From:	Schell, Natalie EAO:EX
To:	Gerry Fleming; Tsang, Amy TRAN:EX
Cc:	Letkeman, Joanne TRAN:EX; Mintak, David TRAN:EX; Erwin, Janelle A TRAN:EX; Shepard, Michael EAO:EX
Subject:	RE: 216th interchange - response to the public
Date:	Tuesday, January 24, 2017 3:24:57 PM

Okay thanks, Gerry. We will pull this from our response then.

Natalie Schell B.Sc., M.Phil.
T: 250.387.9405 | C: 250.812.7093

From: Gerry Fleming [mailto:GFleming@binnie.com]
Sent: Tuesday, January 24, 2017 11:28 AM
To: Schell, Natalie EAO:EX; Tsang, Amy TRAN:EX
Cc: Letkeman, Joanne TRAN:EX; Mintak, David TRAN:EX; Erwin, Janelle A TRAN:EX; Shepard, Michael EAO:EX
Subject: RE: 216th interchange - response to the public

We have not posted this report Natalie, as the purpose was to review based on the new policy even though the remainder of the PMH1 and the approval was based on the previous policy.
I personally think that this report may tend to confuse the issue as it does not address 216 St and we have included very specific information already (drawing and text) on all the proposed noise walls, including the one on 216 St.
Gerry Fleming
Sr. Project Manager
Cell: 604-315-1174

From: Schell, Natalie EAO:EX [mailto:Natalie.Schell@gov.bc.ca]
Sent: Tuesday, January 24, 2017 10:19 AM
To: Tsang, Amy TRAN:EX <Amy.Tsang@gov.bc.ca>
Cc: Letkeman, Joanne TRAN:EX <Joanne.Letkeman@gov.bc.ca>; Mintak, David TRAN:EX <David.Mintak@gov.bc.ca>; Erwin, Janelle A TRAN:EX <Janelle.Erwin@gov.bc.ca>; Shepard, Michael EAO:EX <Michael.Shepard@gov.bc.ca>; Gerry Fleming <GFleming@binnie.com>
Subject: RE: 216th interchange - response to the public

Thank you for these Amy.

I have one more question – Gerry had sent us the updated Noise Impact Assessment (attached) that was completed in 2016. Is this also available online? If yes, could you please provide us a hyperlink? If it's not available, please let us know so that we don't include this in our response.
Thanks,
Natalie

Natalie Schell B.Sc., M.Phil.
T: 250.387.9405 | C: 250.812.7093

From: Tsang, Amy TRAN:EX
Sent: Monday, January 23, 2017 3:52 PM
To: Schell, Natalie EAO:EX; Mintak, David TRAN:EX; Erwin, Janelle A TRAN:EX; Shepard, Michael EAO:EX
Cc: Letkeman, Joanne TRAN:EX; Mintak, David TRAN:EX; Erwin, Janelle A TRAN:EX
Subject: RE: 216th interchange - response to the public

Hi all,
The four documents (Jan 2017 Project Updates, traffic volume memo, the whitepaper and air quality memo) are posted on the project website (at the bottom of the webpage):
http://www2.gov.bc.ca/gov/content/transportation/transportation-

infrastructure/projects/highway1-216th
The links to each of the documents:

- January 2017 Project Update
  http://www2.gov.bc.ca/assets/gov/driving-and-transportation/transportation-infrastructure/projects/hwy1-216/216-project-update-january_d2_jan-20-2017.pdf

- 216th Street Traffic Volumes Review Memorandum
  http://www2.gov.bc.ca/assets/gov/driving-and-transportation/transportation-infrastructure/projects/hwy1-216/binnie-hwy1-216-st-interchange-traffic-volumes-memo-jan-19-20.pdf

- Review of Land Use and Mitigation Guidance for Near-Roadway Land Use White Paper
  http://www2.gov.bc.ca/assets/gov/driving-and-transportation/transportation-infrastructure/projects/hwy1-216/bc_moti_whitepaper_final_draft_20170120.pdf

- Qualitative Near-Roadway Air Quality Analysis for Highway 1 and 216th Street Interchange Memorandum
  http://www2.gov.bc.ca/assets/gov/driving-and-transportation/transportation-infrastructure/projects/hwy1-216/216th_st_interchange_memo_20170120.pdf

Regards,
Amy

From: Schell, Natalie EAO:EX
Sent: Friday, January 20, 2017 4:40 PM
To: 'Gerry Fleming'
Cc: Letkeman, Joanne TRAN:EX; Mintak, David TRAN:EX; Erwin, Janelle A TRAN:EX; Tsang, Amy TRAN:EX; Shepard, Michael EAO:EX
Subject: RE: 216th interchange - response to the public

Thank you, Gerry!
Once these three documents (the whitepaper, air quality memo, and updated traffic forecast memo) are posted, could you please send us the hyperlinks to each of them?

Thanks again for all of your work pushing to finalize these materials.
Have a great weekend!

Best,
Natalie

Natalie Schell B.Sc., M.Phil.
T: 250.387.9405 | C: 250.812.7093

From: Gerry Fleming [mailto:GFleming@binnie.com]
Sent: Friday, January 20, 2017 4:29 PM
To: Shepard, Michael EAO:EX; Schell, Natalie EAO:EX
Cc: Letkeman, Joanne TRAN:EX; Mintak, David TRAN:EX; Erwin, Janelle A TRAN:EX; Tsang, Amy TRAN:EX
Subject: RE: 216th interchange - response to the public

The updated whitepaper and memo.
We decided to leave the 'draft' watermark on these in case we get pushback from others, pretty standard procedure.
Amy, please work with Lucent Quay to get them all posted as quickly as possible.

Gerry Fleming

From: Gerry Fleming
Sent: Friday, January 20, 2017 1:06 PM
To: 'Shepard, Michael EAO:EX' <Michael.Shepard@gov.bc.ca>; Schell, Natalie EAO:EX <Natalie.Schell@gov.bc.ca>
Cc: Letkeman, Joanne TRAN:EX <Joanne.Letkeman@gov.bc.ca>; Mintak, David TRAN:EX <David.Mintak@gov.bc.ca>; Erwin, Janelle A TRAN:EX <Janelle.Erwin@gov.bc.ca>; Tsang, Amy TRAN:EX <Amy.Tsang@gov.bc.ca>
Subject: RE: 216th interchange - response to the public

I think we need to put them all together and I have staff working on the logistics to make sure it can be easily found on the website.
Timing is based on getting the new versions of the air quality memo and white paper, so may be today but if not then I am assuming Monday latest.

From: Shepard, Michael EAO:EX [mailto:Michael.Shepard@gov.bc.ca]
Sent: Friday, January 20, 2017 12:59 PM
To: Gerry Fleming <GFleming@binnie.com>; Schell, Natalie EAO:EX <Natalie.Schell@gov.bc.ca>
Cc: Letkeman, Joanne TRAN:EX <Joanne.Letkeman@gov.bc.ca>; Mintak, David TRAN:EX <David.Mintak@gov.bc.ca>; Erwin, Janelle A TRAN:EX <Janelle.Erwin@gov.bc.ca>; Tsang, Amy TRAN:EX <Amy.Tsang@gov.bc.ca>
Subject: RE: 216th interchange - response to the public

Thanks for the update, Gerry.
Can you please confirm the timing of when the materials are expected to be posted on the website?
Mike

From: Gerry Fleming [mailto:GFleming@binnie.com]
Sent: Friday, January 20, 2017 12:52 PM
To: Schell, Natalie EAO:EX
Cc: Letkeman, Joanne TRAN:EX; Mintak, David TRAN:EX; Erwin, Janelle A TRAN:EX; Shepard, Michael EAO:EX; Tsang, Amy TRAN:EX
Subject: RE: 216th interchange - response to the public

Natalie,
I promised you an update so here is where we are at, I have attached the following:

- Final - Update letter that will be mailed out to adjacent residents and posted to the project website. This will also be the basis for responses to residents or Vancouver Fraser Health Authority.
- Final - Traffic memo that is referenced in the update letter and is being used to update the air quality memo and white paper. Will be posted to the project website
- Draft – Air quality memo and white paper, these are being revised based on the new traffic info and we are expecting will be much more positive in tone. Unfortunately these are running a bit behind and I am expecting the updated version by end of business today. These will also be posted to the project website

Gerry Fleming
Cell: 604-315-1174

From: Schell, Natalie EAO:EX [mailto:Natalie.Schell@gov.bc.ca]
Sent: Wednesday, January 18, 2017 4:43 PM

To: Gerry Fleming <GFleming@binnie.com>
Cc: Letkeman, Joanne TRAN:EX <Joanne.Letkeman@gov.bc.ca>; Mintak, David TRAN:EX <David.Mintak@gov.bc.ca>; Erwin, Janelle A TRAN:EX <Janelle.Erwin@gov.bc.ca>; Shepard, Michael EAO:EX <Michael.Shepard@gov.bc.ca>
Subject: RE: 216th interchange - response to the public

Thanks Gerry!

Natalie Schell B.Sc., M.Phil.
T: 250.387.9405 | C: 250.812.7093

From: Gerry Fleming [mailto:GFleming@binnie.com]
Sent: Wednesday, January 18, 2017 4:40 PM
To: Schell, Natalie EAO:EX
Cc: Letkeman, Joanne TRAN:EX; Mintak, David TRAN:EX; Erwin, Janelle A TRAN:EX; Shepard, Michael EAO:EX
Subject: RE: 216th interchange - response to the public

Agreed to use the project address for questions going forward, 216interchange@gov.bc.ca
As discussed, I will let you know when for the draft documents tomorrow.
Gerry Fleming

From: Schell, Natalie EAO:EX [mailto:Natalie.Schell@gov.bc.ca]
Sent: Wednesday, January 18, 2017 11:41 AM
To: Gerry Fleming <GFleming@binnie.com>
Cc: Letkeman, Joanne TRAN:EX <Joanne.Letkeman@gov.bc.ca>; Mintak, David TRAN:EX <David.Mintak@gov.bc.ca>; Erwin, Janelle A TRAN:EX <Janelle.Erwin@gov.bc.ca>; Shepard, Michael EAO:EX <Michael.Shepard@gov.bc.ca>
Subject: RE: 216th interchange - response to the public

Hi Gerry,
We wanted to follow up with you regarding a revision we have made to the last paragraph in our draft response:
Thank you again for your email and for your interest in the project. The concerns and issues raised in your email are related to the work being undertaken by MOTI, and as such I suggest that any subsequent questions or concerns be directed to them. If you have questions related to the environmental assessment process, please do not hesitate to contact me or Natalie Schell (Natalie.schell@gov.bc.ca).
We wanted to confirm that you are comfortable with us directing future correspondence to your team. Also, is there a standard contact for your team that we could include in this paragraph?
Our Deputy has asked us for a status update from our team by tomorrow afternoon, and we would like to confirm with him the timing of materials being review, finalized and posted. Could you please give us another update by end of day today?
Thanks again for all of your help Gerry!

Best,
Natalie

Natalie Schell B.Sc., M.Phil.
T: 250.387.9405 | C: 250.812.7093

From: Schell, Natalie EAO:EX
Sent: Tuesday, January 17, 2017 11:18 AM
To: 'Gerry Fleming'
Cc: Letkeman, Joanne TRAN:EX; Mintak, David TRAN:EX; Erwin, Janelle A TRAN:EX; Shepard, Michael EAO:EX

Subject: RE: 216th interchange - response to the public

Hi Gerry,

Thank you for the update. We have revised our response based on the information you have provided (attached for your review). You will notice that we have re-phrased several sentences so that we can provide links to the reports/documents once they are made available online. As you stated, we hope we can do this by the end of this week.

Also, since we spoke last week, EAO has received 4 additional incoming correspondence that express similar concerns. EAO now has a total of 7 emails/letters that we will need to respond to. We also understand that our ADM has been forwarding all of these to Kevin Richter for his information.

Please keep us updated on any progress, and thank you again for your feedback.

Best,

Natalie Schell B.Sc., M.Phil.
T: 250.387.9405 | C: 250.812.7093

From: Gerry Fleming [mailto:GFleming@binnie.com]
Sent: Tuesday, January 17, 2017 8:03 AM
To: Schell, Natalie EAO:EX; Shepard, Michael EAO:EX
Cc: Letkeman, Joanne TRAN:EX; Mintak, David TRAN:EX; Erwin, Janelle A TRAN:EX
Subject: 216th interchange - response to the public

Natalie/Michael, a bit of an update:

MOH and EAO Response

- We received your draft response on Friday, which makes reference to the memo/white paper and also to the ToL Council report
- I responded and included a new noise report that was prepared for the project in 2016
- I have received no further comments on your draft (attached)
- I assume that you are waiting for us to finalize the memo/white paper and decide whether to post it to our website

Updated Traffic Information

- We asked Parsons for opening day volumes and based on that an error was discovered on the 2045 forecast information previously released to the public
- We have asked Binnie to prepare a memo to explain the methodology and results of the new forecast information, which we will post to our website
- I will send you a draft of this memo as soon as possible

Memo/white paper

- We talked to the consultant yesterday and discussed the updated traffic numbers we received from Parsons
- The Consultant will start working on revising the memo/white paper based on the updated forecast info
- I will send you a draft of the updated info as soon as possible
- We will be posting this to our website as soon as the changes are made and approved

Project Update letter

- I sent out a draft 'project update' letter prepared by Lucent Quay to our team to review, which includes notice that the project is tendered and refers to the air quality memo posted on our website
- I intend to further amend the letter to draw attention to the Traffic Memo

- I sent a copy to Langley yesterday as I do quote the Council Report and a few highlights from that
- I will send you a draft of this letter as soon as possible
- This letter will be distributed by mail to adjacent residents, copied to those who have written in and posted to our website

Schedule

- We are working hard to finalize and post all of these documents by the end of this week

Gerry Fleming
Cell: 604-315-1174

From: Schell, Natalie EAO:EX [mailto:Natalie.Schell@gov.bc.ca]
Sent: Monday, January 16, 2017 3:42 PM
To: Gerry Fleming <GFleming@binnie.com>
Cc: Shepard, Michael EAO:EX <Michael.Shepard@gov.bc.ca>; Letkeman, Joanne TRAN:EX <Joanne.Letkeman@gov.bc.ca>; Mintak, David TRAN:EX <David.Mintak@gov.bc.ca>; Erwin, Janelle A TRAN:EX <Janelle.Erwin@gov.bc.ca>
Subject: RE: Follow up: EAO response to residents re 216

Hi Gerry,
Thank you for your email and clarifying further points on the noise assessments.
Have you had a chance to review our draft response? Give us a call if you would like to discuss.

Thanks,
Natalie

Natalie Schell B.Sc., M.Phil.
T: 250.387.9405 | C: 250.812.7093

From: Gerry Fleming [mailto:GFleming@binnie.com]
Sent: Friday, January 13, 2017 2:23 PM
To: Schell, Natalie EAO:EX
Cc: Shepard, Michael EAO:EX; Letkeman, Joanne TRAN:EX; Mintak, David TRAN:EX; Erwin, Janelle A TRAN:EX
Subject: RE: Follow up: EAO response to residents re 216

Natalie,
I think the reasoning behind the 2011 Noise Report was because TI Corp/MOTI intended to deliver two noise walls independent of Kiewit, on the north side of the highway adjacent to Barnston Drive (east of 176 St) and on the south side of the highway between 208 St and 216 St. For both of these there was an open tender that allowed bidders to use any of the products approved by MOTI and the result was 3m high wood walls.
I have attached a new report from BKL prepared as part of the 216 St project. We decided to commission this work as MOTI has a new policy in place and the result is that we are building 5m high concrete walls (this was the choice from the open house meeting) on the north side of the highway, rather than the 3m height that was the maximum allowed under the previous policy during the PMH1 project. On the south side, we are extending the wood wall to cover off residents not captured under the initial construction.
As you can see in the report and as discussed, we did not model along 216 St itself as that is within ToL jurisdiction and the MOTI policy does not apply.
I am copying others to review the draft response and will try to get comments back to you by end of day as requested.
Gerry Fleming

From: Schell, Natalie EAO:EX [mailto:Natalie.Schell@gov.bc.ca]
Sent: Friday, January 13, 2017 1:32 PM
To: Gerry Fleming <GFleming@binnie.com>
Cc: Shepard, Michael EAO:EX <Michael.Shepard@gov.bc.ca>
Subject: RE: Follow up: EAO response to residents re 216

Hi Gerry,

Thank you for your update. EAO has drafted a response email to Fraser Health (attached). Would you be able to review and let us know your thoughts by end of day today? We are aiming to send out our responses next week.

Also, a question about the additional 2011 noise impact study (link here) – why was this additional study conducted? Was it in response to public concerns? Do you believe the results of this assessment still hold today? We are thinking of mentioning this in our response as well.

Thank you for your help!

Best,

Natalie

Natalie Schell B.Sc., M.Phil.
T: 250.387.9405 | C: 250.812.7093

From: Gerry Fleming [mailto:GFleming@binnie.com]
Sent: Friday, January 13, 2017 12:10 PM
To: Shepard, Michael EAO:EX
Cc: Schell, Natalie EAO:EX; Erwin, Janelle A TRAN:EX; Mintak, David TRAN:EX; Letkeman, Joanne TRAN:EX
Subject: RE: Follow up: EAO response to residents re 216

Michael, a bit of an update from my perspective (sorry for the delay in responding):

- We do have tentative approval to release the memo and white paper, however we need to ensure that ToL is on-board and we are trying to schedule a meeting with senior management from both parties.
- I am making progress on securing opening day traffic information, as discussed I think this will help to put some context around the current information from residents.
- I have started our consultant working on the joint project update and hope to have a draft to review by both parties (MOTI and ToL) on Tuesday latest. Note that the intent is to consider including a reference to all the above noted information in the update, along with a reference and probably excerpts from the ToL October 17 Council report.
- I will need approval on the project update before sending it out, the initial assumption was to send this to all homes that back onto either Hwy 1 or 216 St, however a further consideration may be to also send to those who have written in as they would not necessarily be included and/or to consider posting a more generic version of the update as we do intend to post quarterly updates so this could be treated as the first of those?

As discussed, my opinion is that it is best that MOTI remain in the lead on responding as the agency delivering the project.

Regards,

Gerry Fleming
Sr. Project Manager
Cell: 604-315-1174

From: Shepard, Michael EAO:EX [mailto:Michael.Shepard@gov.bc.ca]
Sent: Friday, January 13, 2017 10:41 AM
To: Gerry Fleming <GFleming@binnie.com>

Cc: Schell, Natalie EAO:EX <Natalie.Schell@gov.bc.ca>
Subject: Follow up: EAO response to residents re 216

Hi Gerry,

I wanted to follow up on the call we had with yourself and the Township earlier this week. You had committed to seeking clarity on the potential timing for finalizing and posting the memo and white paper, as well as timing for updating the construction status update, that we had discussed could be jointly sent out to residents from MOTI and the Township. We had expressed an interest in referring to both of these actions, and potentially providing links to any posted material, in the response letters that we are drafting.

Once we hear from you today, we will aim to send out our draft responses to you sometime in the early afternoon for your review and comment.

Don't hesitate to give Natalie or I a call to discuss.

Thanks,

Michael Shepard
Project Assessment Manager
Environmental Assessment Office
Michael.Shepard@gov.bc.ca
Office: 1-250-387-0233
Cell: 1-250-213-9809

From:	Gordon Swystun
To:	Gerry Fleming
Cc:	Tsang, Amy TRAN:EX; Mintak, David TRAN:EX; Smith, Grant A TRAN:EX
Subject:	RE: Noise Mitigation Wall / 216 St Interchange
Date:	Tuesday, February 21, 2017 10:02:38 PM

Gerry … thanks for the heads up on this. I'll discuss with staff.
Thanks,

Gord Swystun | Project Supervisor
Engineering Division | Township of Langley
Direct Line: 604.533.6107

From: Gerry Fleming [mailto:GFleming@binnie.com]
Sent: Tuesday, February 21, 2017 4:34 PM
To: Gordon Swystun
Cc: Amy Tsang ; David Mintak (David.Mintak@gov.bc.ca) ; Grant Smith (Grant.A.Smith@gov.bc.ca)
Subject: FW: Noise Mitigation Wall / 216 St Interchange
Importance: High

Gord,
I am copying this to you to make sure you are aware that the project will respond to the issues of the traffic forecasting, but not to the issue of the noise wall along 216 St.
For the record, I have attached a copy of the Binnie memo that is the basis of the air quality work by Sierra Research. This document is readily available on the project website.
In a conversation with Jonathan Ho today he told me that the EMME model simply computes the distance between the intersection of Telegraph Trail/216 St and the intersection of 88 Ave/212 St and as the distance is the same whether you turn at Telegraph Trail or at 88 Ave, it 'splits' the turn volume between the two. I am telling you this in case you are asked, our response to residents is going to be brief, basically as follows:
MOTI will continue to review and monitor the effects of the new interchange on the surrounding road network and will work with the Township of Langley to appropriately respond.
Gerry Fleming

From: s.22
Sent: Sunday, February 19, 2017 4:35 PM
To: jfroese@tol.ca
Cc: krichter@tol.ca; parnason@tol.ca; aquaale@tol.ca; msparrow@tol.ca; blong@tol.ca; cfox@tol.ca; 'Blair Whitmarsh' <bwhitmarsh@tol.ca>; ddavis@tol.ca; hlth.minister@gov.bc.ca; Catherine.McKenna@parl.gc.ca; Hon.Jane.Philpott@Canada.ca; Transportation, Minister TRAN:EX <Minister.Transportation@gov.bc.ca>; env.minister@gov.bc.ca; Gerry Fleming <GFleming@binnie.com>
Subject: Noise Mitigation Wall / 216 St Interchange
Importance: High

Mayor Froese ,
I have reviewed the Sierra report and find it to be flawed . The " new " projected traffic numbers are not logical . I have written the Province regarding this :
I have questions about how "traffic north of the highway disperses" .
The analysis provided by Sierra Research indicates that on opening day, there will be 11,650 ADT between the interchange and Telegraph Trail, and then 7,100 ADT between Telegraph Trail and 88

Avenue. This computes to a “dispersion” of 4550 vehicles at the Telegraph Trail and 216 Street junction, as there are only a few driveways, and no connecting roads between Telegraph Trail and 88 Avenue. Similarly, in the horizon year, the “dispersion” will be 8400 at the Telegraph Trail junction. Is SR familiar with the urban geography of this area? Where are all these vehicles dispersing to?

Moreover, SR has inflated the initial (current) values. Between Telegraph Trail and 88, the most recent data are 3329 (2014) ADT, not 4000, and from 88 to 96, ADT is 3885 (2015) which is close to 4000, but is nevertheless overestimated. There is no official data for the 216 Street segment between the highway and Telegraph Trail, but if you have ever been on that segment of road, ADT is surely less than 100 (not including MOTI work vehicles). Did anyone actually put down a traffic counter on that segment for a week and then take an average?

Again, it is really hard to believe that only 200 extra vehicles are expected north of 88 Avenue. Traffic volume north of the interchange at 200 Street is 38,986 (2014) ADT. So, to be honest, the previous estimates of 22,000 vehicles seemed much more credible in comparison. It appears to be generally common knowledge that a highway interchange increases the volume along its routes substantially, even far along the routes.

What were the models used, and the assumptions that were made for these analyses? Why are the results different now (compared to the 22,000 estimate)? Why were to models/parameters/calibrating of models switched or changed?

Where did you receive “additional traffic information?” Would you please pass along the original source?

I have spoken with s.22 and he holds his ground regarding this project being a threat to human health without a buffer zone . As you know the township sacrificed this land for development .

For now let’s focus on noise as noise is under the jurisdiction of the township . This plan will create traffic which equals 85 decibels . A heavy truck equals 90 decibels or the equivalent of 32 cars .Long exposure to sounds at 85 decibels can cause hearing loss .

What else ? sleep disturbances , high blood pressure , gastrointestinal disturbances . Why ? excess noise causes us to produce stress hormones .

The WHO ‘s guideline is 30 decibels or less for a good nights sleep . Sleep deprivation has been proven to cause a myriad of health problems .

I want to point out that most bedrooms are upstairs . This means that a noise mitigation wall will do nothing to aid sleep for most residents . I along with many other residents plan to hold the township accountable for costs we may incur such as triple glazed windows to allow us to sleep .

When I asked you on Jan 10 what studies / research the township has done to justify a noise wall at 1.5 million dollars of our money you had no answers . Please advise as to what research has been done to support spending this huge sum ? As you support a truck route you are also responsible for the noise this will create .

I , on the other hand have done some research . I have consulted with s.22

s.22

I realize I am repeating myself as I have brought forward these points before however the township is apparently choosing to ignore them .

As I await some solid answers from the Province I expect some answers without delay from the township . Perhaps it is time to schedule another meeting with you ?

s.22

From:	James Norris
To:	Gerry Fleming
Subject:	BKL Noisewall Assessment
Date:	Friday, January 13, 2017 1:56:11 PM
Attachments:	BKL - Hwy 1 and 216 St Interchange NIA Final Report Rev 1.pdf

Hi Gerry,
I believe this is the most current report from BKL.
Regards,

James Norris P.Eng.
Highway Design Manager, Associate
Direct: +1 (778) 945-6056

R.F. Binnie & Associates Ltd.
Leading in Quality: OQM Certified March 2013.
205-4946 Canada Way
Burnaby, BC V5G 4H7
Office: +1 (604) 420-1721 x6056 Fax: +1 (604) 420-4743

HIGHWAY 1 WIDENING AND 216 STREET INTERCHANGE PROJECT

ENVIRONMENTAL NOISE IMPACT ASSESSMENT

PREPARED FOR:

BINNIE

R.F. BINNIE & ASSOCIATES LTD.

MAY 2016

REVISION 1

BKL Consultants in Acoustics

HIGHWAY 1 WIDENING AND 216 STREET INTERCHANGE PROJECT

ENVIRONMENTAL NOISE IMPACT ASSESSMENT

PREPARED FOR:

BINNIE

R.F. BINNIE & ASSOCIATES LTD.

MAY 2016

REVISION 1

PREPARED BY:

BKL CONSULTANTS LTD
acoustics • noise • vibration

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Trevor Cheng, EIT

Mark Bliss, P.Eng.

BKL Consultants in Acoustics

NOTICE

BKL Consultants Ltd. (BKL) has prepared this report for the sole and exclusive benefit of the R.F. Binnie & Associates Ltd. (the Client) in support of the project environmental assessment under applicable regulations. BKL disclaims any liability to the Client and to third parties in respect of the publication, reference, quoting or distribution of this report or any of its contents to and reliance thereon by any third party.

This document contains the expression of the professional opinion of BKL, at the time of its preparation, as to the matters set out herein, using its professional judgment and reasonable care. The information provided in this report was compiled from existing documents and data provided by the Client, site noise measurements and by applying currently accepted industry practice and modelling methods. Unless expressly stated otherwise, assumptions, data and information supplied by or gathered from other sources (including the Client, other consultants, testing laboratories and equipment suppliers, etc.) upon which BKL's opinion as set out herein is based has not been verified by BKL; BKL makes no representation as to its accuracy and disclaims all liability with respect thereto.

This document is meant to be read as a whole, and sections or parts thereof should thus not be read or relied upon out of context. BKL reserves the right to modify the contents of this report, in whole or in part, to reflect any new information that becomes available. If any conditions become apparent that differ significantly from the understanding of conditions as presented in this report, BKL should be notified immediately to reassess the conclusions provided herein.

EXECUTIVE SUMMARY

After being retained by R.F. Binnie & Associates Ltd. (Binnie), BKL Consultants Ltd. (BKL) conducted an environmental noise assessment for the proposed Highway 1 Widening and 216 Street Interchange Project (the Project). The Project includes adding an extra lane in each direction along Highway 1 between 202 Street and 216 Street and building an interchange at 216 Street. The Project is located in Langley, BC.

BKL's environmental noise assessment aimed to

- identify noise-sensitive land uses potentially impacted by Highway 1 traffic noise within the Project construction limits;
- evaluate existing noise conditions at potentially impacted noise-sensitive receivers;
- predict the future noise environment 10 years after Project completion;
- assess the noise impact of the Project according to criteria outlined in the *2014 Policy for Assessing and Mitigating Noise Impacts from New and Upgraded Numbered Highways* (the Policy) published by the Ministry of Transportation and Infrastructure (MOTI);
- identify noise mitigation strategies as warranted by the Policy; and
- provide construction noise best management practices (BMPs).

To predict the attenuation of Project-related noise and assess the impacts of such noise against the Policy criteria, BKL created a 3-D noise model that included

- baseline noise measurements conducted in November 2014 and November 2015;
- existing and projected future traffic volumes, provided by MOTI and Binnie;
- the topography and ground conditions within the Project area, including an existing 3 metre high noise wall south of Highway 1 extending east from 208 Street; and
- the geometry of the new road and interchange alignment.

According to BKL's assessment, predictions and analysis, 187 of 212 residences in the Project area would be affected by Moderate noise impacts, as defined by the Policy criteria. Seven would be affected by Severe noise impacts. Three classrooms in Alex Hope Elementary School would be exposed to noise levels that exceed the maximum one hour equivalent noise levels outlined by the Policy.

In general, BKL predicts that the increase in noise due to the Project would be less than 2 dBA. Most of the predicted Moderate and Severe noise impacts are due to noise exposures that are already very noisy.

BKL recommends considering the following potential mitigation:

- extending the existing noise wall along the Highway 1 right of way to the east until 216 Street;
- building new 5 metre high noise walls along the northern edge of Highway 1 right of way from Yorkson Creek to 216 Street;
- quiet pavement or building facade improvements to offset noise increases and eliminate Severe impacts predicted at residences behind the existing noise wall; and
- building facade and ventilation system improvements at Alex Hope Elementary.

BKL believes that the above noise mitigation would meet the Policy's requirements, but additional analysis may be required to further develop the detailed design.

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List of Abbreviations and Acronyms

Abbreviation/Acronym	Definition
AADT	annual average daily traffic
ANSI	American National Standards Institute
µPa	micropascal
Binnie	R.F. Binnie & Associates Ltd.
BKL	BKL Consultants Ltd.
BMP	best management practice
dB	decibel
dBA	A-weighted decibel
ISO	International Standards Organization
km	kilometre
km/h	kilometres per hour
L_d	daytime (7 am to 10 pm) equivalent sound level
L_{dn}	day-night equivalent sound level
L_{eq}	equivalent sound level
L_{eq24}	24-hour equivalent sound level
L_n	nighttime (10 pm to 7 am) equivalent sound level
m	metre
MOTI	British Columbia Ministry of Transportation and Infrastructure
the Project	Highway 1 Widening and 216 Street Interchange Project
the Policy	*2014 Policy for Assessing and Mitigating Noise Impacts from New and Upgraded Numbered Highways*

1 INTRODUCTION

BKL Consultants Ltd. (BKL) has been retained by R.F. Binnie & Associates Ltd. (Binnie) to provide an environmental noise assessment for the proposed Highway 1 Widening and 216 Street Interchange Project (the Project). The Project, being an upgrade of an existing numbered highway, requires a noise impact study to determine the potential need for mitigation according to *2014 Policy for Assessing and Mitigating Noise Impacts from New and Upgraded Numbered Highways* (The Policy) published by the BC Ministry of Transportation and Infrastructure (MOTI).

This report documents existing noise exposure levels measured at several noise-sensitive receiver locations near the Project, the future noise climate predicted 10 years after the completion of the Project, noise impact assessment results and any required noise mitigation options.

2 PROJECT DESCRIPTION

The Project scope includes improvements along Highway 1 in Langley, BC, from 202 Street to 216 Street, a distance of approximately 3.5 km, and along 216 Street north and south of the highway. The area is mainly residential land use and agricultural land reserve with the exception of one school whose property line is adjacent to the highway right-of-way.

The proposed Project includes the widening of Highway 1 from four to six total travel lanes, the construction of a diamond interchange with 216 Street elevated as an overpass and 216 Street road improvements.

3 STUDY OBJECTIVES

BKL's environmental noise study aimed to

- identify noise-sensitive land uses potentially impacted by Highway 1 traffic noise emitting from within the Project construction limits;
- evaluate existing noise conditions at potentially impacted noise-sensitive receivers;
- predict the future noise environment 10 years after Project completion;
- assess the noise impact according to the Policy;
- specify noise mitigation options as warranted by the Policy; and
- provide construction noise best management practices (BMPs).

This study did not include an assessment of potential noise impacts from traffic on 216 Street or a construction noise and vibration impact assessment.

4 ASSESSMENT CRITERIA

The Policy outlines the required methodology for assessing the impact of traffic noise. It also describes mitigation considerations for noise-sensitive land uses adjacent to the new construction or upgrading of a numbered highway. According to the Policy, noise-sensitive land uses include residences; educational facilities, such as schools, preschools and commercial daycare centres;

hospitals; libraries; churches; museums; passive parks and other land uses where quiet and tranquility are essential attributes.

Eligible noise-sensitive land uses must predate the highway project by receiving planning approvals prior to the first public announcement of the highway project or designation (through gazetting) of the affected lands as potential future highway rights-of-way.

4.1 Residences

For residential receivers, the Policy sets noise impact thresholds to identify areas where noise mitigation consideration is warranted. The Policy quantifies its thresholds with the noise metric outdoor day-night average sound Level (L_{dn}). This metric is similar to the 24-hour equivalent sound level (L_{eq24}) but it applies a 10 dBA penalty to nighttime noise to account for the public's greater sensitivity to noise between 10 pm and 7 am.

Post-project (10 years after project completion) noise predictions are compared to pre-project levels in order to rate impacts at the noise-sensitive receivers as either Minor, Moderate, or Severe. Residential receivers within the Moderate and Severe impact zones are considered for mitigation.

4.2 Educational Facilities

For educational receivers, the Policy sets a criterion based on the loudest one hour equivalent sound level, $L_{eq(max\text{-}hr)}$, inside classrooms. The Policy states:

> *Mitigation measures will be considered at educational facilities where it is anticipated that... the post-project traffic noise levels, ten years after the project completion, will reach Leq(max-hr) 40 dBA inside classrooms or other highly noise sensitive spaces.*

5 STUDY AREA

The study area extends from Yorkson Creek (east of 202 Street) along Highway 1 to 216 Street. Alex Hope Elementary School and the first row of residential houses adjacent to Highway 1 were considered in this assessment. The study area is shown in Figure 5-1.

Within the study area, there are over 200 noise-sensitive land uses, including residences and one school, which could potentially be affected by noise levels that approach or exceed the Policy criteria.

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6 EXISTING NOISE CONDITIONS

Baseline noise monitoring was conducted to measure the noise exposure at locations along the extent of the Project from November 12-14, 2014. Additional baseline noise measurements were completed at Alex Hope Elementary from November 23-25, 2015.

The monitoring results were used to calibrate a noise model and predict the pre-project noise environment throughout the study area. Figure 6-1 Baseline Measurement Locations shows the locations where baseline monitoring was conducted. Results are presented in Table 6-1.

Figure 6-1 Baseline Measurement Locations

Table 6-1 Baseline Measurement Results

Site	Location	Pre-Project Noise Level
B01	20617 86A Ave	L_{dn} 64 dBA
B02	20891 84A Ave	L_{dn} 73 dBA
B03	34-8515 209 St	L_{dn} 70 dBA
B04	21069 85 Ave	L_{dn} 61 dBA
B05	Alex Hope Elementary - Classroom S11	$L_{eq(max-hr)}$ 52 dBA
B06	Alex Hope Elementary - Classroom S15	$L_{eq(max-hr)}$ 52 dBA
B07	Alex Hope Elementary - Classroom W22	$L_{eq(max-hr)}$ 51 dBA
B08	8382 211B St	L_{dn} 70 dBA

Site	Location	Pre-Project Noise Level
B09	21464 83B Ave	L_{dn} 70 dBA
B10	21427 83 Ave	L_{dn} 71 dBA
B11	8298 216 St	L_{dn} 71 dBA
B12	8198 216 St	L_{dn} 74 dBA

7 NOISE PREDICTION METHODOLOGY

7.1 Acoustical Model

Transportation noise levels have been predicted using the French standard for road traffic noise prediction, NMPB-Routes-1996 (NMPB 1996), implemented in the outdoor sound propagation software Cadna/A, version 4.6. *The Good Practice Guide for Noise Mapping* points out that this standard is recommended by the European Commission as current best practice to obtain accurate prediction results (WG-AEN 2007).

NMPB-Routes-96 specifies octave band sound power levels for roadways, dependant on traffic volumes, average travel speed, percentage of heavy vehicles (i.e., trucks, buses), road gradient and flow conditions (continuous, accelerating, decelerating vehicles). BKL has found that this standard provides a high level of agreement with traffic noise measurements conducted in BC.

First order reflections were considered in the acoustic model. Model calculations were performed in octave bands, considering ground cover, topography and shielding objects (see following sections).

7.1.1 Ground Absorption

The acoustic properties of the ground surface can have a considerable effect on the propagation of noise. Flat, non-porous surfaces such as concrete, asphalt, buildings, calm water, etc., are highly reflective to noise, and have a ground constant of G=0. Soft, porous surfaces such as foliage, loam, soft grass, fresh snow, etc., are highly absorptive to noise and have a ground constant of G=1.

In order to approximate the ground effect on sound propagation, the ground surface has been modelled as absorptive (G=1) throughout.

7.1.2 Meteorological Conditions

A temperature of 10 °C and relative humidity of 80 per cent were used in the model settings to best represent weather conditions based on the selection available in Cadna/A. Favourable sound propagation was assumed to occur for 50 per cent of the time during the day and 100 per cent of the time during the night.

Variations in temperature and humidity generally have little effect on the overall noise propagation.

7.1.3 Topography and Obstacles

The intervening terrain has been modelled by directly importing ground contours of the area provided by Binnie. Ground contours were imported at a 1 metre elevation resolution.

Building outlines were included in the model from the previous Port Mann / Highway 1 Project.

7.1.4 Roadway Geometry

The existing highway alignment was modelled using aerial photographs from the previous Port Mann / Highway 1 Project.

Future highway, ramp and 216 Street alignments were provided by Binnie.

7.1.5 Traffic Inputs

Pre-project highway traffic data was provided by MOTI and future highway and 216 Street traffic volume predictions were provided by Binnie. Pre-project 216 Street traffic volumes were estimated by BKL.

Table 7-1 lists the increases in annual average daily traffic (AADT) from 2014 to 10 years after the Project's completion date (2029) that were incorporated in the noise model. For modelling purposes, trucks have been conservatively defined as a vehicle of any size or weight with more than two axles.

Table 7-1 Increases from 2014 to 2029 in Annual Average Daily Traffic

Road	Section	2014 AADT	2029 AADT	% Trucks	Modelled speed (km/h)
Highway 1	200 St to 232 St	68464	91515	11	100
216 St	North of Highway 1	20	14420	10	50
	South of Highway 1	4590	17748	10	50
Highway 1 and 216 St Interchange Ramps	216 St to Highway 1 Eastbound on-ramp	-	6734	10	0 to 100
	Highway 1 to 216 St Eastbound off-ramp	-	7407	10	100 to 0
	216 St to Highway 1 Westbound on-ramp	-	5387	10	0 to 100
	Highway 1 to 216 St Westbound off-ramp	-	6060	10	100 to 0

New on- and off-ramps for the 216 Interchange were also included in the future 2029 noise model. Traffic volumes and geometries along the new 216 Street overpass and access to/from Highway 1 were provided by Binnie.

To account for speed variations along the on- and off-ramps, road traffic was corrected for either "accelerating" or "decelerating" noise emissions as traffic was entering or departing Highway 1 respectively. All other road traffic was modelled for "continuous flow" conditions. Roadways were

modelled with standard asphaltic pavement, except for elevated roadways (e.g., bridges, overpasses) which were modelled with standard concrete pavement.

7.2 Model Calibration

The noise model was calibrated using the baseline location results described in Section 6. The major noise source is road traffic noise from Highway 1, and was modelled to show accurate correlation between the measurement and the noise model. Side streets and minor city roads were not included in the model. A scaling factor was used so the predicted existing noise levels in the model were within 1 dBA of the measured levels. This factor was also applied to the future traffic volumes.

7.3 Receivers

For all assessments, calculations were performed using point receivers at each noise-sensitive land use identified in the study area, e.g., residences and schools. The first floor receiver height was set at 1.5 metres above the ground for buildings without front walk-up steps, and 2 metres above the ground for buildings with front walk-up steps. Where buildings had more than one storey, a second receiver was placed 2.8 metres directly above the first floor receiver. A total of 391 residential receivers were included in this study, representing 212 distinct residences: 212 for the first floor and 179 for the second floor. Three receivers were placed outside the highest noise-exposed classrooms at Alex Hope Elementary.

Average noise contours were predicted on 10 metre by 10 metre grids at a height of 1.5 metres. Figure 7-1 shows an example 3-D view of receivers placed on building facades.

