The preparation of this report has been financed in part through grant[s] from the Federal Highway Administration and Federal Transit Administration, U.S. Department of Transportation, under the State Planning and Research Program, Section 505 [or Metropolitan Planning Program, Section 104(f)] of Title 23, U.S. Code. The contents of this report do not necessarily reflect the official views or policy of the U.S. Department of Transportation.
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1.0 INTRODUCTION

In the interest of improving a portion of their highway network, the Town of Jericho applied for the creation of a project under the Chittenden County Regional Planning Commission (CCRPC) FY2020 Unified Planning Work Program. This request was successful, and a project was granted to perform a planning level study for analyzing the concept of paving existing gravel surface roads, and develop an implementation plan including cost estimates for Packard Road and Raceway Road in Jericho.

1.1 STUDY AREA

The project study includes two segments which are principally unpaved roads with some short Hot Mix Asphalt (HMA) paved sections within their respective corridors. The study road locations are shown in Figures 1 and 2 with attributes listed below.

1. Packard RD – Intersections: Browns Trace RD to VT 15
   - approx. overall length = 1.68 miles
   - gravel surface length = 1.28 miles
   - average surface width = 24.5 feet
   - Classification: Local – Class 3
   - 2019 average annual daily traffic (AADT) = 745
     - See APPENDIX B for details

2. Raceway RD – Intersections: VT 15 West to VT 15 East
   - approx. overall length = 1.44 miles
   - gravel surface length = 1.35 miles
   - average surface width = 23.2 feet
   - Classification: Local – Class 3
   - 2019 average annual daily traffic (AADT) = 821
     - See APPENDIX B for details

Based on an August 2, 2019 drive through visual inspection, each of these roads could be characterized as being generally in fair to good condition with some existing ditching in-service and numerous segments overlain with tree canopy. It is noted that ditching needs and shading of the roadways may create issues for surface and subsurface drainage.
FIGURE 1

Packard RD
~1.7 miles
FIGURE 2

Raceway RD
~1.4 miles
2.0 STUDY PROCESS

With the analysis being the ultimate objective of the paving study, critical data must be collected to form the foundation of the investigation and fundamental parameters assigned as appropriate. Data collection begins the effort and the analysis completes the workflow.

Each of the major steps in the study process are described below.

2.1 ROADWAY BASELINE SURVEY

The first step in the process involved physical measurement of the length of the respective roads to establish the basis for linear referencing (aka stationing). This provides the means for developing a graphical representation of the road in the form of a straight-line diagram. These diagrams are known as a route log system and facilitate the collection and recording of roadway attributes. With that system in place other features or information of interest can be plotted with respect to the roadway centerline and spatially located on the route log. Ultimately, these simple graphics can aid in decision support for planning level studies such as the one being undertaken here.

It is noted that for this project a measuring wheel was used to complete the centerline survey and collect any other survey points of interest. While accuracy of the survey is adequate for this type of project, it is not intended for broader use in 3-dimensional detailed design.

See APPENDIX A for Packard RD and Raceway RD route logs.

2.2 ROADWAY PERFORMANCE REVIEW

A meeting was held on-site with Town public works officials who are known to be experienced with the care and maintenance of the respective roadway corridors throughout the year. The objective was to gain empirical knowledge on how these roadbeds perform in general and in particular during the winter/spring freeze-thaw periods. Even more specifically was the intent of identifying areas with a chronic history of being structurally unstable so these sites could be recognized as candidate locations for full depth improvements. Concise summaries of the information provided are plotted on the route logs at the locations where the review occurred.

Some existing culvert drainage features with potential issues were also reviewed to capture the information for inclusion within the route logs. Areas where it was thought to be possible underdrain could be beneficial were noted as well.
2.3 ROADBED SOIL SAMPLING AND TESTING

Based on the information collected through the site review with the Town, a plan was developed for soil sampling at locations believed to be of greatest interest and concern from a structural standpoint. The intent was to create a plan that would allow for completion of all necessary testing for both road segments in 1 day. Sampling and laboratory testing were completed by subconsultant Atlantic Testing Laboratories (ATL). ATL completed the field investigation on January 30, 2020 and submitted a data report of the results on February 21, 2020. Data provided in the report has been used to identify areas which may benefit from full-depth improvement and/or the installation of underdrain. This has been noted on the route logs and simplified soil characterizations (Good/Fair/Poor) have been included as well.

