:

1. APPROXIMATE WESTBOUND TIE IN TO TRIM ROAD INTERCHANGE AT STA. 311+935

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

CAD File Name: EO2388TOD- 01-PDR-22.DGN | Plot Date: XX/XX/XXXX

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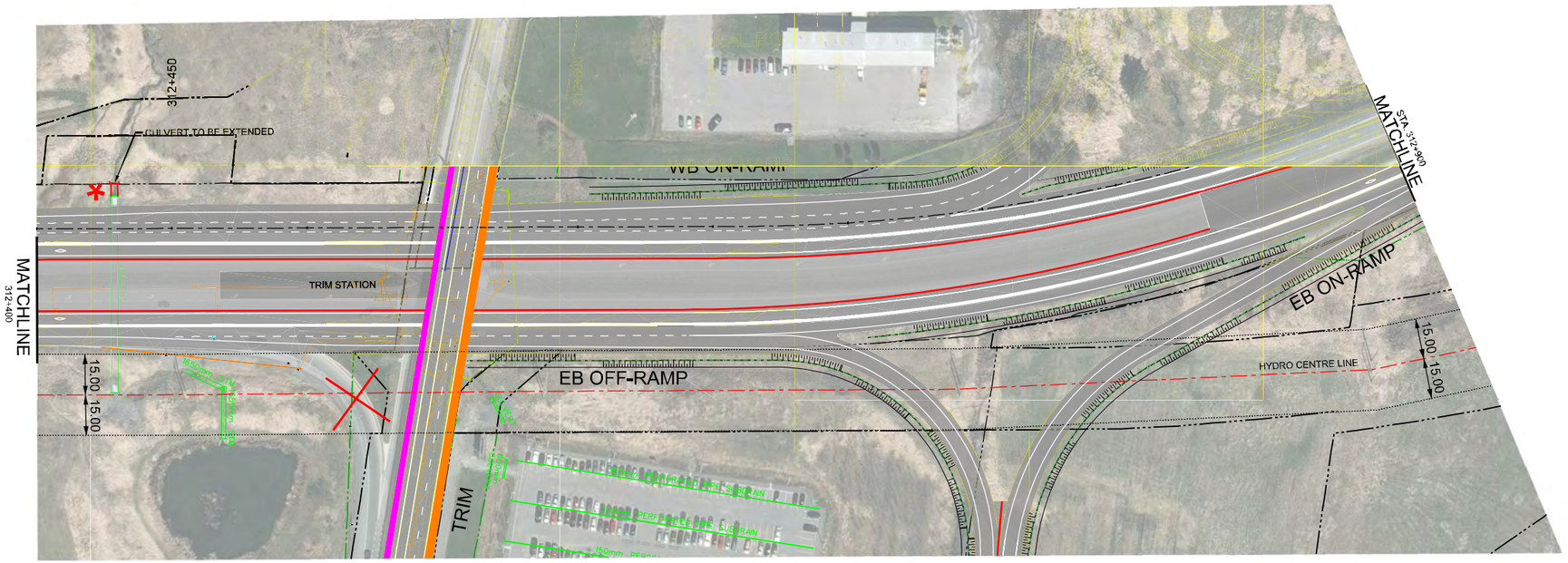
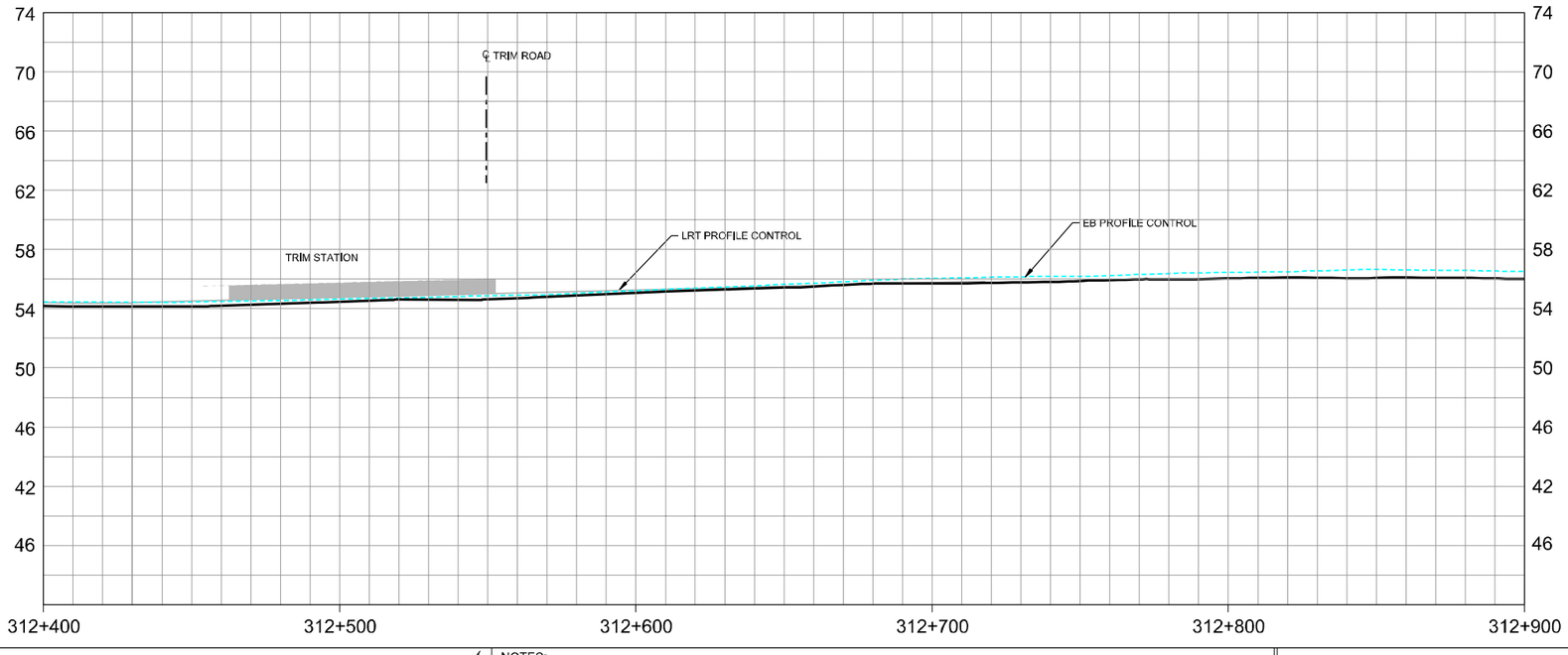
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 311+800 to STA. 312+400