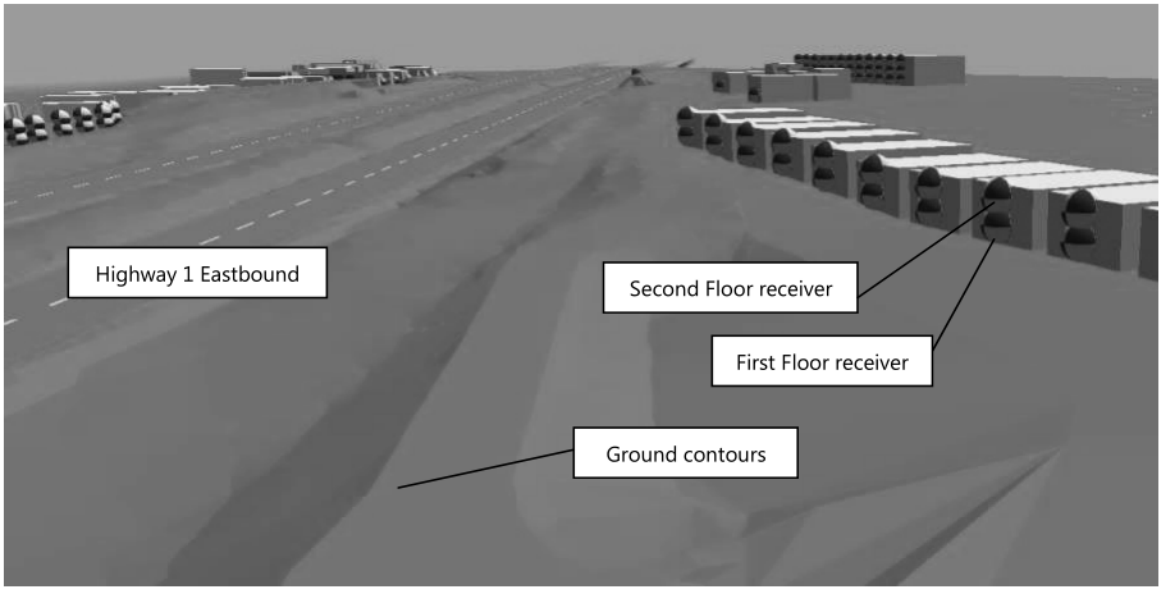
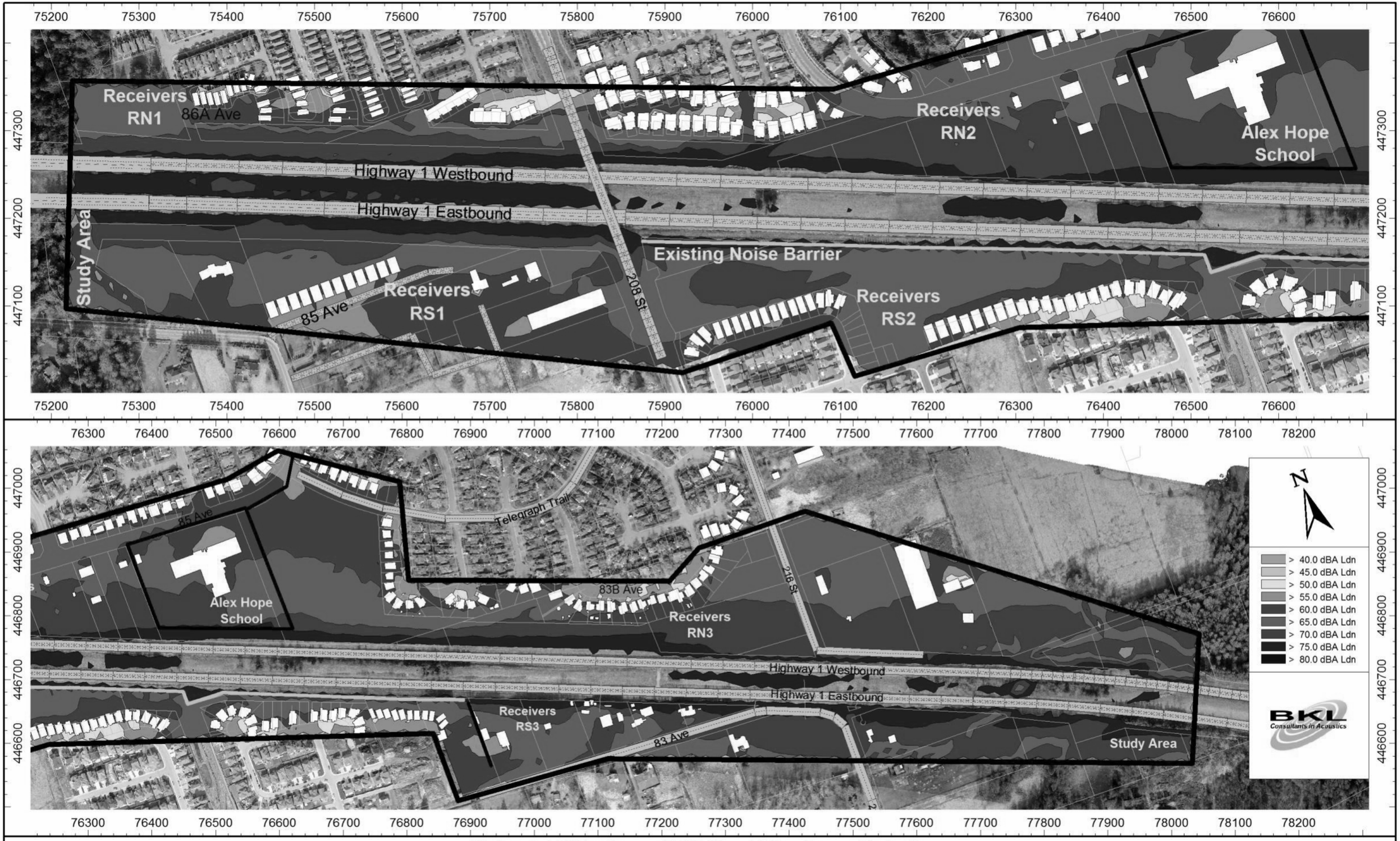


Figure 7-1 Example 3-D view of noise source, ground contours and receivers

8 EXISTING NOISE PREDICTION RESULTS

Figure 8-1 shows a contour plot of predicted existing L_{dn} traffic noise levels. Calculated results in tabulated form at individual receivers are available in Appendix D. The graphical contours are based on interpolation of predictions made on a 10 metre by 10 metre grid at a height of 1.5 metres above the ground. The predictions for individual receivers are based on specific coordinates of each point; therefore, the tabulated levels should be taken as more accurate in the event of any discrepancies.



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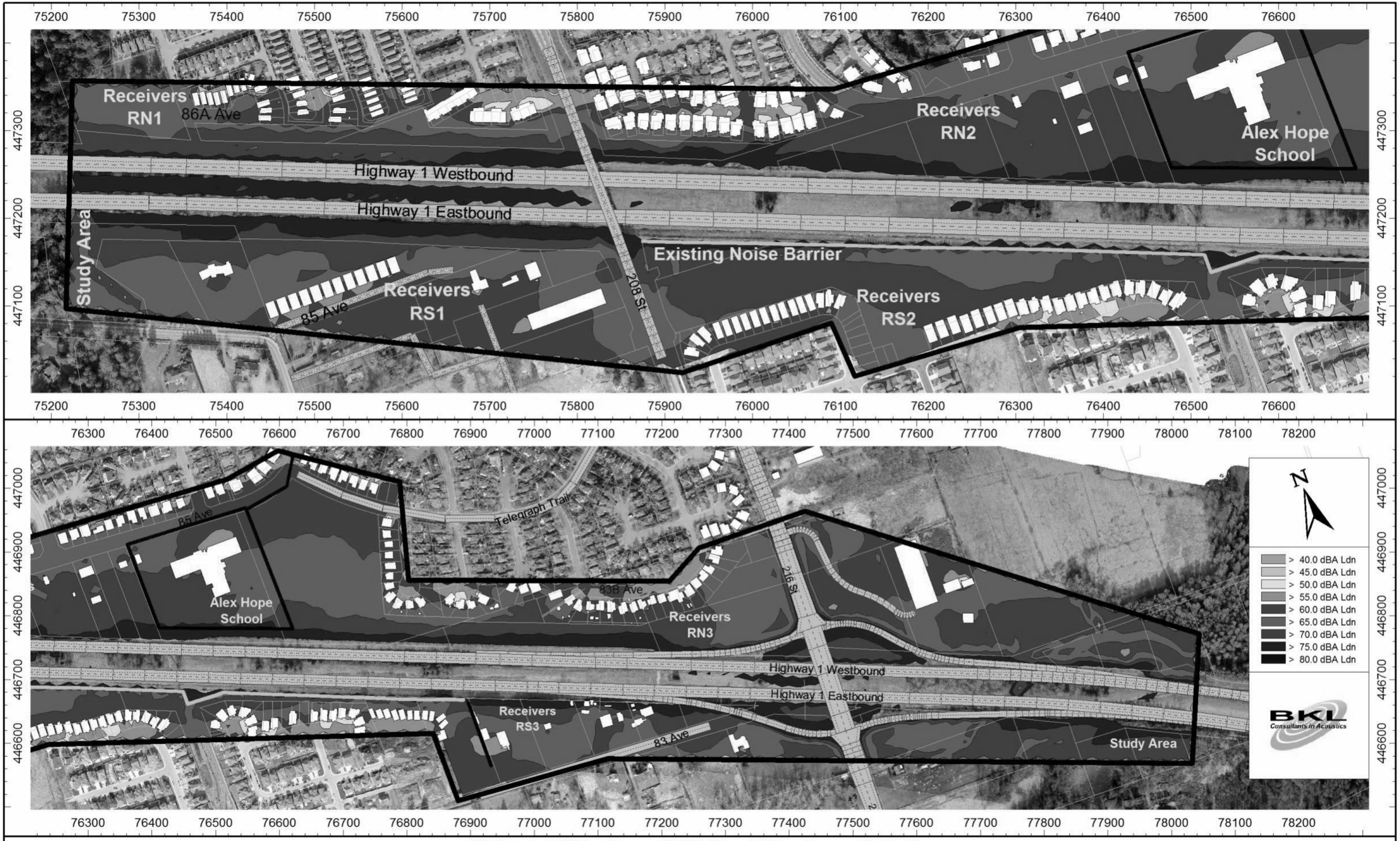
Highway 1 Widening and 216 Street Interchange Project
Figure 8-1: Predicted Existing Noise Contours

Date: May 2016

9 FUTURE NOISE PREDICTION RESULTS

Figure 9-1 shows a contour plot of predicted future L_{dn} traffic noise levels. Calculated results in tabulated form at individual receivers are available in Appendix D. The graphical contours are based on interpolation of predictions made on a 10 metre by 10 metre grid at a height of 1.5 metres above the ground. The predictions for individual receivers are based on specific coordinates of each point; therefore, the tabulated levels should be taken as more accurate in the event of any discrepancies.



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Highway 1 Widening and 216 Street Interchange Project
Figure 9-1: Predicted Future Noise Contours

Date: May 2016

10 NOISE IMPACT ASSESSMENT

10.1 Noise Impact Assessment at Residences

For the purpose of this noise impact assessment, the study area has been broken down into six separate zones, grouped geographically. Table 10-1 summarizes the number of residences and impacts in each assessment zone as indicated in Figure 5-1. Each residence has a first floor receiver, and, where applicable, second floor receiver. The charts in Figure 10-1 show a graphical comparison of project noise to the Policy in each zone. These figures offer an overview and allow for a quick comparison of the noise impact at the first floor versus the second floor. Appendix C breaks down the Policy into each assessment zone. Detailed tabulated results for each receiver are presented in Appendix D.

In general, the increase in total L_{dn} noise levels is less than 2 dBA. However, the Policy assigns a Moderate impact if the future noise environment is predicted to be 65 dBA or greater, regardless of any increase. Most of the Moderate impacts are a result of a predicted baseline L_{dn} of 65 dBA or greater.

The seven Severe impacts are located at the second floor of residences in zone RS2 behind the existing 3 metre noise wall. The predicted existing L_{dn} at these receivers is 74 dBA and the predicted future noise levels of 76 dBA constitute a Severe impact. It is noted that the existing noise wall was developed under the previous MOTI noise policy which only considered ground floor receivers and limited noise wall heights to 3 metres.

Table 10-1 Noise Impact Assessment Summary for Residences

Zone	Extent	Number of Residences	Number of Moderate Impacts	Number of Severe Impacts
RN1	Residences north of Highway 1 and west of 208 Street overpass to 206 Street	26	25	0
RN2	Residences north of Highway 1 between 208 Street overpass and Alex Hope Elementary School	41	38	0
RN3	Residences north of Highway 1 between Alex Hope Elementary School and 216 Street	44	34	0
RS1	Residences south of Highway 1 and west of 208 Street overpass to 205B Street	27	27	0
RS2	Residences south of Highway 1 and east of 208 Street overpass behind existing 3 m high noise wall	69	59	7
RS3	Residences south of Highway 1 west of 216 Street not covered by existing noise wall	5	4	0
	Total	212	187	7

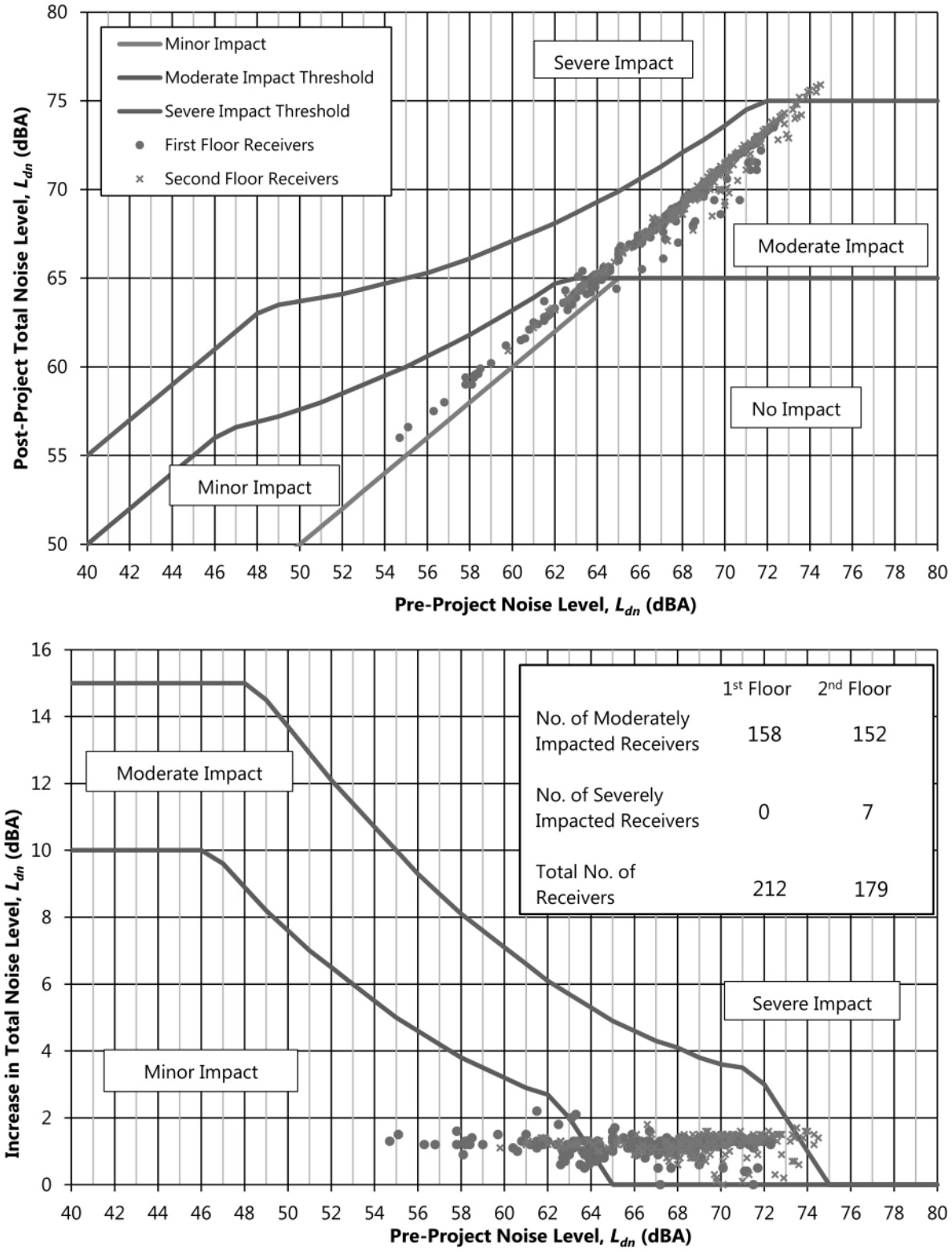


Figure 10-1 Comparison of Pre and Post Project Noise (top) and Increase in Noise (bottom)

10.2 Noise Impact Assessment at Schools

Table 10-2 summarizes the level of impact at the three classrooms identified as the most noise sensitive.

Table 10-2 Noise Impact Assessment at Alex Hope Elementary School

Classroom	Baseline $L_{eq(max-hr)}$ (dBA)	Predicted 2024 $L_{eq(max-hr)}$ (dBA)	Meets 40 dBA Criterion?	Exceedance (dBA)
S11	52	53	No	13
S15	52	53	No	13
W22	51	52	No	12

11 TRAFFIC NOISE MITIGATION STRATEGIES

According to the Policy, the main objective of noise mitigation is to reduce the total noise exposure at affected residences by at least 5 dBA and to reduce classroom noise levels to 40 dBA.

In general, noise mitigation options include

- constructing noise walls or earth berms;
- using low-noise/quiet pavements on roadways;
- controlling noise at the receiver by upgrading facades and/or windows where residential unit density is low;
- improving HVAC in classrooms to eliminate the need to open windows where open windows are currently required; and
- reducing vehicle speeds.

South of Highway 1 and east of 208 Street, there is an existing noise wall that is 3 metres high. BKL is not aware of any practical means of improving the performance of existing noise walls.

Binnie provided four preliminary noise wall alignments:

1. to the north of Highway 1 from Discovery Town Park to 208 Street;
2. to the south of Highway 1 between Yorkson Creek to 208 Street;
3. to the north of Highway 1 between 208 Street and 216 Street; and
4. an extension of the eastern edge of the existing noise wall toward the new off-ramp at 216 Street.

The Policy gives benchmark mitigation cost guidelines for residential units that are directly benefiting from the noise mitigation based on the noise impact situation for that unit. The Policy states:

> *[The] benchmark mitigation cost guideline ... [is] $25,000 per directly-benefiting residential unit in Moderate noise impact situations, and $40,000 per directly-benefiting residential unit in Severe noise impact situations.*

The Policy also gives a height restriction of 5 metres on any noise wall constructed.

Based on Section 10, the total number of residential units in Moderate and Severe noise impact situations is 187 and 7 respectively, which gives a mitigation budget of $5 million. Assuming an installed cost of $300 per square metre of noise wall, 16,500 square metres of noise wall could be constructed while meeting the Policy's cost guideline.

Table 11-1 shows the noise wall geometry required in order to provide a noise benefit of at least 5 dBA at most ground floor receivers and resulting noise wall cost estimates.

Table 11-1 Proposed Noise Wall Summary

Wall No.	Benefiting Receiver Zone	Wall Length (m)	Modelled Wall Height (m)	Estimated Installed Cost	Average Noise Benefit at Fronting Residences	
					First Floor (dBA)	Second Floor (dBA)
1	RN1	550	5	$825,000	5	4
2	RS1	580	5	$870,000	4	2
3	RN2	1,660	5	$2.5 million	5	2
	RN3				7	4
4	RS3	500	3	$450,000	5	N/A

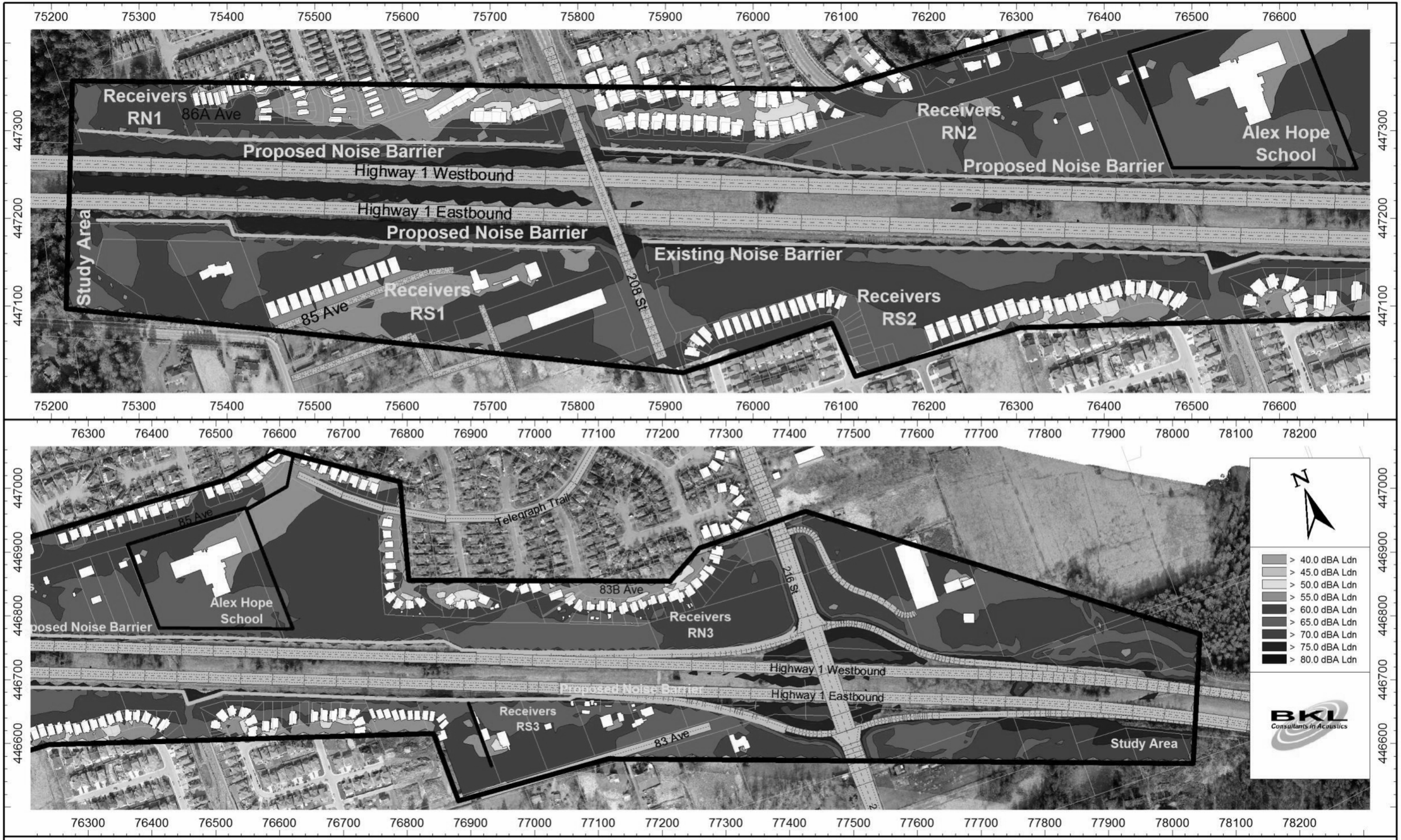
BKL's preliminary estimates show that building noise barriers would generally be effective for ground floor receivers, except at residences within zone RS1. For these residences, effective mitigation would likely be achievable if the noise wall alignment was outside the right of way along the existing multi-use path; otherwise, a noise wall west of 208 Street is not recommended and alternative measures could be pursued.

The existing residences in zone RS3 are either single storey houses, or otherwise behind the proposed 216 Street off-ramp, such that a 3 metre wall height should be sufficient to comply with the policy.

The proposed noise walls would not sufficiently limit noise levels for most upper level receivers. Figure 11-1 shows predicted noise contours at a height of 1.5 metres above the ground with the proposed noise walls in place.

The average predicted noise benefit at Alex Hope Elementary is 4 dBA. In the three worst-case classrooms, this benefit would result in a noise level of 48-49 dBA, which still exceeds the Policy's 40 dBA criterion. Therefore, additional facade improvements would be required to meet the Policy criterion. These improvements include

- eliminating the classroom wall vents; and
- providing mechanical ventilation so windows can stay closed during the summer.



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Highway 1 Widening and 216 Street Interchange Project
Figure 11-1: Predicted Future Noise Contours with Proposed Barriers

Date: May 2016

12 CONSTRUCTION NOISE BEST MANAGEMENT PRACTICES

Construction noise also has the potential to significantly affect the surrounding noise-sensitive land uses. Best management practices (BMPs) should be implemented to minimize the impact of construction noise during the Project. Noise impact minimization generally involves

- actively communicating with affected residents,
- managing and educating construction personnel to minimize noise emissions at the source.

The effectiveness of BMPs for construction activities depend on site-specific conditions and proposed construction methodologies. With this in mind, consider implementing as many BMPs as practical for the Project.

The following BMPs should be considered for the Project:

- Use equipment or processes that have additional noise control features, including high-performance mufflers and enclosures on diesel- or gas-powered equipment or exhaust silencers on air tools.
- Regularly maintain all equipment, including lubricating applicable components and replacing worn parts.
- Operate equipment at minimum engine speeds consistent with effective operation.
- Educate construction personnel (site supervisors, foremen, equipment operators, etc.) regarding particular noise issues and train workers to operate equipment as quietly as possible.
- Avoid unnecessary idling, revving, use of airbrakes and banging of tail gates and front end loader buckets.
- Turn off equipment when not in use.
- Where practicable, use alternative back-up warning systems such as white noise reversing alarms instead of tonal beepers.
- Where practicable, locate stationary work stations as far away as possible from noise-sensitive receivers.
- Schedule construction activities and limit equipment usage times to minimize noise, especially during nighttime hours and near sensitive receivers.
- Where possible, schedule periods of respite during noisy construction activities.
- Where noise-sensitive receivers are affected, install temporary noise barriers or enclosures to block construction equipment noise (would typically need to block line-of-sight from the top of the machine to affected residents to be effective), and/or take action to reduce noise at the source such as laying rubber matting on dump truck beds to minimize impact noise when loading rubble, etc.
- Develop a procedure to handle noise complaints that includes a plan to document and investigate complaints and target timeframes to respond to complaints.

- Develop and implement a community consultation and communication plan to ensure the community is aware of and prepared for scheduled construction activities and planned road closures.

13 CONCLUSIONS AND RECOMMENDATIONS

BKL Consultants Ltd. was retained by R.F. Binnie & Associates Ltd. to conduct a noise impact assessment for the Highway 1 Widening and 216 Street Interchange Project. The noise impact assessment was completed by performing a baseline noise survey, modelling baseline and future noise levels, rating future noise levels using the MOTI Policy and reviewing potential mitigation strategies.

The analysis concluded that out of 212 residences, there are 187 residences with a Moderate noise impact and seven with a Severe noise impact. Three classrooms in Alex Hope Elementary School were also shown to exceed the maximum one hour equivalent noise levels outlined by the Policy. In general, the increase in noise is predicted to be less than 2 dBA; all predicted noise impacts are due to noise exposures that are already very noisy.

Mitigation strategies include, but are not limited to

- building a noise wall that is 5 metres high and 550 metres long along the north side of Highway 1 between Discovery Town Park and 208 Street;
- building a noise wall that is 5 metres high and 1,660 metres long along the north side of Highway 1 between 208 Street and 216 Street;
- building a noise wall that is 3 metres high and 500 metres long, extending from the existing noise wall on the south side of Highway 1 to 216 Street;
- using quiet pavement;
- building facade improvements at residences; and
- building facade and ventilation system improvements at Alex Hope Elementary.

It appears that the above noise mitigation would meet the Policy's cost recommendations. A proposed 5 metre high noise wall alignment south of Highway 1 between Yorkson Creek and 208 Street was modelled but it did not demonstrate an adequate benefit to fronting residences and therefore is not recommended. Further analysis may be required to further develop the detailed design.

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APPENDIX A GLOSSARY

A-weighting – A standardized filter used to alter the sensitivity of a sound level meter with respect to frequency so that the instrument is less sensitive at low and high frequencies where the human ear is less sensitive. Also written as dBA.

ambient/existing level – The pre-project noise or vibration levels.

critical ratio (CR) - The ratio between the power in the pure tone at threshold and the power per hertz (spectrum level) of the background noise.

decibel – The standard unit of measurement for sound pressure and sound power levels. It is the unit of level that denotes the ratio between two quantities that are proportional to pressure or power. The decibel is 10 times the logarithm of this ratio. The reference pressure used for airborne sound is 20 µPa, while the typical reference pressure used for underwater sound is 1 µPa. Also written as dB.

equivalent sound level - The steady level that would contain the same amount of energy as the actual time-varying level. Although it is, in a sense, an "average," it is strongly influenced by the loudest events because they contain the majority of the energy.

frequency – The number of times that a periodically occurring quantity repeats itself in one second.

frequency spectrum – Distribution of frequency components of a noise or vibration signal.

hertz – The unit of acoustic or vibration frequency representing the number of cycles per second.

impulsive sound – Non-continuous sound characterized by brief bursts of sound pressure. The duration of a single burst of sound is usually less than one second.

intermittent – Non-continuous or transient noise or vibration that occurs at regular or irregular time intervals with each occurrence lasting more than about five seconds.

metric – Measurement parameter or descriptor.

noise - Noise is unwanted sound that carries no useful information and tends to interfere with the ability to receive and interpret useful sound.

noise-sensitive receivers – A place occupied by species with a high sensitivity to noise.

octave bands – A standardized set of bands making up a frequency spectrum. The centre frequency of each octave band is twice that of the lower band frequency.

sound – The fluctuating motion of air or other elastic medium which can produce the sensation of sound when incident upon the ear.

sound power – The total sound energy radiated by a source per unit time.

APPENDIX B INTRODUCTION TO SOUND AND ENVIRONMENTAL NOISE ASSESSMENT

B.1 General Noise Theory

The two principal components used to characterize sound are loudness (magnitude) and pitch (frequency). The basic unit for measuring magnitude is the decibel (dB), which represents a logarithmic ratio of the pressure fluctuations in air relative to a reference pressure. The basic unit for measuring pitch is the number of cycles per second, or hertz (Hz). Bass tones are low frequency and treble tones are high frequency. Audible sound occurs over a wide frequency range, from approximately 20 Hz to 20,000 Hz, but the human ear is less sensitive to low- and very high–frequency sounds than to sounds in the mid-frequency range (500 to 4,000 Hz). "A-weighting" networks are commonly employed in sound level meters to simulate the frequency response of human hearing, and A-weighted sound levels are often designated "dBA" rather than "dB".

If a continuous sound has an abrupt change in level of 3 dB it will generally be noticed, while the same change in level over an extended period of time will probably go unnoticed. A change of 6 dB is clearly noticeable subjectively and an increase of 10 dB is generally perceived as being twice as loud.

B.2 Basic Sound Metrics

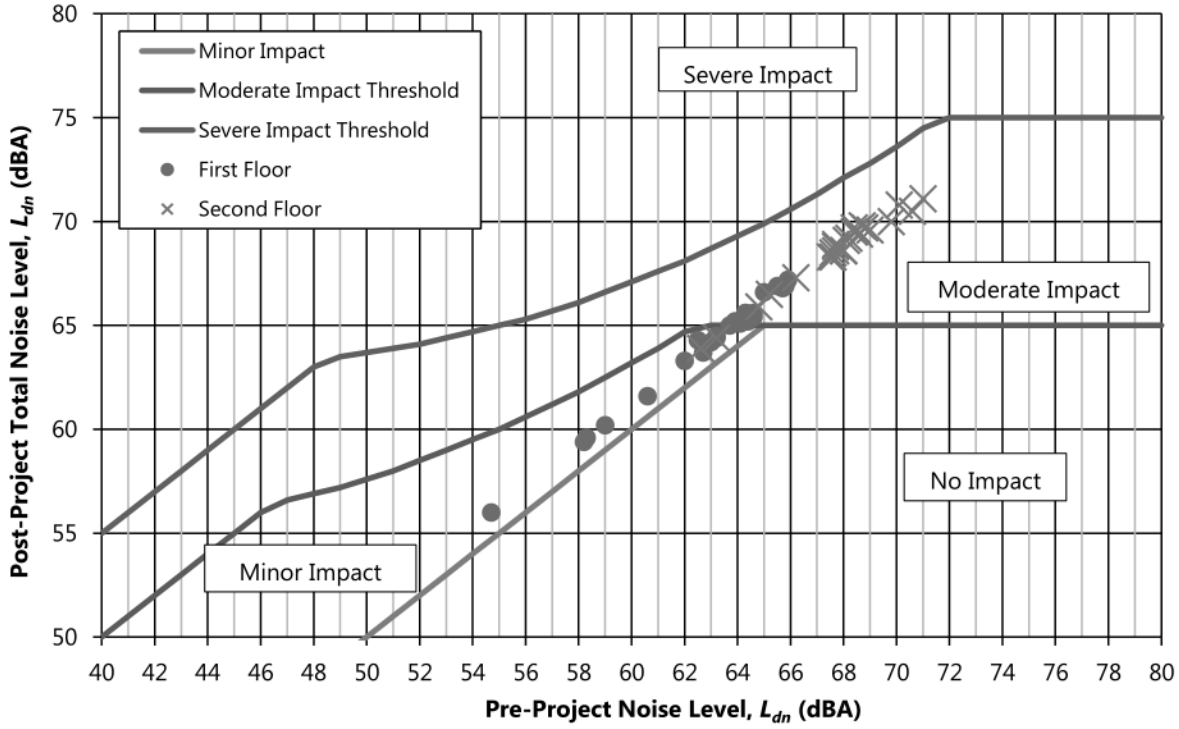
While the decibel, or A-weighted decibel, is the basic unit used for noise measurement, other indices are also used to describe environmental noise. The equivalent sound level, abbreviated L_{eq}, is commonly used to indicate the average sound level over a period of time. The L_{eq} represents the steady level of sound which would contain the same amount of sound energy as the actual time-varying sound level. Although the L_{eq} is an average, it is strongly influenced by the loudest events occurring during the time period because these events contain most of the sound energy. Another common metric used is the L_{90}, which represents the sound level exceeded for 90 per cent of a time interval and is typically referred to as the background noise level.

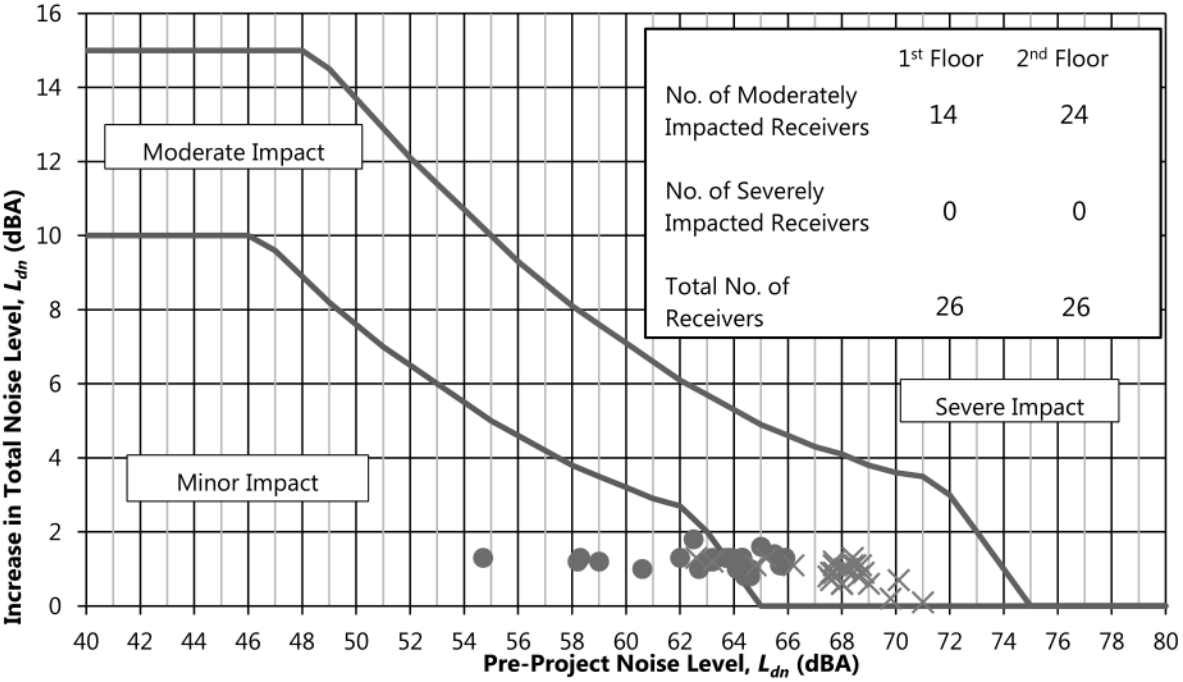
The L_{eq} can be measured over any period of time using an integrating sound level meter. Some common time periods used are 24 hours, noted as the L_{eq24}, daytime hours (7 am to 10 pm), noted as the L_d, and nighttime hours (10 pm to 7 am), noted as the L_n. As the impact of noise on people is judged differently during the day and during the night, 24-hour noise metrics have been developed that reflect this.

The day-night equivalent sound level (L_{dn}) is one metric commonly used to represent community noise levels. It is derived from the L_d and the L_n with a 10 dB penalty applied to the L_n to account for increased human sensitivity to nighttime noise.

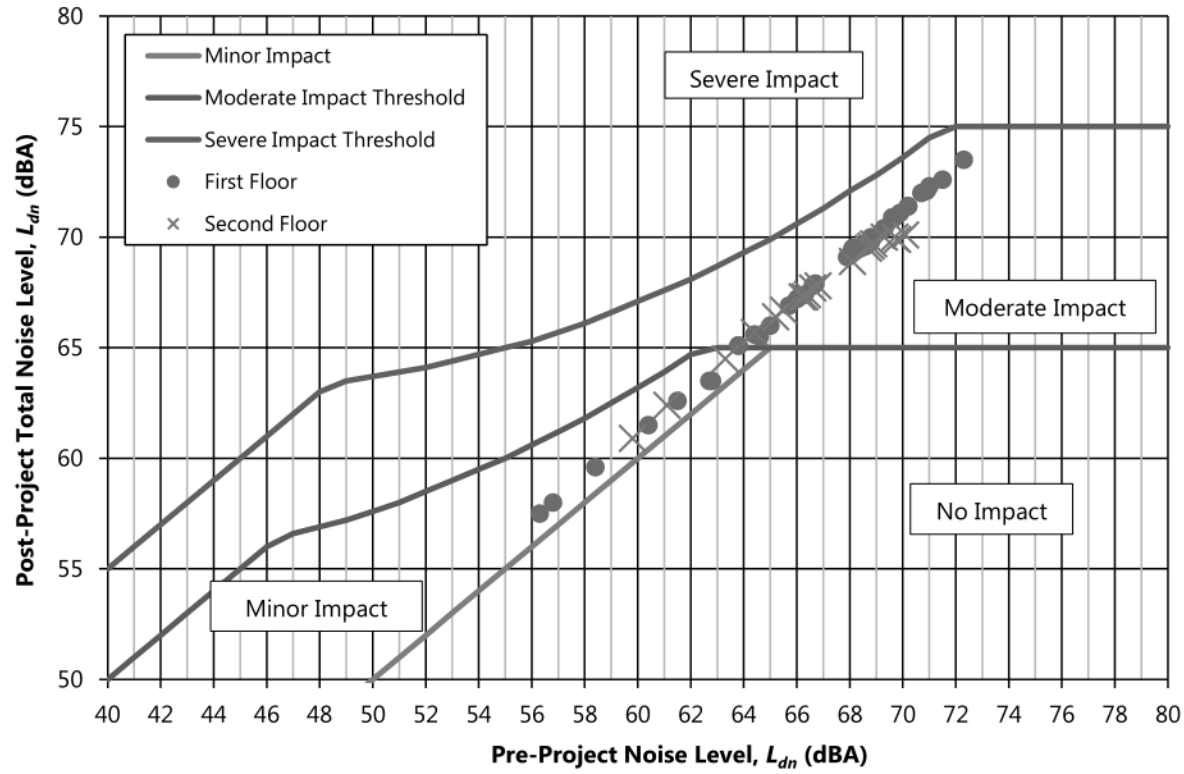
APPENDIX C NOISE IMPACT ASSESSMENT CHART DETAILS

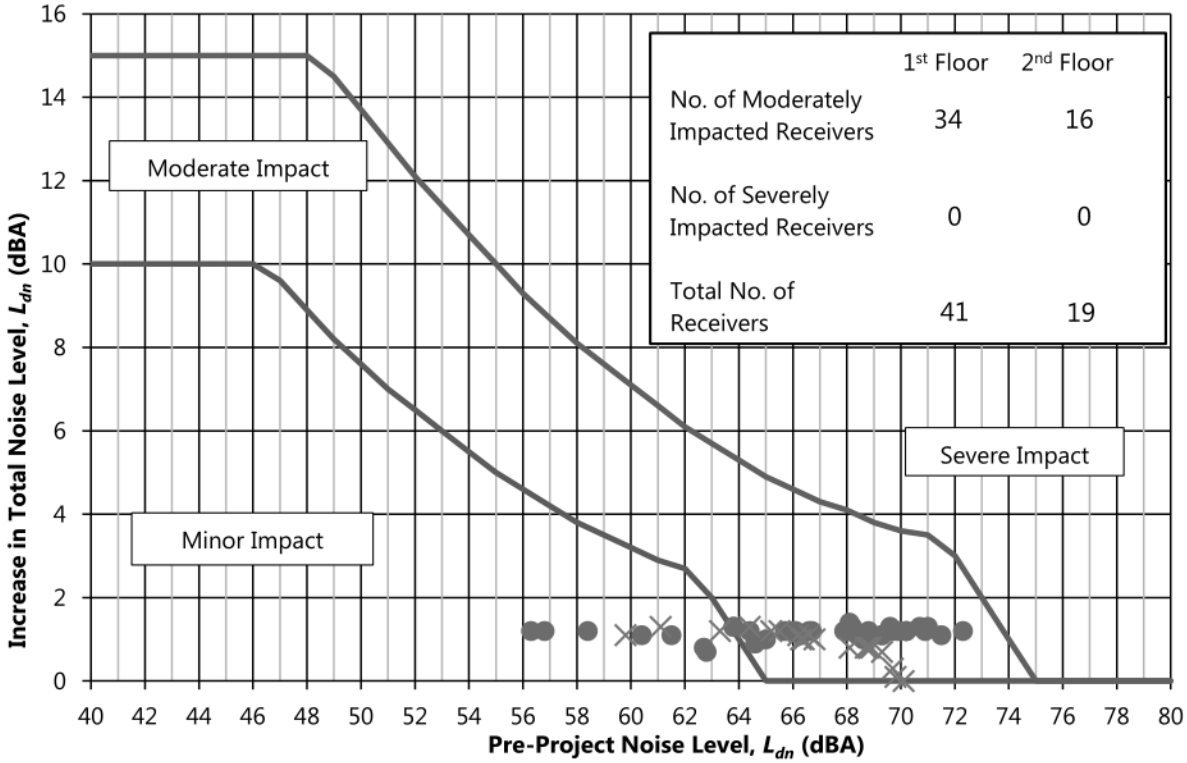
The following charts compare pre and post project road traffic noise at receivers in each assessment zone as described in Figure 5-1.