See APPENDIX G for the ATL data report.

2.4 TYPICAL SECTIONS FOR HMA PAVING

To support the development of sound roadway improvement budget cost estimates, simply knowing the width and depth of pavement treatment can provide the means for developing an estimate. With a given width and depth of proposed material layers a graphical representation or cross section of the treatment can be drawn. These are referred to as standard, or typical sections. Once established calculating material quantities on a unitary basis (i.e. per foot of roadway) becomes straightforward. Unit prices can then be applied to the respective material components and collectively generate a cost per foot of construction.

For this study two different typical sections were developed. The primary typical section is adding a 4” HMA surface with fine grading before paving. The more comprehensive treatment involves a full-depth improvement where past performance of a segment of the pavement structure and/or soil testing suggest its application could be warranted. For budgeting purposes and based on assessment of available information an estimated length of need is 400 linear feet for each of the respective roads.

Overall attributes for the typical sections are as follows.

- Proposed roadway total width of 24 feet: 2' shoulders (1' gravel, 1' HMA), 10' lanes
  - Available average width determined from field measurements
    - See APPENDIX C for dataset and analysis.
- 22' HMA paved width
- 4" HMA structure (VTrans standard minimum thickness for local low volume roads)
3.0 FINDINGS

This study considers planning horizons of one-year, two-years, and four-years for the evaluation of multiple budgeting scenarios. The intent of this approach is to provide an understanding on the magnitude of annual commitment of funds to complete the work of paving Packard RD and Raceway RD over various timeframes beginning with Year 1.

3.1 SEGMENTAL PAVING ANALYSIS

From a practical standpoint each of these roadways were analyzed in terms of cost as either a single segment project (full length of paving need) or a two-segment project providing the opportunity to be completed in different years. The Packard RD and Raceway RD cost analyses and associated segment attributes are summarized in the following list. Additionally, it is noted that for budgeting purposes an estimate per roadway of $15,000 for underdrain and $5,000 for culvert replacement is warranted based on topography, empirical feedback by the Town, and soil conditions encountered,

- **Packard RD**
  - **Single segment project**
    - Length = 6,767 feet (1.28 miles)  
      [STA 0+00 (Browns Trace RD) – STA 67+67 (HMA joint near VT 15)]
    - Current estimated cost = $412,066
Two segment project

- **Segment 1** Length = 3,467 feet (0.66 miles)
  [STA 33+00 (south of Orr RD) – STA 67+67 (HMA joint near VT 15)]
  - Current **Segment 1** estimated cost = $210,482

- **Segment 2** Length = 3,300 feet (0.63 miles)
  [STA 0+00 (Browns Trace RD) – STA 33+00 (south of Orr RD)]
  - Current **Segment 2** estimated cost = $201,584

Raceway RD

- Single segment project
  - Length = 7,127 feet (1.35 miles)
    [STA 0+00 (VT 15) – STA 22+80 (bridge approach West)], and
    [[STA 25+68 (bridge approach East) – STA 30+83 (Foothills DR West)],
     and [[STA 32+50 (Foothills DR East) – STA 75+82 (VT 15)]
  - Current estimated cost = $431,248

Two segment project

- **Segment 1** Length = 4,332 feet (0.82 miles)
  [[STA 32+50 (Foothills DR East) – STA 75+82 (VT 15)]
  - Current **Segment 1** estimated cost = $256,573

- **Segment 2** Length = 2,795 feet (0.53 miles)
  [STA 0+00 (VT 15) – STA 22+80 (bridge approach West)], and
  [[STA 25+68 (bridge approach East) – STA 30+83 (Foothills DR West)]
  - Current **Segment 2** estimated cost = $174,675

See APPENDIX E for details on the paving plan cost analyses summarized here.
3.2 PHASED PAVING PLAN STRATEGIES

With viable potential projects and their respective costs understood various strategies can be developed which illustrate budgetary requirements for phasing the implementation of the projects in different combinations, or packages. Ultimately that will provide the Town of Jericho with the tools needed to determine the most reasonable timeframe for funding construction. A summary of the strategies developed for consideration are listed below. It is noted that for any project proposed for construction after the current year, or Year 1, the cost is subject to a 5% escalation for each year beyond Year 1.