Drawings No.: | Revision: 00 | Sheet No.: 22





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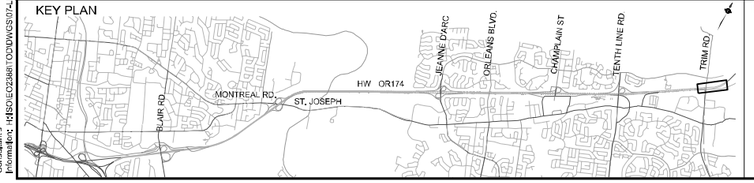

NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By:

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

CAD File Name: EO2388TOD-01-PDR-23.DGN	Plot Date: XX/XX/XXXX

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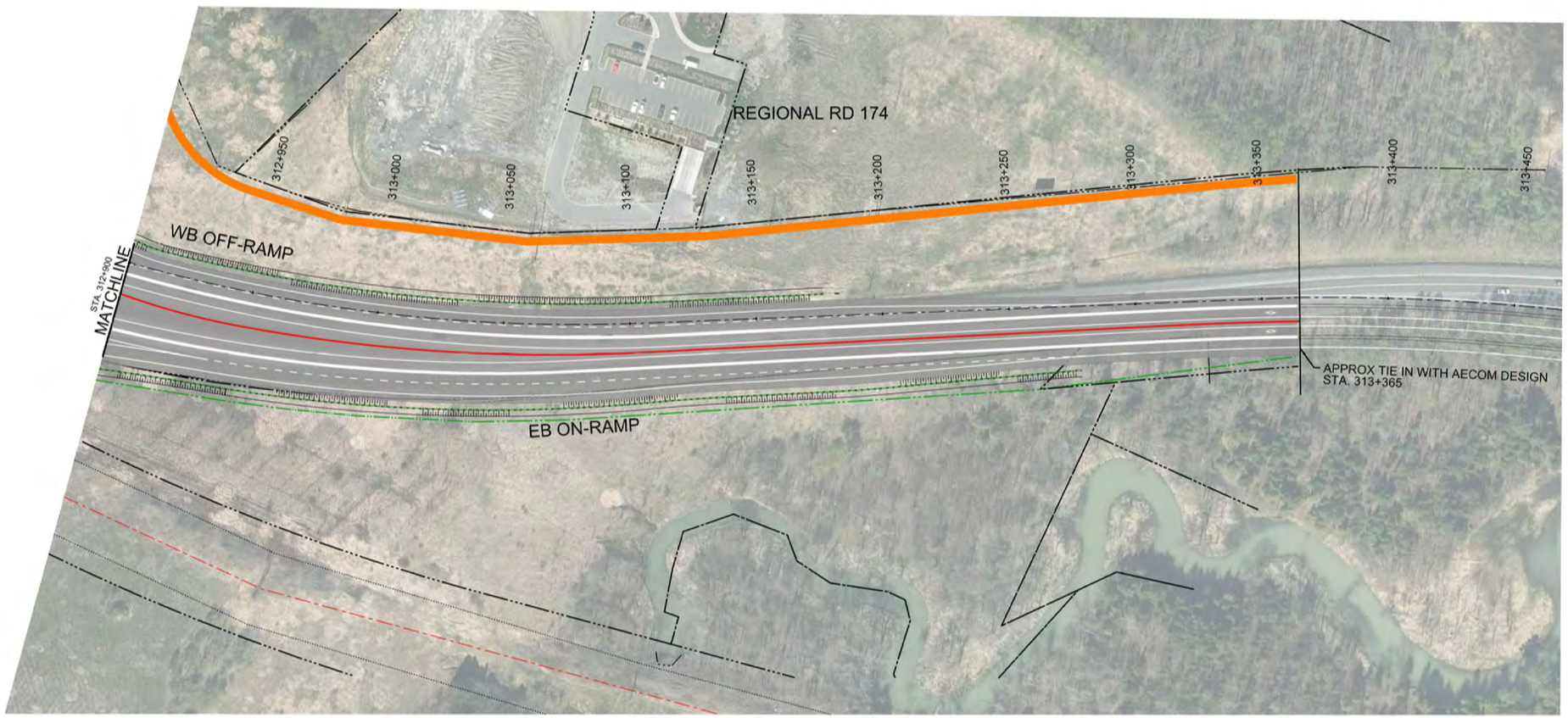
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 312+400 to STA. 312+900

Drawings No.:	Revision: 00	Sheet No.: 23



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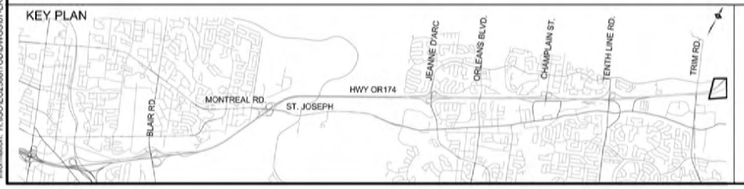

NOTES:

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Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By