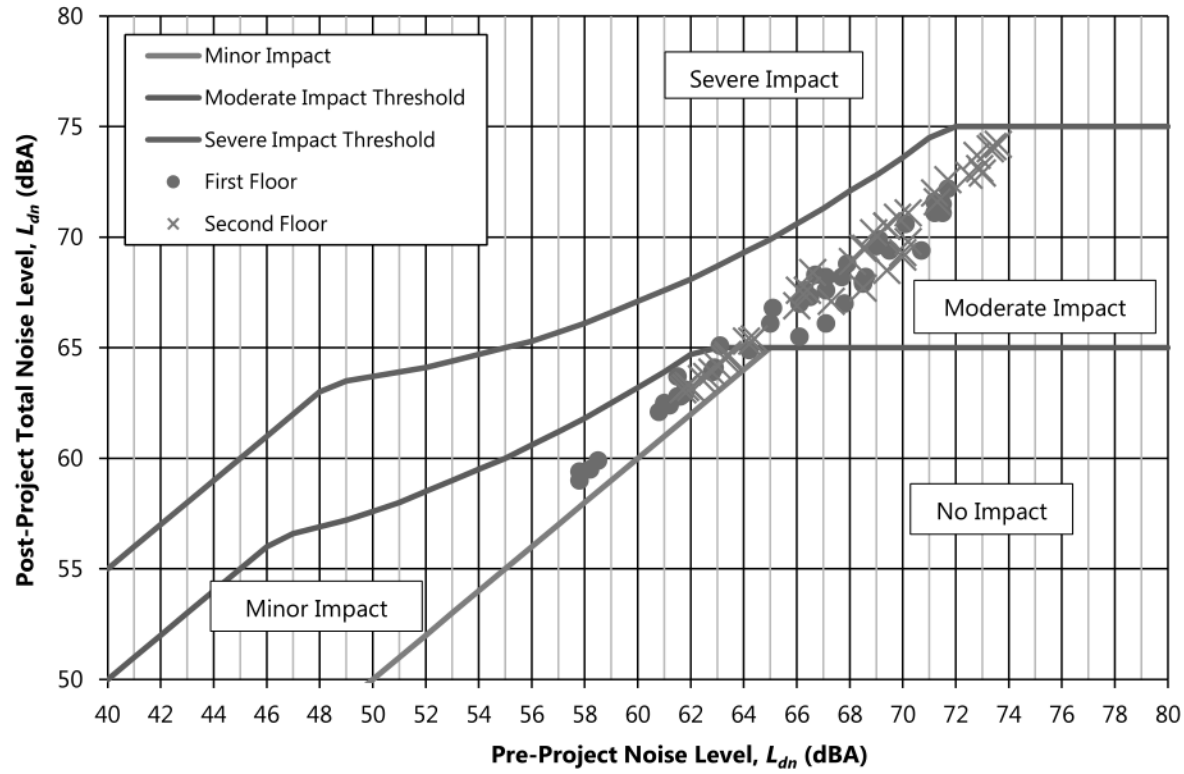


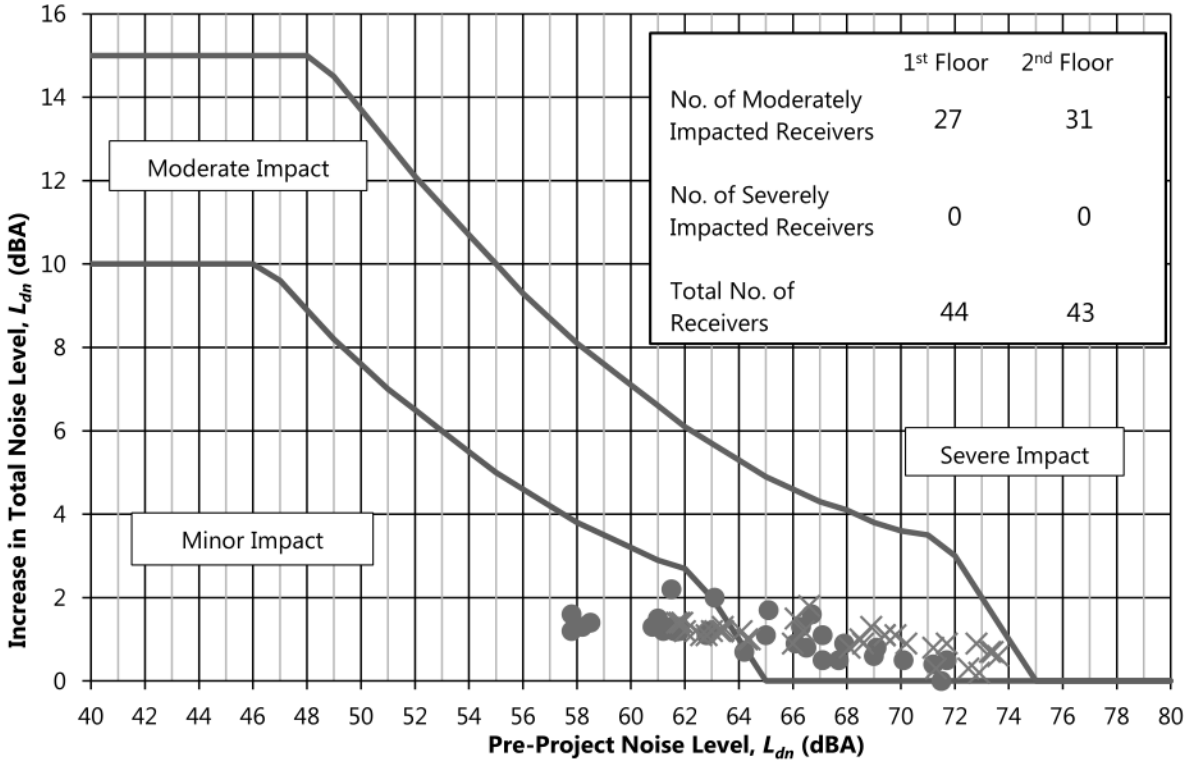
RN1 Comparison of Pre and Post Project Noise (top) and Increase in Noise (bottom)



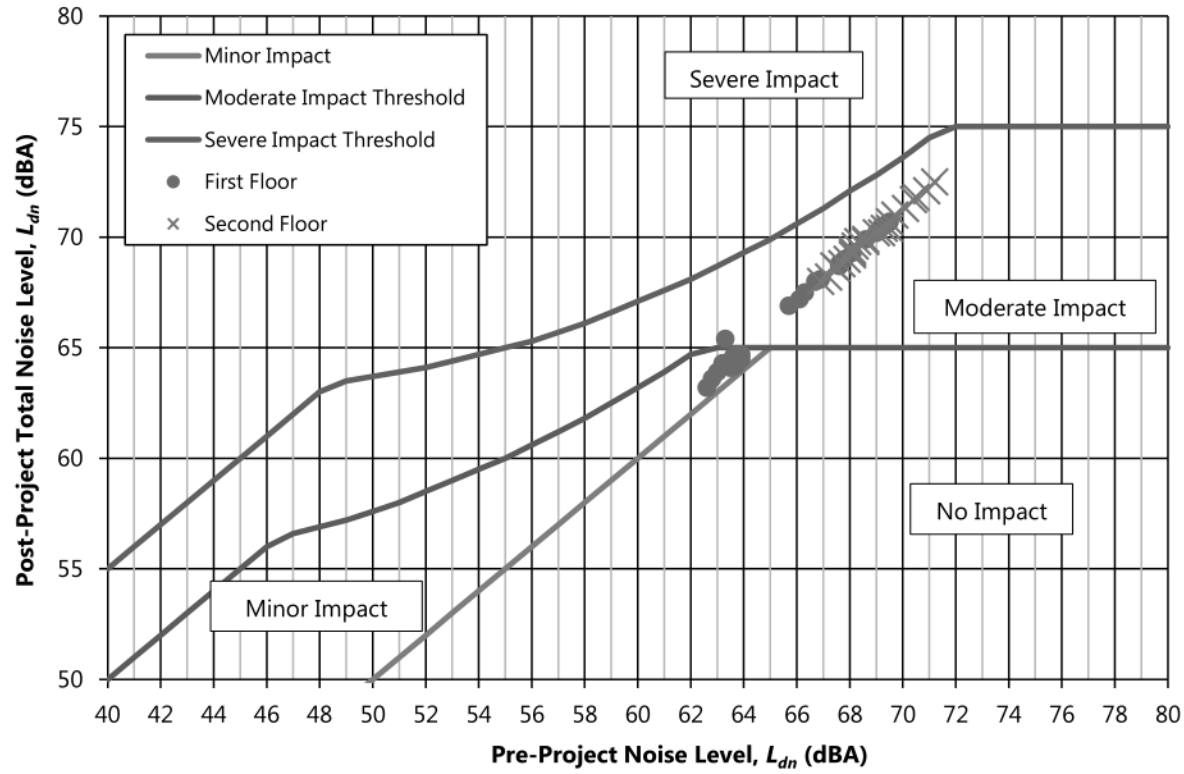


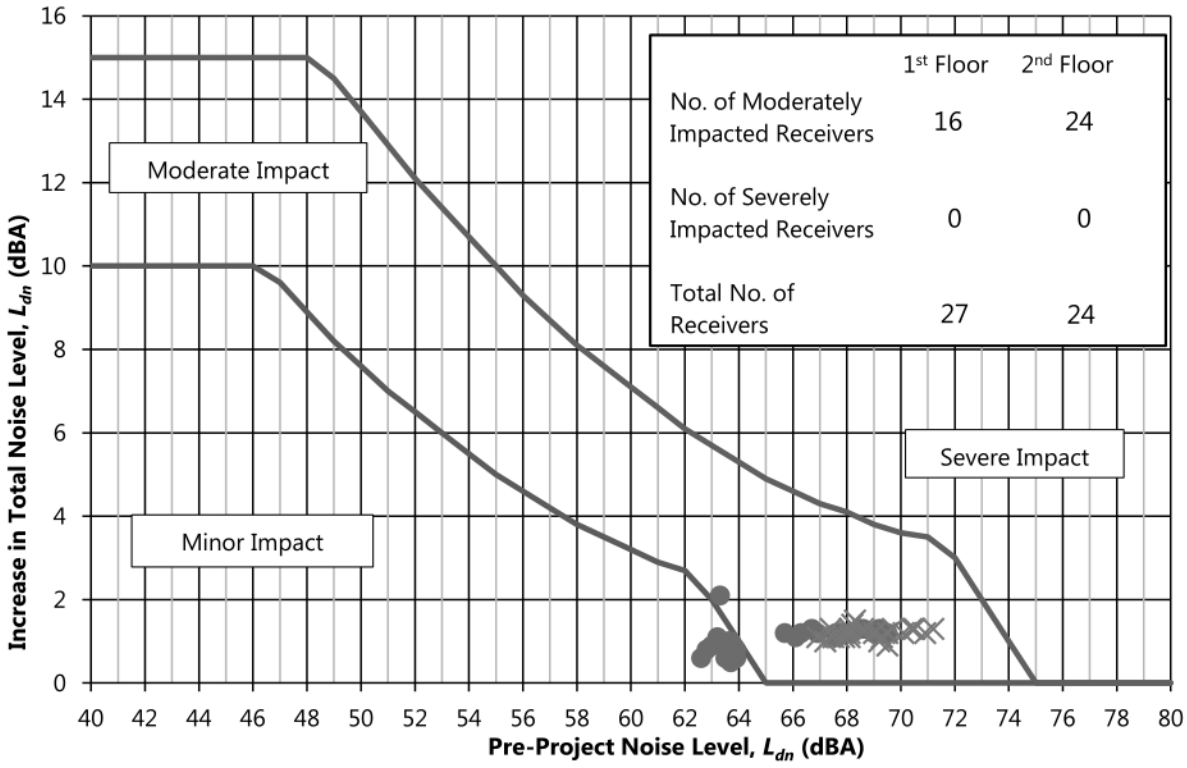
RN2 Comparison of Pre and Post Project Noise (top) and Increase in Noise (bottom)



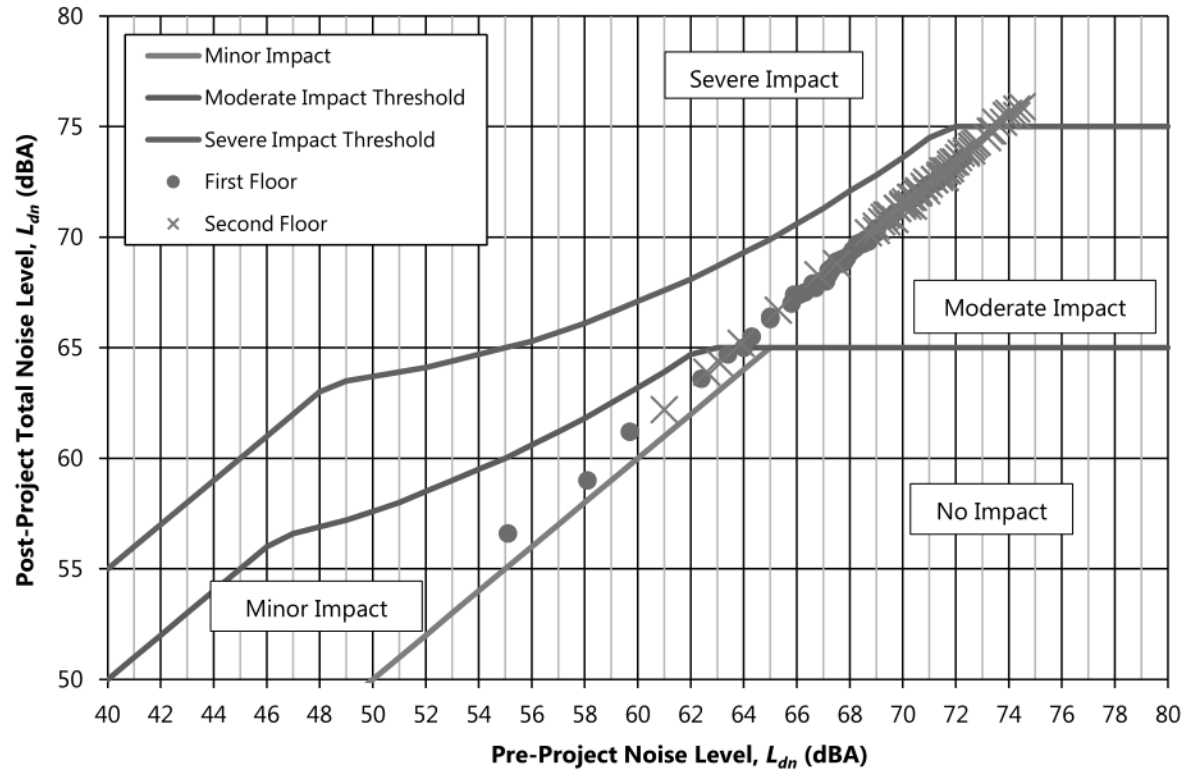


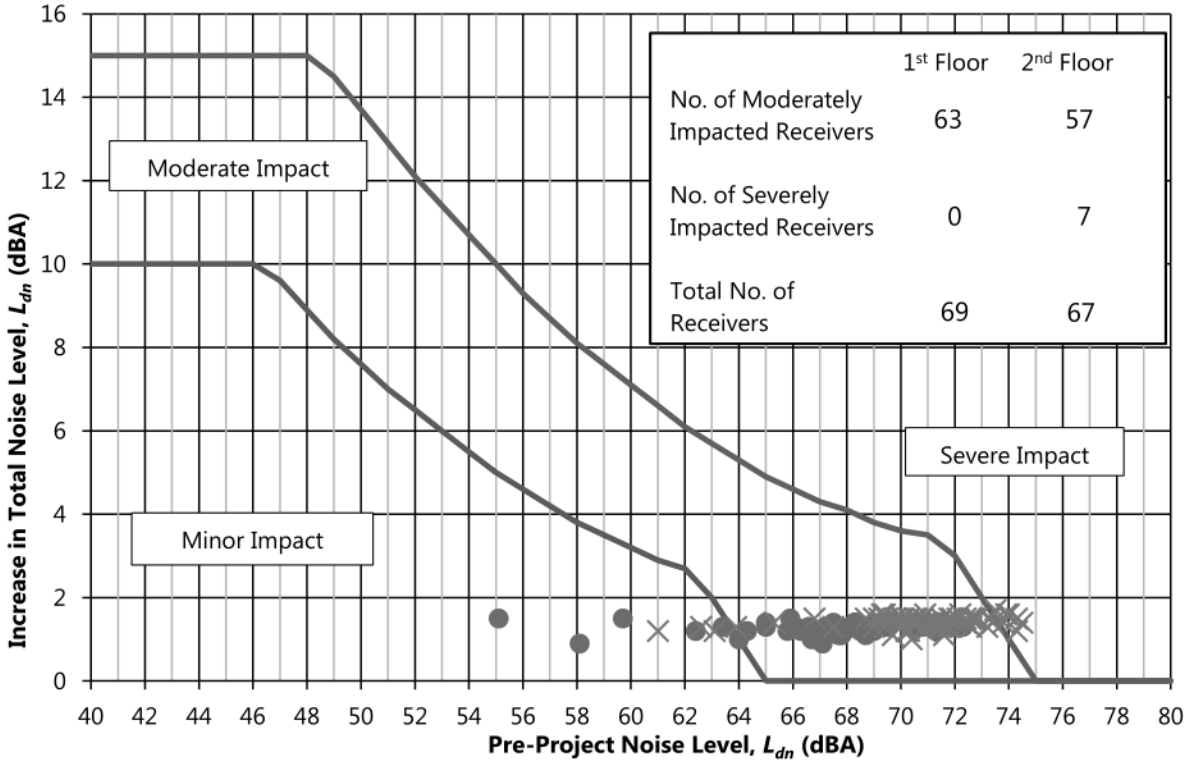
RN3 Comparison of Pre and Post Project Noise (top) and Increase in Noise (bottom)



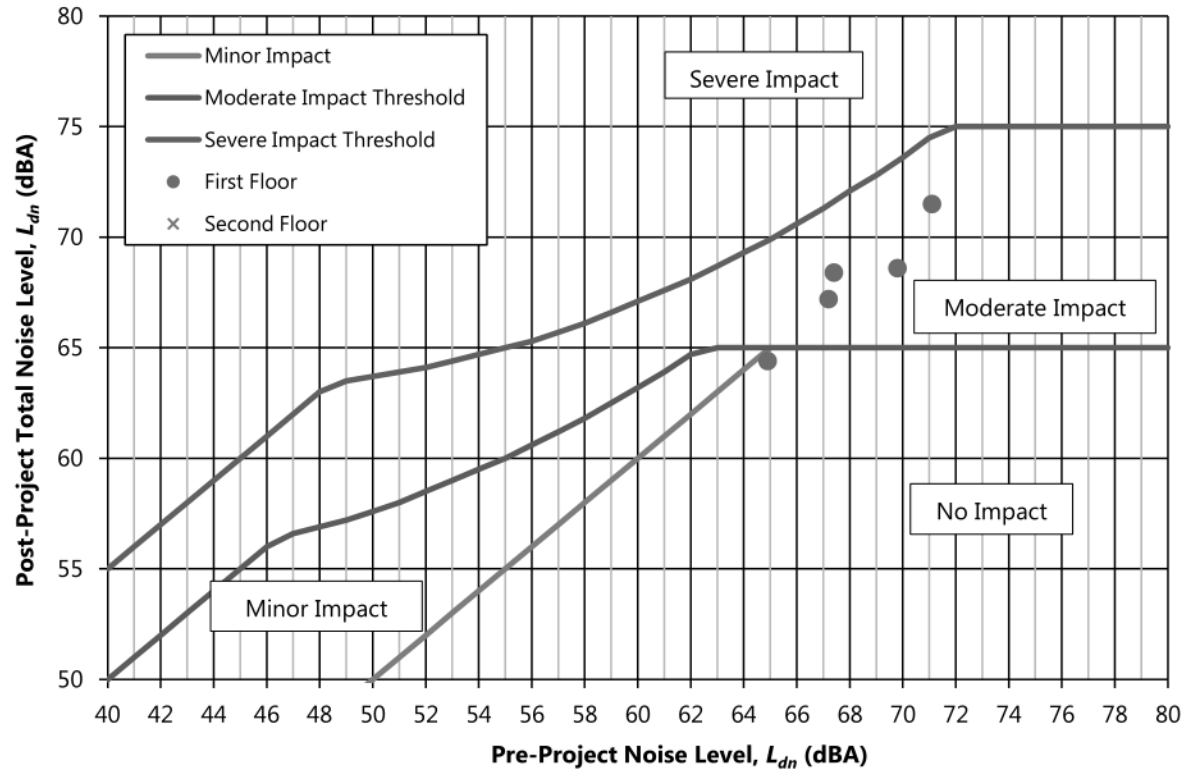


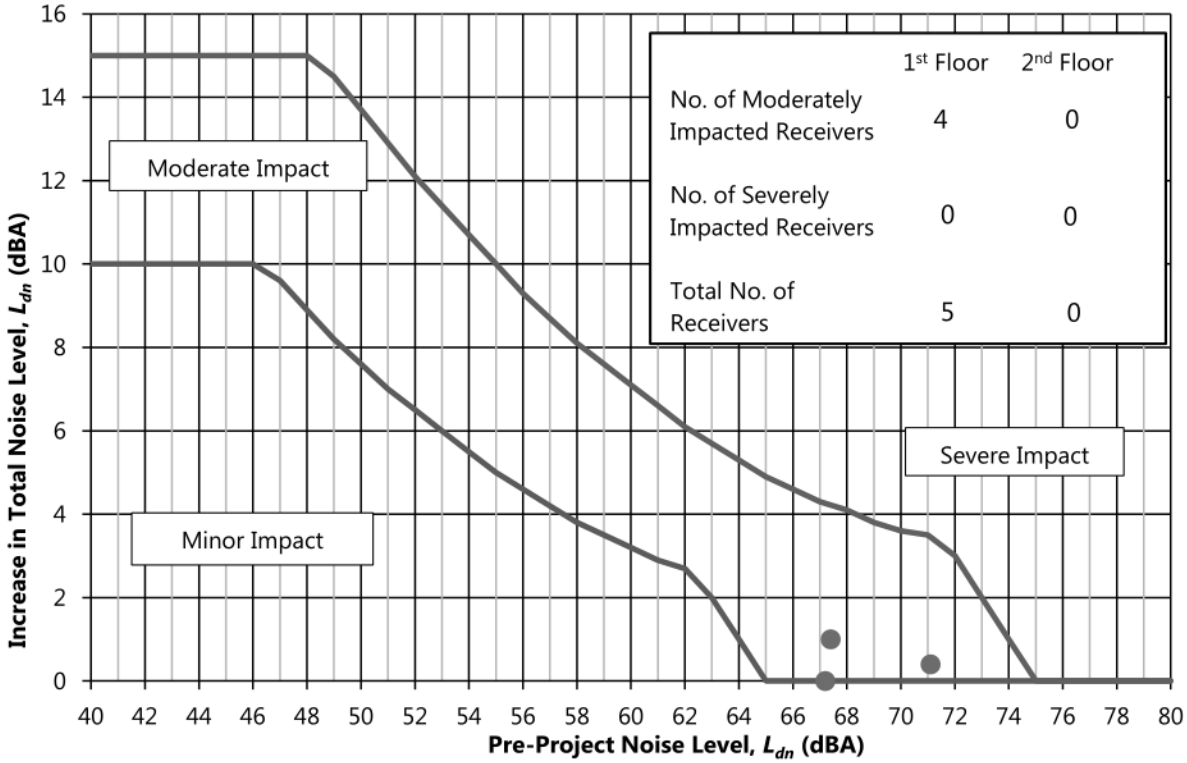
RS1 Comparison of Pre and Post Proejct Noise (top) and Increase in Noise (bottom)





RS2 Comparison of Pre and Post Project Noise (top) and Increase in Noise (bottom)





RS3 Comparison of Pre and Post Project Noise (top) and Increase in Noise (bottom)

APPENDIX D NOISE IMPACT ASSESSMENT RESULT TABLE

Names of residences are grouped according to zones as shown in Figure 5-1 and counted starting from west to east.

Name	L_{dn} (dBA) 1st Floor		L_{dn} (dBA) 2nd Floor		Allowable Increase in L_{dn} 1st Floor (dBA)		1st Floor Predicted Change (dBA)	Allowable Increase in L_{dn} 2nd Floor (dBA)		2nd Floor Predicted Change (dBA)	Noise Impact	
	Pre-Project	Post-Project	Pre-Project	Post-Project	Moderate Impact	Severe Impact		Moderate Impact	Severe Impact		1st Floor	2nd Floor
RN1-01	65.5	66.9	68.6	69.4	0.0	4.6	1.4	0.0	3.8	0.8	Moderate	Moderate
RN1-02	65.7	66.8	68.8	69.7	0.0	4.6	1.1	0.0	3.8	0.9	Moderate	Moderate
RN1-03	65	66.6	68.7	69.8	0.0	4.9	1.6	0.0	3.8	1.1	Moderate	Moderate
RN1-04	64.4	65.2	68.5	69.6	1.0	5.3	0.8	0.0	3.8	1.1	Moderate	Moderate
RN1-05	64.2	65.3	68.4	69.7	1.0	5.3	1.1	0.0	4.1	1.3	Moderate	Moderate
RN1-06	62.5	64.3	68.1	69.1	2.0	5.7	1.8	0.0	4.1	1.0	Minor	Moderate
RN1-07	64.1	65.1	67.7	68.6	1.0	5.3	1.0	0.0	4.1	0.9	Moderate	Moderate
RN1-08	64.6	65.6	67.7	68.8	0.0	4.9	1.0	0.0	4.1	1.1	Moderate	Moderate
RN1-09	65.9	67.2	71	71.1	0.0	4.6	1.3	0.0	3.5	0.1	Moderate	Moderate
RN1-10	63.2	64.5	68.2	69.2	2.0	5.7	1.3	0.0	4.1	1.0	Minor	Moderate
RN1-11	64.3	65.6	70.1	70.8	1.0	5.3	1.3	0.0	3.6	0.7	Moderate	Moderate
RN1-12	64.3	65.6	68.4	69.5	1.0	5.3	1.3	0.0	4.1	1.1	Moderate	Moderate
RN1-13	63.9	65.2	67.5	68.3	1.0	5.3	1.3	0.0	4.1	0.8	Moderate	Moderate
RN1-14	65.8	66.9	70.6	70.5	0.0	4.6	1.1	0.0	3.5	-0.1	Moderate	Moderate
RN1-15	64.6	65.4	69.8	70	0.0	4.9	0.8	0.0	3.6	0.2	Moderate	Moderate
RN1-16	64.2	65.2	69	69.6	1.0	5.3	1.0	0.0	3.8	0.6	Moderate	Moderate
RN1-17	63.7	65	68	68.6	1.0	5.3	1.3	0.0	4.1	0.6	Minor	Moderate
RN1-18	60.6	61.6	66.2	67.3	2.9	6.6	1.0	0.0	4.6	1.1	Minor	Moderate
RN1-19	58.2	59.4	62.6	63.9	3.8	8.1	1.2	2.0	5.7	1.3	Minor	Minor
RN1-20	63	64.2	68	68.6	2.0	5.7	1.2	0.0	4.1	0.6	Minor	Moderate
RN1-21	62.7	63.7	67.6	68.3	2.0	5.7	1.0	0.0	4.1	0.7	Minor	Moderate
RN1-22	63.2	64.4	67.6	68.5	2.0	5.7	1.2	0.0	4.1	0.9	Minor	Moderate
RN1-23	62	63.3	67.7	68.9	2.7	6.1	1.3	0.0	4.1	1.2	Minor	Moderate
RN1-24	58.3	59.6	64.8	65.9	3.8	8.1	1.3	0.0	4.9	1.1	Minor	Moderate

Name	L_{dn} (dBA) 1st Floor		L_{dn} (dBA) 2nd Floor		Allowable Increase in L_{dn} 1st Floor (dBA)		1st Floor Predicted Change (dBA)	Allowable Increase in L_{dn} 2nd Floor (dBA)		2nd Floor Predicted Change (dBA)	Noise Impact	
	Pre-Project	Post-Project	Pre-Project	Post-Project	Moderate Impact	Severe Impact		Moderate Impact	Severe Impact		1st Floor	2nd Floor
RN1-25	59	60.2	65.2	66.5	3.5	7.6	1.2	0.0	4.9	1.3	Minor	Moderate
RN1-26	54.7	56	63.2	64.4	5.0	10.0	1.3	2.0	5.7	1.2	Minor	Minor
RN2-01	56.3	57.5	-	-	4.6	9.3	1.2	-	-	-	Minor	-
RN2-02	68.7	69.8	-	-	0.0	3.8	1.1	-	-	-	Moderate	-
RN2-03	68.8	69.8	-	-	0.0	3.8	1.0	-	-	-	Moderate	-
RN2-04	68.1	69.5	-	-	0.0	4.1	1.4	-	-	-	Moderate	-
RN2-05	68.4	69.5	-	-	0.0	4.1	1.1	-	-	-	Moderate	-
RN2-06	68.6	69.6	-	-	0.0	3.8	1.0	-	-	-	Moderate	-
RN2-07	68.2	69.5	-	-	0.0	4.1	1.3	-	-	-	Moderate	-
RN2-08	69.3	70.4	-	-	0.0	3.8	1.1	-	-	-	Moderate	-
RN2-09	69.3	70.4	-	-	0.0	3.8	1.1	-	-	-	Moderate	-
RN2-10	69.6	70.9	-	-	0.0	3.6	1.3	-	-	-	Moderate	-
RN2-11	70.7	72	-	-	0.0	3.5	1.3	-	-	-	Moderate	-
RN2-12	71	72.3	-	-	0.0	3.5	1.3	-	-	-	Moderate	-
RN2-13	72.3	73.5	-	-	0.0	3.0	1.2	-	-	-	Moderate	-
RN2-14	70.9	72.1	-	-	0.0	3.5	1.2	-	-	-	Moderate	-
RN2-15	70.2	71.4	-	-	0.0	3.6	1.2	-	-	-	Moderate	-
RN2-16	71.5	72.6	-	-	0.0	3.0	1.1	-	-	-	Moderate	-
RN2-17	69.7	70.9	-	-	0.0	3.6	1.2	-	-	-	Moderate	-
RN2-18	67.9	69.1	-	-	0.0	4.1	1.2	-	-	-	Moderate	-
RN2-19	68	69.2	-	-	0.0	4.1	1.2	-	-	-	Moderate	-
RN2-20	70.2	71.4	-	-	0.0	3.6	1.2	-	-	-	Moderate	-
RN2-21	69.9	71.1	-	-	0.0	3.6	1.2	-	-	-	Moderate	-
RN2-22	68.8	70	-	-	0.0	3.8	1.2	-	-	-	Moderate	-
RN2-23	68.2	69.4	70.1	70.1	0.0	4.1	1.2	0.0	3.6	0.0	Moderate	Moderate
RN2-24	68	69.2	69.8	69.9	0.0	4.1	1.2	0.0	3.6	0.1	Moderate	Moderate
RN2-25	66.7	67.9	69.7	70	0.0	4.3	1.2	0.0	3.6	0.3	Moderate	Moderate
RN2-26	66.6	67.8	69.3	70	0.0	4.3	1.2	0.0	3.8	0.7	Moderate	Moderate

Name	L_{dn} (dBA) 1st Floor		L_{dn} (dBA) 2nd Floor		Allowable Increase in L_{dn} 1st Floor (dBA)		1st Floor Predicted Change (dBA)	Allowable Increase in L_{dn} 2nd Floor (dBA)		2nd Floor Predicted Change (dBA)	Noise Impact	
	Pre-Project	Post-Project	Pre-Project	Post-Project	Moderate Impact	Severe Impact		Moderate Impact	Severe Impact		1st Floor	2nd Floor
RN2-27	66	67.2	68.9	69.7	0.0	4.6	1.2	0.0	3.8	0.8	Moderate	Moderate
RN2-28	66.1	67.3	68.8	69.6	0.0	4.6	1.2	0.0	3.8	0.8	Moderate	Moderate
RN2-29	66.3	67.4	68.7	69.5	0.0	4.6	1.1	0.0	3.8	0.8	Moderate	Moderate
RN2-30	65.7	66.9	68.1	68.9	0.0	4.6	1.2	0.0	4.1	0.8	Moderate	Moderate
RN2-31	63.8	65.1	66.2	67.3	1.0	5.3	1.3	0.0	4.6	1.1	Moderate	Moderate
RN2-32	63.8	65.1	66.8	67.8	1.0	5.3	1.3	0.0	4.3	1.0	Moderate	Moderate
RN2-33	64.4	65.6	66.6	67.7	1.0	5.3	1.2	0.0	4.3	1.1	Moderate	Moderate
RN2-34	65	66	66.3	67.3	0.0	4.9	1.0	0.0	4.6	1.0	Moderate	Moderate
RN2-35	64.6	65.5	66.4	67.4	0.0	4.9	0.9	0.0	4.6	1.0	Moderate	Moderate
RN2-36	62.8	63.5	65.5	66.7	2.0	5.7	0.7	0.0	4.6	1.2	Minor	Moderate
RN2-37	62.7	63.5	65.2	66.4	2.0	5.7	0.8	0.0	4.9	1.2	Minor	Moderate
RN2-38	61.5	62.6	64.4	65.7	2.7	6.1	1.1	1.0	5.3	1.3	Minor	Moderate
RN2-39	60.4	61.5	63.3	64.5	3.2	7.1	1.1	2.0	5.7	1.2	Minor	Minor
RN2-40	58.4	59.6	61.1	62.4	3.8	8.1	1.2	2.9	6.6	1.3	Minor	Minor
RN2-41	56.8	58	59.8	60.9	4.2	8.7	1.2	3.2	7.1	1.1	Minor	Minor
RN3-01	57.8	59	61.8	63.2	3.8	8.1	1.2	2.7	6.1	1.4	Minor	Minor
RN3-02	58.2	59.5	61.7	63.1	3.8	8.1	1.3	2.7	6.1	1.4	Minor	Minor
RN3-03	58.5	59.9	61.9	63.3	3.5	7.6	1.4	2.7	6.1	1.4	Minor	Minor
RN3-04	61	62.5	63	64.2	2.9	6.6	1.5	2.0	5.7	1.2	Minor	Minor
RN3-05	61.8	63.1	63.4	64.7	2.7	6.1	1.3	2.0	5.7	1.3	Minor	Minor
RN3-06	61.8	63	64.1	65.3	2.7	6.1	1.2	1.0	5.3	1.2	Minor	Moderate
RN3-07	61.6	62.8	63.4	64.6	2.7	6.1	1.2	2.0	5.7	1.2	Minor	Minor
RN3-08	61.7	62.9	63.4	64.6	2.7	6.1	1.2	2.0	5.7	1.2	Minor	Minor
RN3-09	61.2	62.4	62	63.2	2.9	6.6	1.2	2.7	6.1	1.2	Minor	Minor
RN3-10	60.8	62.1	62.4	63.6	2.9	6.6	1.3	2.7	6.1	1.2	Minor	Minor
RN3-11	61.5	62.8	62.6	63.7	2.7	6.1	1.3	2.0	5.7	1.1	Minor	Minor
RN3-12	61.7	62.9	62.8	63.9	2.7	6.1	1.2	2.0	5.7	1.1	Minor	Minor
RN3-13	62.8	63.9	64.3	65.3	2.0	5.7	1.1	1.0	5.3	1.0	Minor	Moderate

Name	L_{dn} (dBA) 1st Floor		L_{dn} (dBA) 2nd Floor		Allowable Increase in L_{dn} 1st Floor (dBA)		1st Floor Predicted Change (dBA)	Allowable Increase in L_{dn} 2nd Floor (dBA)		2nd Floor Predicted Change (dBA)	Noise Impact	
	Pre-Project	Post-Project	Pre-Project	Post-Project	Moderate Impact	Severe Impact		Moderate Impact	Severe Impact		1st Floor	2nd Floor
RN3-14	62.9	64.1	64.4	65.4	2.0	5.7	1.2	1.0	5.3	1.0	Minor	Moderate
RN3-15	65	66.1	66.1	67.6	0.0	4.9	1.1	0.0	4.6	1.5	Moderate	Moderate
RN3-16	63.1	65.1	66.6	68.4	2.0	5.7	2.0	0.0	4.3	1.8	Moderate	Moderate
RN3-17	65.1	66.8	68.9	70.2	0.0	4.9	1.7	0.0	3.8	1.3	Moderate	Moderate
RN3-18	64.2	64.9	66	66.9	1.0	5.3	0.7	0.0	4.6	0.9	Minor	Moderate
RN3-19	61.5	63.7	66.4	67.6	2.7	6.1	2.2	0.0	4.6	1.2	Minor	Moderate
RN3-20	66.3	67.6	69.8	70.9	0.0	4.6	1.3	0.0	3.6	1.1	Moderate	Moderate
RN3-21	66.7	68.3	70.2	71.1	0.0	4.3	1.6	0.0	3.6	0.9	Moderate	Moderate
RN3-22	57.8	59.4	63.3	64.5	3.8	8.1	1.6	2.0	5.7	1.2	Minor	Minor
RN3-23	66.5	67.3	68.1	68.9	0.0	4.3	0.8	0.0	4.1	0.8	Moderate	Moderate
RN3-24	67.9	68.8	69.4	70.5	0.0	4.1	0.9	0.0	3.8	1.1	Moderate	Moderate
RN3-25	67.1	68.2	69.4	70.5	0.0	4.3	1.1	0.0	3.8	1.1	Moderate	Moderate
RN3-26	67.1	67.6	68.6	69.5	0.0	4.3	0.5	0.0	3.8	0.9	Moderate	Moderate
RN3-27	66.1	67	68.5	69.5	0.0	4.6	0.9	0.0	3.8	1.0	Moderate	Moderate
RN3-28	69	69.6	71.7	72.6	0.0	3.8	0.6	0.0	3.0	0.9	Moderate	Moderate
RN3-29	67.7	68.2	71.2	72	0.0	4.1	0.5	0.0	3.5	0.8	Moderate	Moderate
RN3-30	69.1	69.9	72.8	73.7	0.0	3.8	0.8	0.0	2.0	0.9	Moderate	Moderate
RN3-31	71.7	72.2	73.4	74.1	0.0	3.0	0.5	0.0	2.0	0.7	Moderate	Moderate
RN3-32	71.2	71.6	73.6	74.2	0.0	3.5	0.4	0.0	1.0	0.6	Moderate	Moderate
RN3-33	70.1	70.6	73.3	74	0.0	3.6	0.5	0.0	2.0	0.7	Moderate	Moderate
RN3-34	69.5	69.4	71.3	71.6	0.0	3.6	-0.1	0.0	3.5	0.3	Moderate	Moderate
RN3-35	71.2	71.1	72.5	72.8	0.0	3.5	-0.1	0.0	2.0	0.3	Moderate	Moderate
RN3-36	71.5	71.5	72.9	73.1	0.0	3.0	0.0	0.0	2.0	0.2	Moderate	Moderate
RN3-37	71.5	71.1	73	72.9	0.0	3.0	-0.4	0.0	2.0	-0.1	Moderate	Moderate
RN3-38	68.6	68.2	70.2	69.8	0.0	3.8	-0.4	0.0	3.6	-0.4	Moderate	Moderate
RN3-39	68.5	68	70	69.3	0.0	3.8	-0.5	0.0	3.6	-0.7	Moderate	Moderate
RN3-40	68.5	67.9	70	69.1	0.0	3.8	-0.6	0.0	3.6	-0.9	Moderate	Moderate
RN3-41	67.8	67	69.4	68.5	0.0	4.1	-0.8	0.0	3.8	-0.9	Moderate	Moderate

Name	L_{dn} (dBA) 1st Floor		L_{dn} (dBA) 2nd Floor		Allowable Increase in L_{dn} 1st Floor (dBA)		1st Floor Predicted Change (dBA)	Allowable Increase in L_{dn} 2nd Floor (dBA)		2nd Floor Predicted Change (dBA)	Noise Impact	
	Pre-Project	Post-Project	Pre-Project	Post-Project	Moderate Impact	Severe Impact		Moderate Impact	Severe Impact		1st Floor	2nd Floor
RN3-42	67.1	66.1	68.5	67.7	0.0	4.3	-1.0	0.0	3.8	-0.8	Moderate	Moderate
RN3-43	66.1	65.5	67.3	67.1	0.0	4.6	-0.6	0.0	4.3	-0.2	Moderate	Moderate
RN3-44	70.7	69.4	-	-	0.0	3.5	-1.3	-	-	-	Moderate	-
RS1-01	69.4	70.6	-	-	0.0	3.8	1.2	-	-	-	Moderate	-
RS1-02	65.7	66.9	67.4	68.7	0.0	4.6	1.2	0.0	0.0	0.0	Moderate	Moderate
RS1-03	66.3	67.5	68.1	69.3	0.0	4.6	1.2	0.0	4.3	1.3	Moderate	Moderate
RS1-04	66.9	68.1	68.6	69.8	0.0	4.3	1.2	0.0	4.1	1.2	Moderate	Moderate
RS1-05	67.6	68.7	69	70.2	0.0	4.1	1.1	0.0	3.8	1.2	Moderate	Moderate
RS1-06	67.6	68.8	69.3	70.4	0.0	4.1	1.2	0.0	3.8	1.2	Moderate	Moderate
RS1-07	67.8	69	69.5	70.7	0.0	4.1	1.2	0.0	3.8	1.1	Moderate	Moderate
RS1-08	68.1	69.3	69.7	71	0.0	4.1	1.2	0.0	3.6	1.2	Moderate	Moderate
RS1-09	68.6	69.9	70.1	71.3	0.0	3.8	1.3	0.0	3.6	1.3	Moderate	Moderate
RS1-10	69.2	70.5	70.4	71.7	0.0	3.8	1.3	0.0	3.6	1.2	Moderate	Moderate
RS1-11	69.1	70.3	70.5	71.8	0.0	3.8	1.2	0.0	3.6	1.3	Moderate	Moderate
RS1-12	69.5	70.7	70.9	72.1	0.0	3.6	1.2	0.0	3.5	1.3	Moderate	Moderate
RS1-13	69	70.2	71.2	72.5	0.0	3.8	1.2	0.0	3.5	1.2	Moderate	Moderate
RS1-14	66.1	67.2	-	-	0.0	4.6	1.1	-	-	-	Moderate	-
RS1-15	66.7	68	-	-	0.0	4.3	1.3	-	-	-	Moderate	-
RS1-16	62.6	63.2	66.9	68	2.0	5.7	0.6	0.0	0.0	0.0	Minor	Moderate
RS1-17	62.8	63.6	67.2	68.2	2.0	5.7	0.8	0.0	4.3	1.1	Minor	Moderate
RS1-18	63	63.9	67.5	68.6	2.0	5.7	0.9	0.0	4.3	1.0	Minor	Moderate
RS1-19	63.5	64.1	67.7	68.8	1.0	5.3	0.6	0.0	4.1	1.1	Minor	Moderate
RS1-20	63.7	64.2	67.9	69	1.0	5.3	0.5	0.0	4.1	1.1	Minor	Moderate
RS1-21	63.9	64.5	68.1	69.2	1.0	5.3	0.6	0.0	4.1	1.1	Minor	Moderate
RS1-22	63.7	64.6	68.1	69.4	1.0	5.3	0.9	0.0	4.1	1.1	Minor	Moderate
RS1-23	63.7	64.7	68.2	69.6	1.0	5.3	1.0	0.0	4.1	1.3	Minor	Moderate
RS1-24	63.9	64.7	68.3	69.8	1.0	5.3	0.8	0.0	4.1	1.4	Minor	Moderate
RS1-25	63.3	65.4	68.6	69.9	2.0	5.7	2.1	0.0	4.1	1.5	Moderate	Moderate

