SUR-OM-M-8

Canada – British Columbia

FRASER RIVER FLOOD CONTROL 1968 AGREEMENT

City of Surrey

OPERATION AND MAINTENANCE INSTRUCTIONS
FLOOD CONTROL WORKS

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Records of Amendments
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1.0 Introduction

1.1 The Program

The Fraser River Flood Control Program was initiated in 1968, signing an agreement with the Province of British Columbia to provide flood control works in the lower Fraser Valley. This agreement, undertaken by the Federal and Provincial Governments, provided an extensive flood control program for the lower Fraser Valley by constructing new and upgrading existing dyke systems, increasing river bank protection, and improving existing internal drainage systems.

1.2 Past Upgrades

After the dyke was originally constructed under the 1968 Fraser River Flood Control Program, major construction and upgrades commenced in 1974 and 1975 under the Fraser River flood control program. In conjunction with the District of Surrey, final designs were prepared for various upgrade components and construction of the works described above was completed in 1980. An Operation and Maintenance Manual for these works was created which provide general and specific instructions for the facilities improved under the program – however, did not include any existing structures unless deemed important to the function of the dyke system. The District of Surrey undertook responsibility to operate and maintain the completed dyke works under the Dyke Maintenance Act to insure the integrity of the dyke system was maintained. Since then, several other similar upgrade projects have been accomplished to further provide a solid flood protection system for the Bridgeview and South Westminster areas.

1.3 Current Upgrades

1.3.1 Background

The recent upgrade project was initiated from a study conducted by Associated Engineering titled the “Flood Protection Review – Fraser River Flood Plain Area” which identified minor and major deficiencies in the existing Fraser River Dyke System. As a result of this study, the City of Surrey pursued with plans to upgrade deficiencies recommended by the Report. With the help of Flood Protection Assistance Funding from the Province of British Columbia, the City of Surrey in June 2003 commenced with design and construction to further upgrade weaknesses in the existing Fraser River Dyke System. Associated Engineering was retained as the primary consultant for the upgrade works and preliminary designs were prepared for the entire dyke system. All upgrade components were ranked in order of safety and importance to the system and initial plans were to pursue all upgrades, However due to limited funding, only certain high priority sections of the dyking system given were selected for full design and construction.
1.3.2 Completed Works

A report by Associated Engineering summarized numerous required upgrades to the Fraser River dyke system with ranked priorities given to each. Due to limited funding, only upgrades of highest priorities were pursued with plans to upgrade other lesser priority sites in the future.

The following outlines the locations and description of the selected upgrades:

- Station 0+480 – placement of steel stop log structure (ID 17)
- Station 0+680 – placement of steel stop log structure (ID 16) and extension of dyke
- Station 0+8-0 – raise dyke crest
- Station 0+880 – placement of steel stop log structure (ID 15)
- Station 0+920 – fill driveway with earth dyke (ID 14)
- Station 1+120 – raise and extend dyke to tie-in floodwall
- Station 1+160 – raise stop-log guide rails and use steel stop-logs (ID 13)
- Station 1+700 – replace stop-log guide rails and use steel stop-logs (ID 10)
- Station 1+840 – raise stop-log guide rails and use steel stop-logs (ID 9)
- Station 1+800 to 1+900 – raise flood wall
- Station 2+080 to 2+250 – raise flood wall
- Station 2+240 – raise stop-log guide rails and use steel stop-logs (ID 8)

In addition to the above-mentioned upgrades, all existing stop-log structures from station 2+240 to Old Yale Road were upgraded by replacing existing wooden stop-logs and guide rails with steel stop-logs and guide rails.
2.0 Operation and Maintenance Instructions

2.1 Scope

This section provides details to the general operations and maintenance of the flood protection works discussed previously in the event of a major flooding event. The scope of this section encompasses the newly designed and constructed works along with upgrades to existing structures at major crossing of the Fraser River dyke system. To ensure full protection of this system from flooding, all measures are to be taken at these major crossings.

2.2 Stop Log Structures

Throughout the Fraser River dyke system gaps in the form of driveway and road crossings are present. Adequate protection must be provided at these major crossings, particularly ones attributed to the highest risks. As a result, numerous crossings require installation of flood protecting stop log structures in the event of a major flood. Figure 2.2 outlines the geographic location of these crossings with respect to the dyke system and the Fraser River. Operational details of each crossing will now be given.

No. 17 – 116th Avenue

The crossing at 116th Avenue near 132A Street has undergone construction of a steel stop log structure utilized under severe flooding. The structure provides flood protection by creating a wall essentially blocking off 116th Avenue using steel stop logs and center supports as seen in Figure 2-1. The basic operations are as follows:

1. Removal of manhole covers and installation of two center stop log supports within manholes frame
2. Placement of wooden base inserts between stop log supports
3. Placement of six - 6100mm x 300mm steel stop logs on top of wooden base between stop log support and end guide rails
No. 16 – CN Tie Yard Driveway

Within the CN yard exists a gap in the dyke system where the parking lot driveway meets the railway crossing. Due to the break in the dyke/floodwall caused by the access driveway, a stop log structure has been constructed under this upgrade project to allow for a 0.6m high wall to be placed during a flooding event as follows:

1. Removal of manhole cover and installation of center stop log support within manhole frame
2. Placement of four - 6100mm x 300mm steel stop logs between stop log support and end guide rails

No. 15 – CN Tie Yard Spur Line

The CN Spur Crossing is where the CN railway crosses the dyke system resulting in a break or gap in the dyke system. This crossing has seen the construction of a new stop log structure along with upgraded dyke works to provide adequate flood protection. During a flooding event, steel stop logs are placed over the CN railway track and sandbags are placed to fill in remaining void areas (See Figure 2-2). The basic operation is as follows:
1. Placement of three - 5850mm x 300mm steel stop logs between end guide rails
2. Placement of sand bags between rail bed and bottom of stop logs

![Image: Placement of stop logs on top of railway at crossing No. 15]

**Figure 2-2: Placement of stop logs on top of railway at crossing No. 15**

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No. 13 – 130\(^{th}\) Street

A break in the dyke occurs at the end of 130\(^{th}\) Street, which resulted in placement of a stop log structure during a past upgrade project. This stop-log structure has been further upgraded to allow the use of steel sections by replacing the material of the guide rails from wood to steel. In the event of a flood, multiple steel stop-log sections are put in place and connected to form a barrier against flooding waters. The basic operation is as follows:

1. Placement of two – 4821mm x 320mm steel stop-log sections between end guide rails
2. Use two connection plates to connect the pair of stop log sections placed
3. Repeat procedure for a stacked placement of a 0.96m high wall consisting of six steel stop log sections with two connection plates for each stop log pair
No. 10 – Mill & Timber

The Mill Timber stop log structure was upgraded to replace the wooden stop-log guide rails with steel guide rails to allow for steel stop-log sections. As shown in Figure 2-3, this crossing is smaller than others – hence requires fewer steel stop-log sections to protect against a major flood. Materials and procedure includes placement of two – 5952mm x 300mm steel stop logs between the end guide rails to create a 0.6m high wall.