- **Strategy 1 (1 Year Plan)**
  - Complete all necessary paving for Packard RD and Raceway RD in Year 1
  - Approximate total cost = $850,000
  - Average annual budget cost = $850,000

- **Strategy 2 (2 Year Plan)**
  - Complete all necessary paving for Packard RD Year 1 and Raceway RD Year 2
  - Approximate total cost = $875,000
  - Average annual budget cost = $437,500

- **Strategy 3 (4 Year Plan A)**
  - Complete Packard RD Year 1 and Year 2, Raceway RD Year 3 and Year 4
  - Approximate total cost = $925,000
  - Average annual budget cost = $231,250

- **Strategy 4 (4 Year Plan B)**
  - Complete Raceway RD Year 1 and Year 2, Packard RD Year 3 and Year 4
  - Approximate total cost = $925,000
  - Average annual budget cost = $231,250

See APPENDIX F for additional information on the phased paving plan strategies.

4.0 RECOMMENDATIONS

As expected, any of the phased plans with proposed construction closer to the current year (Year 1) should come at a lower total cost with less exposure to cost escalation. Based on that and recognizing it could take multiple budget cycles to fund the improvements it is recommended to commence the budgetary process as soon as possible. Ideally the plan that comes with the lowest total cost should be the most desirable at face value. However, to secure local support earlier in the process it may be best to target the strategy that is believed to be more reasonably affordable on an annual cost basis. If that is the case pursuit of a 4 Year Plan is clearly a legitimate strategy. It is worth noting that if implementation is deferred more than 2 to 3 years from today then it is recommended that budget provisions be made to revise the scope to include wearing course resurfacing of the existing paved segments within the Packard RD and Raceway RD corridors.
PACKARD ROAD
TOTAL EXISTING
GRAVEL AREA (SF) = 164447
STA. 0+00 TO 67+67 (GRAVEL AREA)

GENERAL LEGEND

= EXISTING CULVERT

= EXISTING UTILITY POLE

= STANDARD PENETRATION BORING (APPROXIMATE STATIONS SHOWN)

AADT: 745 VPD

PACKARD RD. 2019

GRAVEL AREA (SF) = 164447
TOTAL EXISTING
PACKARD ROAD STA. 0+00 TO 67+67 (GRAVEL AREA)
PACKARD ROAD

SOIL CONDITIONS AT DEPTH
0'-2' FAIR
2'-4' FAIR/POOR
4'-6' FAIR
UNDERDRAIN POTENTIAL
FULL-DEPTH SEGMENT CANDIDATE
PACKARD ROAD