Name	L_{dn} (dBA) 1st Floor		L_{dn} (dBA) 2nd Floor		Allowable Increase in L_{dn} 1st Floor (dBA)		1st Floor Predicted Change (dBA)	Allowable Increase in L_{dn} 2nd Floor (dBA)		2nd Floor Predicted Change (dBA)	Noise Impact	
	Pre-Project	Post-Project	Pre-Project	Post-Project	Moderate Impact	Severe Impact		Moderate Impact	Severe Impact		1st Floor	2nd Floor
RS1-26	63.6	64.6	69.2	70.2	1.0	5.3	1.0	0.0	3.8	1.3	Minor	Moderate
RS1-27	63.2	64.3	69.5	70.4	2.0	5.7	1.1	0.0	3.8	1.0	Minor	Moderate
RS2-01	55.1	56.6	61	62.2	5.0	10.0	1.5	2.9	6.6	1.2	Minor	Minor
RS2-02	63.4	64.7	65.3	66.7	2.0	5.7	1.3	0.0	4.9	1.4	Minor	Moderate
RS2-03	65	66.4	66.8	68.3	0.0	4.9	1.4	0.0	4.3	1.5	Moderate	Moderate
RS2-04	67.2	68.5	68.7	70.2	0.0	4.3	1.3	0.0	3.8	1.5	Moderate	Moderate
RS2-05	67.5	68.8	69	70.5	0.0	4.1	1.3	0.0	3.8	1.5	Moderate	Moderate
RS2-06	67.7	69	69.3	70.9	0.0	4.1	1.3	0.0	3.8	1.6	Moderate	Moderate
RS2-07	67.9	69.1	69.4	71	0.0	4.1	1.2	0.0	3.8	1.6	Moderate	Moderate
RS2-08	68.1	69.4	69.8	71.3	0.0	4.1	1.3	0.0	3.6	1.5	Moderate	Moderate
RS2-09	68.2	69.5	70	71.5	0.0	4.1	1.3	0.0	3.6	1.5	Moderate	Moderate
RS2-10	68.3	69.7	70.3	71.8	0.0	4.1	1.4	0.0	3.6	1.5	Moderate	Moderate
RS2-11	68.4	69.7	70.5	72	0.0	4.1	1.3	0.0	3.5	1.5	Moderate	Moderate
RS2-12	68.5	69.8	70.8	72.3	0.0	3.8	1.3	0.0	3.5	1.5	Moderate	Moderate
RS2-13	68.3	69.7	71	72.4	0.0	4.1	1.4	0.0	3.5	1.4	Moderate	Moderate
RS2-14	68.3	69.7	71.2	72.6	0.0	4.1	1.4	0.0	3.5	1.4	Moderate	Moderate
RS2-15	66.6	67.9	70.1	71.6	0.0	4.3	1.3	0.0	3.6	1.5	Moderate	Moderate
RS2-16	69.5	70.8	72	73.4	0.0	3.6	1.3	0.0	3.0	1.4	Moderate	Moderate
RS2-17	68.6	69.9	71.4	72.8	0.0	3.8	1.3	0.0	3.5	1.4	Moderate	Moderate
RS2-18	67.3	68.6	69.2	70.7	0.0	4.3	1.3	0.0	3.8	1.5	Moderate	Moderate
RS2-19	67.5	68.9	69.5	71	0.0	4.1	1.4	0.0	3.6	1.5	Moderate	Moderate
RS2-20	69	70.4	70.3	71.8	0.0	3.8	1.4	0.0	3.6	1.5	Moderate	Moderate
RS2-21	69.4	70.8	70.6	72.1	0.0	3.8	1.4	0.0	3.5	1.5	Moderate	Moderate
RS2-22	69.7	71.1	70.9	72.5	0.0	3.6	1.4	0.0	3.5	1.6	Moderate	Moderate
RS2-23	70.2	71.6	71.5	73	0.0	3.6	1.4	0.0	3.0	1.5	Moderate	Moderate
RS2-24	70.2	71.6	71.6	73	0.0	3.6	1.4	0.0	3.0	1.4	Moderate	Moderate
RS2-25	70.5	71.8	71.8	73.3	0.0	3.5	1.3	0.0	3.0	1.5	Moderate	Moderate
RS2-26	70.5	71.9	71.9	73.4	0.0	3.5	1.4	0.0	3.0	1.5	Moderate	Moderate

Name	L_{dn} (dBA) 1st Floor		L_{dn} (dBA) 2nd Floor		Allowable Increase in L_{dn} 1st Floor (dBA)		1st Floor Predicted Change (dBA)	Allowable Increase in L_{dn} 2nd Floor (dBA)		2nd Floor Predicted Change (dBA)	Noise Impact	
	Pre-Project	Post-Project	Pre-Project	Post-Project	Moderate Impact	Severe Impact		Moderate Impact	Severe Impact		1st Floor	2nd Floor
RS2-27	70.6	72	72.1	73.6	0.0	3.5	1.4	0.0	3.0	1.5	Moderate	Moderate
RS2-28	71.4	72.8	72.8	74.3	0.0	3.5	1.4	0.0	2.0	1.5	Moderate	Moderate
RS2-29	71	72.4	72.6	74.1	0.0	3.5	1.4	0.0	2.0	1.5	Moderate	Moderate
RS2-30	70.9	72.3	72.6	74.1	0.0	3.5	1.4	0.0	2.0	1.5	Moderate	Moderate
RS2-31	70.2	71.6	72.4	73.9	0.0	3.6	1.4	0.0	3.0	1.5	Moderate	Moderate
RS2-32	70.8	72.1	72.8	74.3	0.0	3.5	1.3	0.0	2.0	1.5	Moderate	Moderate
RS2-33	71.5	72.9	73.4	74.8	0.0	3.0	1.4	0.0	2.0	1.4	Moderate	Moderate
RS2-34	71.7	73	73.3	74.8	0.0	3.0	1.3	0.0	2.0	1.5	Moderate	Moderate
RS2-35	71.9	73.2	73.8	75.2	0.0	3.0	1.3	0.0	1.0	1.4	Moderate	Severe
RS2-36	72	73.3	73.9	75.5	0.0	3.0	1.3	0.0	1.0	1.6	Moderate	Severe
RS2-37	72.3	73.6	74.3	75.8	0.0	3.0	1.3	0.0	1.0	1.5	Moderate	Severe
RS2-38	72.1	73.4	74	75.6	0.0	3.0	1.3	0.0	1.0	1.6	Moderate	Severe
RS2-39	71.6	72.9	73.5	75.2	0.0	3.0	1.3	0.0	1.0	1.7	Moderate	Severe
RS2-40	71.1	72.4	72.7	74.2	0.0	3.5	1.3	0.0	2.0	1.5	Moderate	Moderate
RS2-41	70.2	71.6	72.2	73.8	0.0	3.6	1.4	0.0	3.0	1.6	Moderate	Moderate
RS2-42	68.9	70.2	70.4	71.8	0.0	3.8	1.3	0.0	3.6	1.4	Moderate	Moderate
RS2-43	71.7	73	73.2	74.5	0.0	3.0	1.3	0.0	2.0	1.3	Moderate	Moderate
RS2-44	71.3	72.5	74.5	75.9	0.0	3.5	1.2	0.0	0.0	1.4	Moderate	Severe
RS2-45	70.5	71.8	74.3	75.5	0.0	3.5	1.3	0.0	1.0	1.2	Moderate	Severe
RS2-46	66.7	67.7	69.8	71.3	0.0	4.3	1.0	0.0	3.6	1.5	Moderate	Moderate
RS2-47	67.1	68	70.2	71.4	0.0	4.3	0.9	0.0	3.6	1.2	Moderate	Moderate
RS2-48	67.6	68.9	71.2	72.6	0.0	4.1	1.3	0.0	3.5	1.4	Moderate	Moderate
RS2-49	69	70.3	72.4	73.8	0.0	3.8	1.3	0.0	3.0	1.4	Moderate	Moderate
RS2-50	62.4	63.6	63.1	64.3	2.7	6.1	1.2	2.0	5.7	1.2	Minor	Minor
RS2-51	68.2	69.5	71.8	73.1	0.0	4.1	1.3	0.0	3.0	1.3	Moderate	Moderate
RS2-52	69	70.2	72.6	73.9	0.0	3.8	1.2	0.0	2.0	1.3	Moderate	Moderate
RS2-53	68.5	69.7	71.7	73	0.0	3.8	1.2	0.0	3.0	1.3	Moderate	Moderate
RS2-54	68.7	69.8	-	-	0.0	3.8	1.1	-	-		Moderate	-

Name	L_{dn} (dBA) 1st Floor		L_{dn} (dBA) 2nd Floor		Allowable Increase in L_{dn} 1st Floor (dBA)		1st Floor Predicted Change (dBA)	Allowable Increase in L_{dn} 2nd Floor (dBA)		2nd Floor Predicted Change (dBA)	Noise Impact	
	Pre-Project	Post-Project	Pre-Project	Post-Project	Moderate Impact	Severe Impact		Moderate Impact	Severe Impact		1st Floor	2nd Floor
RS2-55	67.3	68.5	70.6	72	0.0	4.3	1.2	0.0	3.5	1.4	Moderate	Moderate
RS2-56	59.7	61.2	63.9	65.2	3.2	7.1	1.5	1.0	5.3	1.3	Minor	Moderate
RS2-57	58.1	59	62.6	63.9	3.8	8.1	0.9	2.0	5.7	1.3	Minor	Minor
RS2-58	66.3	67.5	70	71.4	0.0	4.6	1.2	0.0	3.6	1.4	Moderate	Moderate
RS2-59	65	66.3	69.4	70.7	0.0	4.9	1.3	0.0	3.8	1.3	Moderate	Moderate
RS2-60	66.1	67.4	-	-	0.0	4.6	1.3	-	-	-	Moderate	-
RS2-61	64.3	65.5	69	70.3	1.0	5.3	1.2	0.0	3.8	1.3	Moderate	Moderate
RS2-62	65.9	67.4	70.3	71.5	0.0	4.6	1.5	0.0	3.6	1.2	Moderate	Moderate
RS2-63	66.9	68	70.9	72.1	0.0	4.3	1.1	0.0	3.5	1.2	Moderate	Moderate
RS2-64	67.8	68.9	71.6	72.7	0.0	4.1	1.1	0.0	3.0	1.1	Moderate	Moderate
RS2-65	67.7	68.8	71.4	72.7	0.0	4.1	1.1	0.0	3.5	1.3	Moderate	Moderate
RS2-66	67.9	69.1	71.5	72.8	0.0	4.1	1.2	0.0	3.0	1.3	Moderate	Moderate
RS2-67	67.2	68.3	70.4	71.4	0.0	4.3	1.1	0.0	3.6	1.0	Moderate	Moderate
RS2-68	65.8	67	69.7	70.8	0.0	4.6	1.2	0.0	3.6	1.1	Moderate	Moderate
RS2-69	64	65	67.5	68.8	1.0	5.3	1.0	0.0	4.1	1.3	Minor	Moderate
RS3-01	64.9	64.4	-	-	0.0	4.9	-0.5	-	-	-	Minor	-
RS3-02	67.2	67.2	-	-	0.0	4.3	0.0	-	-	-	Moderate	-
RS3-03	71.1	71.5	-	-	0.0	3.5	0.4	-	-	-	Moderate	-
RS3-04	67.4	68.4	-	-	0.0	4.3	1.0	-	-	-	Moderate	-
RS3-05	69.8	68.6	-	-	0.0	3.6	-1.2	-	-	-	Moderate	-

From:	Gerry Fleming
To:	Gerry Fleming
Subject:	FW: 216th-I/C- s.22 at Telegraph Trail
Date:	Thursday, April 13, 2017 9:54:17 AM
Attachments:	3134-17A 216 St and Telegraph Tr Noise Wall Review Memo.pdf

For file.

From: Gordon Swystun [mailto:gswystun@tol.ca]
Sent: Monday, February 27, 2017 2:49 PM
To: Gerry Fleming <GFleming@binnie.com>; Mark Bliss <Bliss@bkl.ca>
Cc: Gary Mak <mak@bkl.ca>; Maurizio Ponzini <MPonzini@binnie.com>; Edoardo Ballarin <EBallarin@binnie.com>; Richard Welfing <rwelfing@tol.ca>; Gordon Swystun <gswystun@tol.ca>
Subject: RE: 216th-I/C- s.22 at Telegraph Trail

Hi Gerry,
Based on the sound wall study BKL provided, s.13
s.13 : s.22 property.
As mentioned, this work will have to be dealt through the contract process once its awarded.
When you have a chance, an update on the tender closing/review would be great.
Thanks,

Gord Swystun | Project Supervisor
Engineering Division | Township of Langley
Direct Line: 604.533.6107

From: Gerry Fleming [mailto:GFleming@binnie.com]
Sent: Thursday, February 23, 2017 9:22 AM
To: Mark Bliss <Bliss@bkl.ca>; Gordon Swystun <gswystun@tol.ca>
Cc: Gary Mak <mak@bkl.ca>; Maurizio Ponzini <MPonzini@binnie.com>; Edoardo Ballarin <EBallarin@binnie.com>
Subject: RE: 216th-I/C- s.22 at Telegraph Trail

Gord, sorry as I may have forgotten to attach the report yesterday.
Please let us know if there is anything else you need and also if you want us involved in any further discussion with the resident. The decision on any change to the wall is entirely in the hands of ToL. As you know the tender is closing tomorrow (Feb 24), so any change to the wall will need to be in the form of a change request through the MOTI Ministry Representative (Dan Templeton). That process will obviously not be initiated for some time as the priority will be to first get the contractor signed up and then get them geared up to start work.
Maurizio/Eddie, for your information.

Gerry Fleming
Sr. Project Manager
Cell: 604-315-1174

From: Mark Bliss [mailto:Bliss@bkl.ca]
Sent: Wednesday, February 22, 2017 5:00 PM
To: Gerry Fleming <GFleming@binnie.com>; Gordon Swystun <gswystun@tol.ca>
Cc: Gary Mak <mak@bkl.ca>
Subject: RE: 216th-I/C- s.22 at Telegraph Trail

Hi Gerry,
s.13

- We do not recommend quiet pavement for noise mitigation on roadways that have speed limits of less

than 70 km/h. The sound character will be different but we don't think you would measure an appreciable difference in community noise versus new standard asphalt. Note that new standard asphalt is also quieter than old standard asphalt.

Let us know if you have any further questions.

Best Regards,

Mark

Mark Bliss P.Eng. INCE | Principal
BKL CONSULTANTS LTD acoustics · noise · vibration
T: 604-988-2508 ext. 102 | M: 778-838-8528

From: Gerry Fleming [mailto:GFleming@binnie.com]
Sent: Wednesday, February 22, 2017 12:17 PM
To: Gary Mak; Gordon Swystun
Cc: Mark Bliss
Subject: RE: 216th-I/C- s.22 at Telegraph Trail

Gary/Mark,

First I would like to acknowledge that there was a delay from Binnie in providing the information you needed, the various addenda to the contract were the priority.

From what I read, s.13 s.22 s.13 s.22 s.13 s.13

I have a couple of additional Questions please:

1. s.13 s.13 s.22 , I am assuming that this would have no noise mitigation value, so really only aesthetic value? Would you hazard a guess as to the potential savings/m of wall if the decision is made to go with the lower wall?
2. s.13 s.13 , could you please comment on the relative effectiveness of such a measure?

Gerry Fleming
Sr. Project Manager
Cell: 604-315-1174

From: Gary Mak [mailto:mak@bkl.ca]
Sent: Wednesday, February 22, 2017 11:53 AM
To: Gerry Fleming <GFleming@binnie.com>
Cc: Mark Bliss <Bliss@bkl.ca>
Subject: RE: 216th-I/C-s.22 at Telegraph Trail

Hi Gerry,

Please see attached memo and let us know if you have any questions.

Regards,

Gary

Gary Mak P.Eng. | Acoustical Consultant
BKL CONSULTANTS LTD acoustics · noise · vibration
T: 604-988-2508 ext. 107 | mak@bkl.ca | www.bkl.ca

From: Gordon Swystun [mailto:gswystun@tol.ca]
Sent: Wednesday, February 08, 2017 8:59 AM
To: Gerry Fleming <GFleming@binnie.com>; Maurizio Ponzini <MPonzini@binnie.com>
Cc: Edoardo Ballarin <EBallarin@binnie.com>; Richard Welfing <rwelfing@tol.ca>; Gordon Swystun <gswystun@tol.ca>
Subject: RE: 216th-I/C- s.22 at Telegraph Trail

Hi Gerry,

Thanks for the update and please proceed with having BKL assess the above property.

Any idea when BKL would have this assessment done?

Thanks,

Gord Swystun | Project Supervisor
Engineering Division | Township of Langley
Direct Line: 604.533.6107

From: Gerry Fleming [mailto:GFleming@binnie.com]
Sent: Wednesday, February 08, 2017 8:17 AM
To: Gordon Swystun <gswystun@tol.ca>; Maurizio Ponzini <MPonzini@binnie.com>
Cc: Edoardo Ballarin <EBallarin@binnie.com>
Subject: RE: 216th-I/C- s.22 at Telegraph Trail

Gord,

s.22 did call me late afternoon yesterday (Janelle the Deputy Director at MOTI suggested s.22 call), s.22 first asked for the primary reasons why we were extending the tender closing to Feb 23 and I explained that the protracted discussion with Telus around dealing with their fibre optic line that is impacted by the design was the first and the fact that we were building a 3rd SB lane on 216 St for the developer south of the highway was the second. I forgot to mention that a third reason was due to s.16,s.17

We then discussed the sound wall for s.22 and I explained that you and I were discussing hiring BKL, he indicated agreement with that course and s.13

s.13

s.13 I mentioned my suggestion s.13

s.13 and he seems ok with that suggestion.

As far as the scope for BKL, they will initially focus on this property as per the note from Mark Bliss below (We'll do a quick model and memo to document our opinion for you), s.17

s.17

I would really like to get BKL working on this today if at all possible, but I need your approval first.
Gerry Fleming

From: Gordon Swystun [mailto:gswystun@tol.ca]
Sent: Tuesday, February 07, 2017 10:07 PM
To: Gerry Fleming <GFleming@binnie.com>; Maurizio Ponzini <MPonzini@binnie.com>
Cc: Edoardo Ballarin <EBallarin@binnie.com>; Gordon Swystun <gswystun@tol.ca>
Subject: RE: 216th-I/C- s.22 at Telegraph Trail

Hi Gerry,
Sorry for not responding earlier as I was told s.22 were going to be at a meeting with you this afternoon and were going to discuss the proposed sound wall assessment with you, but it was cancelled.
I assume the scope of work would be more than the effects of deleting a portion of the wall as noted below by Mark.
We'll get back to you fairly quick on this.
Thanks,

Gord Swystun | Project Supervisor
Engineering Division | Township of Langley
Direct Line: 604.533.6107

From: Gerry Fleming [mailto:GFleming@binnie.com]
Sent: Monday, February 06, 2017 4:57 PM
To: Maurizio Ponzini <MPonzini@binnie.com>; Gordon Swystun <gswystun@tol.ca>
Cc: Edoardo Ballarin <EBallarin@binnie.com>
Subject: FW: 216th-I/C- s.22 at Telegraph Trail

Gordon,
Sorry for the delay, another very busy day.
I believe that Mark will provide very good value to the project and will respond quickly, I would estimate around s.17 I am requesting that you give Binnie approval to have Mark start immediately, with the paperwork to follow along later to formalize BKL as part of the team for billing purposes.
If you agree with this approach, then my other request is for Eddie to get Mark the requested

information.
Gerry Fleming

From: Mark Bliss [mailto:Bliss@bkl.ca]
Sent: Monday, February 06, 2017 11:11 AM
To: Gerry Fleming <GFleming@binnie.com>
Cc: Maurizio Ponzini <MPonzini@binnie.com>; Edoardo Ballarin <EBallarin@binnie.com>; Gary Mak <mak@bkl.ca>
Subject: RE: 216th-I/C- s.22 at Telegraph Trail

Hi Gerry,
Yes, we can get on this quickly for you. I assume you want us to answer TOL's question: what is the effect of deleting that portion of wall for other houses on Telegraph Trail? We'll do a quick model and memo to document our opinion for you.

- Do you want our proposal to be addressed to Binnie or TOL?
- And fixed fee vs. hourly billing preference?
- Can you send us a CAD file of the area with the wall alignment and building outlines?

Best Regards,
Mark

Mark Bliss P.Eng. INCE | Principal
BKL CONSULTANTS LTD acoustics · noise · vibration
T: 604-988-2508 ext. 102 | M: 778-838-8528

From: Gerry Fleming [mailto:GFleming@binnie.com]
Sent: Monday, February 06, 2017 7:35 AM
To: Mark Bliss
Cc: Maurizio Ponzini; Edoardo Ballarin
Subject: FW: 216th-I/C- s.22 at Telegraph Trail

Mark,
Walking the line between design manager and project manager, I am approaching you as a member of the design team.
As per below, Binnie has a separate contract with ToL for the added scope on 216 St between the highway and 88 Ave.
As part of that scope s.13 We had inquired whether they wanted BKL involved initially, at the time they declined but as you can see there is an issue with s.22 and would prefer to have the noise but keep their view.
Are you willing to get involved, do you have the capacity immediately and what steps would you recommend to move forward?
Gerry Fleming

From: Gordon Swystun [mailto:gswystun@tol.ca]
Sent: Sunday, February 05, 2017 10:45 PM
To: Gerry Fleming <GFleming@binnie.com>; Paul Cordeiro <pcordeiro@tol.ca>
Cc: Edoardo Ballarin <EBallarin@binnie.com>; Rob Sylvester <RSylvester@binnie.com>; James Norris <JNorris@binnie.com>; Gordon Swystun <gswystun@tol.ca>
Subject: RE: 216th-I/C- s.22 at Telegraph Trail

Hi Gerry,
s.22

I think it might be a good idea to have BKL assist with the sound barrier concerns. Can we get a proposal fee from them to do an assessment/design review?
I haven't looked at the tender specs for the pavement design, but another option for sound reduction is porous pavement. It was used on the SFPR project between Hwy#1 and 104 Ave on Hwy#17. We also used porous pavement on 208th street approx. between 94 and 96 ave. It makes a substantial difference in road noise.
I'll call you Monday to further discuss.

Gord Swystun | Project Supervisor
Engineering Division | Township of Langley
Direct Line: 604.533.6107

From: Gerry Fleming [mailto:GFleming@binnie.com]
Sent: Saturday, February 04, 2017 2:11 PM
To: Paul Cordeiro <pcordeiro@tol.ca>
Cc: Edoardo Ballarin <EBallarin@binnie.com>; Rob Sylvester <RSylvester@binnie.com>; James Norris <JNorris@binnie.com>; Gordon Swystun <gswystun@tol.ca>
Subject: RE: 216th-I/C- s.22 at Telegraph Trail
Importance: High

I had another call from s.22 last week, I told s.22 that we were still discussing options, Seems clear that s.22 are quite concerned.
Are you agreeable to us bringing BKL into the picture to help us understand the impact?
Gerry Fleming

From: Gerry Fleming
Sent: Monday, January 30, 2017 2:09 PM
To: 'Paul Cordeiro' <pcordeiro@tol.ca>
Cc: Edoardo Ballarin <eballarin@binnie.com>; Duane Odenbach <dodenbach@tol.ca>; Rob Sylvester <RSylvester@binnie.com>; James Norris <jnorris@binnie.com>; Gordon Swystun <gswystun@tol.ca>
Subject: RE: 216th-I/C- s.22 at Telegraph Trail

Paul,
We did not involve BKL is this so far and not sure that Binnie would be in a position to professionally answer your questions. We could do that (hire BKL) if you want as we have a separate contract with you for this work anyway?
s.13

s.14

Gerry

From: Paul Cordeiro [mailto:pcordeiro@tol.ca]
Sent: Monday, January 30, 2017 1:29 PM
To: Gerry Fleming <GFleming@binnie.com>
Cc: Edoardo Ballarin <EBallarin@binnie.com>; Duane Odenbach <dodenbach@tol.ca>; Rob Sylvester <RSylvester@binnie.com>; James Norris <JNorris@binnie.com>; Gordon Swystun <gswystun@tol.ca>
Subject: RE: 216th-I/C- s.22 ı at Telegraph Trail

Gerry,
What would be the impact of the effectiveness of the wall if a portion were removed? Would there be more noise to the other properties on telegraph trail if this section was reduced and the gap of the wall at the intersection became larger. Does this affect more than one property? We should have those answers before we discuss with the resident.
Thanks
Paul

From: Gerry Fleming [mailto:GFleming@binnie.com]
Sent: Monday, January 30, 2017 12:33 PM
To: Duane Odenbach; Rob Sylvester; James Norris; Paul Cordeiro; Gordon Swystun
Cc: Edoardo Ballarin
Subject: RE: 216th-I/C- s.22 ıt Telegraph Trail

I spoke to this s.22 this morning, s.22 and recently received our update (attached) and has some concerns with the proposed sound wall.

s.22 and would prefer to NOT have the wall as it will block all their windows and they are also concerned about visibility if they are s.22 for vehicles turning right from 216 St.

This is really a decision for ToL to make, i.e., are you willing to leave most of their property without a sound wall and are you willing to s.22 I am available on Wednesday this week.

Gerry Fleming
Cell: 604-315-1174

BKL
Consultants in Acoustics

MEMORANDUM

To: Gerry Fleming R.F. Binnie & Associates Ltd. Date: February 21, 2017

From: Gary Mak

Copies To:

Subject: 216 Street and Telegraph Trail Noise Wall Review

As requested, we have conducted an acoustical assessment of the noise wall on 216 Street near the Telegraph Trail junction. The proposed 3 m tall noise wall is located on the west side of 216 Street, starting at Highway 1 and extending to the north, with a gap at Telegraph Trail.

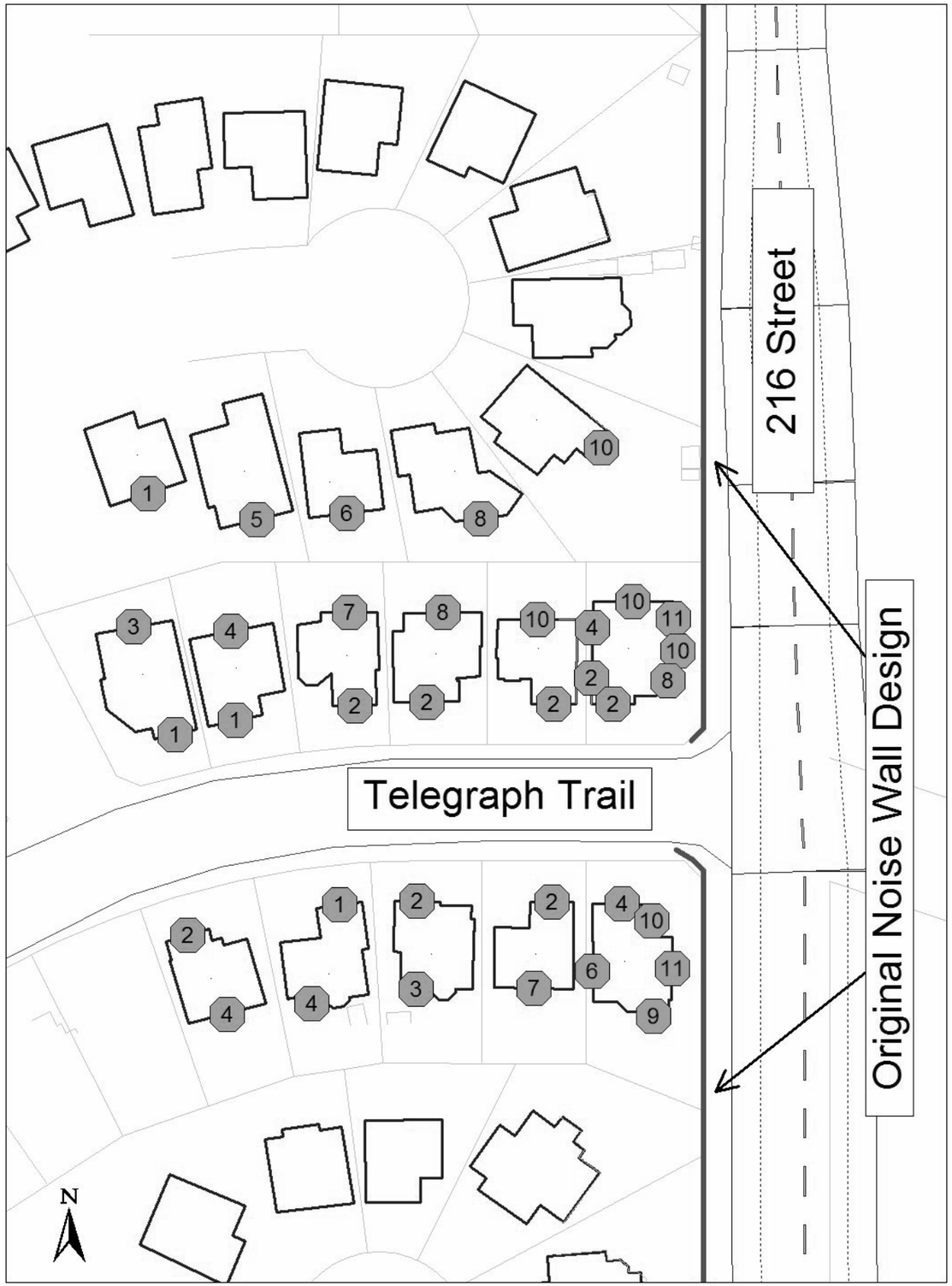
A modification to the noise wall alignment has been proposed which would remove a 22 metre portion of the wall just north of Telegraph Trail. Figures 1 and 2 show the original wall design and the revised design with the deletion.

The noise benefit, or Insertion Loss, of the proposed noise wall options were assessed by importing CAD drawings, provided by RF Binnie & Associates, into our outdoor noise propagation software, Cadna/A, as shown by the pink polylines in the attached figures. We performed predictions of 216 Street traffic noise at houses near the Telegraph Trail intersection, with and without the two versions of the barrier, in order to determine the noise benefit of the two options at first and second storey elevations.

The 2014 BC Ministry of Transportation and Infrastructure (MOTI) *Policy for Assessing and Mitigating Noise Impacts from New and Upgraded Numbered Highways* states that "to be considered sufficiently effective, mitigation measures must be able to reduce total noise (from highway and non-highway sources) at fronting residences, schools, etc., by at least 5 dBA."

The attached figures show the predicted noise benefit for the original and revised wall alignments. Colour coding was used to show compliance with the MOTI noise policy acoustical effectiveness criterion. A significant reduction in noise benefit is only predicted at the residence on the northwest corner of the intersection; the noise benefit is predicted to remain largely the same (generally within 1 dB) at the other nearby residences.

BKL CONSULTANTS LTD acoustics · noise · vibration
#308 - 1200 Lynn Valley Road, North Vancouver, BC V7J 2A2
E: mak@bkl.ca | W: www.bkl.ca
T: 604-988-2508 | F: 604-988-7457



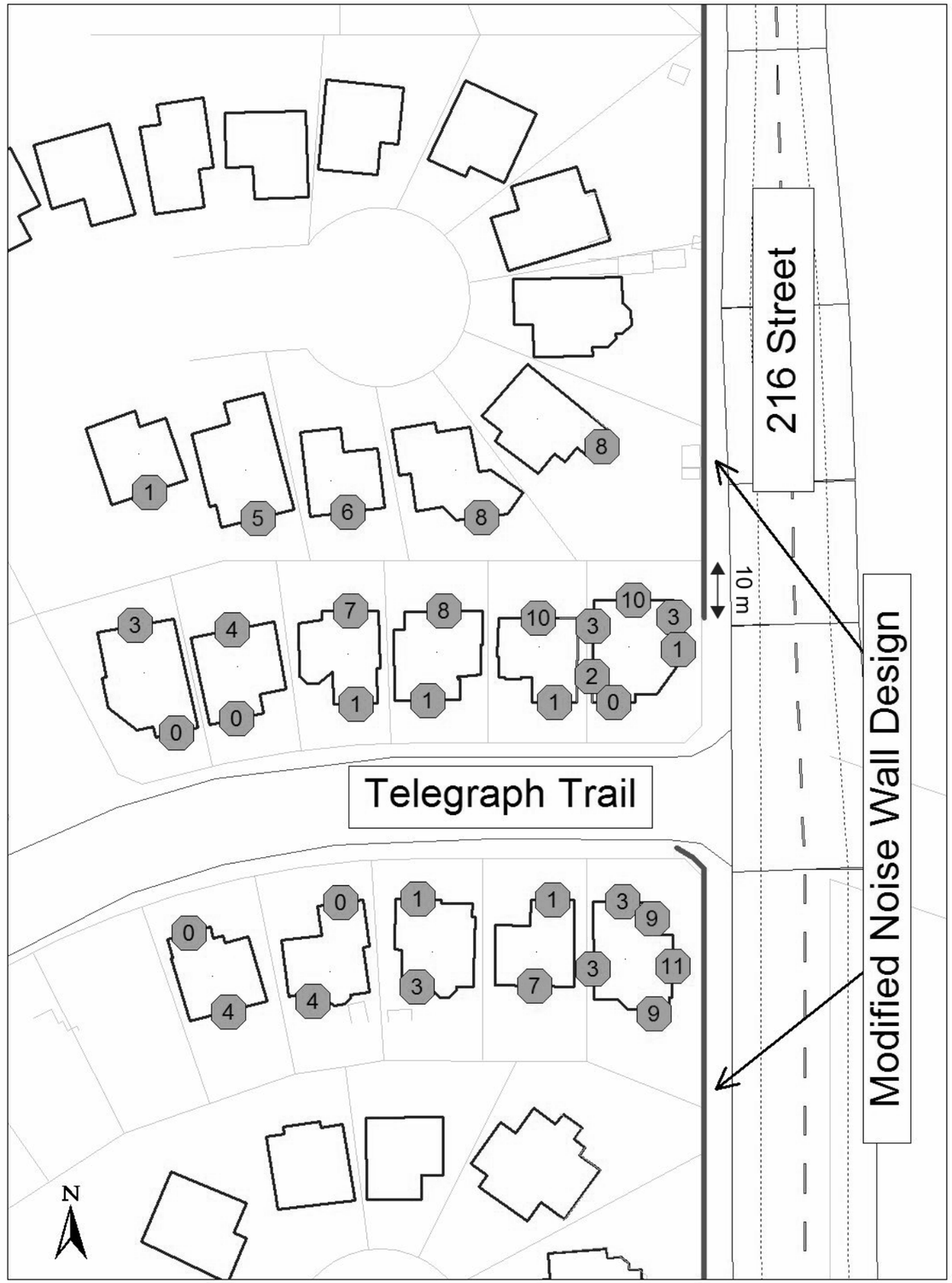
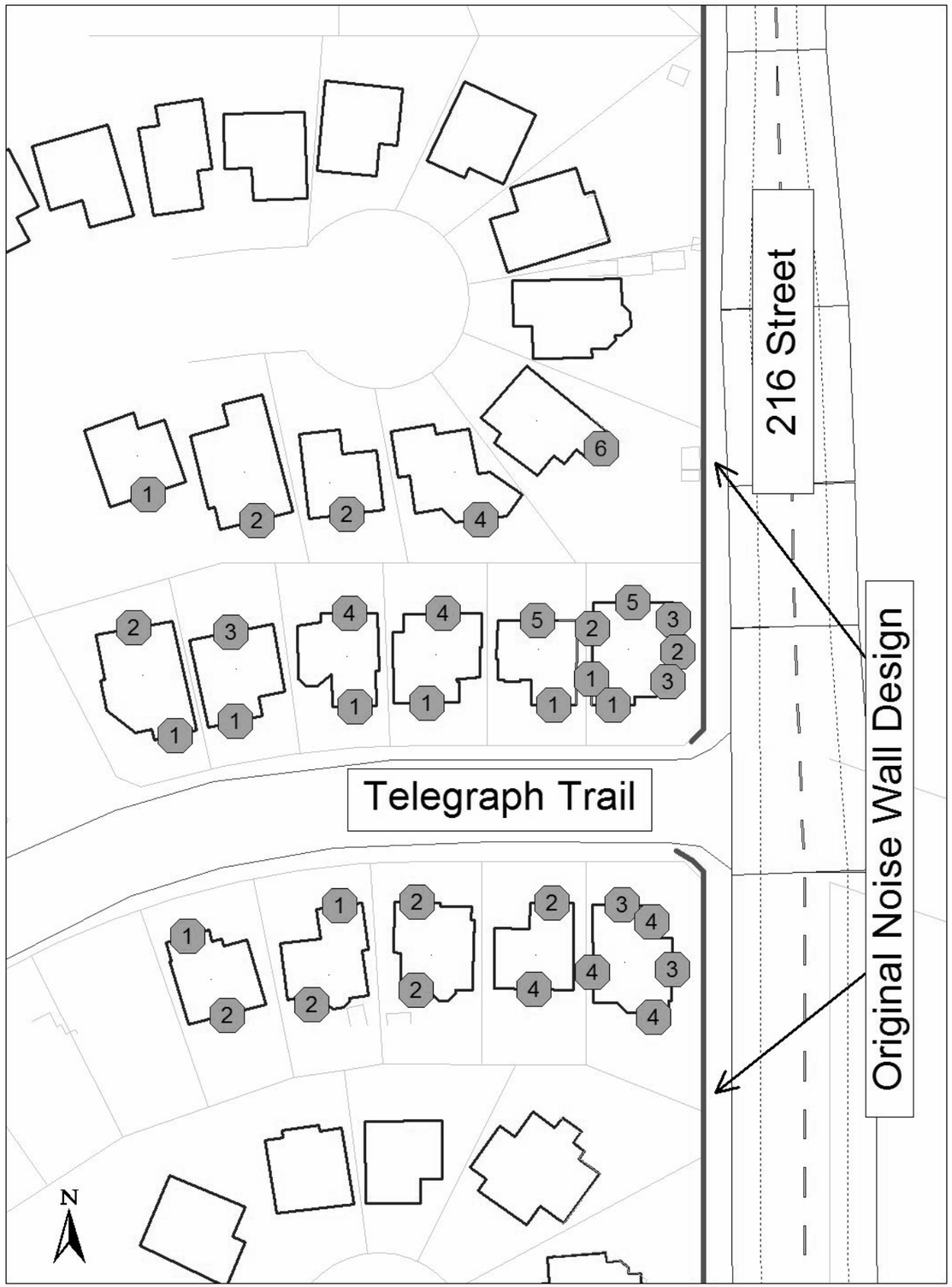


Figure 1: Predicted Insertion Loss of Original and Modified Noise Walls at 1st Floor Height (dB)



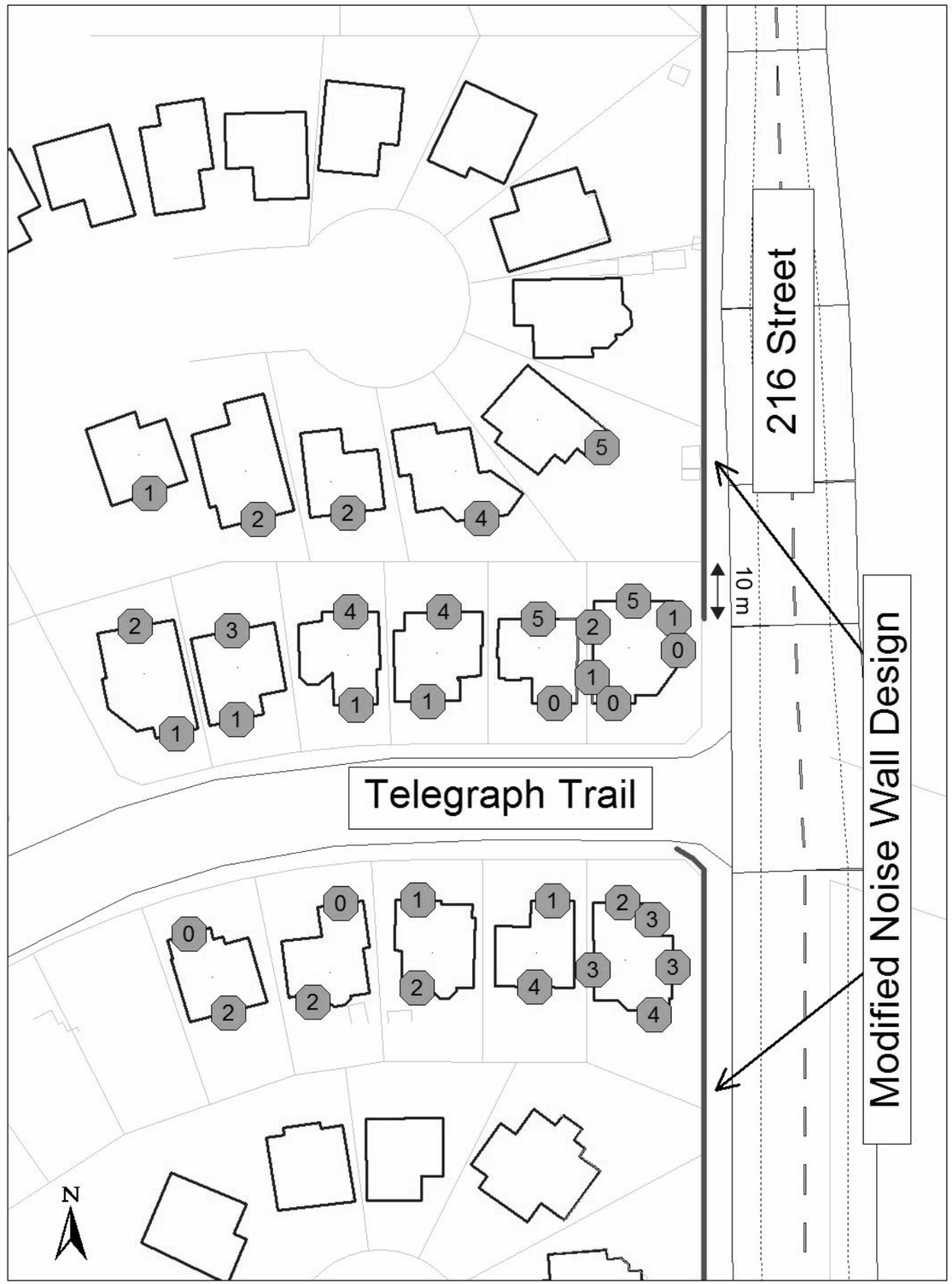


Figure 2: Predicted Insertion Loss of Original and Modified Noise Walls at 2nd Floor Height (dB)

From: Gerry Fleming
To: Gerry Fleming
Subject: FW: 216th Interchange (additional scope items)
Attachments: image001.png
image002.png
image003.png

For file.

From: Duane Odenbach [mailto:dodenbach@tol.ca]
Sent: Thursday, August 18, 2016 2:11 PM
To: Gerry Fleming <GFleming@binnie.com>
Cc: Hui, Sheila TRAN:EX (Sheila.Hui@gov.bc.ca) <Sheila.Hui@gov.bc.ca>; James Norris <JNorris@binnie.com>; Paul Cordeiro <pcordeiro@tol.ca>
Subject: RE: 216th Information requested

Hi Gerry,

Sorry for the late reply. I had to confirm information with some staff that were on holidays as well as deal with a budget transfer to find funding for the watermain. Please see my responses below in red font.