![Figure 2-3: Crossing No. 10 showing stop log structure without steel stop logs](image)

No. 9 – 126A Street

The crossing located at the end of 126A Street was upgraded to include steel stop log guide rails along with raised adjacent floodwall sections. Steel stop logs are to be placed at the crossing to act as a barrier during flooding events as follows:

1. Placement of two – 4800mm x 300mm steel stop log sections between end guide rails
2. Use two connection plates to connect the pair of stop log sections placed
3. Repeat procedure for a stacked placement of a 0.9m high wall consisting of six steel stop log sections with two connection plates for each stop log pair
No. 8 – Georgia Pacific Office

The Georgia Pacific crossings consist of two narrow road crossings to the Georgia Pacific property, which inadvertently interrupts the floodwall. The first crossing seen in Figure 2-4 consists of upgrades that include replacing/raising the stop log guide rails to incorporate placement of steel stop log sections along with raising of the adjacent floodwalls. In the event of a major flood, one - 5937mm x 420mm steel stop log is to be placed between end guide rails to act as a barrier against flooding.

![Figure 2-4: Crossing No. 8 to the Georgia Pacific Office](Image)

No. 7 – Georgia Pacific Warehouse

The second crossing for the Georgia Pacific warehouse shown in Figure 2-5 requires three steel stop log sections placed side by side to fully span the crossing and create a 9622mm x 305mm barrier. General instructions are as follows:

1. Placement of a 2811mm x 305mm steel stop-log at either end of the stop log structure guide rails.
2. Placement of a 4000mm x 305mm steel stop-log sections adjacent to the 2811mm x 305mm steel section. Use two connection plates with bolts to secure both stop-logs together.

3. Placement of a 2811mm x 305mm steel stop-log adjacent of to the 4000mm x 305mm steel section to complete barrier wall. Use two connection plates with bolts to secure stop-logs together.

![Figure 2-5: Crossing No. 7 to the Georgia Pacific Warehouse](image)

No. 6 – Musqueam Drive

This existing crossing located at the end of Musqueam Drive received upgraded steel stop logs and guide rails during this recent upgrade project. The crossing requires stacking of steel stop-logs to create a 0.25m high barrier. The general instructions for placement of these stop-logs are as follows:

1. Placement of two – 4784mm x 254mm steel stop log sections between end guide rails
2. Use two connection plates to connect the pair of stop log sections placed
3. Repeat procedure for a stacked placement of a 0.508m high wall consisting of four steel stop-log sections with two connection plates for each stop-log pair
No. 5 – Ritchie Brothers

The Ritchie Brothers crossing as seen in Figure 2-6 is located near Ritchie Brothers warehouse and requires temporary obstruction of a gap in the dyke system during a flooding event. By placement of a 0.81m wall, adequate protection against flooding is provided. Placement of the steel stop-log wall is as follows:

1. Placement of two – 4804mm x 407mm steel stop-log sections between end guide rails
2. Use two connection plates to connect the pair of stop-log sections placed
3. Repeat procedure for a stacked placement of a 0.814m high wall consisting of four steel stop-log sections with two connection plates for each stop-log pair

Figure 2-6: Crossing No. 5 at Ritchie Brothers Property
No. 4 – Old Yale Road

The crossing at the end of Old Yale Rd. adjacent to the Brownsville Bar area is an access point for many to the Fraser River. Due to this access road, a break is created in the dyking system – hence temporary blockage is required during a flooding event (see Figure 2-7). The procedure calls for placement of a 0.814m steel stop-log wall as outline below:

1. Placement of two – 4804mm x 407mm steel stop-log sections between end guide rails
2. Use two connection plates to connect the pair of stop-log sections placed
3. Repeat procedure for a stacked placement of a 0.814m high wall consisting of four steel stop-log sections with two connection plates for each stop-log pair

Figure 2-7: Crossing No. 4 at the end of Old Yale Road

No. 3 – Brownsville Pub

In addition to the Old Yale Rd. crossing, a gap in the Dyke is also generated from an access driveway to the parking lot of Brownsville Pub located at the end of Old Yale Rd. This driveway needs a temporary barrier to protect the Brownsville area during flooding by placement of a 0.814m high steel stop-log wall as follows:
1. Placement of two – 4804mm x 407mm steel stop-log sections between end guide rails
2. Use two connection plates to connect the pair of stop-log sections placed
3. Repeat procedure for a stacked placement of a 0.814m high wall consisting of four steel stop log sections with two connection plates for each stop-log pair

No. 1 – Imperial Lumber ROW

A break in the Dyke system occurs where the CN Railway intersects with the concrete floodwall near Imperial Lumber yard. In order to protect against floodwaters overwhelming the surrounding area, a stop-log structure had been previously constructed. Furthermore, stop-logs and guide rails were recently upgraded from wood to steel to create an adequate barrier as shown in Figure 2-8. In the event of a flood, a 0.762m wall is to be erected on top of the railway tracks by placing two – 4876mm x 381mm steel stop-logs between the end guide rails. In addition, sandbag is required to fill in the gap between the railway bed and the bottom steel stop-log.

Figure 2-8: Crossing No. 1 adjacent to Imperial Lumber Yard
3.0 Summary

The Fraser River Flood Protection Upgrade for Fraser River Dyking system encompassed new construction of steel stop-log structures and upgrades to existing wooden stop-log structures from the Imperial Lumber right-of-way to the Bolivar Creek along 116th Avenue. Table 3-1 summarizes the location and materials for each stop-log crossing upgraded during the 2003/04 upgrade project.

<table>
<thead>
<tr>
<th>Surrey ID</th>
<th>Provincial ID</th>
<th>Location</th>
<th>Materials (Steel sections; connection plates; center supports)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>Imperial Lumber ROW</td>
<td>2 - 4876mm x 381mm; sand bags</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>Brownsville Pub</td>
<td>4 - 3759mm x 407mm; 4 - connection plates</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>Old Yale Road</td>
<td>4 - 4804mm x 407mm; 4 - connection plates</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
<td>Ritchie Brothers</td>
<td>4 - 4804mm x 407mm; 4 - connection plates</td>
</tr>
<tr>
<td>6</td>
<td>7</td>
<td>Musqueam Drive</td>
<td>4 - 4784mm x 254mm; 4 - connection plates</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>Georgia Pacific Warehouse</td>
<td>2 - 2811mm x 305mm, 1 - 4000mm x 305mm; 4 - connection plates</td>
</tr>
<tr>
<td>8</td>
<td>9</td>
<td>Georgia Pacific Office</td>
<td>1 - 5937mm x 420mm</td>
</tr>
<tr>
<td>9</td>
<td>10</td>
<td>126A Street</td>
<td>6 - 4800mm x 300mm; 6 - connection plates</td>
</tr>
<tr>
<td>10</td>
<td>11</td>
<td>Mill &amp; Timber</td>
<td>2 - 5952mm x 330mm</td>
</tr>
<tr>
<td>13</td>
<td>14</td>
<td>130th Street</td>
<td>6 - 4821mm x 320mm; 6 - connection plates</td>
</tr>
<tr>
<td>15</td>
<td>16</td>
<td>CN Tie Yard Spur Line</td>
<td>3 - 5850mm x 300mm; sand bags</td>
</tr>
<tr>
<td>16</td>
<td>17</td>
<td>CN Tie Yard Driveway</td>
<td>4 - 6100mm x 300mm; 1 - center support</td>
</tr>
<tr>
<td>17</td>
<td>18</td>
<td>116th Avenue</td>
<td>6 - 6100mm x 300mm; 2 - center supports; wooden inserts</td>
</tr>
</tbody>
</table>

Table 3-1: Summary of Upgraded Stop-Log Structures
Appendix A

Site and As-Constructed Drawings
Appendix B

Site Photos
Site Photos - August 10, 2004

3b

1a

1b
Appendix C

Associated Engineering
Construction Report
CITY OF SURREY

Fraser River Flood Protection Upgrade Program (2004), M.S. 4803-313-11
Construction Report
July 23, 2004
File: 022277-6-17

Jeff Arason, P.Eng.
Project Engineer
City of Surrey
Engineering Department
14245 - 56th Avenue
Surrey, B.C.
V3X 3A2

Re: FRASER RIVER FLOOD PROTECTION UPGRADE PROGRAM (2004),
M.S. 4803-313-11 - CONSTRUCTION REPORT

Dear Mr. Arason:

We are pleased to submit the following “Fraser River Flood Protection Upgrade Program (2004) - Construction Report”. This report summarizes the construction work completed for Contract No. M.S. 4803-313-11 by GCL Contracting and Engineering Inc.

