



OUTLOOK LAND DESIGN

LANDSCAPE ARCHITECTURE – CIVIL ENGINEERING

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January 23, 2015

SIMCIC + UHRICH ARCHITECTS
Suite 230 3 West 3rd Avenue
Vancouver, BC Canada V5Y 3T8

Bill Uhrich, AIBC

Dear Bill,

Access Road Design Memo – Hornby Island Fire Hall

To address concerns raised by members of the Hornby Island community regarding the proposed road access Outlook has been asked to prepare a design memo. This memo would outline the approach and standards used in the design of the access road including drainage and steepness of the roadway etc.

To achieve the above, Outlook proposes to visit the site, review concerns raised by the community and prepare an illustrated memorandum suitable for web distribution and stamped by a professional engineer.

We would schedule completion within seven days of authorization. Our fees to provide the above would be \$2,200.00 including disbursements. Please do not hesitate to contact the undersigned if you require further information or wish to discuss.

Sincerely,

Outlook Land Design Inc.

Per

Tim O'Brien, P. Eng., MBCSLA

Landscape Architect, Professional Engineer (Civil), Certified Contract Administrator

LANDSCAPE ARCHITECTURE
CIVIL ENGINEERING
PROJECT MANAGEMENT
DEVELOPMENT PLANNING

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February 16, 2015

SUBJECT HORNBY ISLAND FIREHALL ACCESS ROAD MEMO

ATTENTION: BILL URHICH, MAIBC, SIMSIC UHRICH ARCHITECTS

Per your request, we have prepared the following access road memorandum for the proposed new fire hall on Hornby Island. Outlook has visited the site and prepared two access roadway alignments Options 1 and 2, (Figure 1), for consideration. Option 1 is as currently indicated on the architectural site plan and utilizes the MoTi south access. Option 2 utilizes the MoTi north access.

We are advised that the budget for this project is limited and that imported granular fill materials for the project should be minimized where practical. The level of service achieved by the access road is a function primarily of grade, width and curvature. Idealized service levels must be considered in conjunction with increased costs as well as other site planning considerations.

The building site is located at a lower elevation than Central Road, and requires a curving roadway. Creating a raised pad and slab for the building will be required. A desirable slab elevation of 48.0 has been previously identified and is used in our analysis. This elevation was selected as the 48 m contour of existing ground equates closely with the centre of the proposed building.

Geometric Standards

Table 1 below has been prepared by Outlook to assess design options for this project. We are unaware of any access road geometry guidelines specific to rural fire halls or similar facilities. In developing Table 1 below we have reviewed standards and guidelines provided by the Transportation Association of Canada and the Master Municipal Construction Document Association Design Guideline Manual and the BC Ministry of Transportation and Infrastructure.

Table 1: Geometric Design Criteria Hornby Island Firehall Access Road

	Ideal	Acceptable	Undesirable
Grade (%)	0 to 3.0	3.1 to 8.0	> 8.1
Width (m)	9	7 to 8	< 7
Centreline Radius (m)	20 to 30	15	< 15
Crossfall (%)	1 to 2	2 to 3.5	> 3.5

Access Road Options 1 and 2

A variety of alignments and building locations were analyzed prior to selecting the options discussed in this memo. Building locations further downslope were assessed and found to provide only marginal benefit in terms of roadway gradient thus have not been included in this analysis. Note that profile

drawings are rendered in 10 x exaggerated vertical scale for readability purposes. This results in gradients that appear much steeper than in reality. Sample gradients have been drawn in non-exaggerated scale and are given in Figure 4.

From our evaluation we are able to confirm from an access road perspective that the fire hall's proposed location on the site is suitable and not in conflict with good engineering practices. The results are summarized in Table 2 below.