THE HILL COMING OFF THE HILL

PACKARD ROAD ROUTE LOG PLAN SHEET 3
SOIL CONDITIONS AT DEPTH

- 0' - 2': GOOD/FAIR
- 2' - 4': FAIR/POOR
- 4' - 6': FAIR/POOR

UNDERGROUND POTENTIAL

SOIL CONDITIONS AT DEPTH

- 0' - 2': GOOD/FAIR
- 2' - 4': FAIR/POOR
- 4' - 6': FAIR/POOR

SOIL CONDITIONS AT DEPTH

- 0' - 2': GOOD/FAIR
- 2' - 4': FAIR/POOR
- 4' - 6': FAIR/POOR

SOIL CONDITIONS AT DEPTH

- 0' - 2': GOOD/FAIR
- 2' - 4': FAIR/POOR
- 4' - 6': FAIR/POOR

SOIL CONDITIONS AT DEPTH

- 0' - 2': GOOD/FAIR
- 2' - 4': FAIR/POOR
- 4' - 6': FAIR/POOR

SOIL CONDITIONS AT DEPTH

- 0' - 2': GOOD/FAIR
- 2' - 4': FAIR/POOR
- 4' - 6': FAIR/POOR

SOIL CONDITIONS AT DEPTH

- 0' - 2': GOOD/FAIR
- 2' - 4': FAIR/POOR
- 4' - 6': FAIR/POOR
PACKARD ROAD

SOIL CONDITIONS AT DEPTH

- GOOD/FAR
- POOR
- FAIR

FULL-DEPTH SEGMENT CANDIDATE
PACKARD ROAD
TOTAL EXISTING
PAVED AREA (SF) = 52723
Stk. 67+67 to 88+96 (PAVED AREA)
RACEWAY ROAD
TOTAL EXISTING
GRAVEL AREA (SF) = 157989
STA. 0+00 TO 22+80 (GRAVEL AREA)

RACEWAY ROAD
EXISTING PAVED AREA (SF) = 2525
STA. 0+00 TO 0+92 (PAVED AREA)

GENERAL LEGEND

EXISTING CULVERT

EXISTING UTILITY POLE

STANDARD PENETRATION BORING (APPROXIMATE STATIONS SHOWN)

BANK

COMMUNITY

B-#
RACEWAY ROAD

SITE: SPRING TIME
TOWN HUMP FORMS WITH TOWN SEGMENT REVIEWED
POSSIBLE MATERIAL DISPARITY
UNDERDRAIN POTENTIAL
FULL-DEPTH SEGMENT CANDIDATE

SOIL CONDITIONS AT DEPTH
0'-2' GOOD/FAIR
2'-4' POOR
4'-6' GOOD/FAIR

UNDERDRAIN POTENTIAL
FULL-DEPTH SEGMENT CANDIDATE

SOIL CONDITIONS AT DEPTH
0'-2' GOOD/FAIR
2'-4' POOR
4'-6' GOOD/FAIR

UNDERDRAIN POTENTIAL
FULL-DEPTH SEGMENT CANDIDATE

LOG BORING +28
LOG BORING +46

LIMIT CONDITIONS AT DEPTH
0'-2' GOOD/FAIR
2'-4' GOOD/FAIR
4'-6' GOOD/FAIR
UNDERDRAIN POTENTIAL
POSSIBLE MATERIAL DISPARITY
RACEWAY ROAD
TOTAL EXISTING
GRAVEL AREA (SF) = 157989
STA. 0+92 TO 22+80 (GRAVEL AREA)

RACEWAY ROAD
EXISTING BRIDGE
AREA (SF) = 7200
STA. 22+80 TO 25+68 (EXISTING CONCRETE BRIDGE DECK AND PAVED APPROACH)

GRAVEL AREA (SF) = 157989
STA. 0+92 TO 22+80 (GRAVEL AREA)

EXISTING BRIDGE
AREA (SF) = 7200
STA. 22+80 TO 25+68 (EXISTING CONCRETE BRIDGE DECK AND PAVED APPROACH)
SOIL CONDITIONS AT DEPTH

0'-2' FAIR
2'-4' GOOD/FAIR
4'-6' FAIR

UNDERGROUND POTENTIAL
POSSIBLE MATERIAL DISPARITY

RACEWAY ROAD ROUTE LOG PLAN SHEET 7 SHEET 23 OF 28
RACEWAY ROAD
TOTAL EXISTING
GRAVEL AREA (SF) = 157989
STA. 32+50 TO 75+40 (GRAVEL AREA)

RACEWAY ROAD
EXISTING PAVED AREA (SF) = 1413
STA. 75+40 TO 75+82 (PAVED AREA)

STA. 75+40 TO 75+82 (PAVED AREA)

GRAVEL AREA (SF) = 157989
STA. 32+50 TO 75+40 (GRAVEL AREA)

W = 23'

GRAVEL AREA (SF) = 157989
STA. 32+50 TO 75+40 (GRAVEL AREA)

TOTAL EXISTING
RACEWAY ROAD
STA. 32+50 TO 75+40 (GRAVEL AREA)

EXISTING PAVED AREA (SF) = 1413
STA. 75+40 TO 75+82 (PAVED AREA)
Appendix B  HIGHWAY & AADT DATA (VTRANS MS2 OUTPUT)
### Jericho Paving Analysis