The Fraser River Flood Protection Upgrade Program (2004) entails upgrading and supplying steel stop logs along the existing Fraser River Dyke from the Imperial Lumber Right-of-way to Bolivar Creek (east of 132A St). The work completed in this contract include the following:

- Construction of steel stop log closure structures and supply of steel stop logs for existing stop log closure structures at the following locations:

<table>
<thead>
<tr>
<th>City of Surrey ID</th>
<th>Province ID</th>
<th>Location</th>
<th>Work</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>Imperial Lumber Right-of-way</td>
<td>Supply Steel Stop Logs</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>Brownsville Pub</td>
<td>Supply Steel Stop Logs</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>Old Yale Road</td>
<td>Supply Steel Stop Logs</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
<td>Ritchie Brothers</td>
<td>Supply Steel Stop Logs</td>
</tr>
<tr>
<td>6</td>
<td>7</td>
<td>Musqueam Drive</td>
<td>Supply Steel Stop Logs</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>Domtar Warehouse</td>
<td>Supply Steel Stop Logs</td>
</tr>
<tr>
<td>8</td>
<td>9</td>
<td>Domtar Office/Georgia Pacific</td>
<td>Supply Steel Stop Logs</td>
</tr>
<tr>
<td>9</td>
<td>10</td>
<td>126A Street</td>
<td>Supply Steel Stop Logs</td>
</tr>
</tbody>
</table>

.../2
July 23, 2004
Jeff Arason, P.Eng.
City of Surrey
- 2 -

<table>
<thead>
<tr>
<th>City of Surrey ID</th>
<th>Province ID</th>
<th>Location</th>
<th>Work</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>11</td>
<td>Mill and Timber</td>
<td>Supply Steel Stop Logs</td>
</tr>
<tr>
<td>13</td>
<td>14</td>
<td>130th Street</td>
<td>Supply Steel Stop Logs</td>
</tr>
<tr>
<td>14</td>
<td>15</td>
<td>CN Tie Yard East of 130th Street</td>
<td>Fill Access w/ Earth Dyke</td>
</tr>
<tr>
<td>15</td>
<td>16</td>
<td>CN Tie Yard - Tracks</td>
<td>Structure w/ Steel Stop Logs</td>
</tr>
<tr>
<td>16</td>
<td>17</td>
<td>CN Yard Driveway</td>
<td>Structure w/ Steel Stop Logs</td>
</tr>
<tr>
<td>17</td>
<td>18</td>
<td>116th Avenue</td>
<td>Structure w/ Steel Stop Logs</td>
</tr>
</tbody>
</table>

- Construction of approximately 25 m of earth dyke at an old driveway access onto CN property.
- Raise approximately 160 m of existing dyke to Fraser River Flood Control levels.
- Retrofit 4 existing stop log guide rails.
- Raise approximately 80 m of concrete flood wall to Fraser River Flood Control levels.
- Backfill existing gaps between earth dyke and concrete flood walls at various locations to provide a continuous dyke.

The construction work was successfully completed by GCL Contracting and Engineering Inc. The work was completed from January 05, 2004 to July 16, 2004. Construction inspection was completed by Ken Fudge, CTech, of Associated Engineering. The daily site reports are attached in Appendix A.

The as-built drawings are included in Appendix B. All the work was completed as specified. The dyke fill material placed had a higher fines content than originally specified; however, the compaction tests indicate that the dyke fill material achieved the specified 95% Modified Proctor Density. In addition, the earth dyke slopes were overlain with top soil and hydroseeded to promote vegetation growth. The dyke fill material and compaction tests reports are attached in Appendix C.

Concrete tests were completed for all major pours. The concrete test reports indicate that the concrete achieved the specified 28 day strength of 25 MPa. Concrete test reports are attached in Appendix D.

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July 23, 2004
Jeff Arason, P.Eng.
City of Surrey
- 3 -

We trust this letter report clearly summarizes the construction activities completed for the Fraser River Flood Protection Program (2004), M.S. 4803-313-11. Please contact me if you have any questions.

Yours truly,

[Signature]

Helen Chan, P.Eng.
Project Engineer

HC/kk

Enclosure
DAILY INSPECTION REPORTS
REPORT NO: 1
PROJECT NO: 982887
DATE: January 12, 2004
FILE NO: 4803-313-11

OWNER: City of Surrey
PROJECT: Fraser River Flood Protection
LOCATION: Surrey B.C.
CONTRACTOR: GCL Contracting Ltd.
CONTRACT: Upgrade Program (2004)
WEATHER: Overcast: Light rain
TEMP: High: 6 C  Low: 2 C

List the LABOUR FORCE (by trade) and the CONTRACTOR’S EQUIPMENT, followed by the REPORT.

LABOUR FORCE: 1- Supt., 1 operator, 1 sub-contractor, 1 laborer (t=4)
EQUIPMENT: 1-Case 580 Super “L” rubber tired backhoe

Contractor mobilizes at CN parking lot-rubber tire backhoe and tool container brought to site. Contact CN’s John Campbell for permission to view the site areas. Contractor and AE visit and identify work areas as shown on the dwgs. Discuss the requirements for roughening the existing concrete retaining wall. A test area will be done with a power wash as agreed with AE (head office) to ensure an acceptable clean surface. Contact Karl Bornemann (Consultant) as Contractor intends to commence excavation at the CN crossing tomorrow. Safety video is set up to view at 8:00 a.m. Tuesday.

AE personnel: Ken Fudge
Cc: Helen Chan
ASSOCIATED
ENGINEERING

OWNER: City of Surrey
PROJECT: Fraser River Flood Protection
LOCATION: Surrey B.C.
CONTRACTOR: GCL Contracting Ltd.
CONTRACT: Upgrade Program (2004)
WEATHER: Overcast; Light rain
TEMP: High: 6 C  Low: 2 C

REPORT NO: 2
PROJECT NO: 022277
DATE: January 13, 2004
FILE NO: CONTRACT NO: 4803-313-11

List the LABOUR FORCE (by trade) and the CONTRACTOR’S EQUIPMENT, followed by the REPORT.