Table 2: Access Road Comparisons

	Option 1	Option 2	Comments
Fire Truck Access Grade (%)	5.89	4.60	Both options are acceptable. Option 2 has a gentler gradient.
Ambulance Access Grade	7.7	5	Ambulances can approach using the truck bay centreline gradients shown above.
Width (m)	9	9	Meets ideal requirements.
Centreline Radius (m)	20	25	Option 2 is slightly preferable to Option 1 for centreline radius.
Crossfall (%)	2	2	Cross fall on the main alignment can be held to 2%.
Intersection at Central Road	Two access points.	One access point.	Two access points may be preferable to avoid potential congestion between gravel trucks and fire truck operations. However ideally the MoTI access would be relocated 60 m from the fire hall access and there would be only one access point for the fire hall.
Transition Slopes at Central Road	good	good	A gentle transition area where the access roads meet central road has been accommodated. This slope is less or equal to 2% and extends for 10 m.
Slopes away from the building	good	good	The access road design allows for slopes away from the building to be provided on four sides.
Truck Bay Access Aprons	good	good	On both designs the access road gradient transitions to a gentle upward slope as it approaches the truck bays. Trucks will exit the fire hall bays with a favourable slope and surface water will drain away from the building.
Drainage	good	good	The built up pad ensures that the site will be well above surface water and groundwater levels. A system of swales, catchbasins and a trench drain system in front of the truck bays will be utilized to collect and drain away surface flows.
Staff Parking Area	Requires assessment	Requires assessment	This may not be an ideal location for staff parking due to potential geometrical and manoeuvring conflicts with MoTI access.
Land Tenure	Permitted.	Currently not permitted.	If Option 1 was selected an access agreement with MoTI is required.

Intersection Sight Triangles

Sight triangles at Central Road will need to be established and incorporated in the clearing plan. The purpose of sight triangles is to ensure good visibility at intersections. The straight alignment of Central Road in this location is a benefit to providing safe access to the site.

Ideal Access Road Gradients

Access road service levels must be considered in the context of other site planning considerations as well as value for money spent. Although we consider the “ideal” access road gradient to be 3% or less, the roadway slopes given in Table 2 are nevertheless relatively gentle and not an impediment to vehicles except perhaps under conditions of snow or ice. In this event we have been advised that standard operational procedures will be engaged to ensure that chains are applied prior to snowfall warnings.

Figure 2 indicates an additional access road profile where the roadway gradient meets the Table 1 ideal conditions. This results in a building slab elevation of 49.5 which corresponds to an increase of imported fill depth of 1.5 m across the main project area. Assuming a cost of \$60 per cubic metre (estimate derived from barge-in tendered prices from a fairly recent project) and an area of 2,300 square metres of imported fill this will add a premium to the overall project cost of approximately \$200,000. If locally sourced fill could be utilized the premium could potentially be lowered to approximately \$100,000. The main benefit of this option is that it reduces the vertical climb for fire trucks from truck bay elevation to Central Road elevation from 2.5 m to 1 m (round numbers).

Table 3 below provides the approximate premium associated with various building slab elevations. We have assumed off island import in the cost estimates.

Table 3: Premium Associated with Raising Building Slab above 48.0

Proposed Slab Elevation (m)	Additional Fill Depth (m)	Approximate Cost Increase (\$)	Approximate Access Road Gradient (%)
48.0	0	0	6 %
48.5	0.5	\$66,000	5%
49.0	1.0	\$132,000	4%
49.5	1.5	\$200,000	3%

Closing

Option 1, corresponding to the current architectural site plan, is suitable for this project.

Option 2 could be a substantial improvement if it were combined with relocating the MoTI access road northward away from the fire hall site. The practicality of relocating this road is not known from either a technical or approvals perspective.

However, moving the MoTI access road could be given consideration for both options as there are costs (perhaps \$20,000 +/-) associated with upgrading and adjusting the current roadbed to blend with grades with the fire hall pad.

If there were a ready source of suitable fill on site we would recommend raising the building slab to 49.5 m. However our understanding is that fill will have to be imported at considerable cost (\$200,000 per Table 3). If this were an urban situation where emergency calls were frequent the costs of fill would be less of a concern. However for the Hornby fire hall, call outs are not frequent, making it more difficult to justify the increased cost relative to the benefit received.

If budget were available to meet a slab grade of 48.5 this would reduce the need for ditching and/or interceptor drains on the Central Road side of the building pad. This would also serve to bring the access road into the 5% gradient range.

Staff parking locations should be given additional consideration in order to minimize potential conflicts with the MoTI access.

Outlook Land Design Inc.