Thanks,

Duane Odenbach, P.Eng. | Project Engineer
Engineering Division | Township of Langley
20338 – 65 Avenue, Langley, BC V2Y 3J1
Direct Line: 604.533.6036

Web | Facebook | Twitter | YouTube

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From: Gerry Fleming [mailto:GFleming@binnie.com]
Sent: Monday, August 08, 2016 9:01 PM
To: Duane Odenbach
Cc: Hui, Sheila TRAN:EX (Sheila.Hui@gov.bc.ca); James Norris
Subject: FW: 216th Information requested

Duane,

Sorry for the delay in getting this to you, however we have a few questions please as follows:

Sound Wall
As per the below screen shots, we will need to cut down quite a mature hedge in order to add the sound wall. Are you quite sure you want to proceed with this all the way to 88 Ave and if yes, do you agree for us to give you a price for the added survey and geotech investigation?

s.13
Yes, pleas provide a price for the added survey and geotech investigation.

Property acquisition in NE quadrant of Telegraph Trail
We are currently only showing sufficient acquisition to accommodate the 'interim' work, should we be showing to take for the 'ultimate' template? For now we should just be accommodating the 'interim work'. The Township will have to deal with the 'ultimate' works if 216 Street is widened to 88 Avenue in the future.

Also, is there a specific type of fence you would want to specify both north and south of Telegraph Trail where property acquisition is required within ToL Jurisdiction?

Typically we replace the same type of fencing that the owner's currently have. In this case it looks as though s.22 In this case we would suggest s.13 s.13
I can't tell what type of fence if any they have south of Telegraph Trail due to the blackberry bushes however, I would recommend s.13

Waterline replacement south of the highway
We have assumed to change from 250mm to 300mm for the waterline that is impacted by the interchange construction, with ToL paying the minor cost for the upgrade, however, we still have not heard whether you want to replace the remainder of the line south to 80 Ave? I have received approval for the estimated s for the upsizing to 300 mm all the way south to the intersection of 216 Street and 80 Avenue so we would like to proceed with this.

Additional infrastructure for the future fibre optic line on 216 St
I am not clear if that additional infrastructure should be shown on the drawings and in the contract bid items for payment by ToL? Can you provide an estimated costs for the additional fibre optic line infrastructure? s.13 s.1 however, if there is another method that MOTI prefers we can discuss. I want to be able to confirm the costs for the fibre optic line so our IT Manager can be aware of the costs.

Gerry Fleming
604-315-1174

From: James Norris
Sent: Tuesday, August 02, 2016 11:22 AM
To: Gerry Fleming <GFleming@binnie.com>; Edoardo Ballarin <EBallarin@binnie.com>
Cc: Maurizio Ponzini <MPonzini@binnie.com>
Subject: RE: 216th Information requested

Hi Gerry,

I was thinking we would just need survey from existing EP to existing property line; however, it looks like in some areas there will not be any room to put a wall against the property line without cutting down existing hedges (see below) and I'm not sure if we should even survey this area unless ToL wants to pursue this option. Let me know what you think.

From: James Norris
Sent: Tuesday, July 26, 2016 3:33 PM
To: Gerry Fleming <GFleming@binnie.com>; Edoardo Ballarin <EBallarin@binnie.com>
Cc: Maurizio Ponzini <MPonzini@binnie.com>
Subject: RE: 216th Information requested

Yes, we will need survey and most likely geotech since I'm guessing our geotechnical investigation didn't go this far. We also want to make sure there aren't any utility conflicts (I know there is an oil pipeline in this location and there might be other utilities) so the survey will be worthwhile.

From: Gerry Fleming
Sent: Tuesday, July 26, 2016 3:25 PM
To: James Norris <JNorris@binnie.com>; Edoardo Ballarin <EBallarin@binnie.com>
Cc: Maurizio Ponzini <MPonzini@binnie.com>
Subject: Fwd: 216th Information requested

As discussed James, do we need survey to build a wall on the west side to 88 Ave and if yes then approximately how much and when would we have it?

Gerry

Sent from my iPhone

Begin forwarded message:

> **From:** "Hui, Sheila TRAN:EX" <Sheila.Hui@gov.bc.ca>
> **Date:** July 26, 2016 at 2:56:37 PM PDT
> **To:** 'Doug Fourchalk' <doug@dmfconsultants.com>, 'Gerry Fleming' <GFleming@binnie.com>, 'Elana Krol' <elanakrol@lucentquay.ca>
> **Cc:** James Norris <JNorris@binnie.com>, "Loewen, James TRAN:EX" <James.Loewen@gov.bc.ca>, "Hilliard, Karin TRAN:EX" <Karin.Hilliard@gov.bc.ca>
> **Subject: FW: 216th Information requested**
>
> Doug / Gerry/ Elana,
> As discussed, please see below a summary from Paul (TOL) with regards to last night meeting with Council regarding about the 216th interchange.
>
> James / Gerry – I don't know if we have already included the ALR land on the north side of 216th from pump station to telegraph trail to be included in ALC submission – please ensure Karin / James get the latest drawings that will include these and if it is not included, we will update our submission. If it is included, which I think it is, then that's fine.
>
> Doug - as discussed, please ensure we capture the land costs for this additional work from pump station to telegraph trail for accounting purposes.
>
> Thanks,
>
> Sheila Hui, PMP
> A/ Senior Project Manager
> Ministry of Transportation and Infrastructure, South Coast Region, Project Delivery
> Address: Suite 310-1500 Woolridge Street, Coquitlam, BC V3K 0B8
> Email: sheila.hui@gov.bc.ca| Office: 604-527-2261| Cellular: 604-788-1541
>
>

From: Paul Cordeiro [mailto:pcordeiro@tol.ca]
Sent: Tuesday, July 26, 2016 1:50 PM
To: Hui, Sheila TRAN:EX
Cc: Duane Odenbach; Richard Welling; Scott Thompson
Subject: RE: 216th Information requested

Sheila,

I can provide the following information on the various reports and council motions. Below are from the Draft minutes of the Council meetings.

Road Network Improvements Report 16-83, File ENG 5330-23-010
MOTION
Moved by Councillor Fox,
Seconded by Councillor Quaale,
That Council approve $5.5 million in funding to increase the scope of work currently underway as part of the provincial 216 Interchange project, to include municipal road network improvements and including a sound attenuation wall from Highway 1 to 88 Avenue on the west side of 216 Street, not to exceed the cost of $1.5 million.
CARRIED

MOTION REFERRED FROM THE AFTERNOON MEETING OF JULY 25, 2016.
Moved by Councillor Richter,
Seconded by Councillor Davis,
That the delegation's comments from the Regular Evening Meeting regarding the 216 Street Interchange be referred to staff and the Ministry of Transportation for a report on whether other interchange options are feasible and possible at this time.

AMENDMENT
Moved by Councillor Whitmarsh,
Seconded by Councillor Quaale,
That the comments from the delegations be referred to staff and the Ministry of Transportation for a report on the following:

- Why the location was chosen;
- Safety concerns for local residents;
- Implications of a truck route on 216 Street; and
- Implications of closing the Telegraph trail entrance to Forest Hills.

CARRIED
Councillors Arnason and Richter opposed
MOTION, AS AMENDED
The question was called on the Motion, as amended, and it was
CARRIED

Council also gave first, second and third reading to a loan authorization bylaw for capital road works for both the 216 Street Interchange and the 208 Street overpass.

Council also approved the expropriation of property for road widening of 216 St and 80 Avenue from the property at 8020-216 Street. Scott Thompson can follow up with you on the property issues.

As discussed, the Township can now proceed with including additional work north of the MoTI jurisdiction on 216 Street to north of Telegraph Trail as part of the scope of the Interchange project to be delivered by MoTI. MoTI will deliver the additional project including land acquisition, the necessary regulatory approvals, and construction with the cost being invoiced to the Township. MoTI can also proceed with the design of a 3m concrete noise wall on the west side of 216 Street from Highway 1 to 88 Avenue.

Let me know if you have any questions.

Thanks
Paul Cordeiro | Manager, Transportation Engineering

604.533.6183

From: Hui, Sheila TRAN:IEX [mailto:Sheila.Hui@gov.bc.ca]
Sent: Tuesday, July 26, 2016 1:29 PM
To: Paul Cordeiro
Cc: Duane Odenbach
Subject: 216th Information requested

Paul,

If I may asked, can you please summarize in an email requesting the information you need from me with regards to the planning for the interchange at 216th?

That way, I know for sure what studies / reports you are looking for and I can work with the Ministry staff so I can get back to you in a timely manner.

Thanks,

Sheila Hui, PMP
A/ Senior Project Manager
Ministry of Transportation and Infrastructure, South Coast Region, Project Delivery
Address: Suite 310-1500 Woolridge Street, Coquitlam, BC V3K 0B8
Email: sheila.hui@gov.bc.ca| Office: 604-527-2261| Cellular: 604-788-1541

R.F. BINNIE & ASSOCIATES LTD.
205 - 4946 Canada Way,
Burnaby, BC V5G 4H7
TEL 604 420 1721
BINNIE.com

Design Registry

XT:Fabick, Valerie L TRAN:IN <VFabick@binnie.com>; Sundher, Veena TRAN:EX <Veena.Sundher@gov.bc.ca>Project: Project 12570 – Highway 1 – 202 St. to 216 St. Highway Widening & 216th Interchange	**Date:** Jan 25, 2016
Subject: Design Registry	**Binnie File No.:** 14-483-03
In Attendance: Gerry Fleming, James Norris, Eddie Ballarin, Sheila Hui, Helen Cheung	

Item	Description	Action
1	**Mushroom farm and e-culvert**	
	▪ Binnie, MOTI and Karin Hilliard met with the owners of the farm and we expect to get feedback in the near future.	MOTI
	▪ Binnie agreed to arrange a meeting between survey staff and the owner representative to get a sense of the location of underground features (septic field, storage tanks, connecting pipes, well).	Binnie
	▪ Binnie, MOTI and Hatfield met separately and agreed to modify the alignment of the frontage road and to go back to the original concept for an e-culvert under the off-ramp connecting to the highway ditch.	Binnie
2	**Transition to/from existing at 200 St/202 St**	
	▪ MOTI confirmed that for the 50% submission we will show Option 4 for WB and Option 1 for EB.	Binnie
	▪ Preliminary indications are that Option 4 would not require any property acquisition, however it may not fit within the overall project budget.	Binnie/MOTI
	▪ MOTI indicated that if the decision is made to move away from Option 4 for WB, then the second choice would be Option 1 (drop lane). As part of this alternate plan, MOTI may request to investigate Option 2 for EB (to extend the 200 St on-ramp).	Binnie/MOTI
3	**Preliminary RoW drawings**	
	▪ A drawing was prepared and submitted to MOTI showing a preliminary indication of the RoW acquisition required along 216 St near to 80 Ave. This drawing would be shared with ToL to facilitate a joint approach to the property owners.	

Item	Description	Action
4	**Preload early contract** ▪ MOTI have expressed a strong desire to proceed immediately with preparing a separate contract package for preload at the 216 St interchange ramps and approaches. ▪ Property acquisition drawings in the NE and SW quadrants would need to be finalized and submitted to MOTI as quickly as possible following the review of the 50% detailed design submission.	Binnie/MOTI Binnie
5	**Public Consultation** ▪ MOTI requested an updated workplan and schedule, the open house meeting is expected to be no later than mid-March of 2016 and there are several stakeholder meetings to be completed prior to the open house. ▪ Possible consultation questions/issues were circulated under separate cover.	Lucent-Quay Binnie/MOTI
6	**Drainage design and construction** ▪ The design for Guy Creek will be similar to the KF concept for the PMH1 project, i.e., to incorporate a parallel channel on the south side to link the three separate watercourses. ▪ MOTI suggested to consider the option of drilling instead of open cut with detours into the median for the two major culvert crossings.	Binnie Binnie
7	**Sound Walls** ▪ There is a desire to know the extent of the proposed walls as part of the 50% submission and in particular whether additional measures would be required for the adjacent school.	Binnie
8	**Environmental** ▪ A list of questions from Hatfield for their report were circulated to MOTI/Binnie under separate cover. ▪ MOTI responded that the design should account for future bus stops on the ramps for a highway based bus service.	Binnie Binnie

Prepared by R.F. Binnie & Associates Ltd.

R.F. BINNIE & ASSOCIATES LTD.
205 - 4946 Canada Way
Burnaby, BC V5G 4H7
TEL 604 420 1721
BINNIE.com

Monthly Status Report

Project:	**Project 12570 – Highway 1 – 202 St. to 216 St. Highway Widening & 216th Interchange**		
Client:	**Ministry of Transportation and Infrastructure**		
Date:	**July 22, 2016**	**Binnie File No.:**	**14-482-03**

Summary of Activities for the Previous Month

- Finalized the 100% project estimate with input from MOTI.
- Discussed the project estimate with MOTI on July 12, instructed to proceed based on the existing scope of work (no need for scope reduction considerations).
- Submitted an estimate for the added waterline scope as requested by ToL.
- Met with utility company representatives/MOTI on July 15 (Telus, BC Hydro and Fortis BC). MOTI agreed to arrange for locating the Telus FO in potential conflict with the concrete sound wall and the new interchange ramps.
- Reviewed the draft Cost Sharing Agreement with MOTI/AG, a drawing to clarify the jurisdictional boundaries was requested and delivered.
- Design Team site meeting on July 19 to review potential downstream impacts at Yorkson and Guy Creeks.
- Meeting with ToL utility staff and MOTI on July 19 to review the 90% drainage and waterline design review comments from ToL and the estimate for the added waterline scope.
- At the July 19 meeting with ToL, presented a draft design confirming that a 3.0m wide MUP and 1.65m wide boulevard was achievable on the west side of 216 St north of the highway. ToL confirmed to proceed with the 100% submission with this template.
- Submitted 2045 traffic information to ToL, additional information for earlier horizon years to be provided by MOTI.
- Submitted cost estimates and pictures of 3m high wood and concrete sound walls to ToL as requested.

Summary of Activities for the Month Ahead

- 100% Detailed Design Package (including the 50% package for ToL scope to Telegraph Trail), to be submitted to MOTI and ToL on July 29.
- Coordinate with utility companies and provide drawings as needed to ensure their design for the relocation works proceeds.
- Attend 100% review meetings with MOTI and ToL, dates to be determined.

- Convene a separate meeting with MOTI to review construction staging and Special Provisions.
- Continue working toward the Tender Package submission, incorporate any changes as needed from the various meetings with MOTI and ToL.
- Work toward completing the formal response to the VE and the RSA.

Table 1 – Project Issues

Date	Issue	Action	Required by or Resolved
Sept. 25, 2015	*The scope of the assignment will increase to include transit facilities.*	*Binnie/ MOTI*	*Resolved - Binnie and the MOTI will meet with BC Transit and Translink to define scope. Afterwards a work plan will be developed for MOTI approval.* *E-mail on file clarifying: Therefore, to allow for future transit opportunities, we recommend that the interchange be designed in such a way to easily allow for the creation of bus stops on the on-off ramps for a future highway-based transit service.*
Sept. 25, 2015	*How to transition from 3 GP lanes westbound to 2 GP lanes, 1 HOV lane and an exit ramp to 200th Street given the limited width at the 202nd Street structure.*	*Binnie/* *MOTI*	*Resolved - Binnie will develop options and provide recommendations to the MOTI. Binnie met with the MOTI and the MOTI is reviewing the options and will advise. MOTI agreed that the 50% design submission will show the options for EB and WB as recommended by Binnie.* *Recently clarified that we will show and cost Option 4 for WB and Option 1 for EB as part of the 50% submission.* *Option 1 for WB was shown as part of the VE submission as one of the cost saving measures.* *A New option for a two lane exit at WB 200 St off-ramp has been developed and accepted to present with the 90% submission.*

Date	Issue	Action	Required by or Resolved
Oct. 22, 2015	*Binnie and MOTI met with the TOL to discuss the scope of the project within the TOL. The scope of the project within the TOL is still unclear. The project may extend on 216 Street from the intersection at 80th Avenue to the intersection with Telegraph Trail.*	*Binnie/ MOTI*	*Resolved - Binnie will develop preliminary 50% detailed design drawings. Binnie and the MOTI met with the TOL to review the preliminary drawings and finalize the scope of the project along 216th Street.*
Nov. 6, 2015	*In a meeting with MOTI the TOL asked if Binnie could provide an estimate to prepare the design for 216 Street to the Telegraph Trail intersection.*	*Binnie/ ToL*	*Resolved - Binnie has submitted an estimate for the agreed to scope of work to TOL.* *ToL have agreed to pay for the additional survey and design, however no confirmation the budget will be available to combine into one construction contract.*
Nov. 18, 2015	*The MOTI is investigating whether the construction of the culverts should be advanced to 2016.*	*MOTI/ Binnie*	*In Progress – Binnie/Tetra Tech/MMM recommend that the preload at the ramps and approaches for the new interchange be advanced to 2016.* *MOTI indicated a desire to move forward with the separate preload contract, including fast tracking the needed RoW acquisition.* *VE proposal to include a pile test in the median is under consideration.* *Final decision made to have no advance work, including the pile test and/or preload.*
Jan., 2016	*Investigating options for the frontage road access to the mushroom farm in the NE quadrant.*	*Binnie*	*Resolved - this issue is also linked to the e-culvert replacement at the existing driveway to the mushroom farm.* *VE proposal to have a short 'road' ending with a cul-de-sac and a long 'driveway' has been accepted to present as part of the 90% submission.*

Date	Issue	Action	Required by or Resolved
Feb., 2016	*Investigating cost saving measures, including Option 1 for WB and various changes to the preload and pavement structure requirements.*	*Binnie*	*Resolved - Changes were presented in the VE submission.* *VE suggestions were reviewed some cost saving measures were carried forward in the design.*
April, 2016	*Investigating the various VE proposals.*	*Binnie*	*Resolved – Agreed to realign the WB highway lanes at 216 St, results in a shorter bridge structure.*
April, 2016	*ToL requested to extend the project limits to include changes to the intersection of 216 St and 80 Ave*	*ToL*	*Resolved - A proposal for this detailed design work was submitted to ToL.* *MOTI will not cost share on the improvements to the south and west legs, ToL will work with McElhanney and include the design/construction as part of their 80 Ave extension project.*
May, 2016	*The 90% construction cost estimate does not fit within the overall Project Budget, MOTI requests we consider options to reduce costs*	*Binnie/* *MOTI*	*In Progress – Some initial work has begun within the design team, will be further developed as part of the 90% review with MOTI* *Resolved, the 100% cost estimate was reviewed with MOTI and now fits within the project budget.*
June, 2016	*Additional sound wall will be required on the south side of the highway and to the west of the 208th Street structure.*	*Binnie/* *BKL*	*In Progress – Binnie and BKL will review the limits of the sound wall and modify the design to include additional sound wall.* *Consideration is now being given to a berm that will partially cover these new homes.*

From:	Gerry Fleming
To:	James Norris; Duane Odenbach
Cc:	Edoardo Ballarin; XT:Ponzini, M TRAN:IN; Hui, Sheila
Subject:	216 St Soundwall (Submitted for comments on Oct 3, 2016)
Date:	Monday, October 3, 2016 1:16:47 PM
Attachments:	20161001 - 14-482 - 800SW.PDF 20161001 - Soundwall X-Secs.pdf

Duane,

Here is our first cut at the proposed sound wall along 216 St, comments are as follows:

General

- For the MOTI sound wall, we were proposing to have a 1m offset between the wall and the property line, however my understanding is that along 216 St we are only proposing a 0.3m offset from the property line to the back face of the sound wall. (James to confirm please).
- Wherever possible we are showing a 'swale' between the property line and the sidewalk/MUP, however in some areas the sound wall seems to be 'in' the swale and I am wondering if a sub-drain placed below the sidewalk/MUP would not be a better solution?
- We have used the new layout for 216 St and Telegraph Trail as per our recent draft review submission.
- We have not engaged the services of our sub-consultant on noise (BKL), so what we are proposing is based on past experience and not on a computer generated model as there were no 'pre-construction' noise measurements along 216 St.

Dwg 809

- We are proposing to 'overlap' the berm with a wall along the back property line for some homes, there is also an overlap for the utility easement and the wall is shown going 'around' the easement for the pump station.
- The 3m high sound wall is going to be quite a bit lower than the berm and by copy of this e-mail I am requesting that James distribute a copy of the relevant sections to show the berm and top of sound wall. Just trying to make sure we are all on the same page with this if questions are asked later on by residents.
- Also shows the proposed short turn around for maintenance vehicles at the pump station (based on the 100% review comments).
- Some of this wall is within MOTI jurisdiction, but was not included in the 100% submission. Binnie is not in a position to comment on the cost sharing breakdown, we are simply notifying you that such a conversation probably does need to occur.

Dwg 810

- We are proposing to carry the sound wall a bit around the curb return on either side of the Telegraph Trail intersection.

Dwg 811

- As noted by James, there are areas where the base of the sound wall is lower than 216 St, which means the residents do not get the maximum possible sound mitigation. My suggestion above with regard to a sub-drain rather than a swale may partially offset this issue.
- Also as noted by James, we are proposing to have short section of sound wall on either side of the Kinder Morgan property line to partially mitigate the impact of the gap for adjacent residents. Our assumption is that this would require an agreement/easement with the

utility owner and this could be a lengthy exercise.

- Shows one of the FH relocations as noted by James.

Dwg 812

- Shows the second FH relocation as noted by James.
- Shows short sections of wall along each side of the walkway around Sta 72+40, again to partially mitigate the impact of the gap in the sound wall.
- The proposed wall is 'reflective', so in theory may have a negative effect on the school on the east side of 216 St.

As you know we are trying hard to finalize the tender package, so your prompt attention to this would be appreciated.

Gerry Fleming
Design Manager
Cell: 604-315-1174

From: James Norris
Sent: Saturday, October 01, 2016 4:03 PM
To: Gerry Fleming
Cc: Edoardo Ballarin ; Maurizio Ponzini
Subject: 216 St Soundwall

Hi Gerry,

Attached are the updated drawings for the soundwall on 216 St. In some locations it looks like the wall will be low compared to 216 (station 212+50 to station 212+90). It also looks like in a couple of spots we will need to relocate an existing Fire Hydrant in order to fit the wall in. We may want to consider sending these to ToL to get approval from them before we finalize. I'm also not sure if we need to get Kinder Morgan involved since the soundwall will be on their easement.

Regards,

James Norris P.Eng.
Highway Design Manager, Associate
Direct: +1 (778) 945-6056

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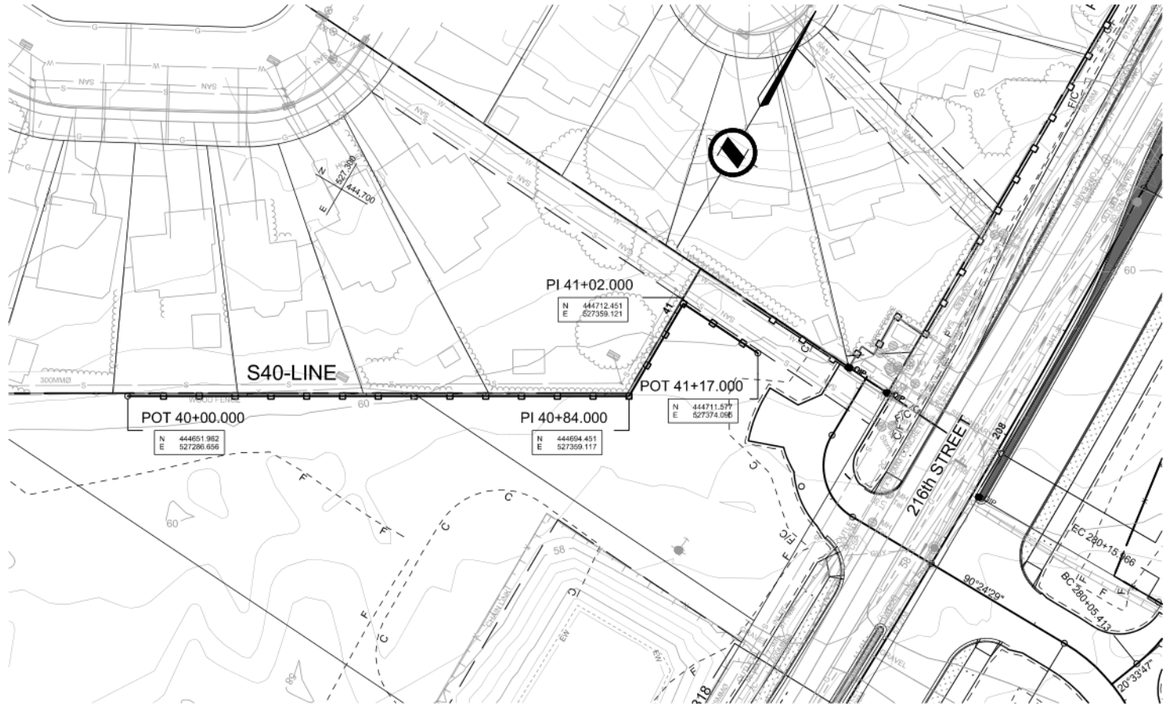
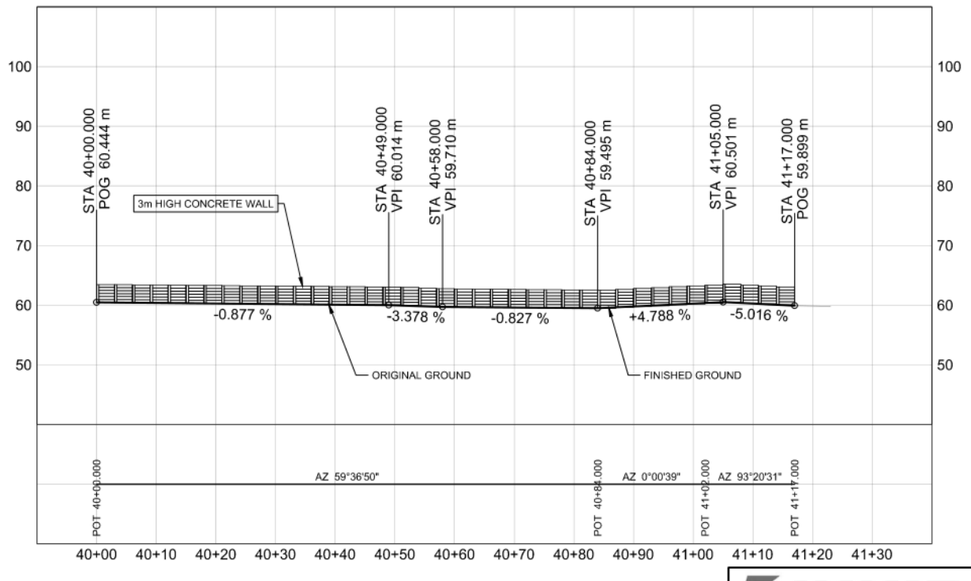
Burnaby, BC V5G 4H7
Office: +1 (604) 420-1721 x6056 Fax: +1 (604) 420-4743





FOR PLANS SEE DWG. R1-818-101 TO 118	FOR SIGNING & PVMT MARKINGS SEE DWG. R1-818-601 TO 618
FOR PROFILES SEE DWG. R1-818-201 TO 223	FOR DRAINAGE PLANS SEE DWG. R1-818-701 TO 733
FOR TYPICAL SECTIONS SEE DWG. R1-818-301 TO 314	FOR CREEK SITE PLANS SEE DWG. R1-818-741 TO 751
FOR GEOMETRICS AND LANING SEE DWG. R1-818-401 TO 418	FOR WATERMAIN RELOCATION SEE DWG. R1-818-771 TO 773
FOR SPOT ELEVATIONS SEE DWG. R1-818-501 TO 507	FOR SOUND WALLS SEE DWG. R1-818-801 TO 812

NOTE: CONTRACTOR TO LOCATE ALL UNDERGROUND UTILITIES PRIOR TO INSTALLING POSTS AND ADJUST POST SPACING AS REQUIRED

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SCALE 0 5 1:500 25m
CAD FILENAME 14-482 - 800SW.DWG
DATE 2016-10-01

REV	DATE	REVISIONS	SIGNATURE

BRITISH COLUMBIA
MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE
HIGHWAY DESIGN ENGINEERING AND GEOMATICS
SOUTH COAST REGION

S40 LINE - SOUND WALL DETAILS

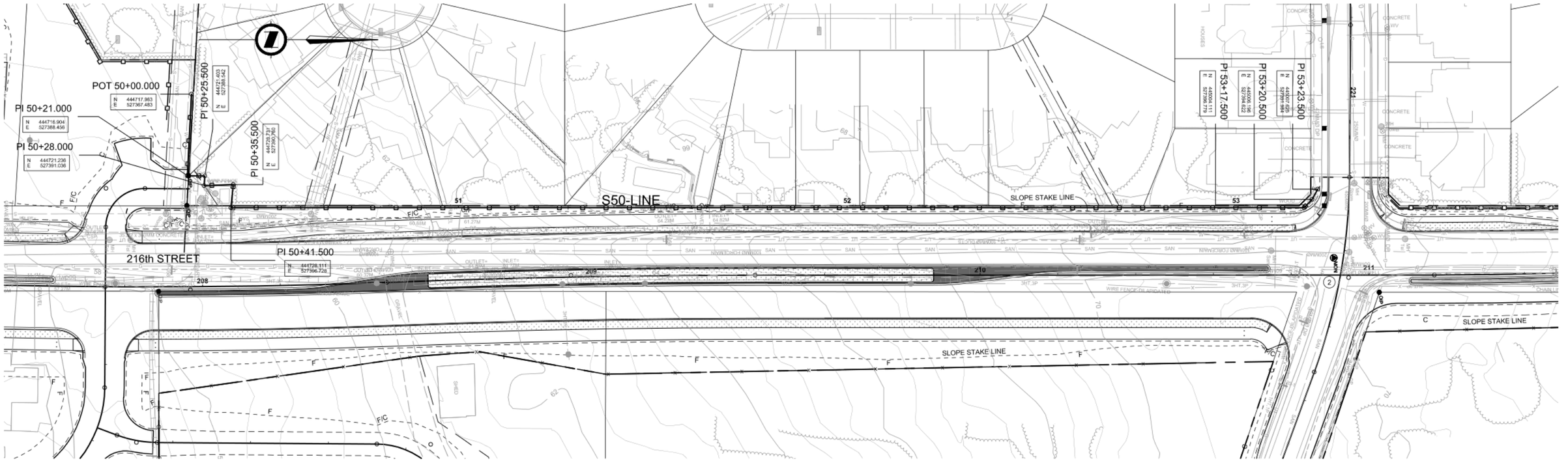
HIGHWAY NO. 1

202 ST. TO 216 ST. HIGHWAY WIDENING AND 216 ST. INTERCHANGE

SENIOR DESIGNER
DATE

DESIGNED J. NORRIS DATE JULY 2016
QUALITY CONTROL E. BALLARIN DATE JULY 2016
QUALITY ASSURANCE J. NORRIS DATE JULY 2016
DRAWN M. CARREIRA DATE JULY 2016

FILE NUMBER	PROJECT NUMBER	REG	DRAWING NUMBER	REV
14-482	12570-0000	1	R1-818-809	



FOR PLANS SEE DWG. R1-818-101 TO 118	FOR SIGNING & PVMT MARKINGS SEE DWG. R1-818-601 TO 618
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REV	DATE	REVISIONS	SIGNATURE

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MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE
HIGHWAY DESIGN ENGINEERING AND GEOMATICS
SOUTH COAST REGION

S50 LINE - SOUND WALL DETAILS

HIGHWAY NO. 1

202 ST. TO 216 ST. HIGHWAY WIDENING AND 216 ST. INTERCHANGE

SENIOR DESIGNER

DATE

DESIGNED J. NORRIS DATE JULY 2016
QUALITY CONTROL E. BALLARIN DATE JULY 2016
QUALITY ASSURANCE J. NORRIS DATE JULY 2016
DRAWN M. CARREIRA DATE JULY 2016

FILE NUMBER	PROJECT NUMBER	REG	DRAWING NUMBER	REV
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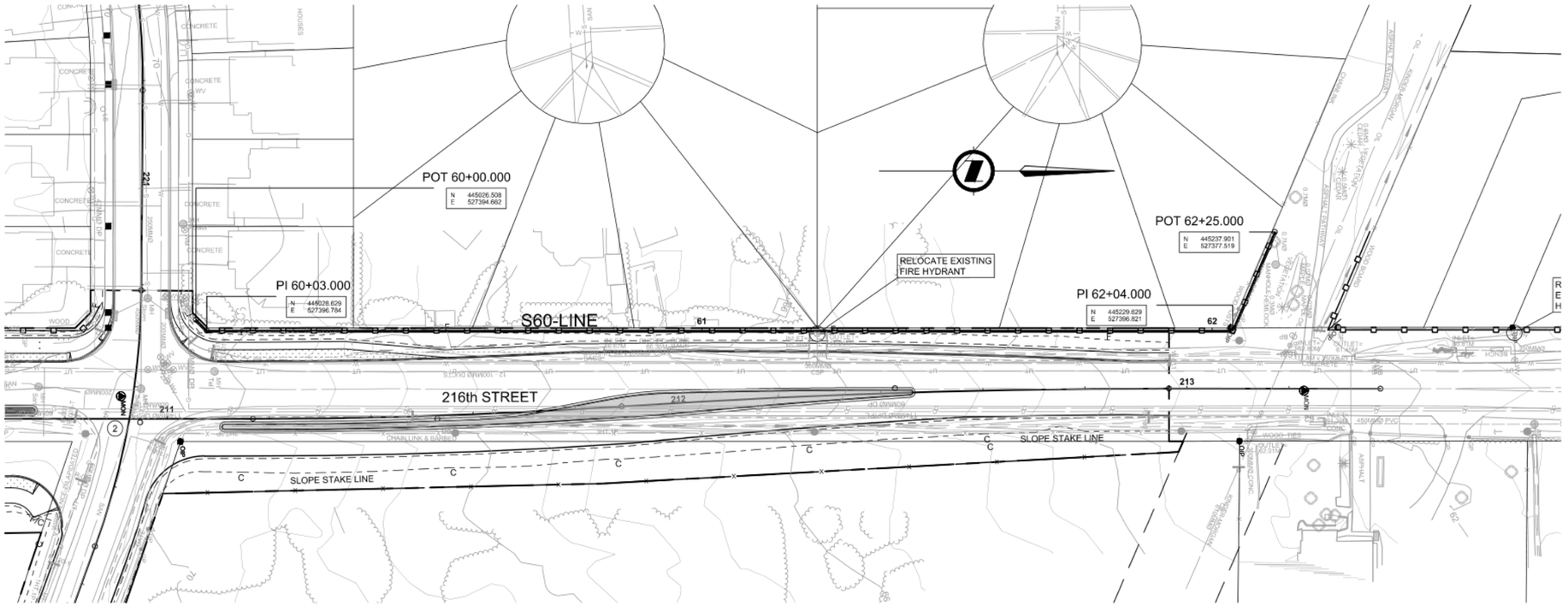

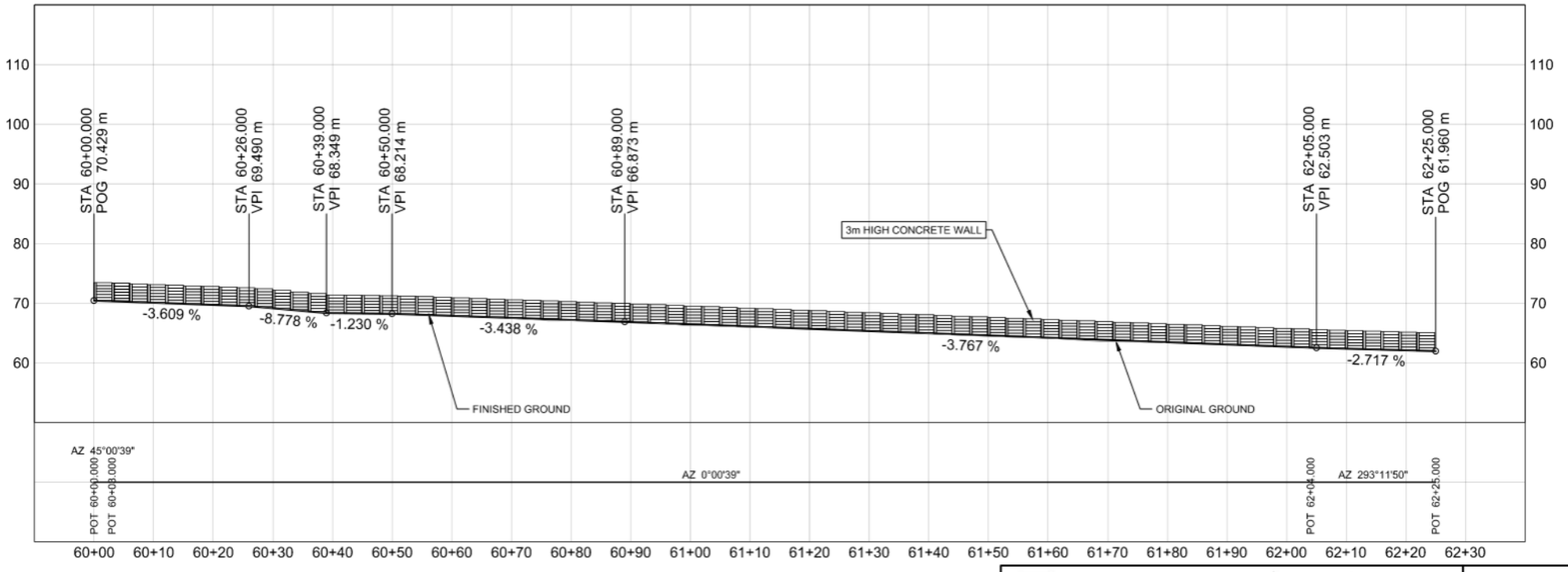

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HIGHWAY DESIGN ENGINEERING AND GEOMATICS
SOUTH COAST REGION

S60 LINE - SOUND WALL DETAILS

HIGHWAY NO. 1
202 ST. TO 216 ST. HIGHWAY WIDENING AND 216 ST. INTERCHANGE

SENIOR DESIGNER
DATE

DESIGNED J. NORRIS DATE JULY 2016
QUALITY CONTROL E. BALLARIN DATE JULY 2016
QUALITY ASSURANCE J. NORRIS DATE JULY 2016
DRAWN M. CARREIRA DATE JULY 2016

FILE NUMBER	PROJECT NUMBER	REG	DRAWING NUMBER	REV
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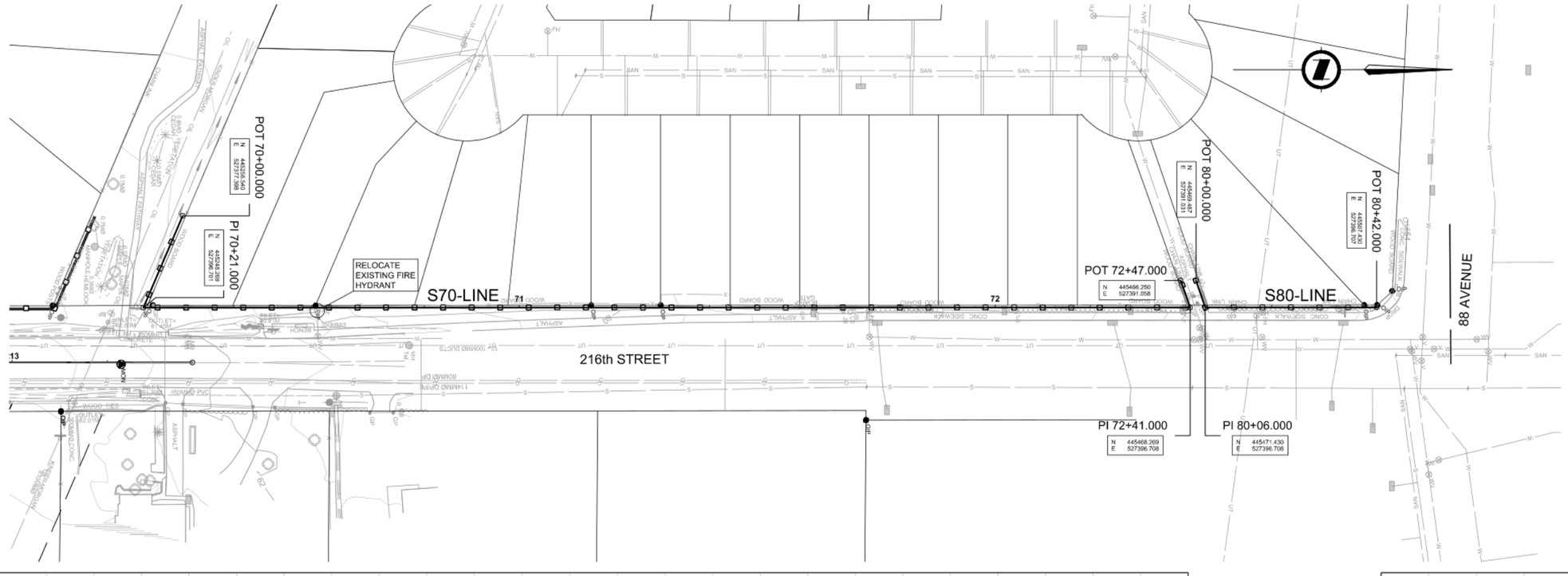