LABOUR FORCE: 1- Supt., 1 operator, 4 laborers (T=6)
EQUIPMENT: 1-Case 580 Super “L” rubber tired backhoe

Safety video at 8:00. Contractor’s crew in attendance. Start the excavation for the log stop footings at the CN crossing. Allstream were on site Monday to locate (scope) the existing utilities (fiber optics) in the area adjacent to the excavations and again today to be present during excavation. Excavated material is of good quality and is stockpiled for reuse. Contractor covers with poly to protect material. A protective snow fence is installed at the excavations and adjacent to the existing overhead walkway. Discuss testing sub-consultant with H.O. Start the drilling of holes in the existing concrete wall at 300mm o/c. A short delay (9:30-10:30 by CN) at crossing prior to the start of the excavation.

AE personnel: Ken Fudge
Cc: Helen Chan
ASSOCIATED ENGINEERING

OWNER: City of Surrey
PROJECT: Fraser River Flood Protection
LOCATION: Surrey B.C.
CONTRACTOR: GCL Contracting Ltd.
CONTRACT: Upgrade Program (2004)
WEATHER: Overcast: Heavy rain
TEMP: High: 10 C  Low: 5 C

REPORT NO: 3
PROJECT NO: 022277
DATE: January 14, 2004
FILE NO: CONTRACT NO: 4803-313-11

List the LABOUR FORCE (by trade) and the CONTRACTOR’S EQUIPMENT, followed by the REPORT.

LABOUR FORCE: 1- Supt., 1 operator, 4 laborers (T=6)
EQUIPMENT: 1-Case 580 Super “L” rubber tired backhoe

Wednesday:
Remove fence section at the 116th crossing and start the excavation for the footings on the north side. Discuss the intent for the layout of the crossing with H.O. Existing pole on the south side will be relocated next week. Reinforcing steel delivered to site.
Excavations to subgrade for the CN crossings were complete yesterday. The u/s of the footing grade is firm and dry.
Contractor starts the formwork for the CN crossing. Form material is old. AE reminds contractor that the finished, exposed wall must have an acceptable finish.
Contractor has arranged to have the container bins relocated for the spur crossing. A section of fence was removed here, along the south side and strewn over with grubbing material along GCL’s work area (photos)
Check the depth of drilled holes in the existing concrete wall (200mm).
Confirm that the walls will be identified by AE office. The numbers will be visible and incorporated into the permanent wall.
Discuss design slopes at the spur crossing. The new slopes will be steeper than 3:1 to avoid encroachment to the ballast area.

AE personnel: Ken Fudge
Cc: Helen Chan
ASSOCIATED ENGINEERING

DAILY CONSTRUCTION REPORT

OWNER: City of Surrey
PROJECT: Fraser River Flood Protection
LOCATION: Surrey B.C.
CONTRACTOR: GCL Contracting Ltd.
CONTRACT: Upgrade Program (2004)
WEATHER: Overcast: Clear, sunny
TEMP: High: 10 C Low: 5 C

REPORT NO: 4
PROJECT NO: 022277
DATE: January 15, 2004
FILE NO:
CONTRACT NO: 4803-313-11

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

LABOUR FORCE: 1- Supt., 1 operator, 4 laborers (T=6)
EQUIPMENT: 1-Case 580 Super “L” rubber tired backhoe

Thursday:
Contractor starts and completes the installation of the reinforcing steel for the 2 CN footings and
the north footing at the 116th crossing.
Start the layout and the excavation for the spur crossing. Containers were relocated as requested.
Contact Ron Elvira (Valley Testing) for concrete testing. Contractor proposes to pour 3 footings on
Friday.

AE personnel: Ken Fudge
Cc: Helen Chan
ASSOCIATED ENGINEERING

DAILY CONSTRUCTION REPORT

OWNER: City of Surrey
PROJECT: Fraser River Flood Protection
LOCATION: Surrey B.C.
CONTRACTOR: GCL Contracting Ltd.
CONTRACT: Upgrade Program (2004)
WEATHER: Overcast: Clear, sunny
TEMP: High: 10 C Low: 5 C

REPORT NO: 5
PROJECT NO: 022277
DATE: January 16, 2004
FILE NO: CONTRACT NO: 4803-313-11

List the LABOUR FORCE (by trade) and the CONTRACTOR’S EQUIPMENT, followed by the REPORT.

LABOUR FORCE: 1- Supt., 1 operator, 4 laborers (T=6)
EQUIPMENT: I-Case 580 Super “L” rubber tired backhoe, plate tamper
Valley Testing (1), Concrete by Graestone Concrete

Friday:
Check final rebar prior to concrete pour now rescheduled for 10:00. (Valley notified.)
Contractor has encountered wood material (hog fuel) in the excavation at the south side of the spur crossing along the new dyke centerline. A test hole indicated that the unsuitable material extended and additional 1.5m. below the u/s of base materials. (Encountered water table)
Discuss with H.O. the requirement for installing import material under the design footing elevation.
The Contractor will supply and install a coarse pit-run for 300mm (600mm below the u/s of footing) and "dyke fill, imported, for the remaining 300mm below the design u/s of footing. The lower portion would be considered as extra work on a time and material basis. The excavated unsuitable material (wood chips etc) will be hauled away offsite.
Contractor places (sandy, silt) material fill to bring the dyke crest elevation to design grade in the area to the west of the spur crossing. The existing material was stripped of organic material prior to the placing.
Note that the deflection angle at the spur crossing was altered to facilitate a suitable transition to the existing dyke east of the bend.
Continue the drilling of the holes in the existing wall at 300mm on center.
Pour 3 footings as noted. Total concrete, 9.8m³.
Slump for concrete-75mm, Air, 4.2%.

AE personnel: Ken Fudge
Cc: Helen Chan
OWNER: City of Surrey
PROJECT: Fraser River Flood Protection
LOCATION: Surrey B.C.
CONTRACTOR: GCL Contracting Ltd.
CONTRACT: Upgrade Program (2004)
WEATHER: Overcast; some rain
TEMP: High: 10 C  Low: 5 C

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

LABOUR FORCE: I- Supt., 1 operator, 4 laborers (T=6)
EQUIPMENT: I-Case 580 Super "L" rubber tired backhoe, plate tamper

Monday: Contractor intends to strip footings and form footings at the spur crossing. Identifications have been forwarded to GCL office. Hydro pole is to be relocated early this week.

Tuesday: Subcontractor starts the power washing of the existing concrete retaining wall. No other work on site as contractor awaits the Hydro pole relocation.

Wednesday: Power pole as not yet been relocated. Contractor (sub) continues to power wash existing concrete wall. Start the formwork for the spur footing. AE requests EVO time and materials for over excavation at this crossing. Excavated hog fuel is to be disposed offsite. Contractor is awaiting imbedded steel (galvanizing) for further work on the walls. Hand backfill adjacent to the CN footings.

Thursday: No work by GCL. Crew is at 1st aid course. Subcontractor continues power washing, setting footing forms and reinforcing steel at the spur crossing.

Friday: Contractor completes reinforcing steel for the spur crossing and requests concrete testing for a Monday pour at noon. AE contacts Valley (Ron) for tests. Power pole has not yet been relocated (AE)

AE personnel: Ken Fudge
Cc: Helen Chan
Monday: Contractor pours both sides of the spur line footings at 11:00. Valley on site for testing. Air content: 5.0%, Slump=70mm.
Contractor continues the installation of reinforcing steel for the additional height of the existing concrete wall. No other work.

Clear opening dimensions are as follows:
1. Georgia-Pacific; 6.085m *existing channeling is new. (clear opening=75mm)
2. East @ 126A,(at P.Sta.) 9.750m *as above
3. East 6.100m *east removed for repair, dimension assumes in place
4. East @ 130th 9.790m *as per 1. and 2.