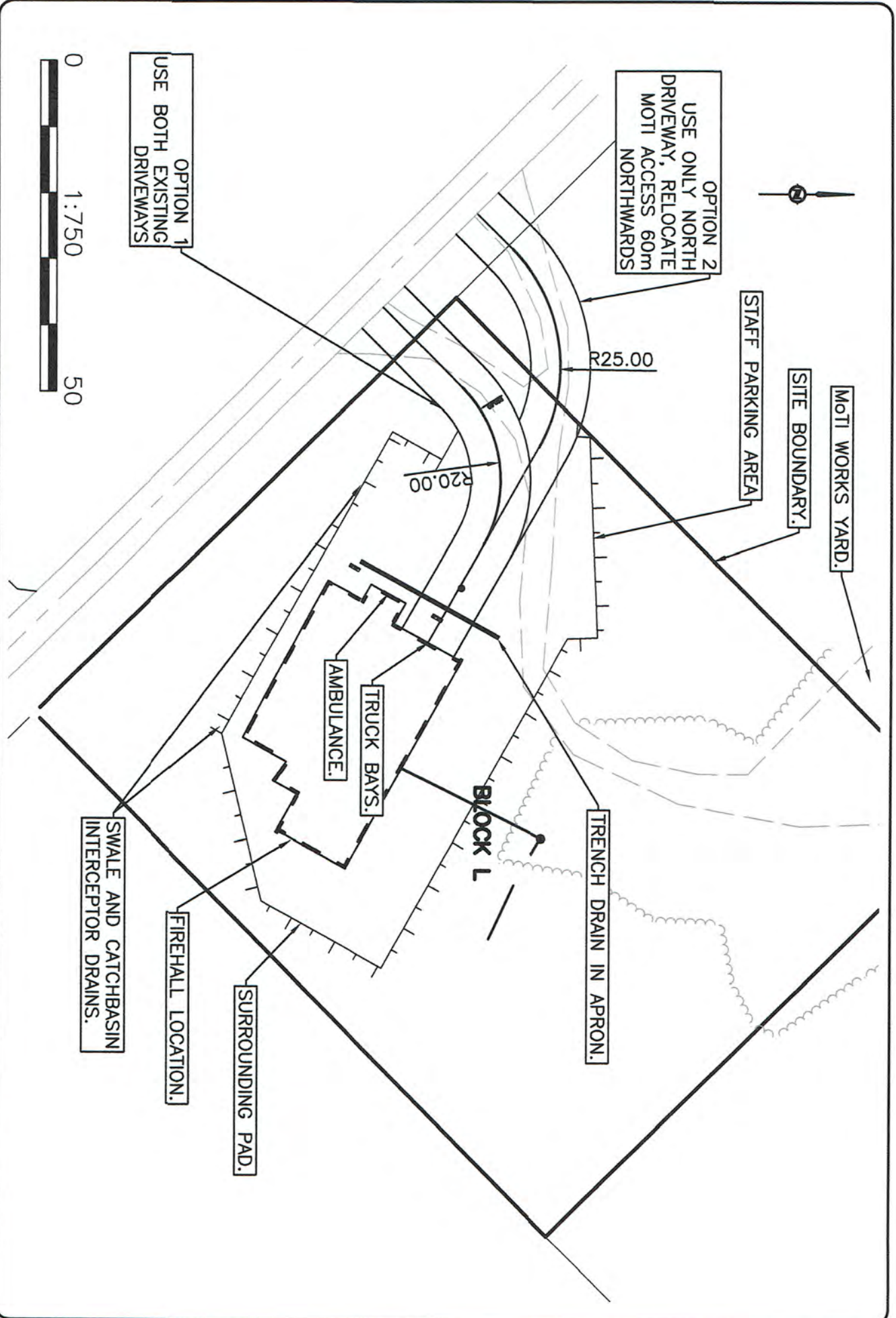
Per



Tim O'Brien, P. Eng., MBCSLA

Professional Engineer (Civil), Certified Contract Administrator, Landscape Architect

Enclosures: Figure 1 Options 1 and 2, Figure 2 Option 1 Profile, Figure 3 Option 2 Profiles, Figure 4 Sample Profiles Natural Scales