#### Existing Roadway Widths

<table>
<thead>
<tr>
<th>Station</th>
<th>Width (ft.)</th>
<th>Notes</th>
<th>Station</th>
<th>Width (ft.)</th>
<th>Notes</th>
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<tbody>
<tr>
<td>0+87</td>
<td>27</td>
<td></td>
<td>0+25</td>
<td>25</td>
<td>(pvt. Joint)</td>
</tr>
<tr>
<td>2+40</td>
<td>27</td>
<td></td>
<td>0+92</td>
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<tr>
<td>5+00</td>
<td>23</td>
<td></td>
<td>3+00</td>
<td>26</td>
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</tr>
<tr>
<td>10+00</td>
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<td>30+00</td>
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<td></td>
<td>30+83</td>
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<td>(Begin pvt.)</td>
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<td></td>
<td>32+50</td>
<td>24</td>
<td>(End pvt.)</td>
</tr>
<tr>
<td>65+00</td>
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<td>35+00</td>
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<td>88+45</td>
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Average Width = 24.5 feet

<table>
<thead>
<tr>
<th>Station</th>
<th>Width (ft.)</th>
<th>Notes</th>
</tr>
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<td>0+87</td>
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<tr>
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</tr>
<tr>
<td>88+45</td>
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</tr>
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</table>

Average Width = 23.22 feet

Note: Based on the average results of the measured widths of the respective existing roadway surfaces, a typical roadway surface width of 24 feet will be used for the analysis: 1' gravel shldr., 1' paved shldr., 10' travel lanes.
Appendix D  TYPICAL SECTIONS & ASSOCIATED COST DATA
RESURFACING TYPICAL

---

### QUANTITIES AND COST PER FOOT OF ROADWAY

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QUANTITY</th>
<th>UNIT</th>
<th>$/UNIT</th>
<th>COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>3&quot; SUBBASE CRUSHED GRAVEL</td>
<td>0.431</td>
<td>TONS</td>
<td>$20.00</td>
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<td>4&quot; AGGREGATE SHOULDERS</td>
<td>0.063</td>
<td>TONS</td>
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<td>$1.89</td>
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<td>4&quot; HOT MIX ASPHALT</td>
<td>0.570</td>
<td>TONS</td>
<td>$75.00</td>
<td>$42.78</td>
</tr>
</tbody>
</table>

**TOTAL = $53.28** PER FOOT

**OR = $281,000** PER MILE
FULL-DEPTH IMPROVEMENT TYPICAL

QUANTITIES AND COST PER FOOT OF ROADWAY

<table>
<thead>
<tr>
<th>ITEM</th>
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<th>UNIT</th>
<th>$/UNIT</th>
<th>COST</th>
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<td>$1.89</td>
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<tr>
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</tr>
</tbody>
</table>

TOTAL = $132.02 PER FOOT

OR = $697,000 PER MILE

NOT TO SCALE

Road Surface
EXISTING GRAVEL
FULL-DEPTH IMPROVEMENT TYPICAL
FINE GRADE (TYP.)
CRUSHED GRAVEL,
24" SUBBASE OF
EXCAVATION
COMMON
24" LIMITS OF
SEPARATOR
SUBGRADE
LIMITS OF
SHOULDER
AGGREGATE
10'-0" LANES
1'-0"
10'-0" LANES
1'-0"
10'-0" LANES
1'-0"
1'-0" LANES
10'-0" LANES
1'-0" LANES
10'-0" LANES
1'-0"
10'-0" LANES
1'-0"
Appendix E  PAVING PLAN COST ANALYSES
PACKARD ROAD ANALYSIS AND PAVING PLAN

ASSUMPTIONS:
1) ROAD WILL NEED 400 FEET OF FULL-DEPTH IMPROVEMENT BASED ON EXISTING ROADBED SOIL CONDITIONS.
2) $15,000 ALLOTMENT WILL BE CARRIED FOR THE INSTALLATION OF UNDERDRAIN.
3) $5,000 ALLOTMENT WILL BE CARRIED FOR CULVERT REPLACEMENT.
4) FOR MULTI-YEAR PHASED PLANS, A 5% COST ESCALATION FACTOR WILL BE APPLIED TO EACH YEAR AFTER YEAR 1.