Please note that the above dimensions do not allow for adjustment should the vertical face of the new channeling not be true to plumb. A reduction of at least 10mm per stop log(s) should be considered when manufactured. It might be suggested that units be “trial fitted” prior to the flood!

AE personnel: Ken Fudge
Cc: Helen Chan
ASSOCIATED ENGINEERING

OWNER: City of Surrey
PROJECT: Fraser River Flood Protection
LOCATION: Surrey B.C.
CONTRACTOR: GCL Contracting Ltd.
CONTRACT: Upgrade Program (2004)
WEATHER: Overcast; mostly rain
TEMPS: High: 4 C  Low: 2 C

REPORT NO: 8
PROJECT NO: 022277
DATE: January 27-30, 2004
FILE NO:
CONTRACT NO: 4803-313-11

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

LABOUR FORCE: I- Supt., 1 operator, 4 laborers (T=6)
EQUIPMENT: I-Case 580 Super “L” rubber tired backhoe, plate tamper (idle)

Tuesday:
Strip footing forms.
Subcontractor installs reinforcing steel along the existing wall as per detail. Note that the design elevations vary from 4.87-4.64 along the design crest. Discuss with H.O. The grades have been predetermined.

Wednesday:
Continue reinforcing steel along existing wall.

Thursday:
Start the reinforcing steel and the formwork for the spur x-ing and the CN x-ing.
Trans-Mountain on site to install a new Hydro pole to the east of the existing pole. Relocate only the Hydro wires to the new pole. The existing pole is still in place c/w the Telus cables attached.

Friday:
Inspect reinforcing steel and embedded channeling for the spur and CN x-ing. Pour 4 wall sections at 11:30 Valley Testing on site for slump (70mm) and air (4.0%) tests. The numbering designation is “16” for the CN and “15” for the spur x-ing.
AE checks height of wall at chamfer strip.
(photos)
Dale Summers (Telus) (604) 436-8496, coordinator for the remaining work to relocate pole and attached cables.

AE personnel: Ken Fudge
Cc: Helen Chan
OWNER: City of Surrey  REPORT NO: 9
PROJECT: Fraser River Flood Protection  PROJECT NO: 022277
LOCATION: Surrey B.C.  DATE: February 2-6th, 2004
CONTRACTOR: GCL Contracting Ltd.  FILE NO:
WEATHER: Overcast: mostly rain
TEMP: High: 4 C  Low: 2 C

List the LABOUR FORCE (by trade) and the CONTRACTOR’S EQUIPMENT, followed by the REPORT.

LABOUR FORCE: 1- Supt., 1 operator, 4 laborers (T=6)
EQUIPMENT: 1-Case 580 Super "L" rubber tired backhoe, plate tamper (idle)

Monday: Subcontractor strips formwork for last Friday's footing pours.
Tuesday: Start the formwork for the existing wall extension.
Wednesday: Set new embedded channeling at existing walls where wall is heightened.

The following items remain for total completion of the project. The Contractor has stated that they will mobilize immediately upon the removal of the existing pole and Telus cables at 116th.

1. Excavation, footing and wall for the south side of the 116th crossing.
2. Wall installation for the north side of 116th-concrete pour
3. Setting of the 2 deep posts (c/w) MH covers for 116th and 1 for the CN crossing.
4. Backfilling of the spur crossing.
6. Installation of approx. 13m of lock block sections to retain slope where additional earth fills are required.
7. Pour approx 700 feet of concrete wall to heighten existing wall.
8. Weld new embeded steel to existing wall ends.

Contractor will re-mobilize on Monday February 9th, 2004 to complete all work not related to the relocation of the pole. Total completion time is estimated at 2 weeks from Feb. 9th.

AE personnel: Ken Fudge
Cc: Helen Chan
ASSOCIATED ENGINEERING

OWNER: City of Surrey
PROJECT: Fraser River Flood Protection
LOCATION: Surrey B.C.
CONTRACTOR: GCL Contracting Ltd.
CONTRACT: Upgrade Program (2004)
WEATHER: Overcast. Clearing
TEMP: High: 6 C Low: 2 C

REPORT NO: 10
PROJECT NO: 022277
DATE: February 4th, 2004
FILE NO: CONTRACT NO: 4803-313-11

List the LABOUR FORCE (by trade) and the CONTRACTOR’S EQUIPMENT, followed by the REPORT.

LABOUR FORCE: 1- Supt., 1 operator, 4 laborers (T=6)
EQUIPMENT: 1-Case 580 Super “L” rubber tired backhoe, plate tamper (idle)

Subcontractor installs formwork at the Georgia-Pacific area to heighten existing wall. Pour scheduled for Friday.
The following is a list of openings from east to west along the existing wall. All are 0.075m embedded channeled, except as noted. (*)

1. 9.790m-previously sent, at 130th. Ground to wall=0.80m. Ground to top of channel on east side =0.
2. 5.080m-(#12), at bend Ground to wall=0.90m. (*) Width of concrete=0.175m
3. 5.085m , at bend Ground to wall=0.60m. (*) Width of concrete=0.175m
4. 6.100m-previously sent (!) Ground to wall=0.63m
5. 9.750m-previously sent, at P.Sta. Ground to wall=0.64m
6. 6.085m-previously sent, (#8) Ground to wall=0.00m (Asphalt at wall hgt.)(Georgia-Pac.)
7. 5.770m-west of above, (#7) Ground to wall=0.25m
8. 9.715m-Musqueam Ground to wall=0.50m
9. 9.755m-at Ritchie Bros. Ground to wall=0.85m
10. 9.755m-under skytrain (#4) Ground to wall=0.85m
11. 7.665m-(#3) Ground to wall=0.74m
12. 5.100m-(#2) Ground to wall=1.22m (*) Width of concrete=0.175m
13. 5.100m-(#1) Ground to wall=0.85m (*) Width of concrete=0.175m

(!) Channel under repair by contractor. Dimension has been considered without embedment.

AE personnel: Ken Fudge
Cc: Helen Chan
ASSOCIATED ENGINEERING

DAILY CONSTRUCTION REPORT

OWNER: City of Surrey
PROJECT: Fraser River Flood Protection
LOCATION: Surrey B.C.
CONTRACTOR: GCL Contracting Ltd.
CONTACT: Upgrade Program (2004)
WEATHER: Overcast: Rain Friday
TEMP: High: 6 C Low: 2 C

REPORT NO: 11
PROJECT NO: 022277
DATE: February 5-7, 2004
FILE NO:
CONTRACT NO: 4803-313-11

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

LABOUR FORCE: 1- Supt., 1 operator, 4 laborers (T=6)
EQUIPMENT: 1-Case 580 Super "L" rubber tired backhoe, plate tamper (idle)
1-Hitachi LC 200 (Friday)

Thursday: The power pole was apparently removed late on Wednesday but GCL did not mobilize until Friday. Continue to install formwork for the wall extension.

Friday:
Site meeting at 9:00 with City of Surrey, Karl. GCL and AE. Discuss remaining items for completion and schedule.
Contractor starts the excavation of the south side of the 116th crossing.
The remaining stub of power pole was cut off at footing subgrade. Material at subgrade is of good quality-sandy and dry.
Sub-contractor starts formwork and installs reinforcing steel for the 116th footing. Due to heavy rain, Contractor elects to pour on Saturday.
Valley Testing (Ron) notified of testing required. A sample of the Type 1 fill was to be taken for future densities.
Saturday:
Pour the south side 116th footing and the north side wall as identified as #17. Approx. 200 feet of wall extension was poured at the Georgia crossing — both east and west of the access. Valley Testing on site.