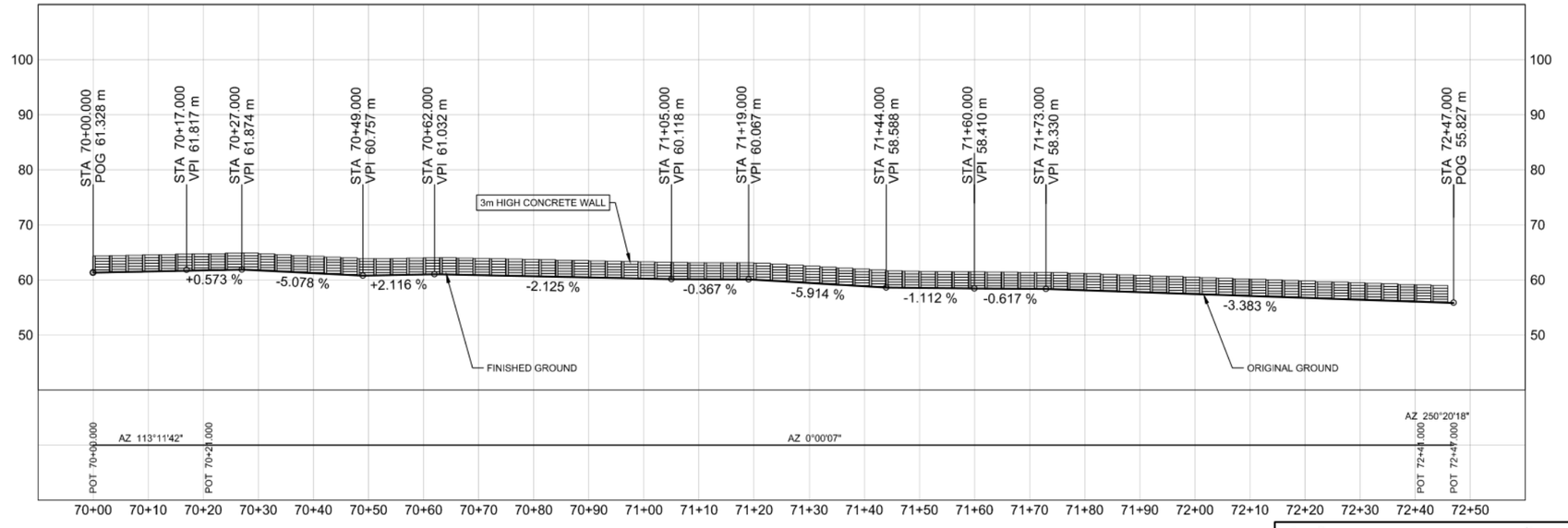

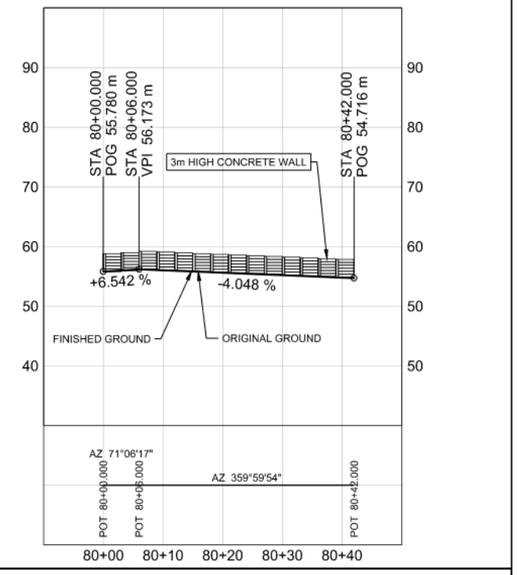

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HIGHWAY DESIGN ENGINEERING AND GEOMATICS
SOUTH COAST REGION

S70 AND S80 LINES - SOUND WALL DETAILS

HIGHWAY NO. 1
202 ST. TO 216 ST. HIGHWAY WIDENING AND 216 ST. INTERCHANGE

SENIOR DESIGNER
DATE

DESIGNED J. NORRIS DATE JULY 2016
QUALITY CONTROL E. BALLARIN DATE JULY 2016
QUALITY ASSURANCE J. NORRIS DATE JULY 2016
DRAWN M. CARREIRA DATE JULY 2016

FILE NUMBER	PROJECT NUMBER	REG	DRAWING NUMBER	REV
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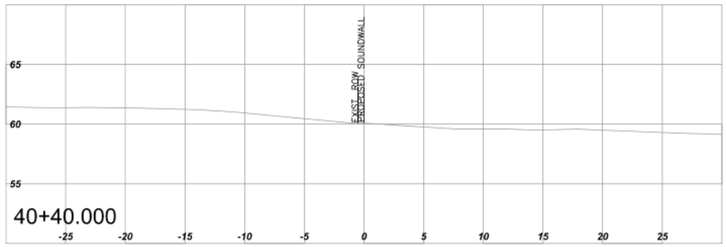

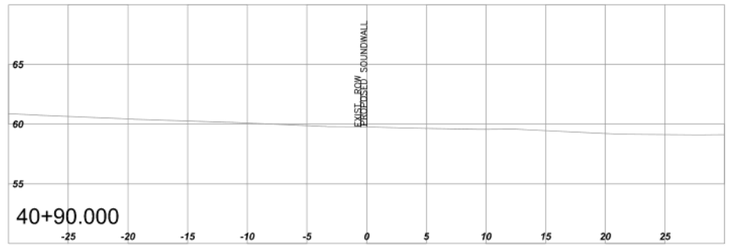

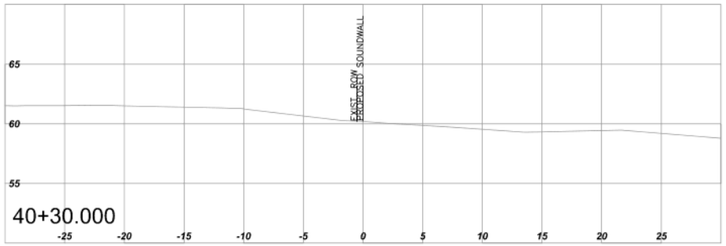

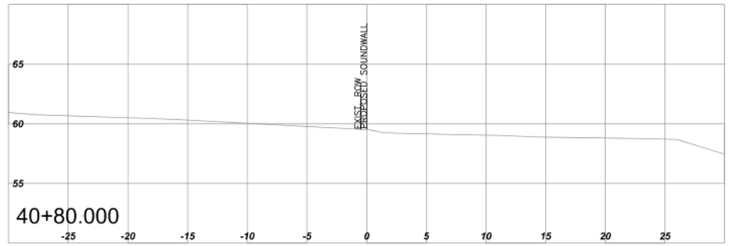

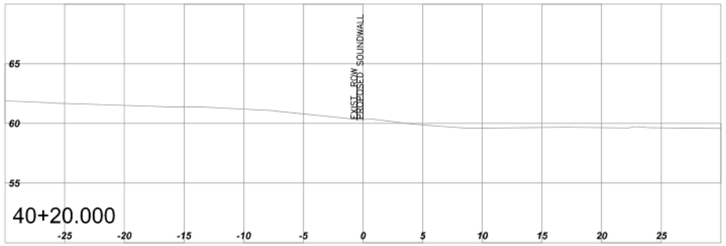

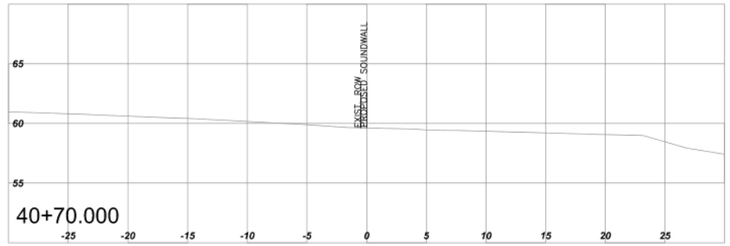

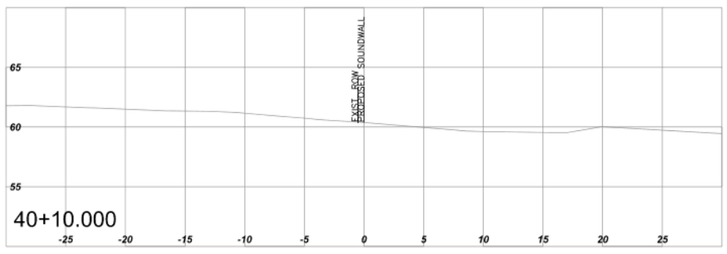

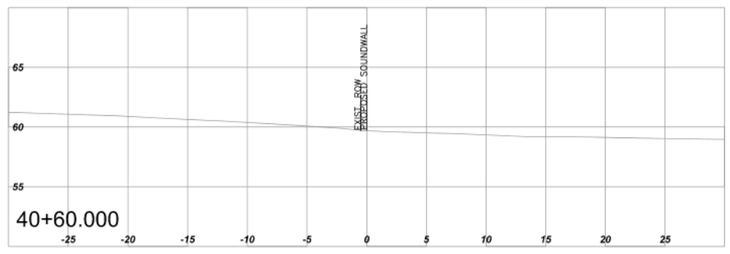

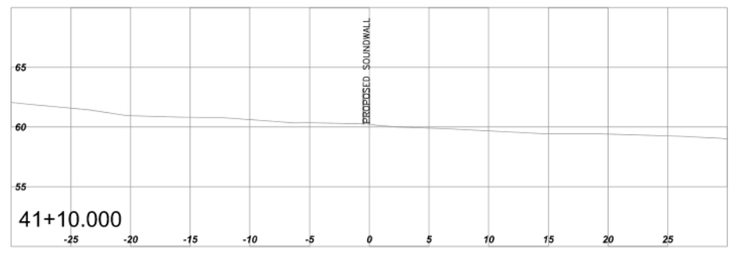

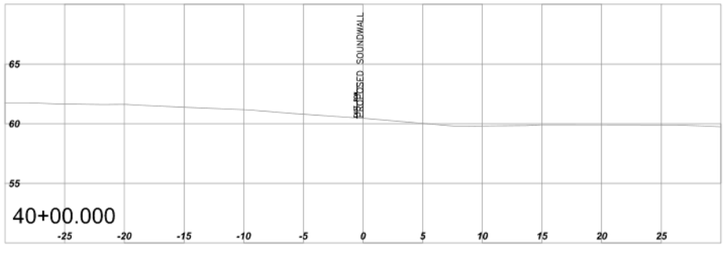

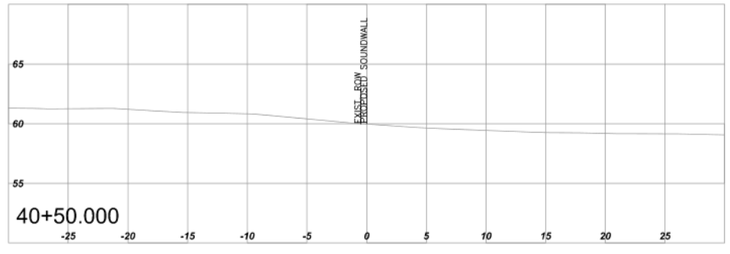

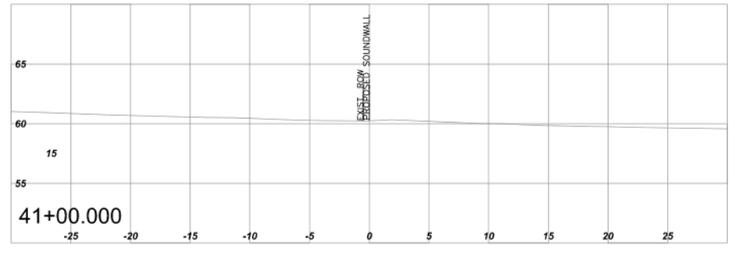

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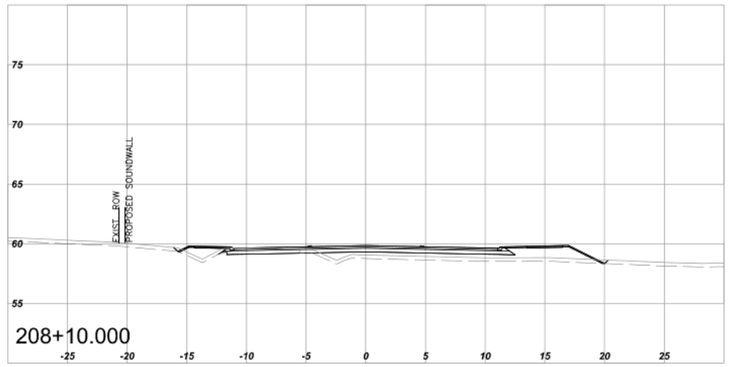
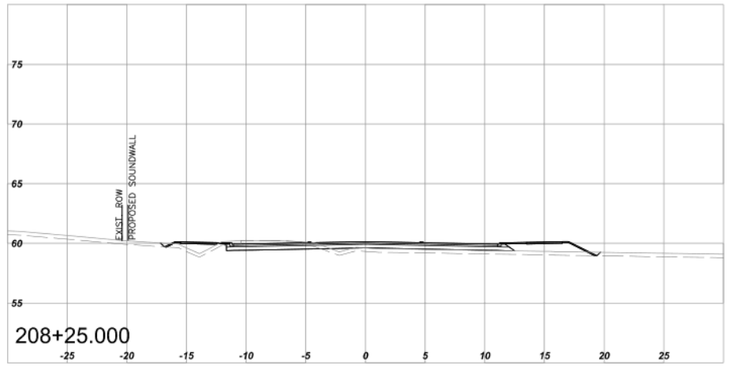
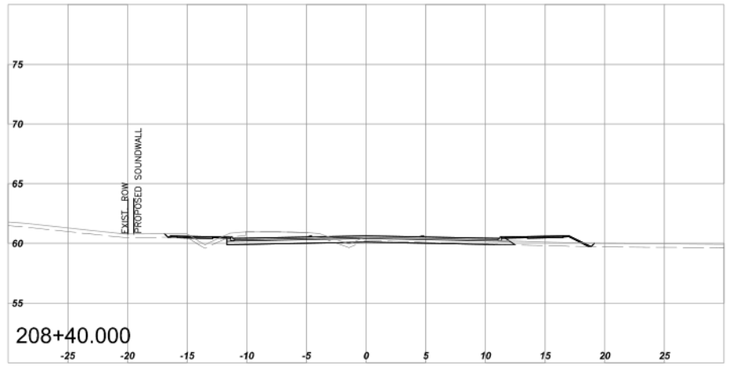
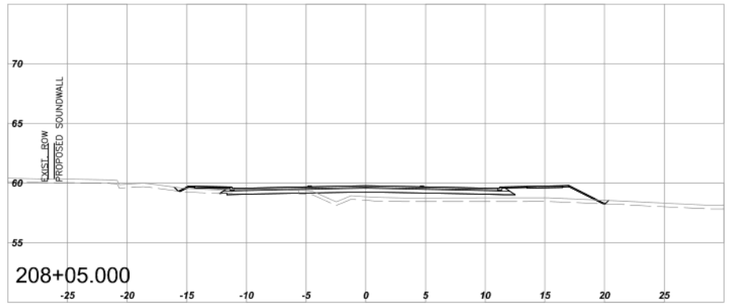
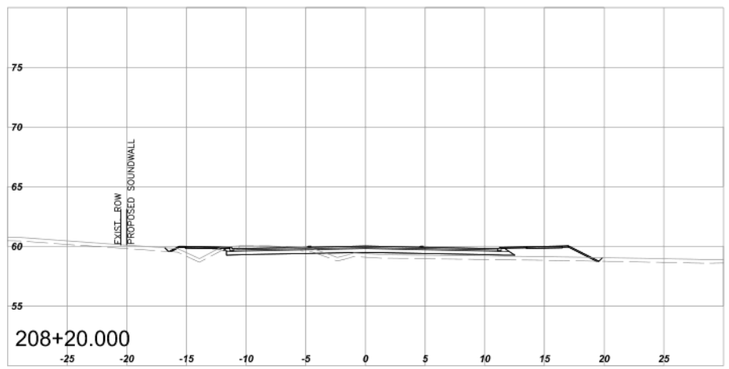
HIGHWAY 1 - 216th STREET OVERPASS
PROPOSED SOUND WALL SECTIONS - S40LINE
FOR INFORMATION ONLY
SCALE: 1:250 DATE: OCTOBER 1, 2016

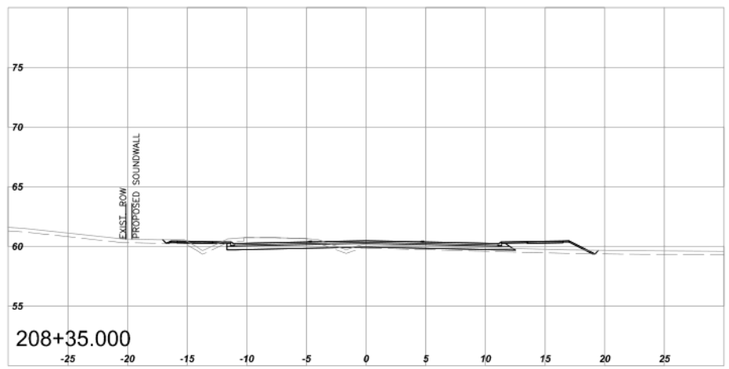


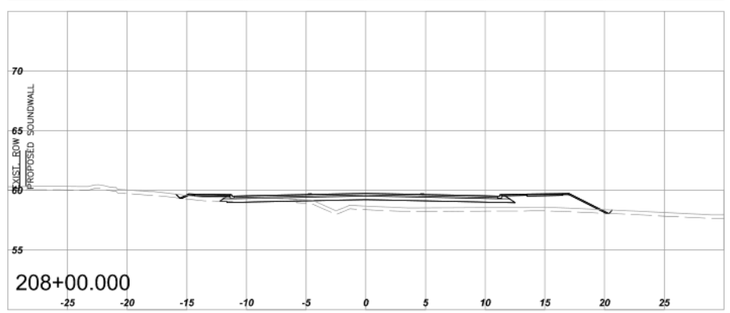


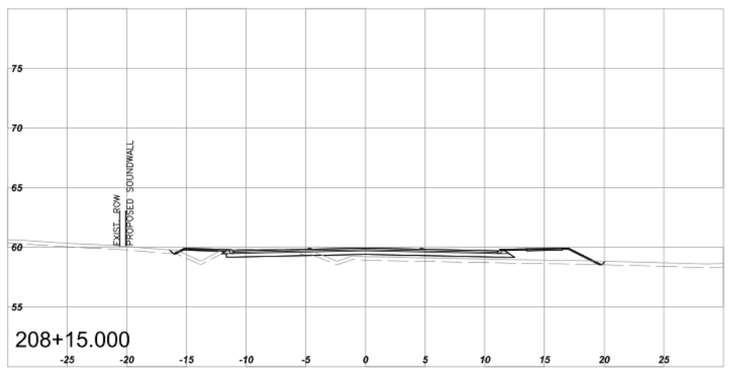


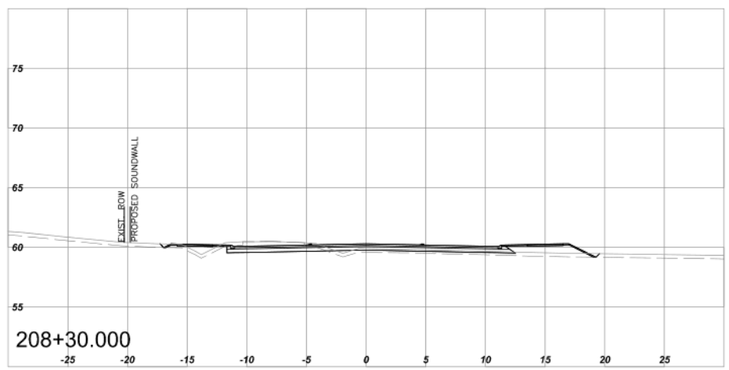












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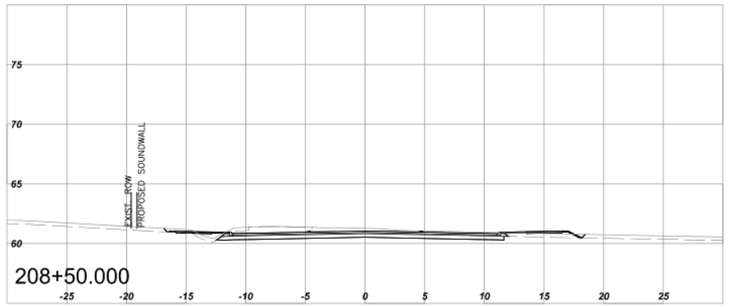
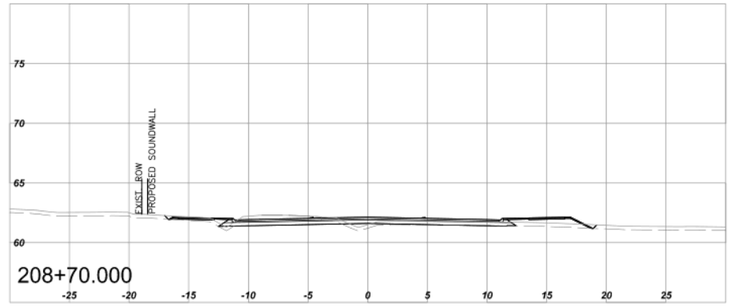
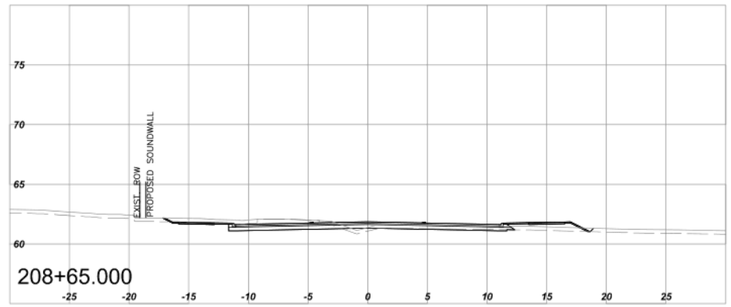
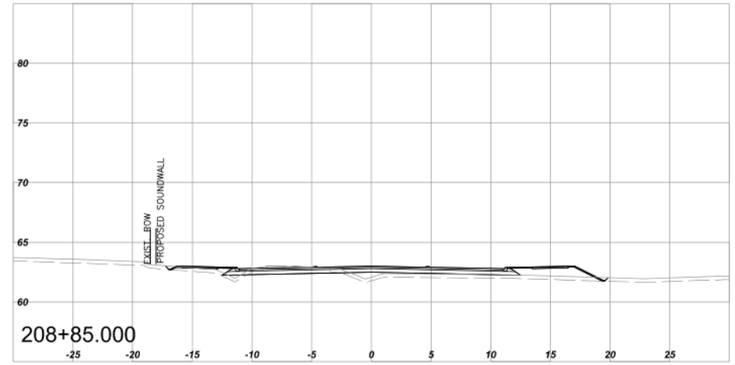
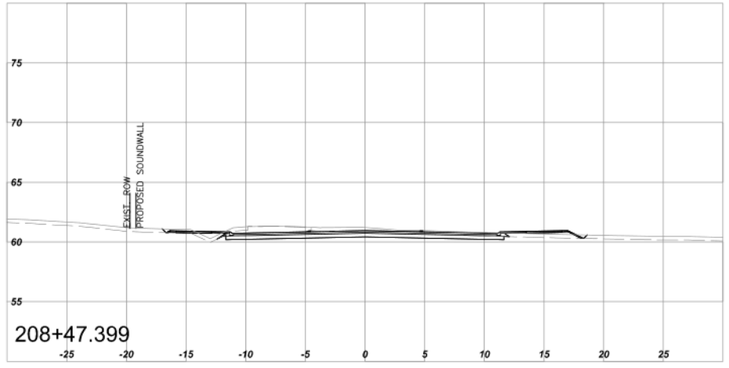
HIGHWAY 1 - 216th STREET OVERPASS
PROPOSED SOUND WALL SECTIONS - S50LINE
FOR INFORMATION ONLY
SCALE: 1:250 DATE: OCTOBER 1, 2016

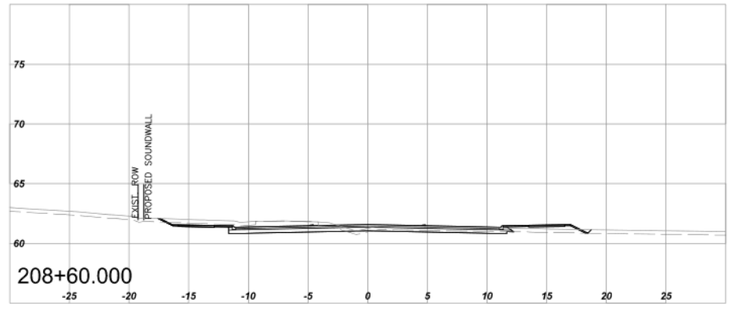


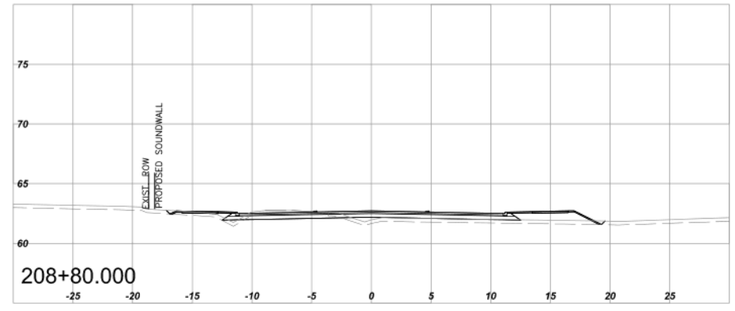


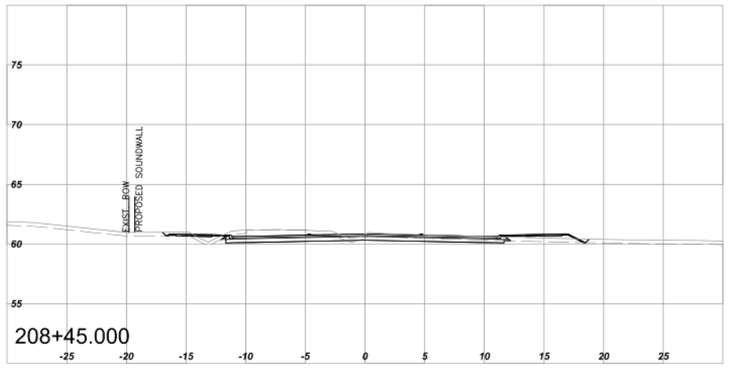


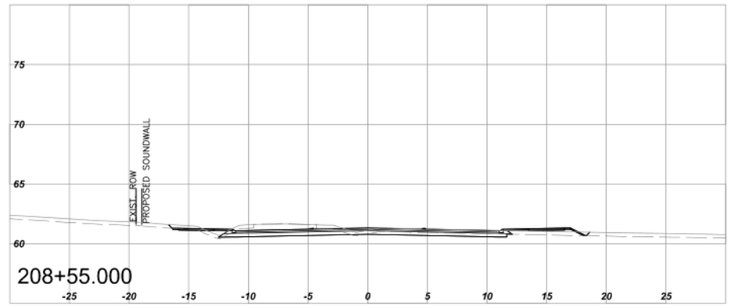


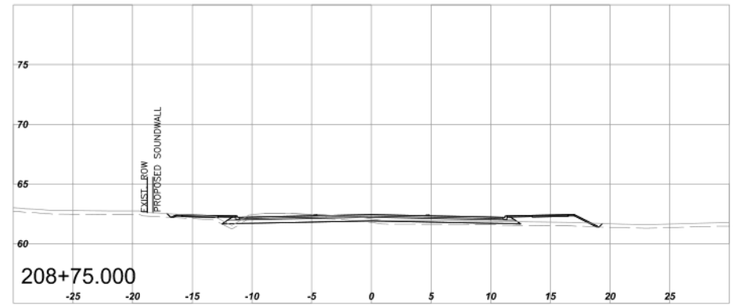












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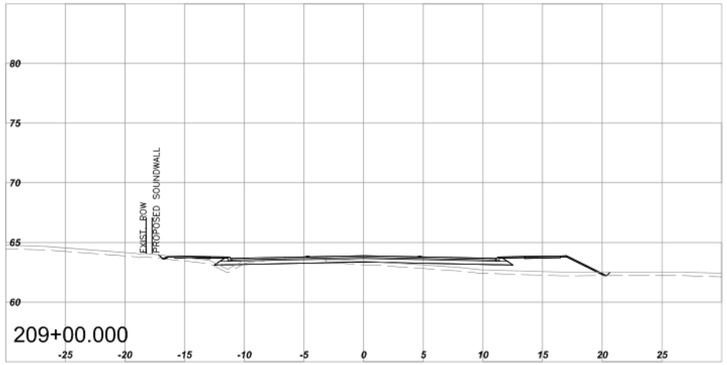
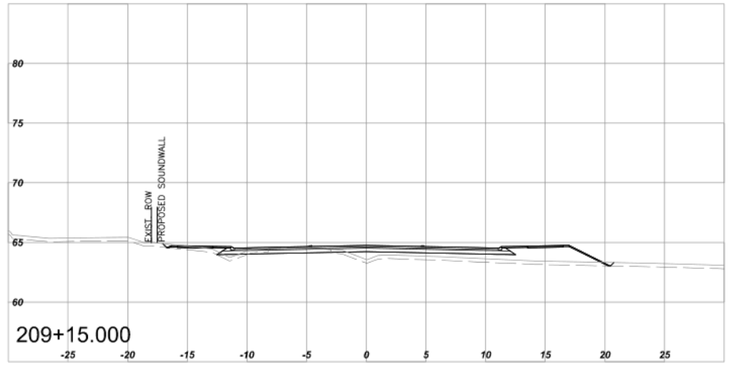
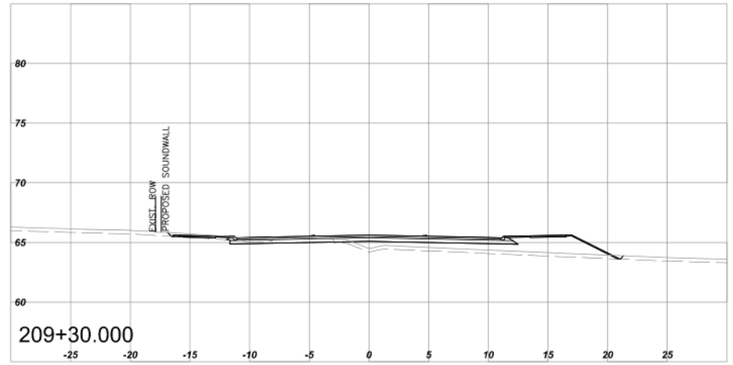
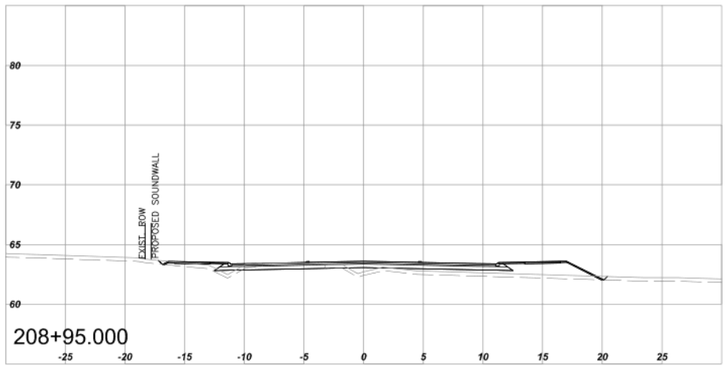
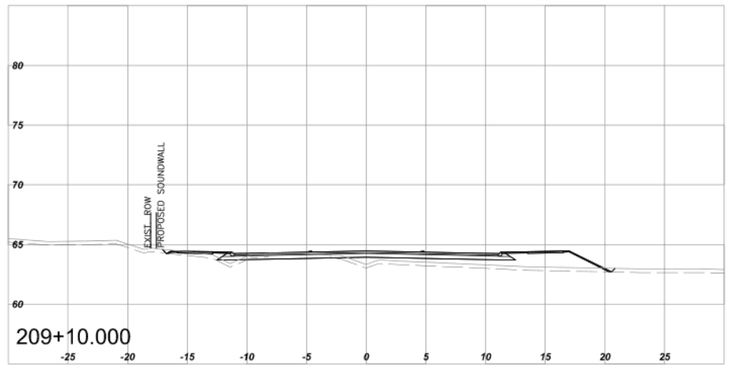
HIGHWAY 1 - 216th STREET OVERPASS
PROPOSED SOUND WALL SECTIONS - S50LINE
FOR INFORMATION ONLY
SCALE: 1:250 DATE: OCTOBER 1, 2016

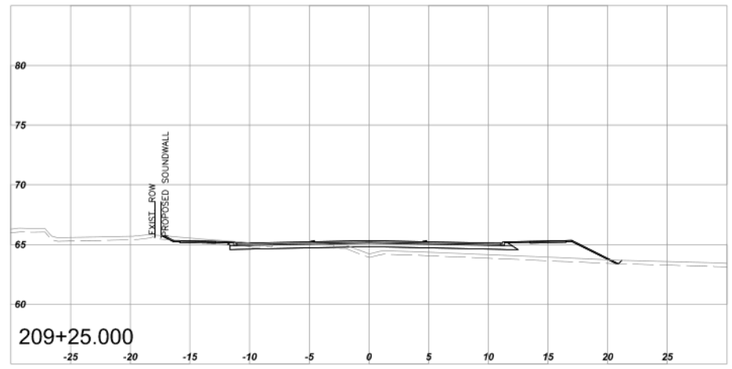


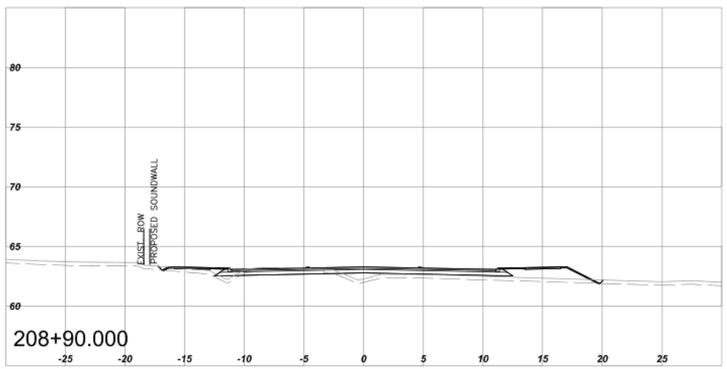


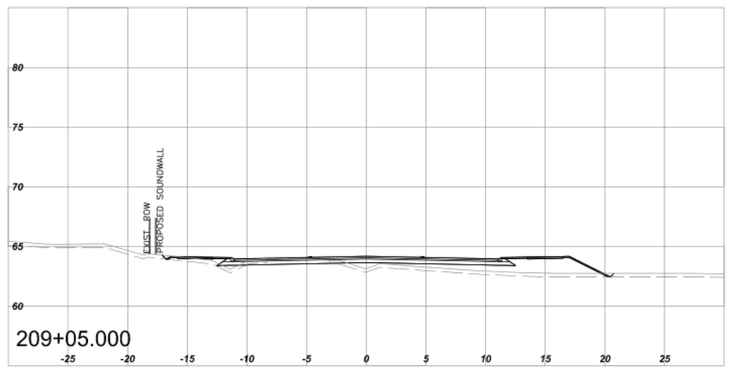


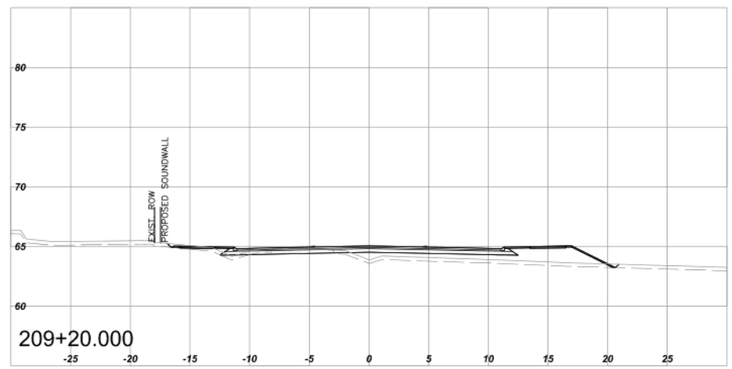












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HIGHWAY 1 - 216th STREET OVERPASS
PROPOSED SOUND WALL SECTIONS - S50LINE
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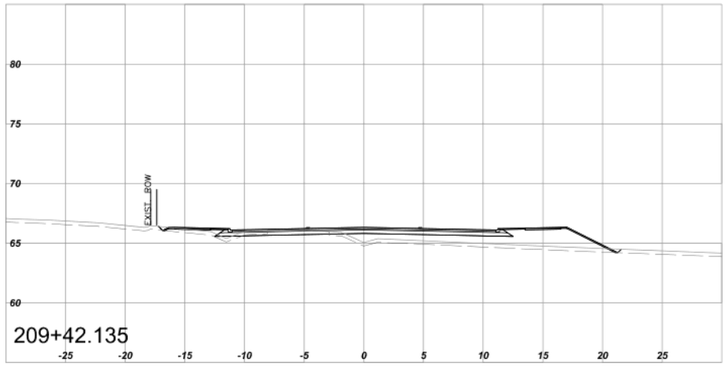
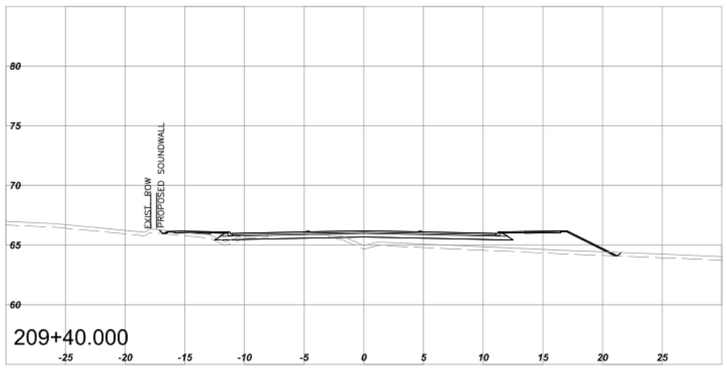
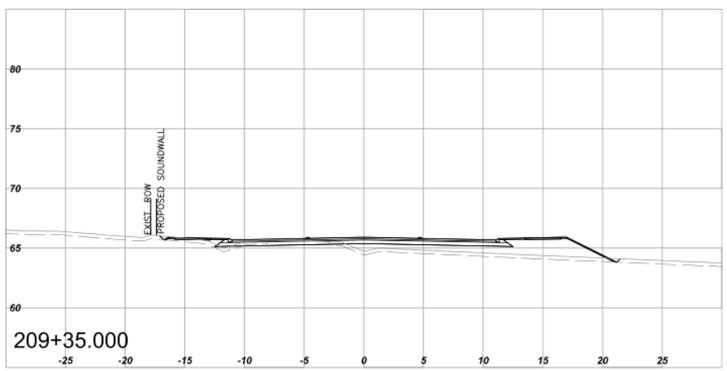
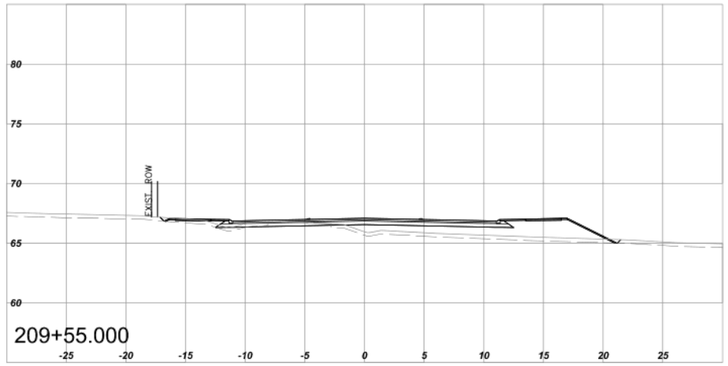
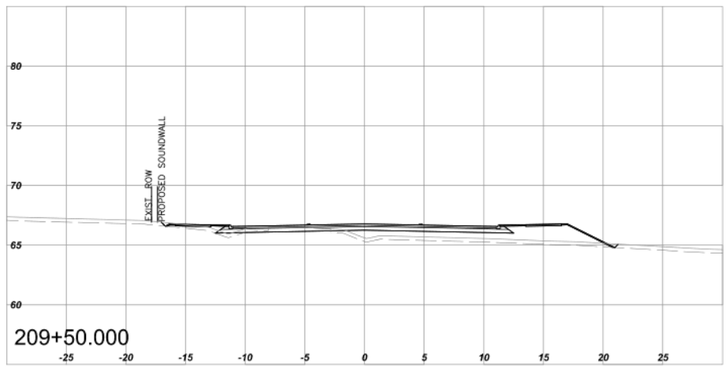
SCALE: 1:250 DATE: OCTOBER 1, 2016