1 YEAR PLAN:

SEGMENT: STA 0+00 (BROWNS TRACE) TO STA 67+67 (EXISTING HMA PAVEMENT JOINT)

BEGIN STA = 0 FEET

END STA = 6767 FEET

LENGTH = 6767 FEET
OR = 1.28 MILES

COMPLETE ALL WORK FOR PACKARD (6767 FEET) IN ONE PHASE IN YEAR 1.

<table>
<thead>
<tr>
<th>LENGTH (FEET)</th>
<th>COST PER FOOT</th>
<th>COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>FULL-DEPTH IMPROVEMENT</td>
<td>400</td>
<td>$132.02</td>
</tr>
<tr>
<td>RESURFACING</td>
<td>6367</td>
<td>$53.28</td>
</tr>
<tr>
<td>ALLOTMENT FOR UNDERDRAIN</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>ALLOTMENT FOR CULVERT REPLACEMENT</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

TOTAL ESTIMATE FOR ONE PHASE PLAN = $412,066
# PACKARD ROAD ANALYSIS AND PAVING PLAN (continued)

## 2 YEAR PLAN:

### YEAR 1 SEGMENT: STA 33+00 (SOUTH OF ORR RD) TO STA 67+67 (EXISTING HMA PAVEMENT JOINT)

<table>
<thead>
<tr>
<th>Length (Feet)</th>
<th>Cost per Foot</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full-Depth Improvement</td>
<td>200</td>
<td>$132.02</td>
</tr>
<tr>
<td>Resurfacing</td>
<td>3267</td>
<td>$53.28</td>
</tr>
<tr>
<td>Allotment for Underdrain</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Allotment for Culvert Replacement</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

TOTAL ESTIMATE FOR 2 YEAR PLAN, PHASE 1 = $210,482

### YEAR 2 SEGMENT: STA 0+00 (BROWNS TRACE) TO STA 33+00 (SOUTH OF ORR RD)

<table>
<thead>
<tr>
<th>Length (Feet)</th>
<th>Cost per Foot</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full-Depth Improvement</td>
<td>200</td>
<td>$132.02</td>
</tr>
<tr>
<td>Resurfacing</td>
<td>3100</td>
<td>$53.28</td>
</tr>
<tr>
<td>Allotment for Underdrain</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Allotment for Culvert Replacement</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

5% PER YEAR COST ESCALATION FACTOR = APPLIED TO SUBTOTAL FIGURE IN STRATEGY SUMMARY TABLES AS APPLICABLE

SUBTOTAL ESTIMATE FOR 2 YEAR PLAN, PHASE 2 = $201,584
RACEWAY ROAD PAVING PLAN

ASUMPTIONS:
1) ROAD WILL NEED 400 FEET OF FULL-DEPTH IMPROVEMENT BASED ON EXISTING ROADBED SOIL CONDITIONS.
2) $15,000 ALLOTMENT WILL BE CARRIED FOR THE INSTALLATION OF UNDERDRAIN.
3) $5,000 ALLOTMENT WILL BE CARRIED FOR CULVERT REPLACEMENT.
4) FOR MULTI-YEAR PHASED PLANS, A 5% COST ESCALATION FACTOR WILL BE APPLIED TO EACH YEAR AFTER YEAR 1.
5) PAVING WILL BEGIN AND END AT VT 15 AND WILL NOT EXCLUDE EXISTING PAVED APPROACHES

1 YEAR PLAN:

SEGMENT(S): STA 0+00 (VT ROUTE 15) TO STA 22+80 (EXISTING HMA PAVEMENT JOINT AT BRIDGE APPROACH)

BEGIN STA = 0 FEET
END STA = 2280 FEET
LENGTH = 2280 FEET
OR = 0.43 MILES

STA 25+68 (EXISTING HMA PAVEMENT JOINT AT BRIDGE APPROACH) TO STA 30+83 (EXISTING HMA JOINT)

BEGIN STA = 2568 FEET
END STA = 3083 FEET
LENGTH = 515 FEET
OR = 0.10 MILES

STA 32+50 (EXISTING HMA PAVEMENT JOINT) TO STA 75+82 (VT ROUTE 15)

BEGIN STA = 3250 FEET
END STA = 7582 FEET
LENGTH = 4332 FEET
OR = 0.82 MILES

TOTAL LENGTH OF SEGMENTS = 7127 FEET
1.35 MILES

COMPLETE ALL WORK FOR RACEWAY (7127 FEET) IN ONE PHASE IN YEAR 1.