AE personnel: Ken Fudge
Cc: Helen Chan
ASSOCIATED ENGINEERING

DAILY CONSTRUCTION REPORT

OWNER: City of Surrey
PROJECT: Fraser River Flood Protection
LOCATION: Surrey B.C.
CONTRACTOR: GCL Contracting Ltd.
CONTRACT: Upgrade Program (2004)
WEATHER: See below
TEMP: High: 6 C  Low: 2 C

REPORT NO: 14
PROJECT NO: 022277
DATE: February 16-20, 2004
FILE NO: CONTRACT NO: 4803-313-11

List the LABOUR FORCE (by trade) and the CONTRACTOR'S EQUIPMENT, followed by the REPORT.

LABOUR FORCE: 1- Supt., 1 operator, 4 laborers (T=6)
EQUIPMENT: 1-Case 580 Super "L" rubber tired backhoe, plate tamper (idle)
1-Hitachi LC 200
1-pumper truck
2-flagpersons

Monday: GCL backfill adjacent to the 116th south side retaining wall. Continue the compaction of the dyke crest where new fill material has been placed. Mostly overcast, light rain.

Tuesday: Valley Testing on site to retest dyke fills where results had previously failed. Valley noted that 5 tests indicate 95-97% modified proctor. Note that the fitting of the stop logs is scheduled for next Monday.

Wednesday: Overcast, moderate rain-no work by Contractor.

Thursday: GCL hydroyseed all slopes where topsoil has been placed. No other work. Mostly overcast, some rain.

Friday: Winvan pave the remaining fillets of hot mix asphalt adjacent to the edge of pavement at the 116th crossing. Mostly clear, no rain. Contractor has delivered the wood stop logs to site. They were scheduled to be tested on Monday. However, one set of stop logs was missing and Contractor will notify AE when located. Presently the pre-fabricated logs are now scheduled for installation for Friday, Feb, 27th.

AE personnel: K. Fudge
Cc: Helen Chan
ASSOCIATED ENGINEERING

OWNER: City of Surrey
PROJECT: Fraser River Flood Protection
LOCATION: Surrey B.C.
CONTRACTOR: GCL Contracting Ltd.
CONTRACT: Upgrade Program (2004)

WEATHER: Mostly overcast-little or no rain
TEMP: High: 8 C  Low: 4 C

FILE NO: CONTRACT NO: 4803-313-11

List the LABOUR FORCE (by trade) and the CONTRACTOR’S EQUIPMENT, followed by the REPORT:

LABOUR FORCE:
EQUIPMENT:

CN continues job action at the main gate
Preliminary “final” inspection with GCL and AE on Thursday. The following items remain deficient.

1. Remove all debris from concrete works. (i.e. Form materials and reinforcing steel)
2. Grind and patch graffiti from the top of the extended wall from Georgia-Pacific to the pump station.
3. Remove nails from face of extended wall where left after stripping.
4. Patch honeycombed areas (holes larger than 10mm) from the face of the south wall at 116th.
5. Install stop logs as a testing requirement.

AE personnel: K. Fudge
Cc: Helen Chan
THE CITY OF SURREY
Engineering Department

FRASER RIVER FLOOD PROTECTION UPGRADE PROGRAM (2004)

CONTRACT M.S. 4803-313-11

LIST OF DRAWINGS

022277-1-100 GENERAL - COVER SHEET
022277-1-101 CIVIL - PROJECT PCP PLAN
022277-1-103 CIVIL - STATION 0+480 TO 0+830
022277-1-104 CIVIL - STATION 0+830 TO 1+380
022277-1-105 CIVIL - STATION 1+380 TO 1+830
022277-1-107 CIVIL - STATION 1+830 TO 2+000
022277-1-120 CIVIL - 114 AVE STOP LOG CROSSING
022277-1-131 CIVIL - 114 AVE STOP LOG CROSSING
022277-1-132 CIVIL - STOP CROSSING AND DRAIN GAP
022277-1-133 CIVIL - STOP CROSSING AND DRAIN GAP
022277-1-134 CIVIL - TIDE GATE
022277-1-135 CIVIL - TIDE GATE
022277-1-136 STRUCTURAL - DETAILS SHEET 1
022277-1-137 STRUCTURAL - DETAILS SHEET 2
022277-1-138 STRUCTURAL - DETAILS SHEET 3

ASSOCIATED ENGINEERING
DYKE FILL MATERIAL AND COMPACTION
TEST REPORTS
Fax

To: ML Ken
From: J M Hernandez
Fax: 604 291 0163
Pages: 2

Phone: Date: Feb 12, 2004
Re: Fraser Dyke Upgrade CC:

☐ Urgent ☐ For Review ☐ Please Comment ☐ Please Reply ☐ Don't reply

*Messages:

Attached please find the sieve analysis report for the project.

Yours sincerely,

Technician: Jim
### Sieve Analysis Report

**Project No.:** V-2022  
**Client:** ASSOCIATED ENGINEERING  
**Location:** 300 - 4940 CANADA WAY, BURNABY, BC  
**Contractor:** FRASER RIVER DYKE - UPGRADE / #022277  
**Date Sampled:** 2004. Feb. 10  
**Date Tested:** 2004. Feb. 11  
**Date Received:** 2004. Feb. 10

**Supplier:** JOBSITE  
**Source:** JOBSITE  
**Material Type:** SILTY SAND

**Sampled By:** JH  
**Tested By:** DJ  
**Test Method:** WASHED

---

#### Gravel Sizes

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<th>Percent Passing</th>
<th>Gradation Limits</th>
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#### Sand Sizes and Fines

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<td>No. 6 2.36 mm</td>
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<tr>
<td>No. 16 1.18 mm</td>
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<tr>
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**Comments:**

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.
ASSOCIATED ENGINEERING
300 - 4940 CANADA WAY
BURNABY, BC
V5B 4M5

ATTN: MS. HELEN CHAN, P.ENG

PROJECT FRASER RIVER DYKE - UPGRADE / #022277 132ND ST. @ 116TH AVENUE
CONCRETE

PROJECT NO. V-2022
CLIENT ASSOCIATED ENGINEERING
C.C.


SUPPLIER JOBSITE
SOURCE
SPECIFICATION
MATERIAL TYPE SILTY SAND

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<th>PERCENT PASSING</th>
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REPORTING OF THESE TEST RESULTS CONSTITUTES A TESTING SERVICE ONLY. ENGINEERING INTERPRETATION OR EVALUATION OF TEST RESULTS IS PROVIDED ONLY ON WRITTEN REQUEST.
To: Associated Engrs. Ltd.  From: Jim Hernandez
Fax: (604) 291-8103  Pages: 2
Phone:  Date: Feb 16, 2004
Re: Field Density Test  CC:

☐ Urgent  ☐ For Review  ☐ Please Comment  ☐ Please Reply  ☐ Don't reply

Messages:

Hi Ken,

Attached is the invoice for the field density test conducted for the Fraser power dyke upgrade project.

Thank you.

Technician: Jim
To: ASSOCIATED ENGINEERING LTD.