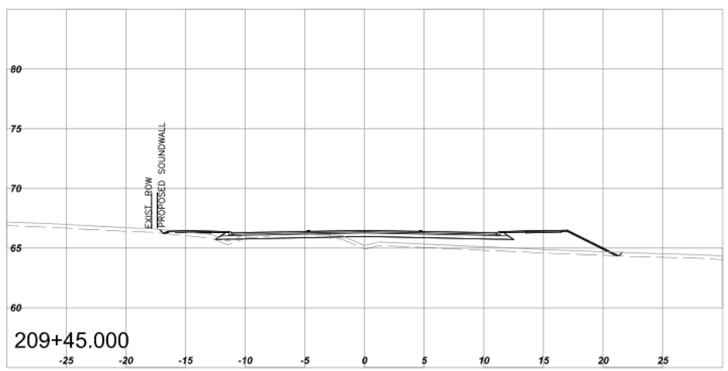


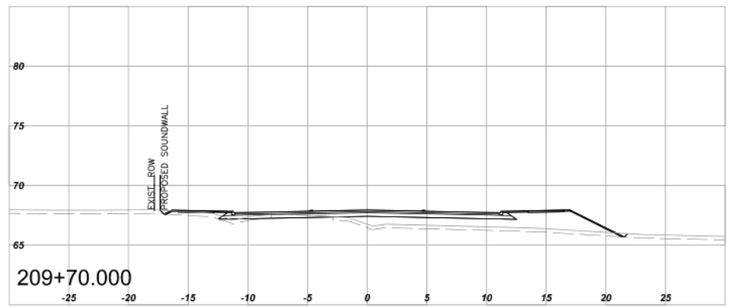


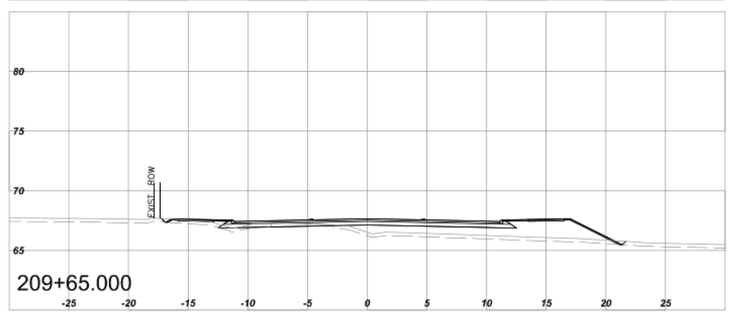


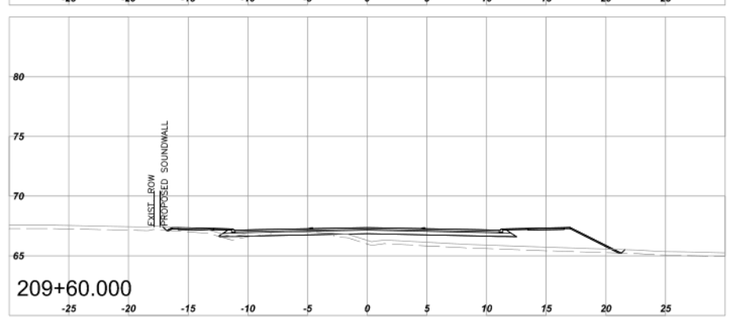












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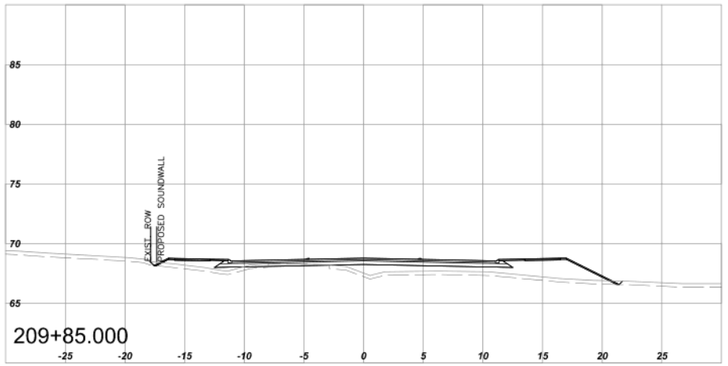
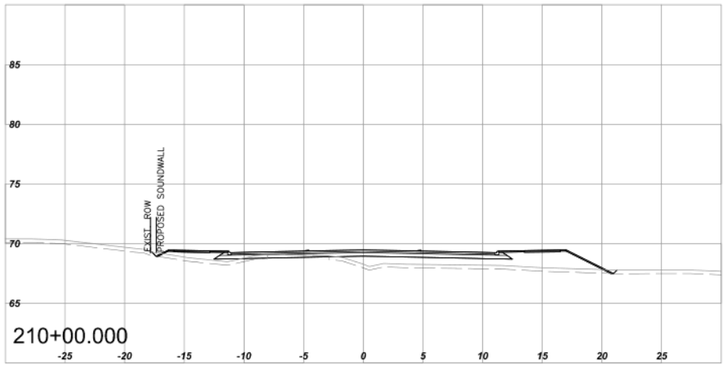
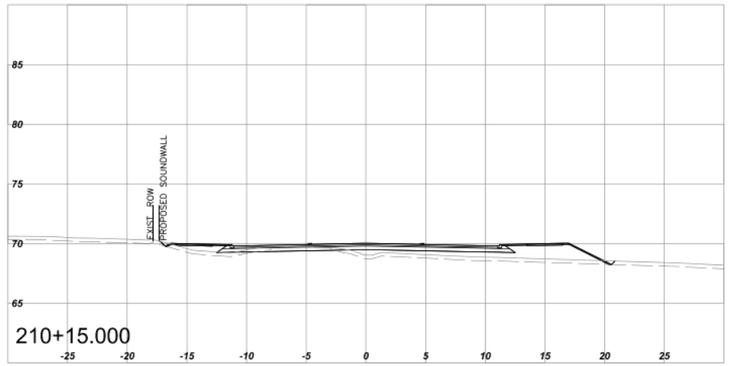
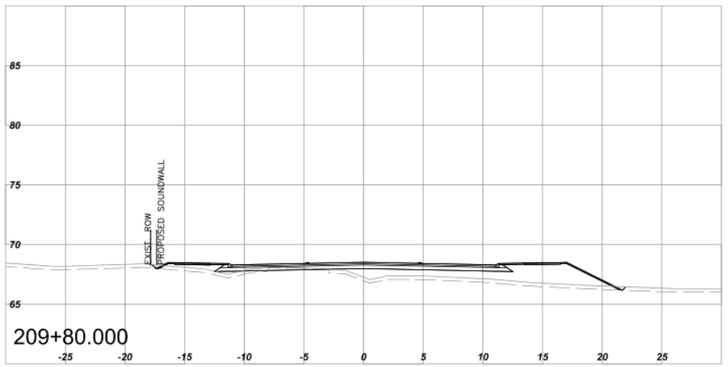
HIGHWAY 1 - 216th STREET OVERPASS

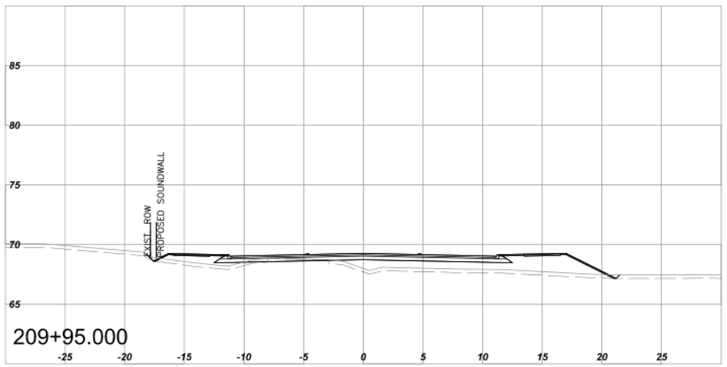
PROPOSED SOUND WALL SECTIONS - S50LINE
FOR INFORMATION ONLY
SCALE: 1:250 DATE: OCTOBER 1, 2016

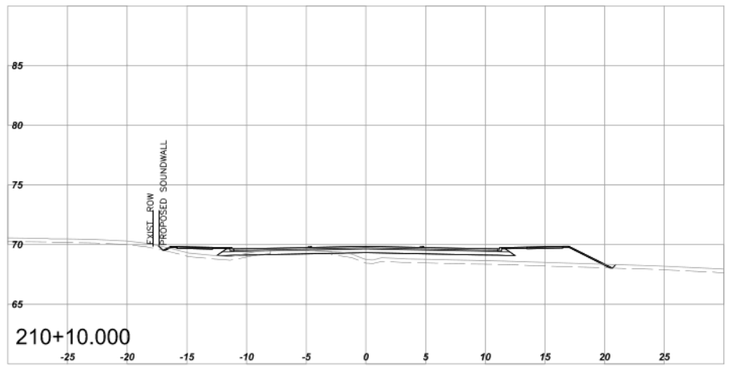


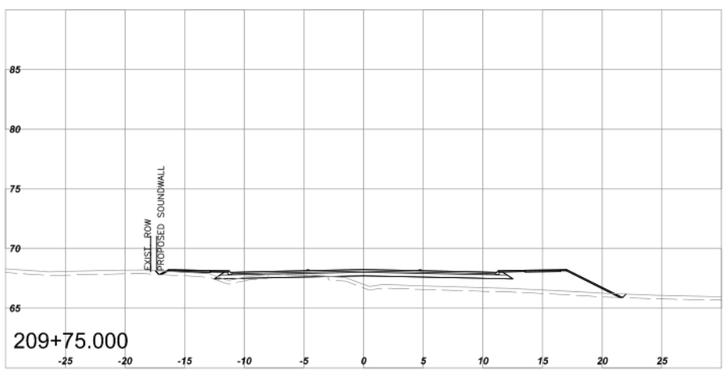


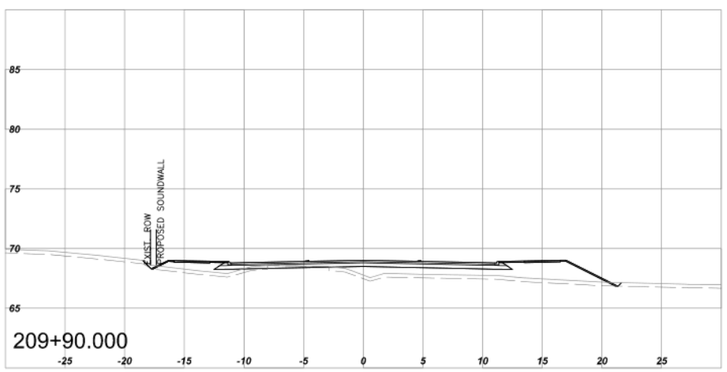


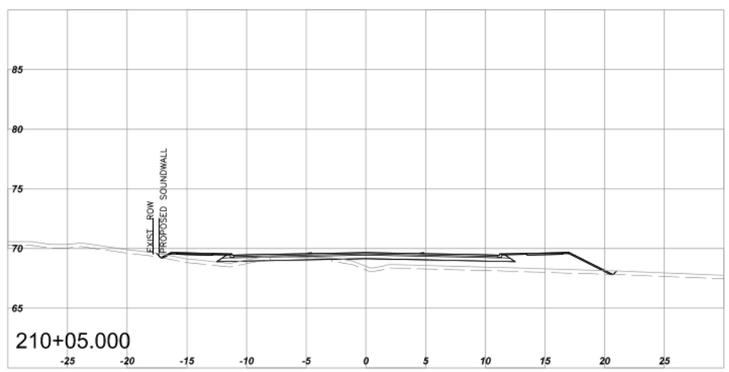












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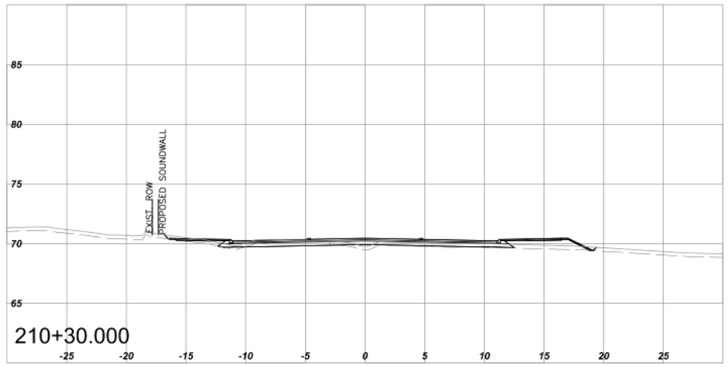
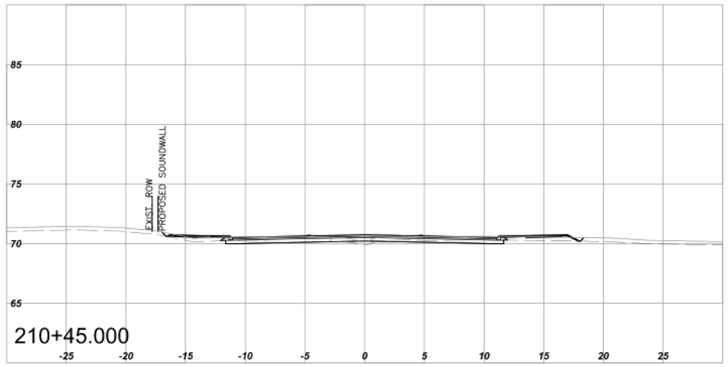
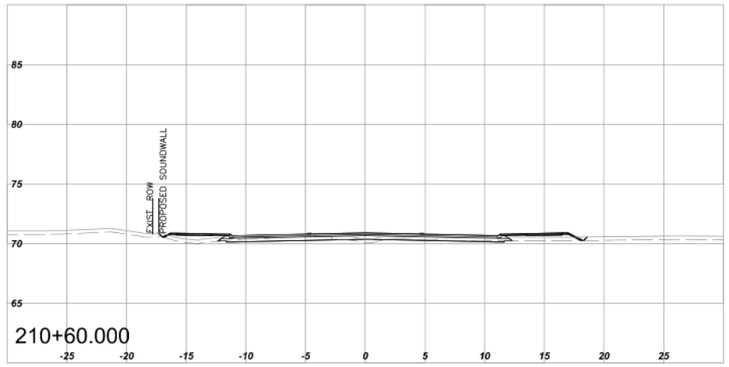
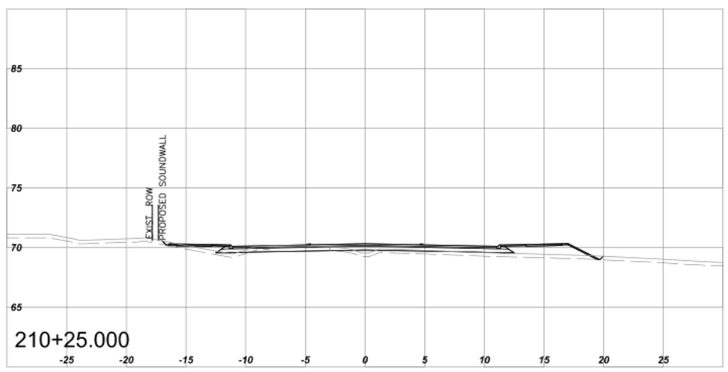
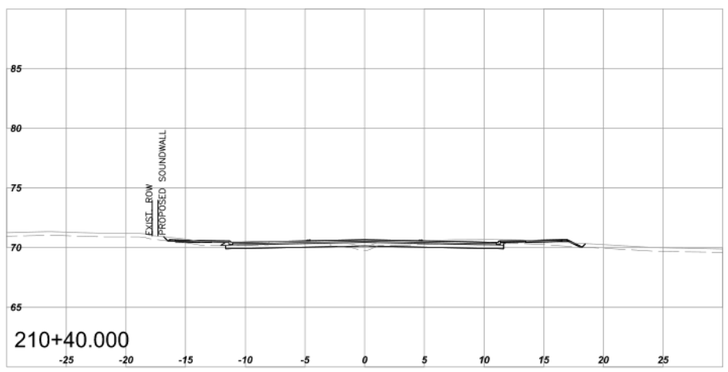
HIGHWAY 1 - 216th STREET OVERPASS
PROPOSED SOUND WALL SECTIONS - S50LINE
FOR INFORMATION ONLY
***SCALE:* 1:250 *DATE:* OCTOBER 1, 2016**

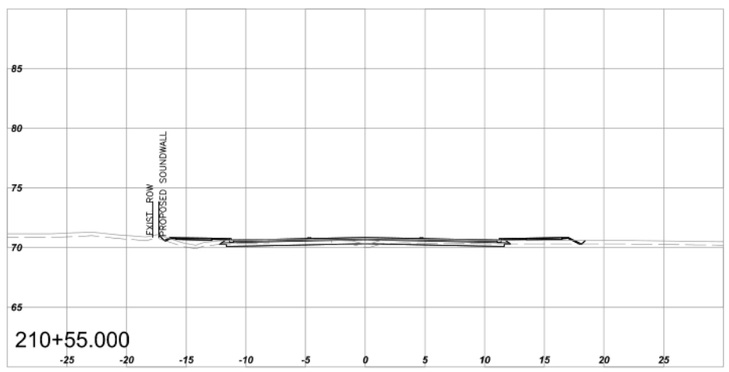


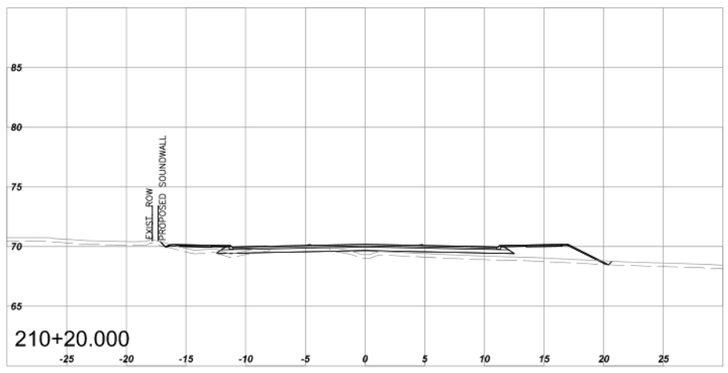


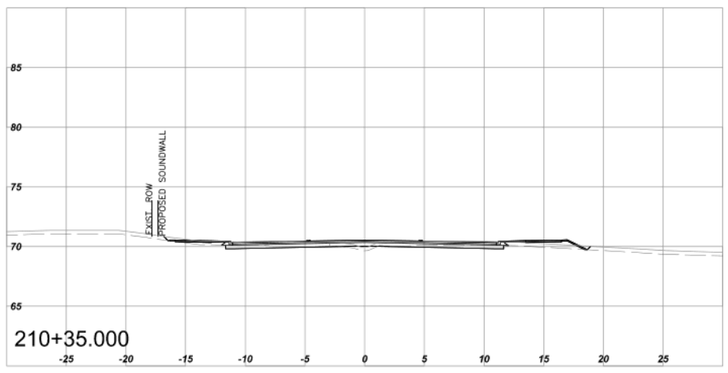


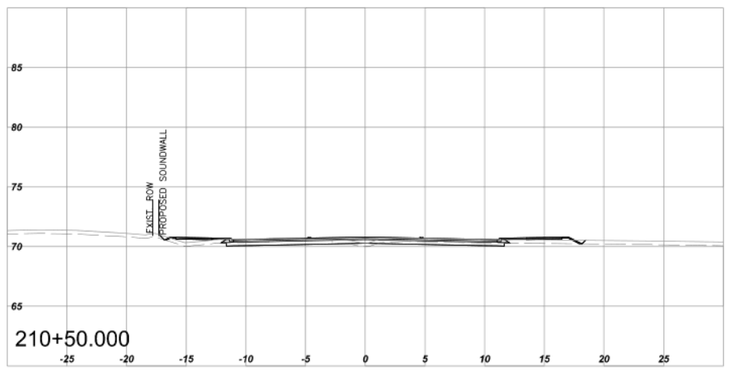












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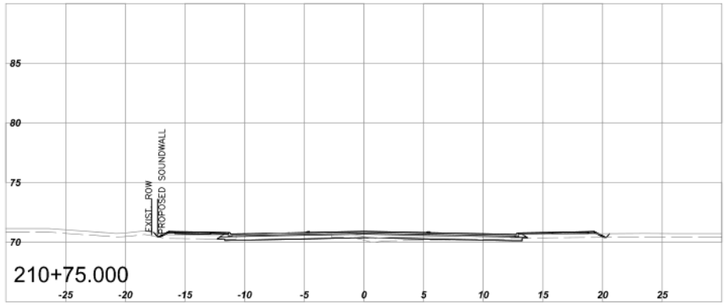
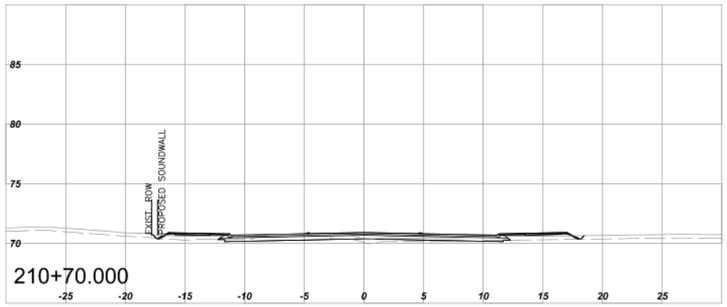
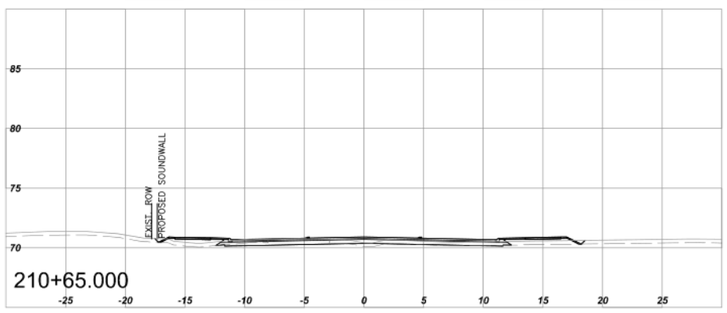
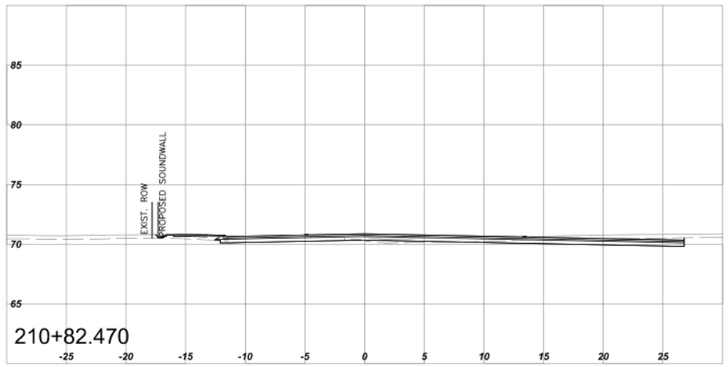
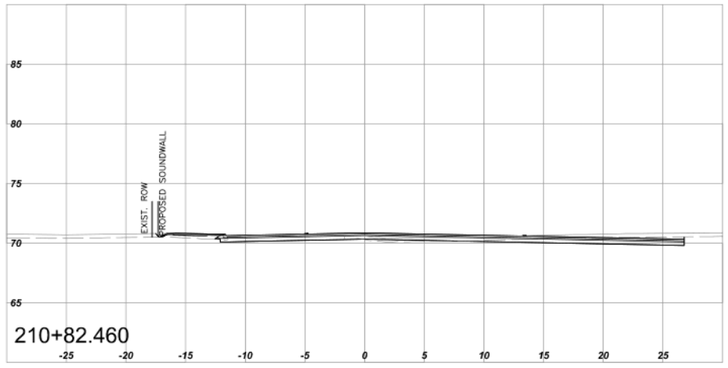
HIGHWAY 1 - 216th STREET OVERPASS
PROPOSED SOUND WALL SECTIONS - S50LINE
FOR INFORMATION ONLY
SCALE: 1:250 DATE: OCTOBER 1, 2016

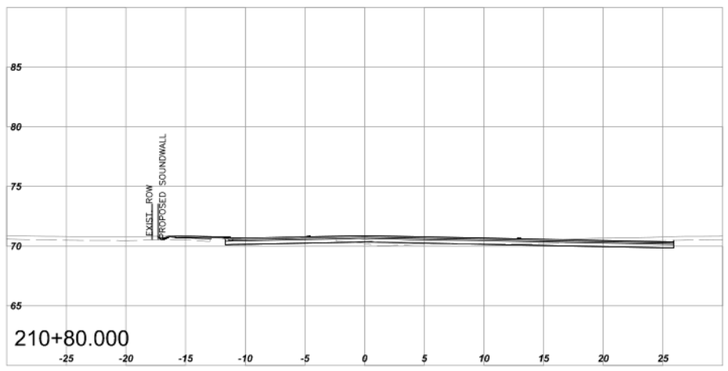


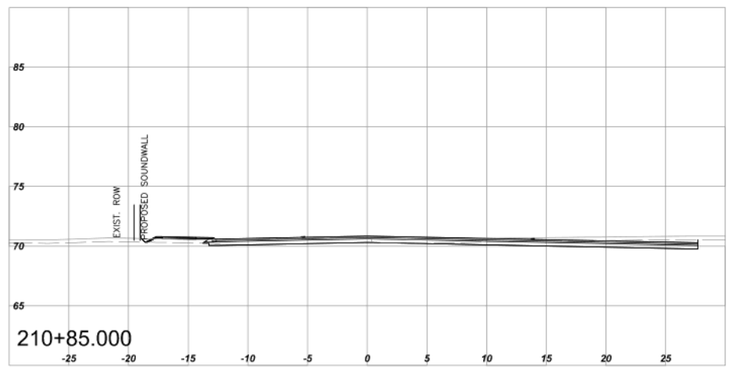












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HIGHWAY 1 - 216th STREET OVERPASS
PROPOSED SOUND WALL SECTIONS - S50LINE
FOR INFORMATION ONLY
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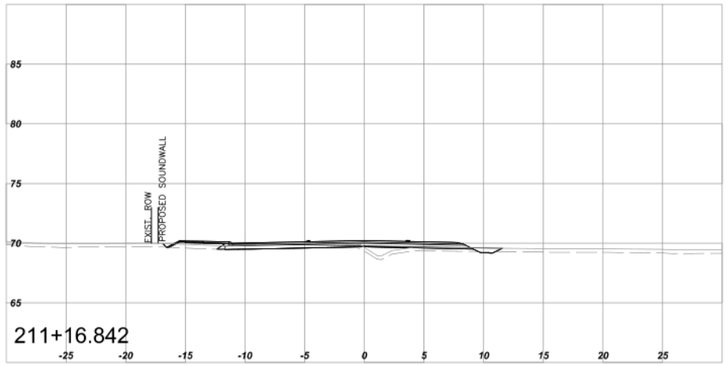

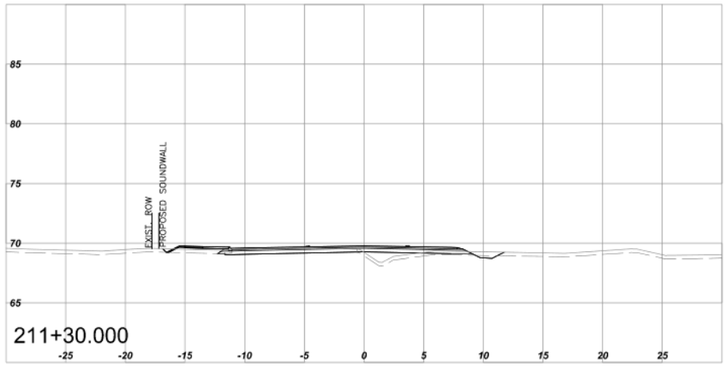

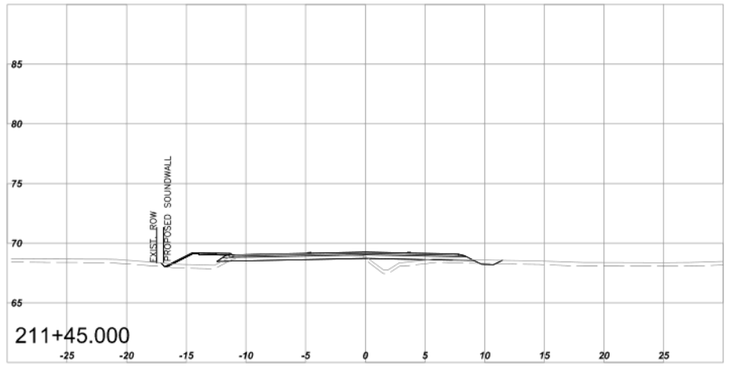

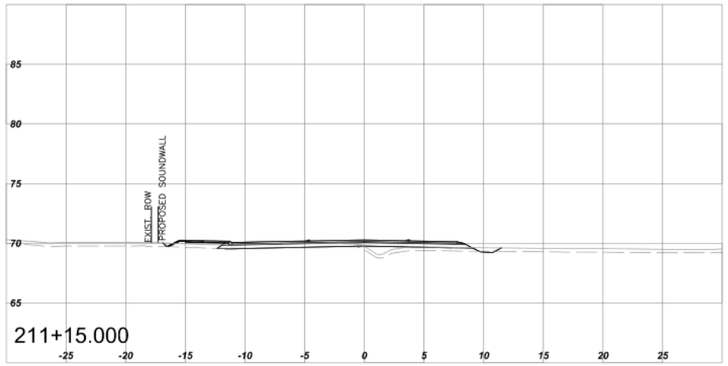

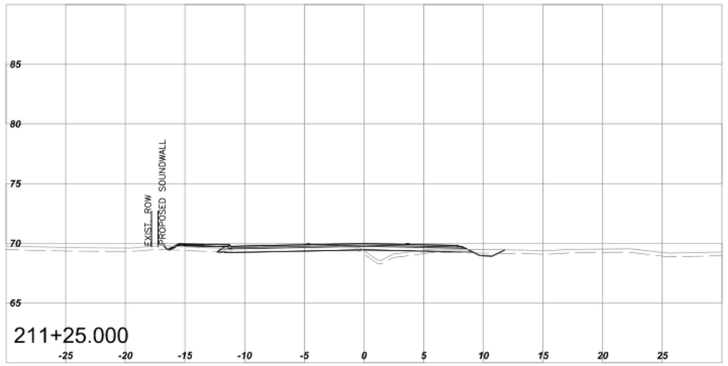

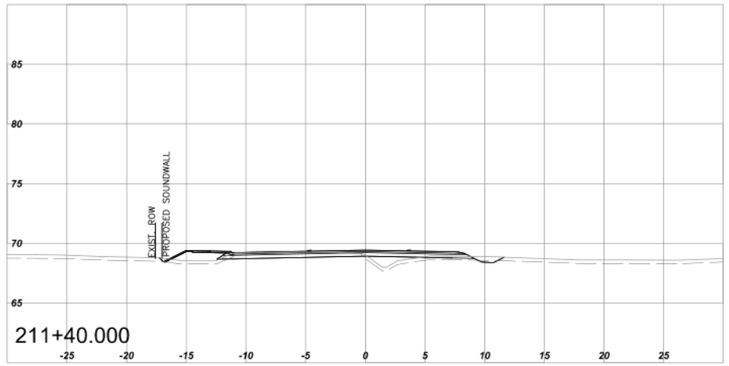

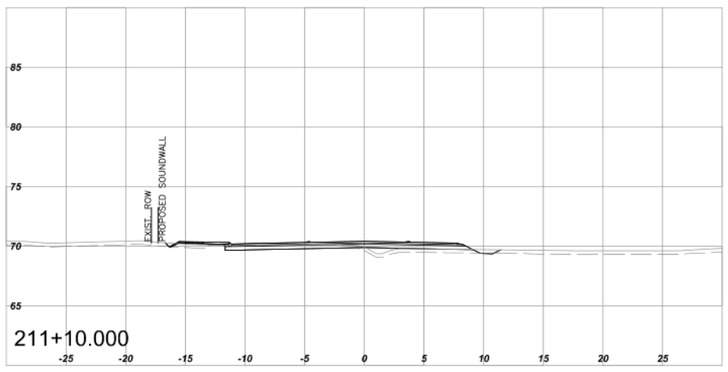

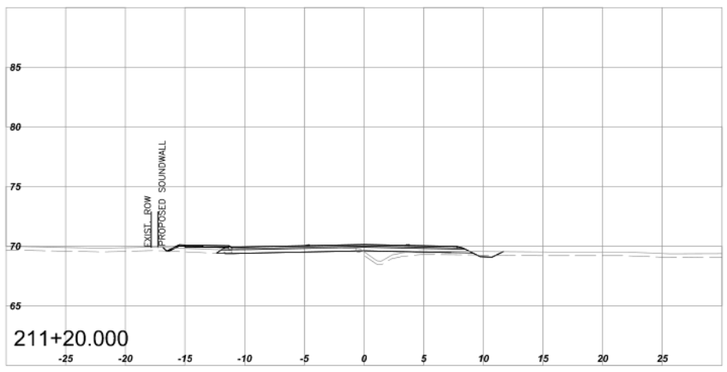

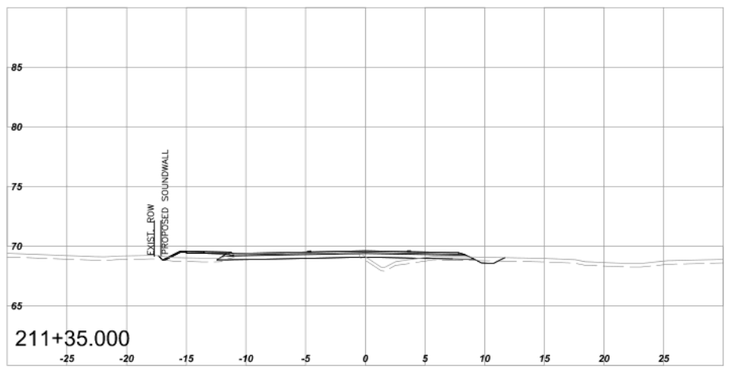

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HIGHWAY 1 - 216th STREET OVERPASS
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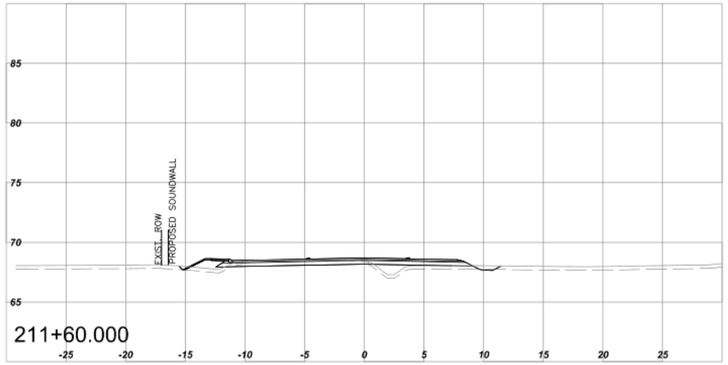
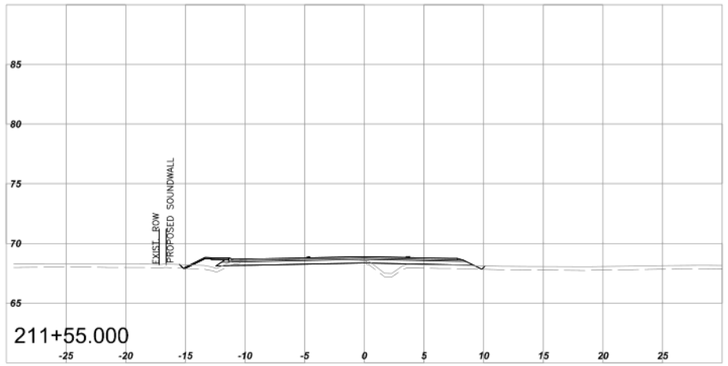
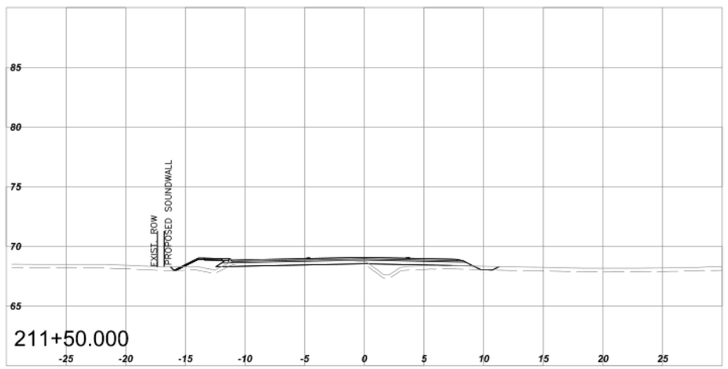
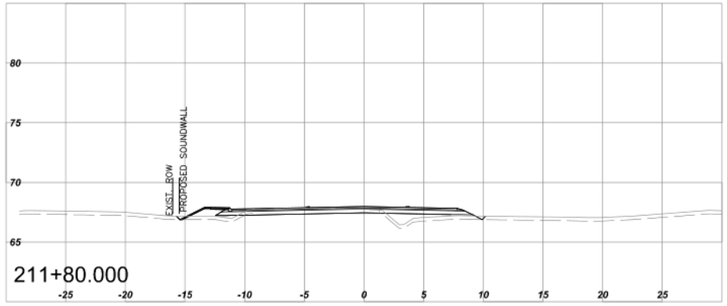
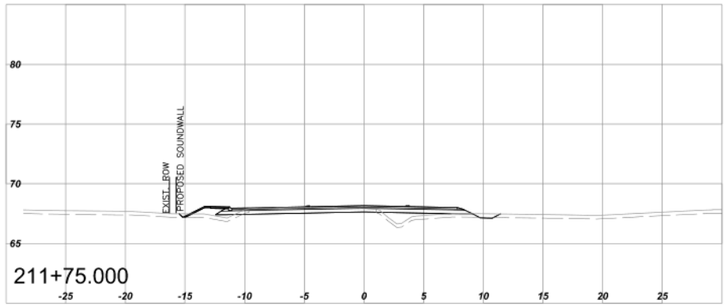
FOR INFORMATION ONLY
SCALE: 1:250 DATE: OCTOBER 1, 2016

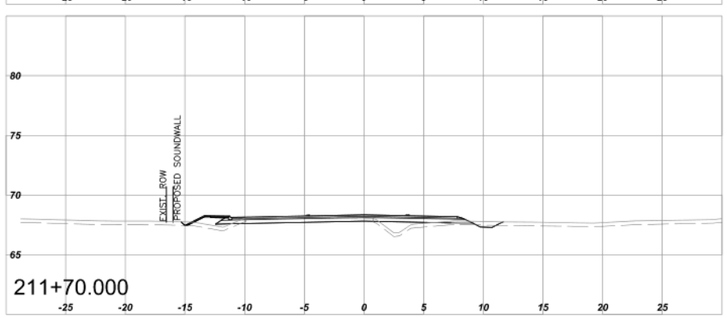


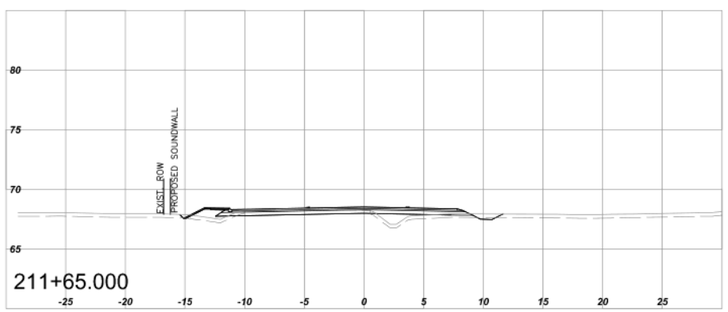


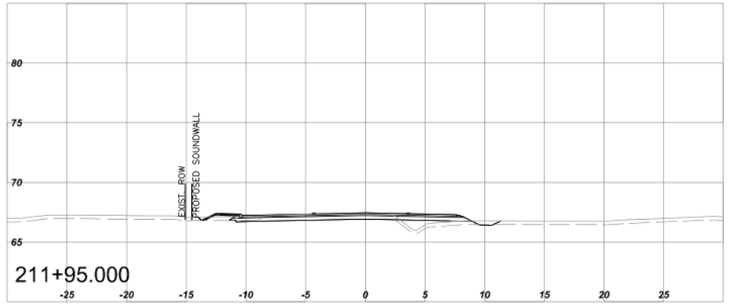


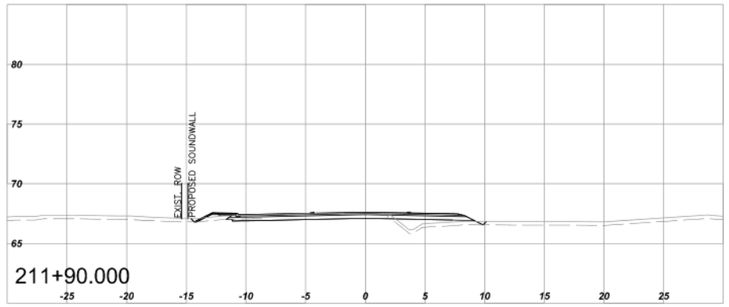


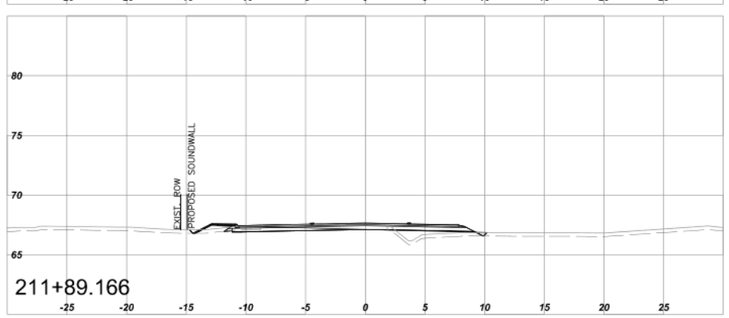


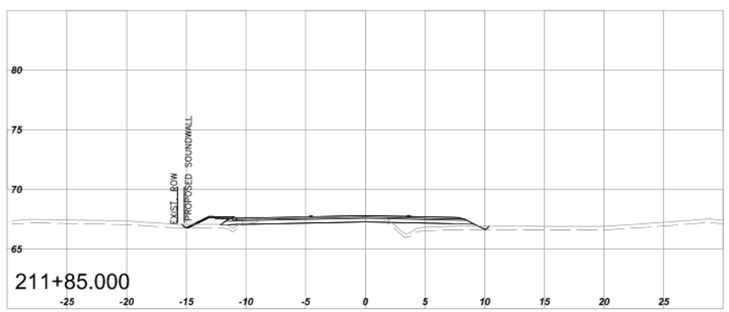












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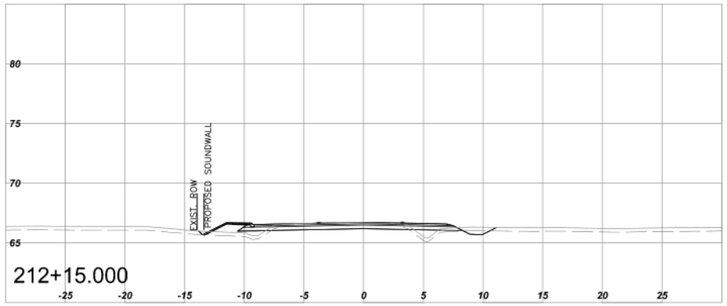
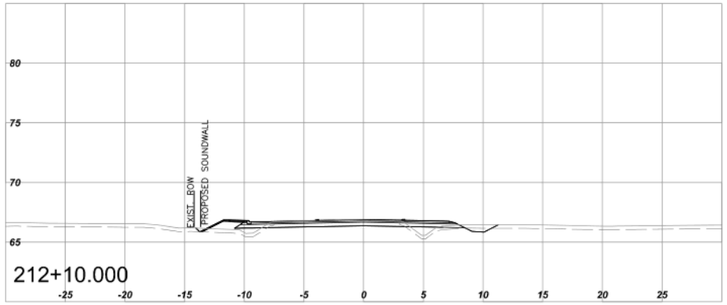
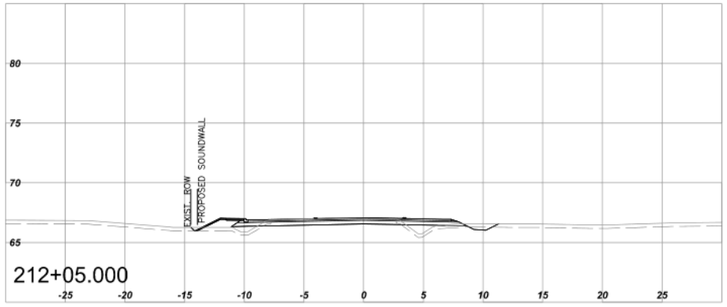
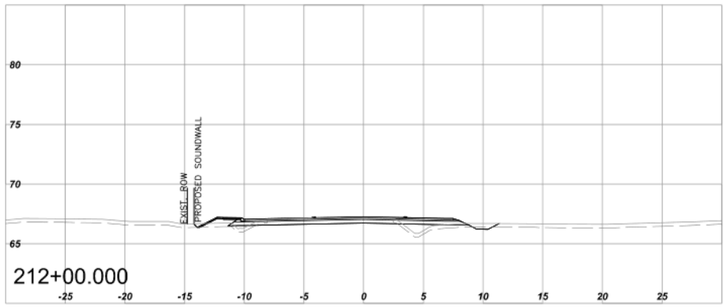
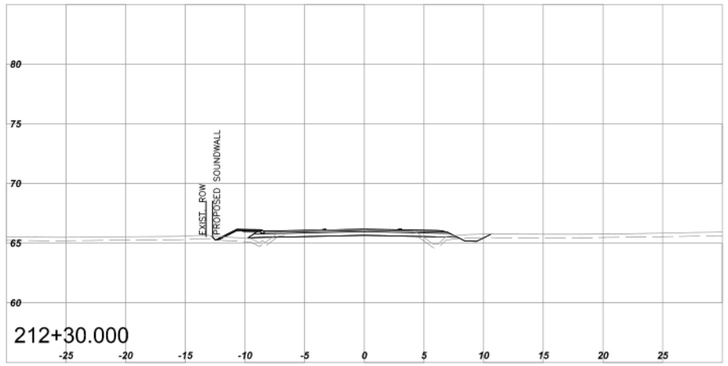
HIGHWAY 1 - 216th STREET OVERPASS
PROPOSED SOUND WALL SECTIONS - S60LINE
FOR INFORMATION ONLY
SCALE: 1:250 DATE: OCTOBER 1, 2016