<table>
<thead>
<tr>
<th>LENGTH (FEET)</th>
<th>COST PER FOOT</th>
<th>COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>FULL-DEPTH IMPROVEMENT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LENGTH (FEET) = 400</td>
<td>$132.02</td>
<td>$52,806</td>
</tr>
<tr>
<td>RESURFACING LENGTH (FEET)</td>
<td>$53.28</td>
<td>$358,442</td>
</tr>
<tr>
<td>ALLOTMENT FOR UNDERDRAIN</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>ALLOTMENT FOR CULVERT REPLACEMENT</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

TOTAL ESTIMATE FOR ONE PHASE PLAN $431,248
## RACEWAY ROAD PAVING PLAN (continued)

### 2 YEAR PLAN:

#### YEAR 1 SEGMENT:

STA 32+50 (EXISTING HMA PAVEMENT JOINT) TO STA 75+82 (VT ROUTE 15)

- BEGIN STA = 3250 FEET
- END STA = 7582 FEET
- LENGTH = 4332 FEET
- OR = 0.82 MILES

COMPLETE ALL YEAR 1 SEGMENT WORK FOR RACEWAY (4332 FEET) AS PHASE 1.

<table>
<thead>
<tr>
<th>LENGTH (FEET)</th>
<th>COST PER FOOT</th>
<th>COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>FULL-DEPTH IMPROVEMENT</td>
<td>200</td>
<td>$132.02</td>
</tr>
<tr>
<td>RESURFACING</td>
<td>4132</td>
<td>$53.28</td>
</tr>
<tr>
<td>ALLOTMENT FOR UNDERDRAIN</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>ALLOTMENT FOR CULVERT REPLACEMENT</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

TOTAL ESTIMATE FOR 2 YEAR PLAN, PHASE 1 = $256,573

#### YEAR 2 SEGMENT(S):

STA 0+00 (VT ROUTE 15) TO STA 22+80 (EXISTING HMA PAVEMENT JOINT AT BRIDGE APPROACH)

- BEGIN STA = 0 FEET
- END STA = 2280 FEET
- LENGTH = 2280 FEET
- OR = 0.43 MILES

STA 25+68 (EXISTING HMA PAVEMENT JOINT AT BRIDGE APPROACH) TO STA 30+83 (EXISTING HMA JOINT)

- BEGIN STA = 2568 FEET
- END STA = 3083 FEET
- LENGTH = 515 FEET
- OR = 0.10 MILES

TOTAL LENGTH OF SEGMENTS = 2795 FEET

0.53 MILES

COMPLETE ALL YEAR 2 SEGMENT WORK FOR RACEWAY (2795 FEET) AS PHASE 2.

<table>
<thead>
<tr>
<th>LENGTH (FEET)</th>
<th>COST PER FOOT</th>
<th>COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>FULL-DEPTH IMPROVEMENT</td>
<td>200</td>
<td>$132.02</td>
</tr>
<tr>
<td>RESURFACING</td>
<td>2595</td>
<td>$53.28</td>
</tr>
<tr>
<td>ALLOTMENT FOR UNDERDRAIN</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>ALLOTMENT FOR CULVERT REPLACEMENT</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

5% PER YEAR COST ESCALATION FACTOR = APPLIED TO SUBTOTAL FIGURE IN STRATEGY SUMMARY TABLES AS APPLICABLE

SUBTOTAL ESTIMATE FOR 2 YEAR PLAN, PHASE 2 = $174,675
Appendix F  PHASED PAVING PLAN STRATEGIES
PHASED PAVING PLAN STRATEGIES

*FOR MULTI-YEAR PHASED PLANS, A 5% COST ESCALATION FACTOR WILL BE APPLIED TO EACH YEAR AFTER YEAR 1.