Subject: DENSITY TESTING

RE: FRASER RIVER DYKE UPGRADE

ATTN: MR. KEN

Date: FEB 12, 2004

As requested, Valley Testing Services conducted field density testing at the job site. The location is the dyke near/beside container area of CN railway with fill of ≥300 mm thick minimum.

Density results did not meet the compaction requirement of minimum 95%.

Compaction ranges from 92% to 99% based from maximum modified Proctor dry density.

Failure is due to low moisture content.

Watering and recompaction is recommended.

Signed:

☐ Please reply  ☐ No reply necessary
Hi Ken,

Attached is the result of field density testing conducted on Feb 13, 2004. Also attached is the project report.

Thanks.

Jim
# Field Density Report

**Project No.: V-2022**  
**Client:** ASSOCIATED ENGINEERING  
**Site:** 132ND ST. @ 116TH AVENUE, SURREY

**Contractor:** GCL  
**Area:** DYKE  
**Construction Type:** FILL

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<th>Location</th>
<th>Lab Reference and Material Type</th>
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<th>Dry Density</th>
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**Field Method:** Nuclear ASTM D2922  
**Laboratory Method:** Modified Proctor ASTM D1557  
**Specified Compaction:** 95%  
**Low Densities Indicated:** *

** Comments:**  
Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.
**FIELD DENSITY REPORT**

**PROJECT NO. V-2022**
**CLIENT ASSOCIATED ENGINEERING**
**C.C.**

**TO**
ASSOCIATED ENGINEERING
300 - 4940 CANADA WAY
BURNABY, BC
V5B 4M5

**ATTN: MS. HELEN CHAN, P.ENG**

**PROJECT** FRASER RIVER DYKE - UPGRADE / #022277
**CONCRETE**

**REPORT NO. 1**
**NO. OF DENSITIES 7**
**TESTED BY JH**
**DATE TESTED 2004.Feb.13**

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<th>LAB REFERENCE AND MATERIAL TYPE</th>
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**FIELD METHOD** Nuclear ASTM D2922
**LABORATORY METHOD** Modified Proctor ASTM D1557
**LOW DENSITIES INDICATED**

**COMMENTS**

---

Page 2 of 2 2004.Feb.16 VALLEY TESTING SERVICES LTD. PER.
TO
ASSOCIATED ENGINEERING
300 - 4940 CANADA WAY
BURNABY, BC
V5B 4M5

ATTN: MS. HELEN CHAN, P.ENG

PROJECT NO. V-2022
CLIENT: ASSOCIATED ENGINEERING
C.C.

PROJECT: FRASER RIVER DYKE - UPGRADE / #022277
CONCRETE

SURREY

CONTRACTOR

PROCTOR NO. 1
NO. OF TRIALS 3
DATE RECEIVED 2004.Feb.10
DATE SAMPLED 2004.Feb.10

INSITU MOISTURE N/A %
SAMPLED BY JH
TESTED BY JH
SUPPLIER SOURCE JOBSITE

MATERIAL IDENTIFICATION
MAJOR COMPONENT SAND
SIZE DESCRIPTION

DENSITY (kg/m3) MOISTURE CONTENT (%)
1800
1875
1850
1825
1800
1775
1750

1 11
2 12
3 13
4 14
5 15
6 16

TRIAL NUMBER WET DENSITY (kg/m3) DRY DENSITY (kg/m3) MOISTURE CONTENT (%)
1 1953 1771 10.3
2 2040 1821 12.0
3 2010 1790 12.3

ZERO AIR VOIDS CURVE FOR ESTIMATED SPECIFIC GRAVITY OF 2.40
MAXIMUM DRY DENSITY (kg/m3) OPTIMUM MOISTURE CONTENT (%)
1850 11.5

OVERSIZE CORRECTED

CALCULATED

COMMENTS

Page 1 of 1 2004.Feb.13 VALLEY TESTING SERVICES LTD. PER
Hi Ken,

Attached is the field density test report conducted on Feb 17, 2004.

Thank you,

Jim

Technician: [Signature]
<table>
<thead>
<tr>
<th>DENSITY NUMBER</th>
<th>LOCATION</th>
<th>LAB REFERENCE AND MATERIAL TYPE</th>
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<th>OVERTSIZE MATERIAL FIELD</th>
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**FIELD METHOD**
Nuclear ASTM D2922

**LABORATORY METHOD**
Modified Proctor ASTM D1557

**SPECIFIED COMPACTION**
95

**LOW DENSITIES INDICATED**

**OVERSIZE SCREEN SIZE**
Passing 3/4" - 19mm

**REPORT NO**
2

**NO. OF DENSITIES**
7

**TESTED BY**
JH

**DATE TESTED**
2004-Feb-17

**PROJECT NO**
V-2022

**CLIENT**
ASSOCIATED ENGINEERING

**GEOLOGY**
CONCRETE

**LOCATION**
132ND ST. @ 116TH AVENUE

**SURREY**

**CONTRACTOR**
GCL

**AREA**
DYKE

**CONSTRUCTION TYPE**
FILL

**REPORTED BY**

**NOTES**
Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.
**FIELD DENSITY REPORT**

**TO**  
ASSOCIATED ENGINEERING  
300 - 4940 CANADA WAY  
BURNABY, BC  
V5B 4M5

**ATTN:** MS. HELEN CHAN, P.ENG

**PROJECT**  
FRASER RIVER DYKE - UPGRADE / #022277  
132ND ST. & 116TH AVENUE  
SURREY

**CONTRACTOR** GCL  
**AREA** DYKE  
**CONSTRUCTION TYPE** FILL

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**LABORATORY METHOD**  
Modified Proctor ASTM D1557  
**OVERSIZE SCREEN SIZE**  
Passing 3/4" - 19mm

**FIELD METHOD**  
Nuclear ASTM D2922  
**SPECIFIED COMPACTION**  
95  
**LOW DENSITIES INDICATED**

**REPORT NO** 2  
**NO. OF DENSITIES** 7  
**TESTED BY** JH  
**DATE TESTED** 2004. Feb. 17
CONCRETE TEST REPORTS
# VALLEY TESTING SERVICES LTD.
## CONCRETE TEST REPORT

**TO**

ASSOCIATED ENGINEERING  
300 - 4940 CANADA WAY  
BURNABY, BC  
V5B 4M5

**ATTN:** MS. HELEN CHAN, P.Eng

**PROJECT**  
FRASER RIVER DYKE - UPGRADE / #022277  
132ND ST. @ 116TH AVENUE  
SURREY

**SET NO.** 1  
**NO. OF SPECIMENS** 6  
**DATE RECEIVED** 2004 Jan. 17  
**DATE CAST** 2004 Jan. 16

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<th>CURE COND</th>
<th>DATE TESTED</th>
<th>AGE AT TEST (DAYS)</th>
<th>AVERAGE DIAMETER (mm) OR SIDE (mm x mm)</th>
<th>AVERAGE LENGTH OR SPAN (mm)</th>
<th>MAXIMUM LOAD (kN)</th>
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<td>203.2</td>
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**SPECIFIED STRENGTH** 25 MPa @ 28 DAYS  
**CONCRETE TEMP.** 15°C  
**AIR TEMP.** 9°C  
**SLUMP** 60 mm  
**SPEC.** 60 ± 10  
**AIR** 4.2%  
**SPEC.** 5.5 ± 1.5  
**PLASTIC DENSITY**  
**HARDBENED DENSITY**  
**CAST TIME** 10:35  
**CAST BY** VTS JH  
**CURING CONDITIONS** CURING BOX  
**INITIAL CURING TEMP:** MAXIMUM 20°C MINIMUM 16°C  
**LOCATION**  
**FOOTINGS**  
**COMMENTS**  
TEST TAKEN AT ENTRANCE OF CN RAILWAY COMPOUND.  
SPECIMEN "A" TESTED AT 7 DAYS WAS BELOW 70% OF THE SPECIFIED STRENGTH.