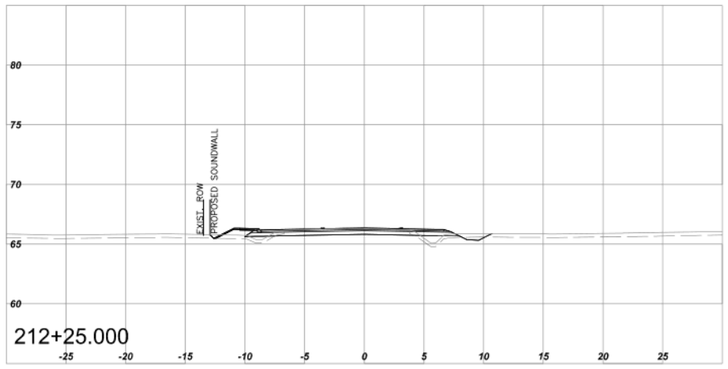


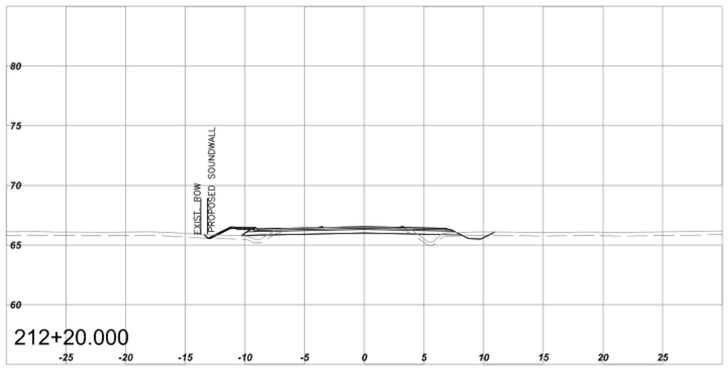


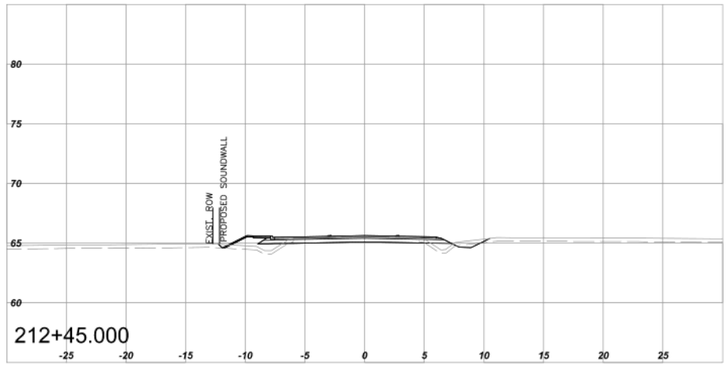


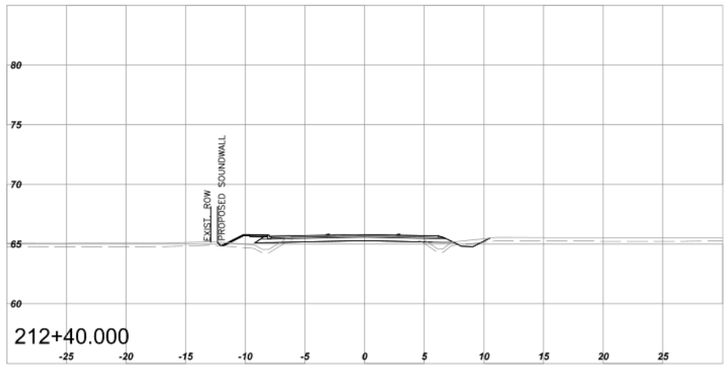


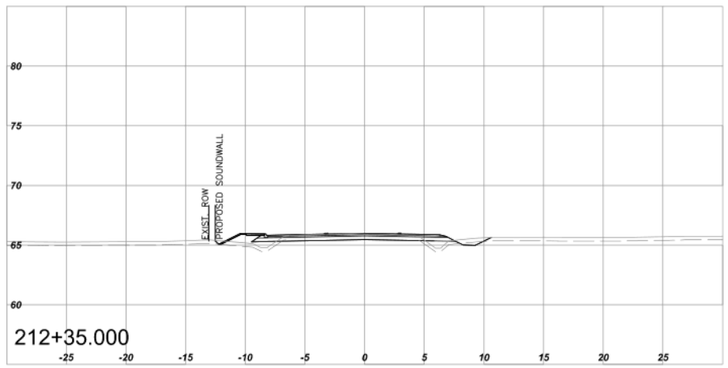












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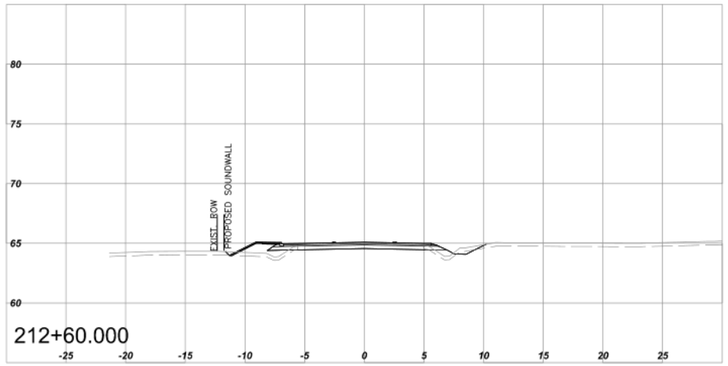
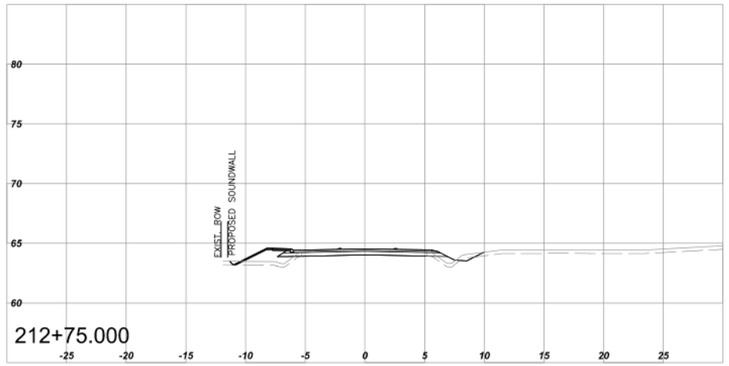
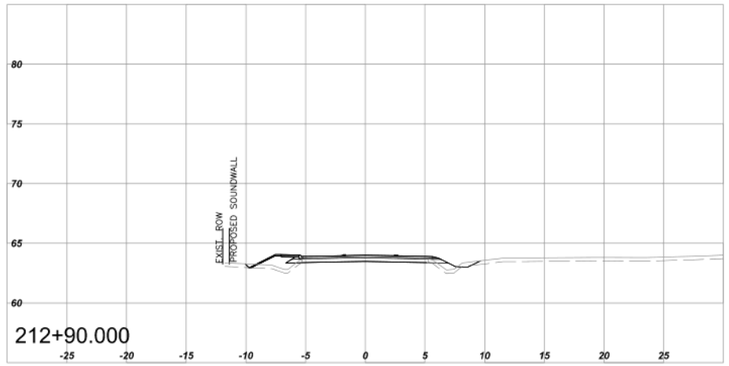
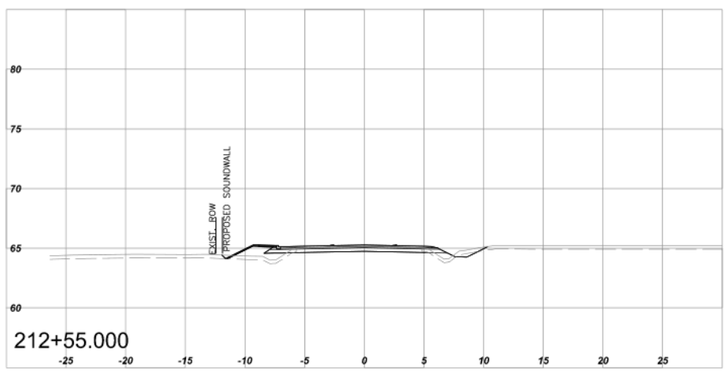
HIGHWAY 1 - 216th STREET OVERPASS

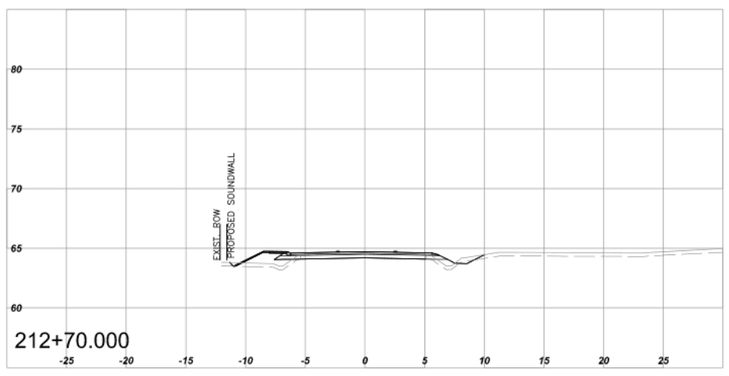
PROPOSED SOUND WALL SECTIONS - S60LINE
FOR INFORMATION ONLY
SCALE: 1:250 DATE: OCTOBER 1, 2016

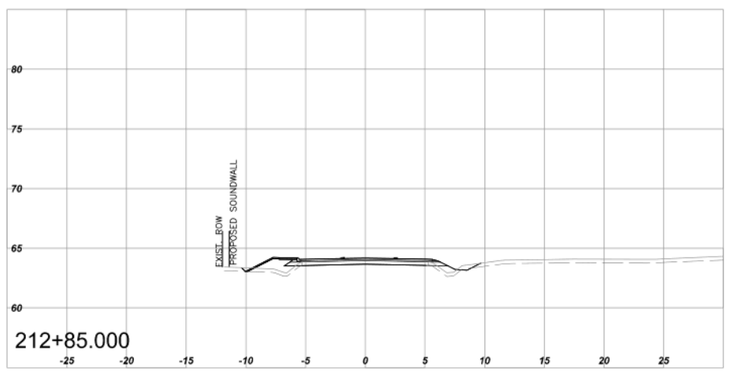


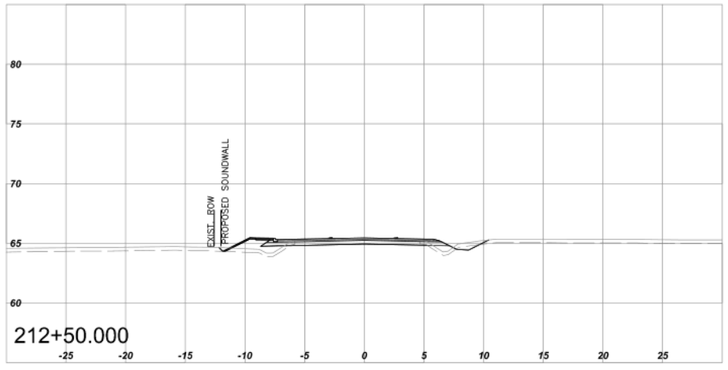


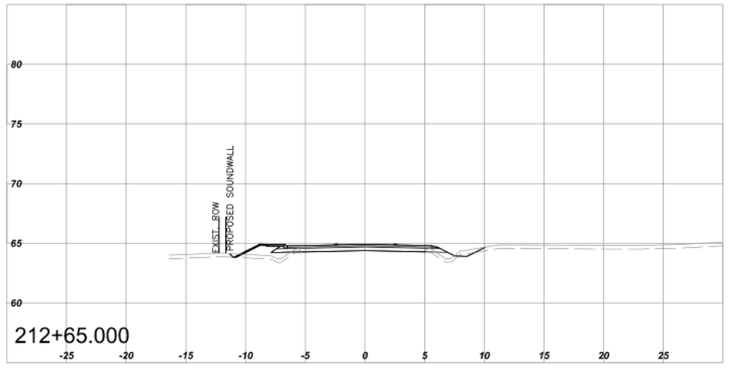


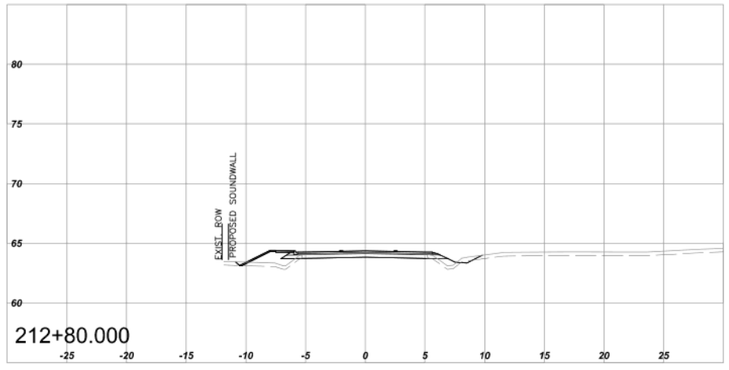












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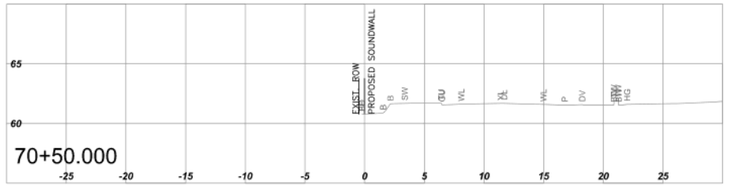

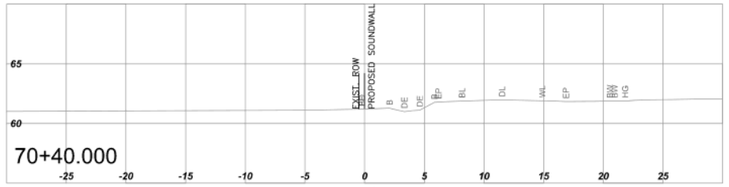

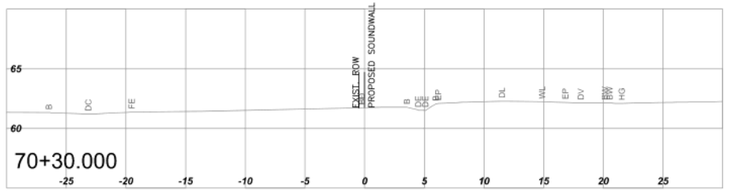

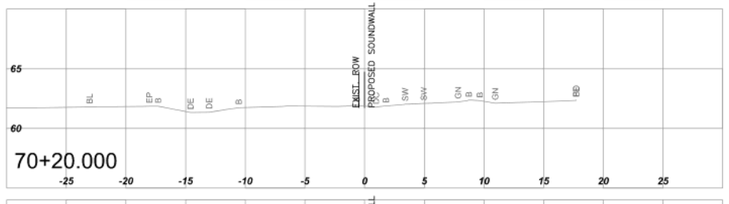

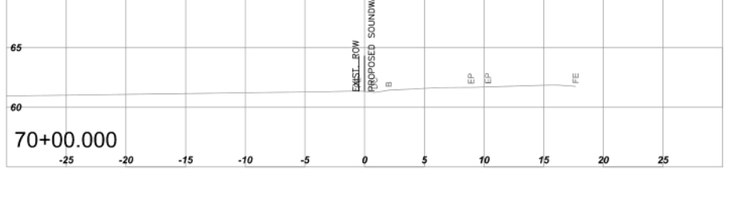

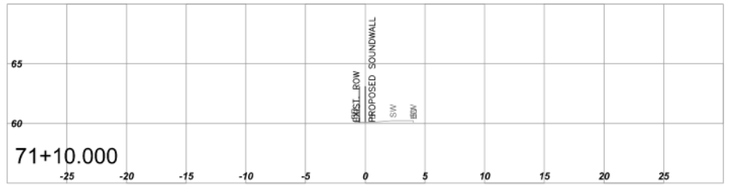

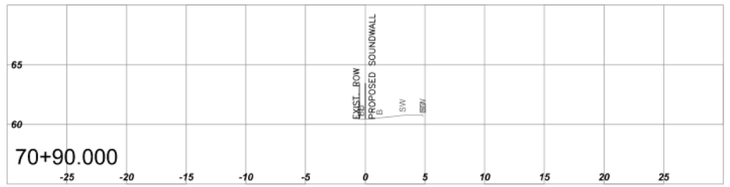

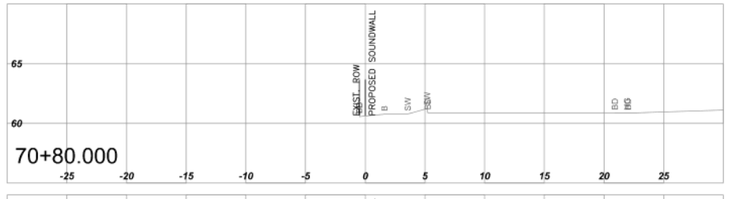

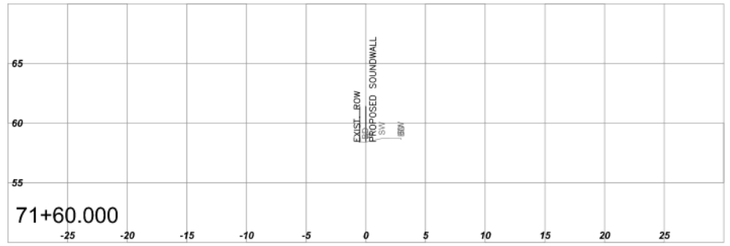

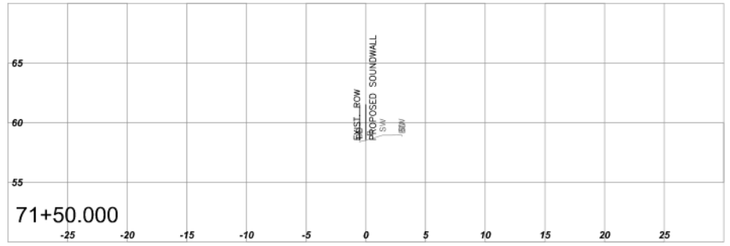

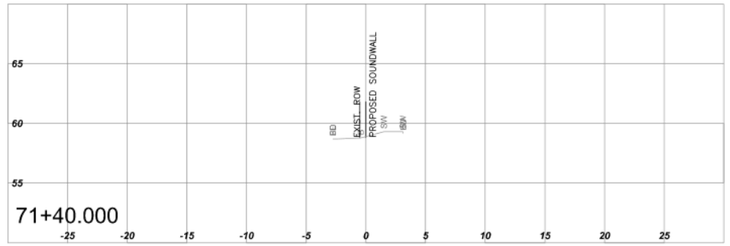

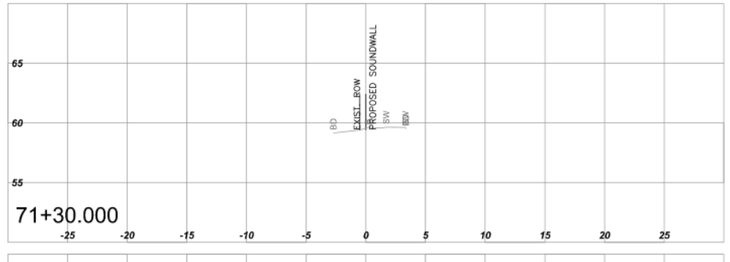

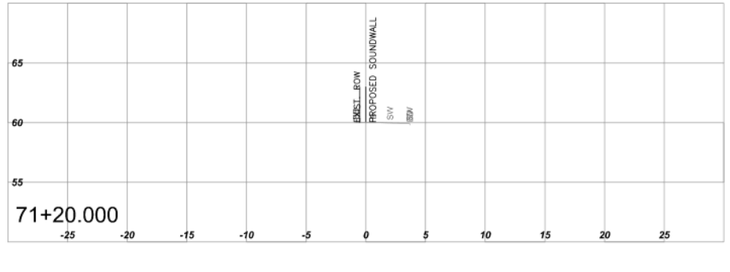

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HIGHWAY 1 - 216th STREET OVERPASS
PROPOSED SOUND WALL SECTIONS - S70LINE
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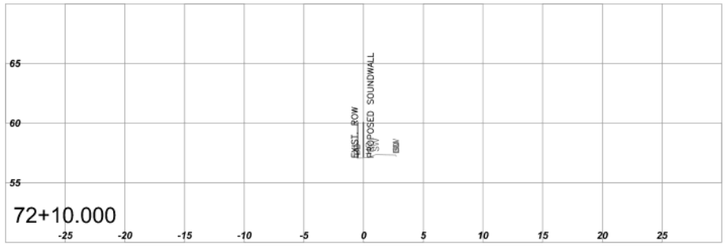
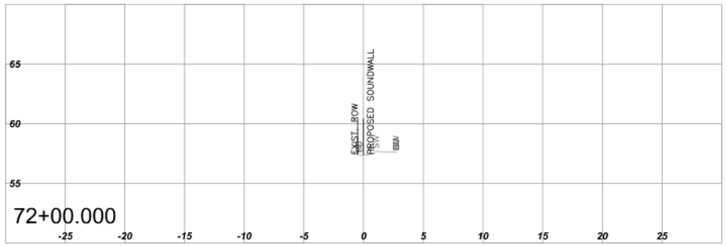
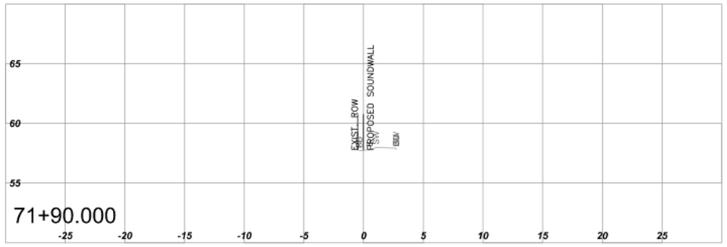
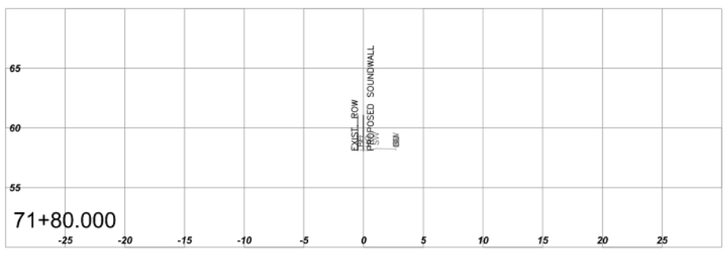
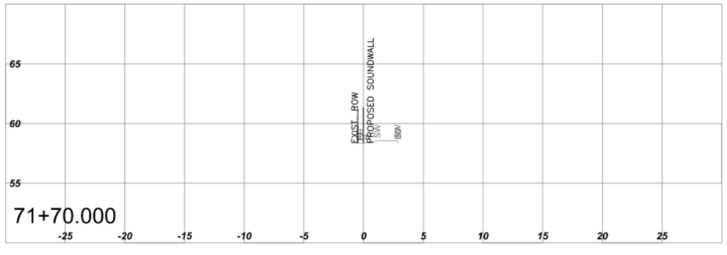
SCALE: 1:250 DATE: OCTOBER 1, 2016

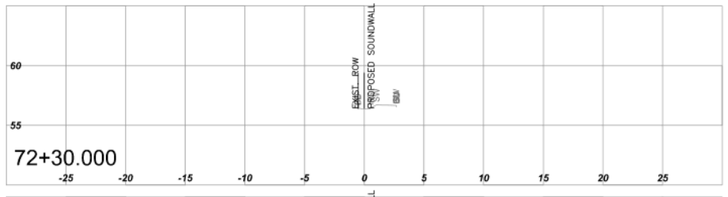


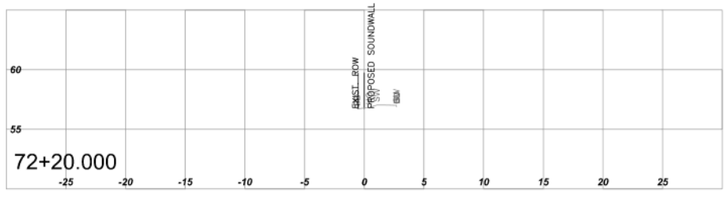












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HIGHWAY 1 - 216th STREET OVERPASS

PROPOSED SOUND WALL SECTIONS - S70LINE
FOR INFORMATION ONLY
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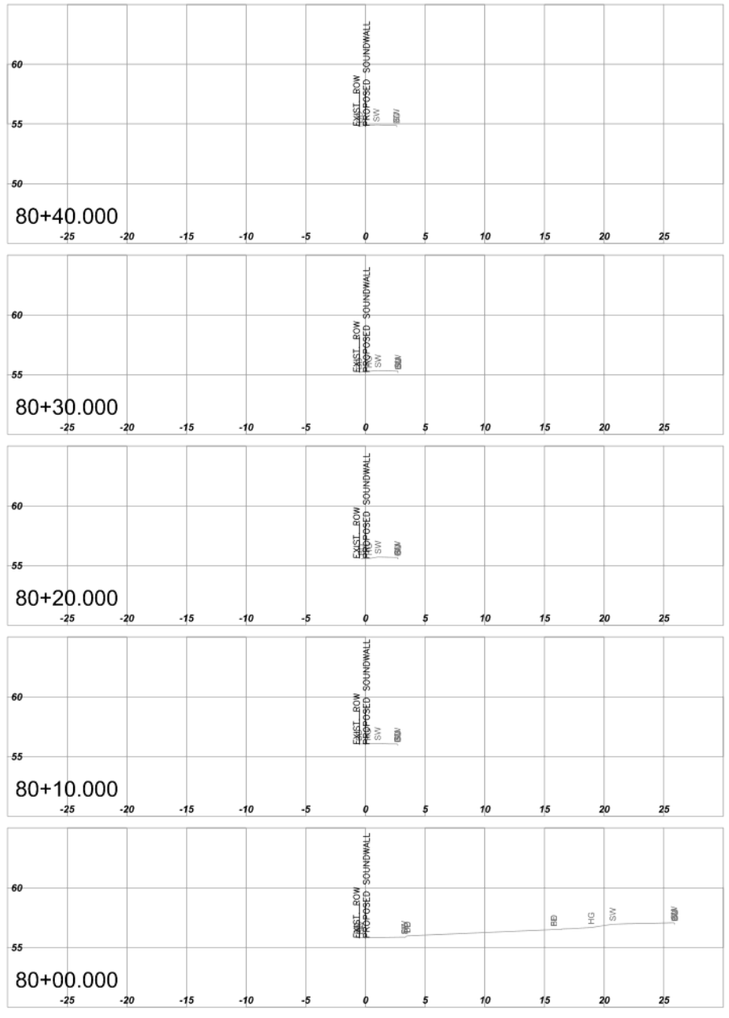

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HIGHWAY 1 - 216th STREET OVERPASS
PROPOSED SOUND WALL SECTIONS - S80LINE
FOR INFORMATION ONLY
SCALE: 1:250 DATE: OCTOBER 1, 2016

Alex Hope Elementary School
Parent Advisory Committee
March 1, 2016

Sheila Hui

A/Sr. Project Manager

South Coast Region, Ministry of Transportation and Infrastructure

MEETING AGENDA

- Introductions
- Project Background and Benefits
- Project Design
- Noise Walls
- Environmental Improvements
- Construction Activities
- Consultation and Engagement
- Questions

PROJECT BACKGROUND

- In July 2015, the B.C. Government announced plans to move forward with this Project
  - The Project includes construction of a new 216th Street Interchange and widening Highway 1 from 202nd to 216th Street
  - The Project is being delivered by the federal and provincial government and Township of Langley
  - The total cost of the Project is $59 million

PROJECT RATIONALE

- Currently, Highway 1 has a daily traffic volume of more than 106,000 vehicles
- About 15,000 vehicles in this area of Highway 1 are commercial trucks
- Significant growth in Langley has contributed to increased congestion

Photo of Highway 1 eastbound during peak hours (February 2016)

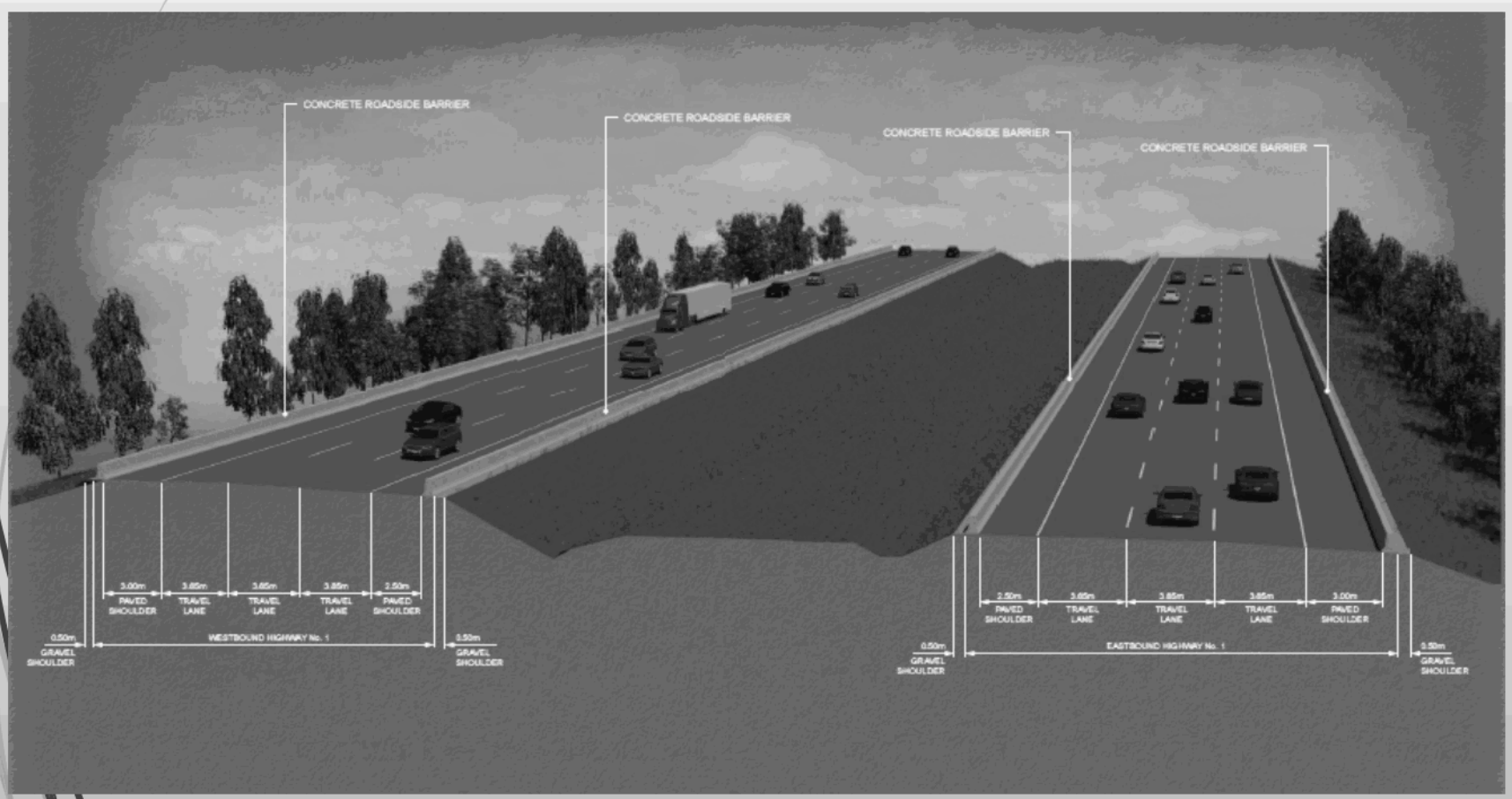
PROJECT BENEFITS

- The project will create a number of benefits including:
  - **Improved travel times** and reduced congestion for the travelling public and goods movers on Highway 1
  - **Greater connectivity and mobility** for residents in Langley communities north and south of the highway
  - **Increased highway capacity** and safety and operational improvements
  - **Cycling and pedestrian improvements** by building pedestrian sidewalks and a new multi-use path on the 216th Street overpass

PROJECT DESIGN

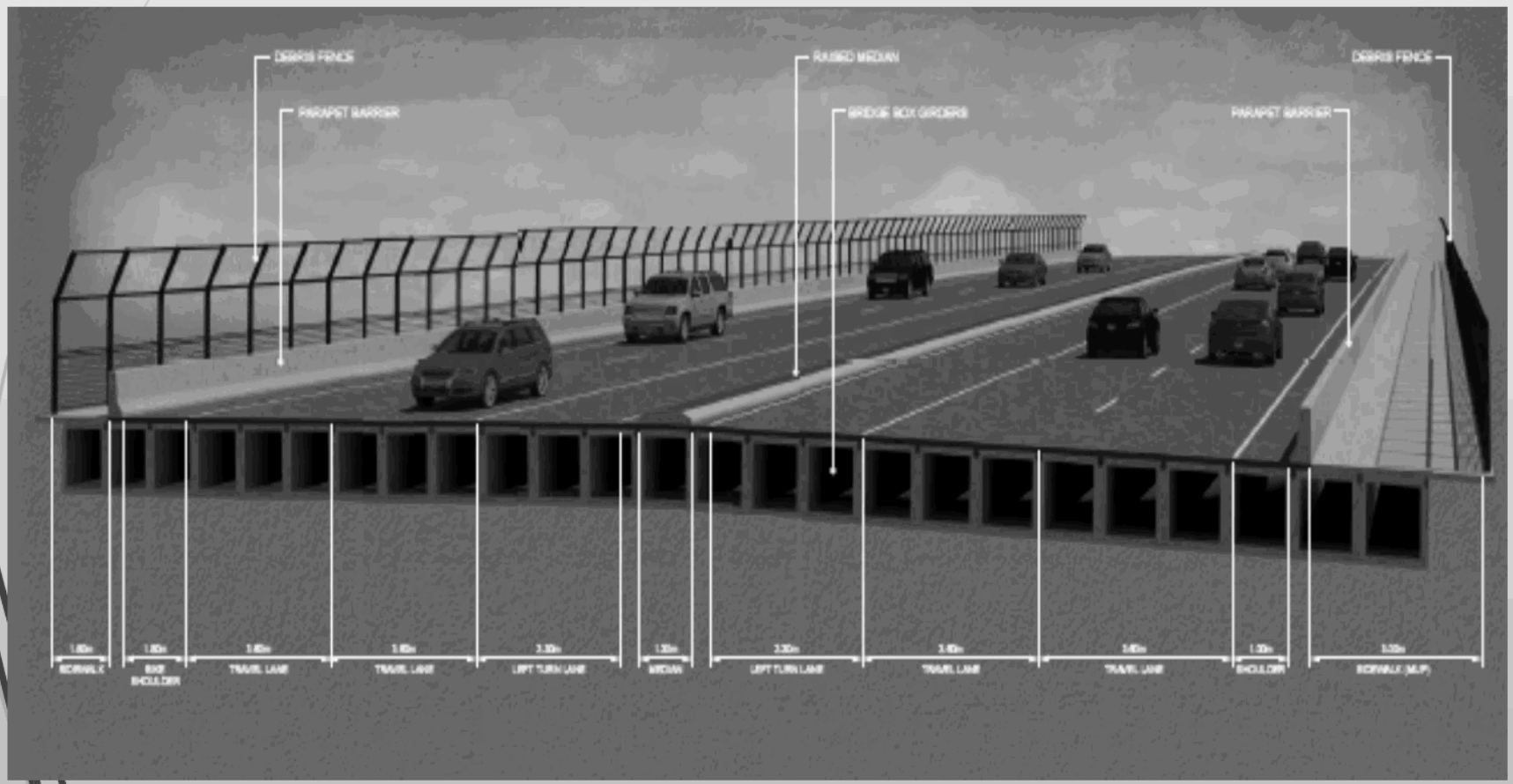
PROJECT DESIGN

Highway Lane Widening



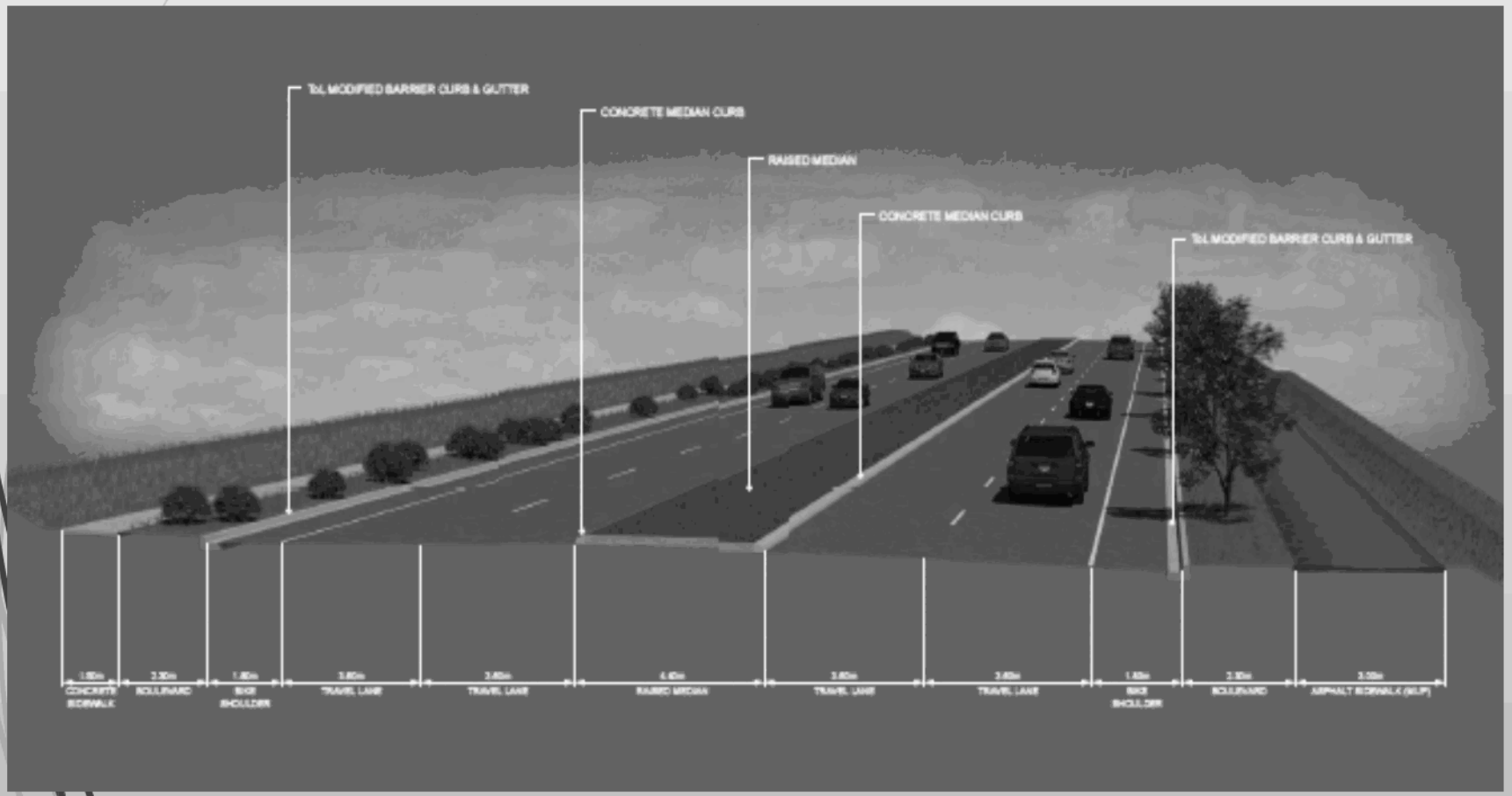
PROJECT DESIGN

216th Street Interchange Overpass



PROJECT DESIGN

216th Street Roadway



NOISE MITIGATION

The Ministry is in the process of determining noise wall locations for this project

- Locations are determined by the Ministry's noise assessments
- Noise walls are constructed along Ministry property, at a location where the wall would have the most benefit
- Some tree removal and pruning is typical when building noise walls

ENVIRONMENT

An Environmental Assessment Certificate for the project area was completed in 2008 as part of the Port Mann/Highway 1 Improvement Project (PMH1).

- The assessment identified areas along the project alignment and provided detailed measures to mitigate environmental impacts
- This project complies with the requirements outlined in the *Table of Commitments and Assurances* for PMH1
- The project team will work with and collect input from First Nations, environmental stakeholders, Fisheries and Oceans Canada, Agricultural Land Commission, and the Ministry of Forests, Lands and Natural Resources

ENVIRONMENTAL IMPROVEMENTS

Culverts at Yorkson Creek and Guy Creek

- Reviewing concepts at these two creeks to improve fish and wildlife passage and conserve natural habitats
- Will follow the commitments as listed in the TOCA to provide the environmental improvements for this project

Photo of Yorkson Creek (February 2016)

ENVIRONMENTAL IMPROVEMENTS

Air Quality and Dust Control

- Measures for air quality and dust control will be implemented throughout construction
- Routine site inspections will be conducted to monitor impacts and ensure compliance with Environmental Assessment Certificate requirements

CONSTRUCTION ACTIVITIES

What to Expect:

- Site preparations such as preloading of project materials (soil stockpiling, utility work, installing drainage measures).
- Pile driving for ramps, overpass foundations, etc.
- Any construction activity which requires a lane closure will need to be done at night to ensure highway operations remain safe
- Noisy work will be scheduled during daytime hours (7 a.m. – 7 p.m.) wherever possible, as outlined by the Ministry's guidelines to minimize the impact to the community.
- Construction will begin in late fall 2016 and is expected to be complete by fall 2019

CONSULTATION and ENGAGEMENT

Consultation and engagement includes:

- Meetings with stakeholders, property owners and First Nations
- Open house at Alex Hope Elementary School
  - Learn about the project, speak with the project team
- Community notification and newspaper advertising
- Opportunities to provide feedback (in-person, online, mail)

We Value Your Input

Please share your feedback with us:

- Consultation begins March 7th
- Visit the project website to review consultation materials and complete a feedback form online: engage.gov.bc.ca/highway1and216/
- Feedback is due by April 15th

THANK YOU!

For questions, please contact:

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