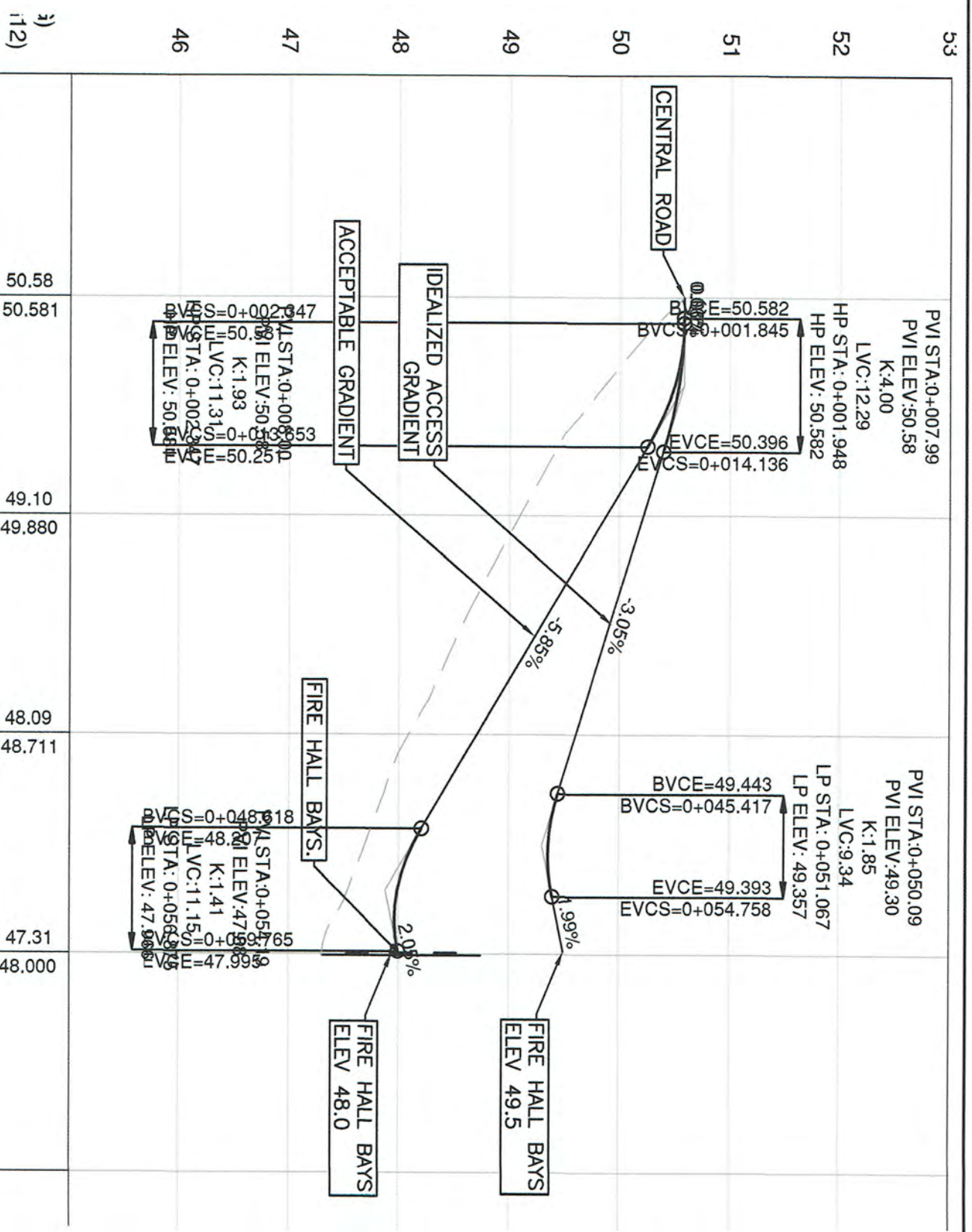
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Project: Hornby Firehall Access Memo
 Title: Figure 1: Options 1 and 2
 Date: 2015-02-16