Scale: HORIZONTAL 1in 10 20 50 100; 1in 2.5 5 10 25; VERTICAL

CAD File Name: EO2388TOD- 01-PDR-24.DGN	Plot Date: XX/XX/XXXX

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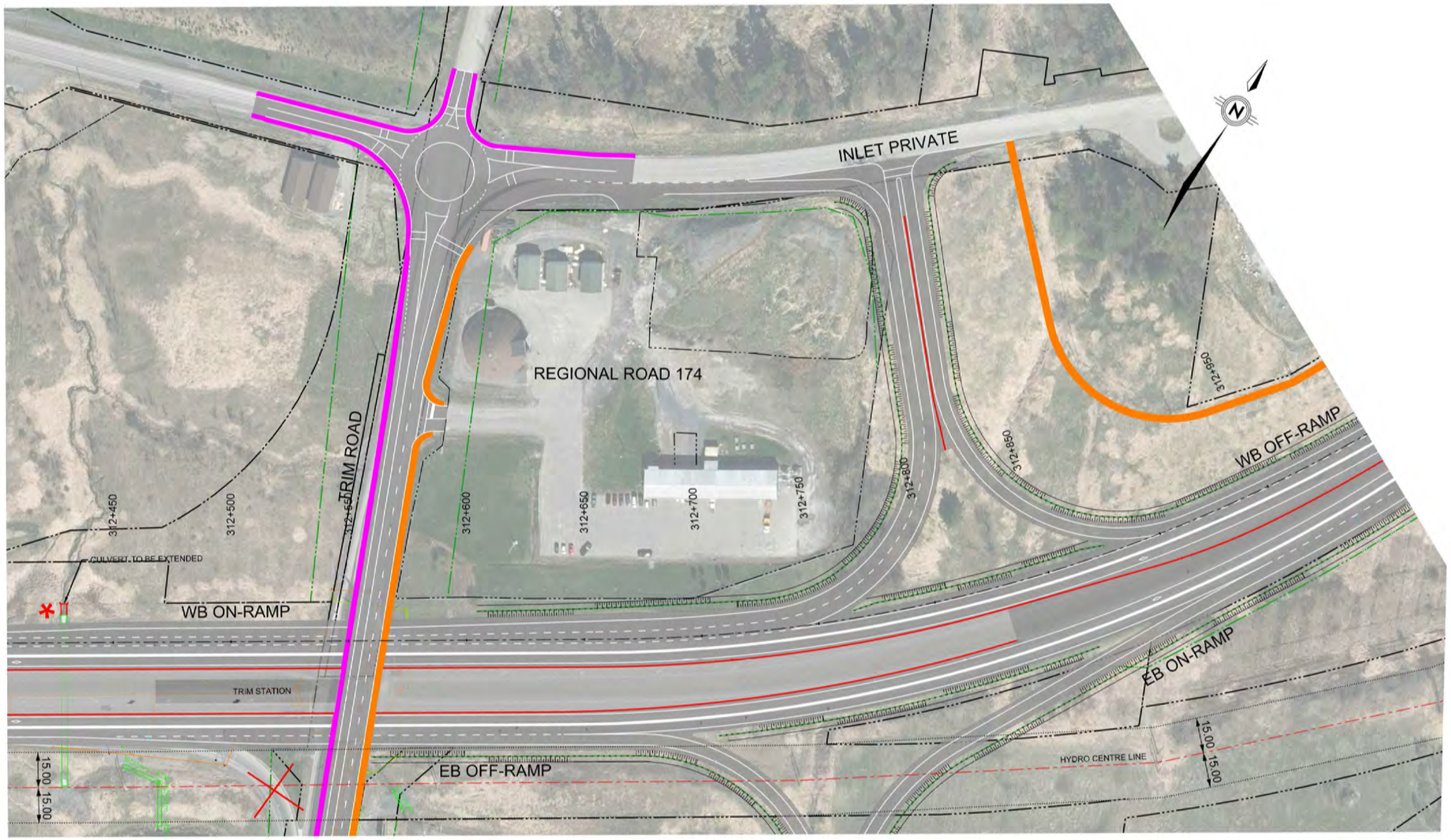
HWY 174 ROAD WIDENING
HOV AND TWO GENERAL PURPOSE LANES
STA. 312+900 to STA 313+450

Drawings No.:	Revision	Sheet No.
	00	24



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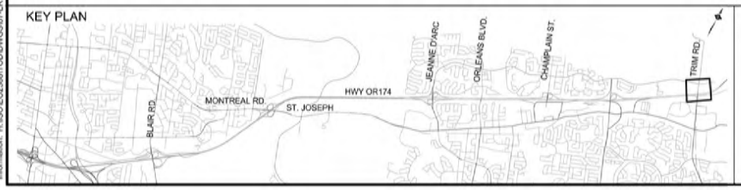

NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By

Scale: HORIZONTAL 0m 10 20 50 100; VERTICAL 0m 2.5 5 10 20

CAD File Name: EO2388TOD- 01-PDR-25.DGN | Plot Date: XX/XX/XXXX

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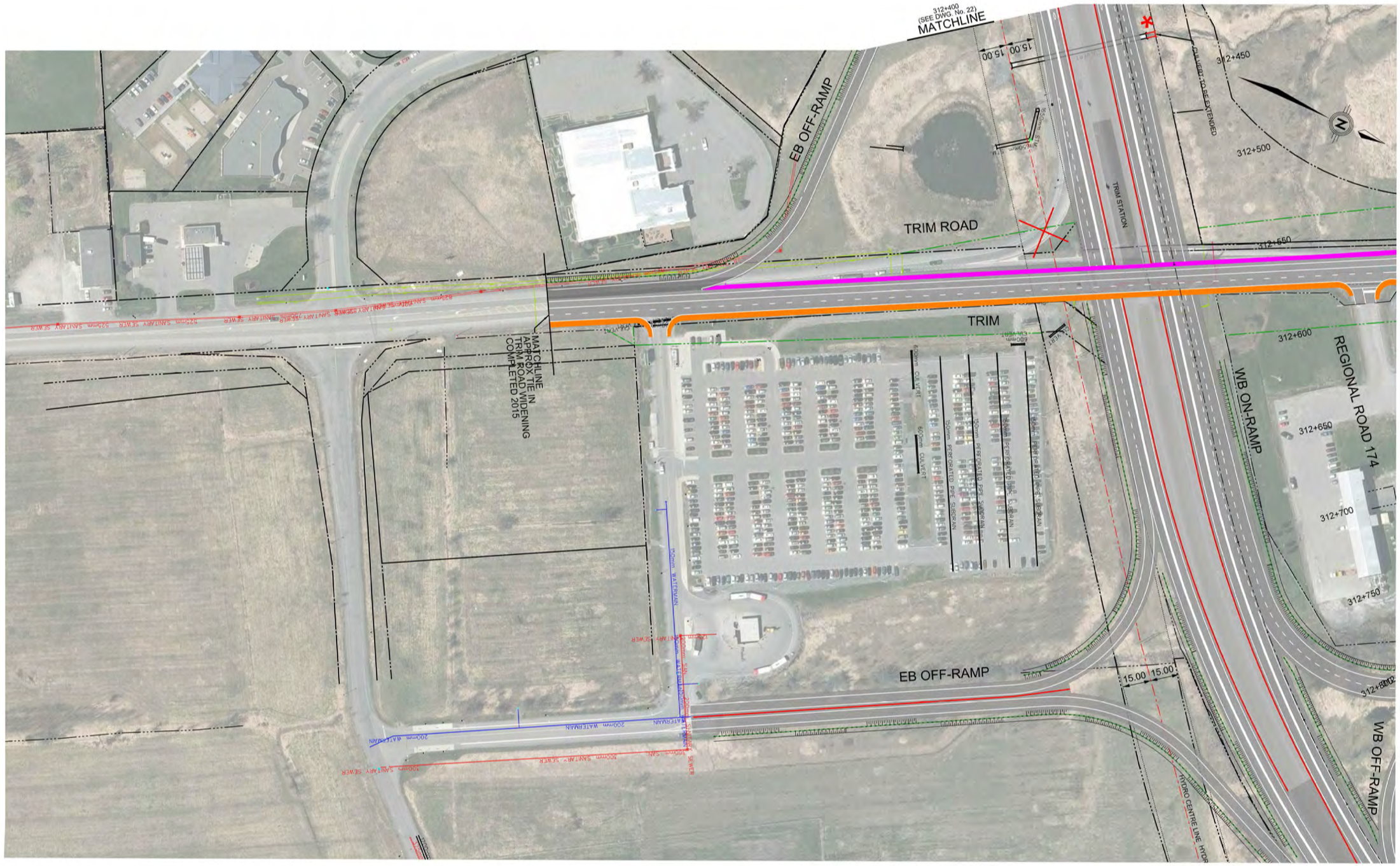
TRIM ROAD INTERCHANGE NORTH

Drawings No.: | Revision: 00 | Sheet No.: 25



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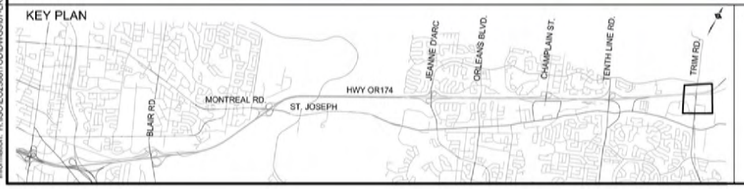

NOTES:

PARSONS

Date: JANUARY 2016	Designed By:	Drawn By:
Project Manager:	Discipline Engineer:	Checked By

Scale: HORIZONTAL 1in 10 20 50 100; 1m 2.5 5 10 25; VERTICAL

CAD File Name: EO2388TOD- 01-PDR-26.DGN	Plot Date: XX/XX/XXXX

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TRIM ROAD INTERCHANGE SOUTH

Drawings No.:	Revision 00	Sheet No. 26