---

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.
# VALLEY TESTING SERVICES LTD.

## CONCRETE TEST REPORT

**PROJECT NO.** V-2022  
**CLIENT** ASSOCIATED ENGINEERING  
**C.C.** GRAEASTONE

TO  
ASSOCIATED ENGINEERING  
300 - 4940 CANADA WAY  
BURNABY, BC  
V5B 4M5

ATTN: MS. HELEN CHAN, P.ENG

PROJECT  
FRASER RIVER DYKE - UPGRADE / #022277  
132ND ST. & 116TH AVENUE  
SURRY

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**SPECIFIED STRENGTH:** 25 MPa @ 28 DAYS  
**CONCRETE TEMP.:** 14°C  
**AIR TEMP.:** 8°C  
**SLUMP:** 70 mm  
**SPEC.:** 60 ± 10  
**AIR:** 5.0%  
**SPEC.:** 5.5 ± 1.5  
**PLASTIC DENSITY:** kg/m³  
**HARDENED DENSITY:** kg/m³  
**CAST TIME:** 11:20  
**CAST BY:** VTS DJ  
**CURING CONDITIONS:** CURING BOX

**LOCATION:** FOOTINGS.

**SUPPLIER:** GRAEASTONE  
**MIX NO.:** 2502  
**TRUCK NO.:** 108  
**TICKET NO.:** 16370  
**LOAD VOL.:** 6.5 m³ CUM. VOL. 6.5 m³  
**WATER ADDED:** 1

**COMMENTS:**

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.
## CONCRETE TEST REPORT

**PROJECT NO.** V-2022  
**CLIENT** ASSOCIATED ENGINEERING  
**C.C.** GRAESTONE  

**PROJECT** FRASER RIVER DYKE - UPGRADE / #022277  
**CONCRETE**  
**SET NO.** 3  
**NO. OF SPECIMENS** 6  
**DATE RECEIVED** 2004.Jan.31  
**DATE CAST** 2004.Jan.30

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**SPECIFIED STRENGTH** 25 MPa @ 28 DAYS

**CONCRETE TEMP.** 12 ºC  
**AIR TEMP.** 3 ºC

**SLUMP** 80 mm SPEC. 60 ± 10

**AIR** 4.0 % SPEC. 5.5 ± 1.5

**PLASTIC DENSITY** kg/m³

**HARDENED DENSITY** kg/m³

**CAST TIME** 12:00  
**CAST BY** VTS DT  
**CURING CONDITIONS** CURING BOX

**TRENDS GRAPH**

**MOULD TYPE** PLASTIC

**INITIAL CURING TEMP.** MAXIMUM 20 ºC MINIMUM 16 ºC

**LOCATION** WALLS.

**COMMENTS** SPECIMEN "A" TESTED AT 7 DAYS WAS BELOW 70% OF THE SPECIFIED STRENGTH.

**SUPPLIER** GRAESTONE

**MIX NO.** 2502

**TRUCK NO.** 118  
**TICKET NO.** 164

**LOAD VOL.** 7.8 m³ CUM. VOL. 7.8 m³

**WATER ADDED** 1  
**AUTH. BY**

Page 1 of 1 2004.Mar.10

VALLEY TESTING SERVICES LTD. PER.

---

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CONCRETE TEST REPORT

TO
ASSOCIATED ENGINEERING
300 - 4940 CANADA WAY
BURNABY, BC
V5B 4M5

ATTN: MS. HELEN CHAN, P.ENG

PROJECT NO. V-2022
CLIENT ASSOCIATED ENGINEERING
C.C. GRAESTONE

PROJECT FRASER RIVER DYKE - UPGRADE / #02277
132ND ST. @ 116TH AVENUE
SURREY


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SPECIFIED STRENGTH 25 MPa @ 28 DAYS

CEMENT CONTENT kg/m³ TYPE 10
POZZOLAN CONTENT kg/m³ TYPE
MAXIMUM SIZE AGGREGATE 20 mm
BATCH TIME 07:10 A.E.A.

SUPPLIER GRAESTONE
MIX NO. 2502
TRUCK NO. 105 TICKET NO. 16754
LOAD VOL. 10.5 m³ CUM. VOL. 10.5 m³
WATER ADDED 1 AUTH. BY

CONCRETE TEMP. 10 °C AIR TEMP. 3 °C
SLUMP 80 mm SPEC. 60 ± 10
AIR 3.6 % SPEC. 5.5 ± 1.5
PLASTIC DENSITY kg/m³
HARDENED DENSITY kg/m³
CAST TIME 08:40
CAST BY VTS EDJ CURING CONDITIONS CURING BOX

INITIAL CURING TEMP: MAXIMUM 21 °C MINIMUM 15 °C
LOCATION
FOOTINGS FOR STRUCTURE #17.

COMMENTS
SPECIMEN "A" TESTED AT 7 DAYS WAS BELOW 70% OF THE SPECIFIED STRENGTH.

VALLEY TESTING SERVICES LTD. PER.

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.
# CONCRETE TEST REPORT

**TO**

ASSOCIATED ENGINEERING  
300 - 4940 CANADA WAY  
BURNABY, BC  
V5B 4M5

**ATTN:** MS. HELEN CHAN, P.ENG

**PROJECT NO.** V-2022  
**CLIENT** ASSOCIATED ENGINEERING  
**C.C.** GRAESTONE

## PROJECT
FRASER RIVER DYKE - UPGRADE / #022277  
132ND ST. @ 116TH AVENUE  
SURRY

## CONCRETE

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<th>SPECIMEN TYPE</th>
<th>CURE COND</th>
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**SPECIFIED STRENGTH**  
25 MPa @ 28 DAYS

| CEMENT CONTENT | 10 kg/m³ TYPE |
| POZZOLAN CONTENT | 20 mm |
| MAXIMUM SIZE AGGREGATE | 20 mm |
| BATCH TIME | 11:00 |
| ADMIXTURES | |

**CONCRETE TEMP.** 18 °C  
**AIR TEMP.** 9 °C

| SLUMP | 80 mm | SPEC. 60 ± 10 |
| AIR   | 4.6 %  | SPEC. 5.5 ± 1.5 |
| PLASTIC DENSITY | kg/m³ |
| HARDENED DENSITY | kg/m³ |
| CAST TIME | 12:30 |
| CAST BY | VTS |
| CURING CONDITIONS | CURING BOX |

**INITIAL CURING TEMP.**  
MAXIMUM 20 °C  
MINIMUM 16 °C

**LOCATION**  
RETAINING WALL 60M EAST OF 132A ST ALONG  
116 AVE SOUTH SIDE

**COMMENTS**  
SPECIMEN "A" TESTED AT 7 DAYS WAS BELOW 70% OF THE SPECIFIED STRENGTH.

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Valley Testing Services Ltd. Per.