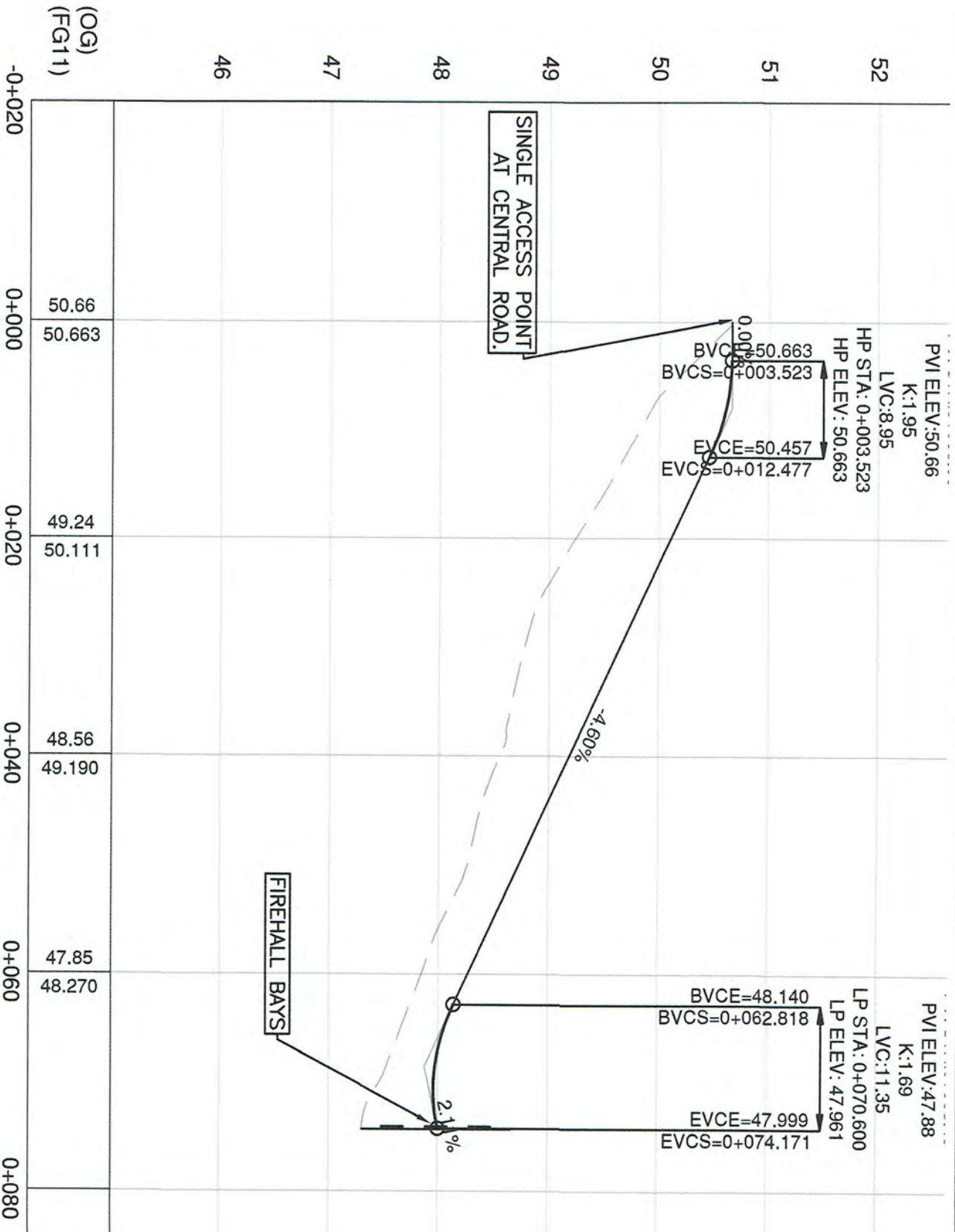


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Project: Hornby Firehall Access Memo
 Title: Fig 2: Option 1 Profiles
 Date: 2015-02-16

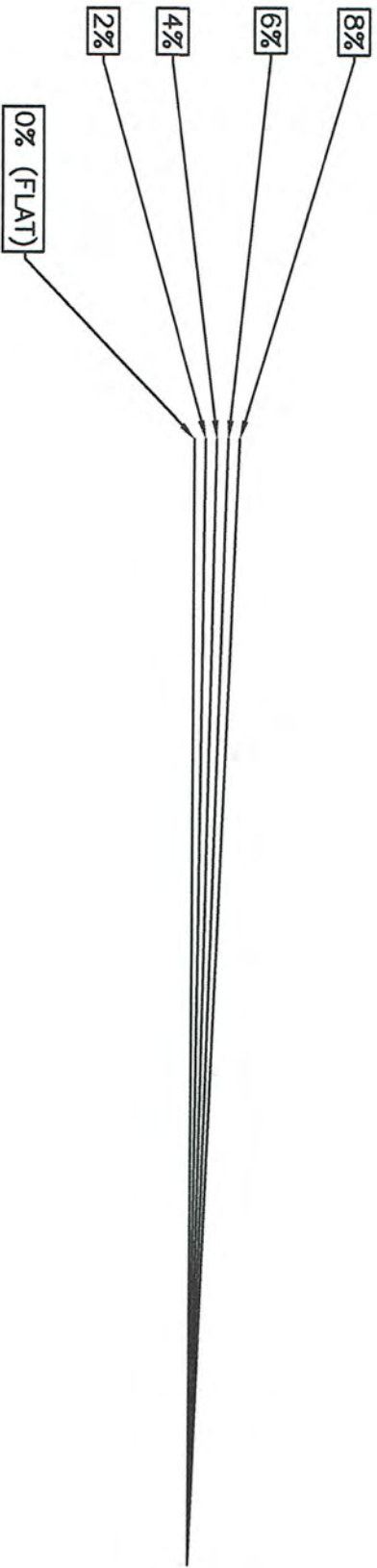


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 Fig 4: Sample Unexaggerated Profiles
 (Natural Scale)
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 2015-02-16