STRATEGY 1
1 YEAR PLAN (COMPLETE ALL NECESSARY PAVING FOR PACKARD AND RACEWAY IN YEAR 1)

<table>
<thead>
<tr>
<th></th>
<th>PACKARD (LENGTH = 1.28 MILES)</th>
<th>RACEWAY (LENGTH = 1.35 MILES)</th>
<th>COST/YEAR*</th>
</tr>
</thead>
<tbody>
<tr>
<td>YEAR 1 COST</td>
<td>$412,066</td>
<td>$431,248</td>
<td>$843,314</td>
</tr>
<tr>
<td>YEAR 2 COST</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>YEAR 3 COST</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>YEAR 4 COST</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

TOTAL COST FOR STRATEGY 1 = $843,314
AVERAGE ANNUAL COST FOR STRATEGY 1 = $843,314

STRATEGY 2
2 YEAR PLAN (COMPLETE ALL NECESSARY PAVING FOR PACKARD YEAR 1 AND RACEWAY YEAR 2)

<table>
<thead>
<tr>
<th></th>
<th>PACKARD (LENGTH = 1.28 MILES)</th>
<th>RACEWAY (LENGTH = 1.35 MILES)</th>
<th>COST/YEAR*</th>
</tr>
</thead>
<tbody>
<tr>
<td>YEAR 1 COST</td>
<td>$412,066</td>
<td>-</td>
<td>$412,066</td>
</tr>
<tr>
<td>YEAR 2 COST</td>
<td>-</td>
<td>$452,811</td>
<td>$452,811</td>
</tr>
<tr>
<td>YEAR 3 COST</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>YEAR 4 COST</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

TOTAL COST FOR STRATEGY 2 = $864,877
AVERAGE ANNUAL COST FOR STRATEGY 2 = $432,438
### PHASED PAVING PLAN STRATEGIES (continued)

**STRATEGY 3**

4 YEAR PLAN "A" (COMPLETE PAVING FOR PACKARD, YEAR 1 AND YEAR 2, AND RACEWAY, YEAR 3 AND YEAR 4)

<table>
<thead>
<tr>
<th>Year</th>
<th>PACKARD1 (LENGTH = 0.66 MILES)</th>
<th>PACKARD2 (LENGTH = 0.63 MILES)</th>
<th>RACEWAY1 (LENGTH = 0.82 MILES)</th>
<th>RACEWAY2 (LENGTH = 0.53 MILES)</th>
<th>Cost/Year*</th>
</tr>
</thead>
<tbody>
<tr>
<td>YEAR 1</td>
<td>$210,482</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>$210,482</td>
</tr>
<tr>
<td>YEAR 2</td>
<td>-</td>
<td>$211,663</td>
<td>-</td>
<td>-</td>
<td>$211,663</td>
</tr>
<tr>
<td>YEAR 3</td>
<td>-</td>
<td>-</td>
<td>$282,230</td>
<td>-</td>
<td>$282,230</td>
</tr>
<tr>
<td>YEAR 4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>$200,877</td>
<td>$200,877</td>
</tr>
</tbody>
</table>

**TOTAL COST FOR STRATEGY 3 =** $905,252

**AVERAGE ANNUAL COST FOR STRATEGY 3 =** $226,313

**STRATEGY 4**

4 YEAR PLAN "B" (COMPLETE PAVING FOR RACEWAY, YEAR 1 AND YEAR 2, AND PACKARD, YEAR 3 AND YEAR 4)

<table>
<thead>
<tr>
<th>Year</th>
<th>PACKARD1 (LENGTH = 0.66 MILES)</th>
<th>PACKARD2 (LENGTH = 0.63 MILES)</th>
<th>RACEWAY1 (LENGTH = 0.82 MILES)</th>
<th>RACEWAY2 (LENGTH = 0.53 MILES)</th>
<th>Cost/Year*</th>
</tr>
</thead>
<tbody>
<tr>
<td>YEAR 1</td>
<td>-</td>
<td>-</td>
<td>$256,573</td>
<td>-</td>
<td>$256,573</td>
</tr>
<tr>
<td>YEAR 2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>$183,409</td>
<td>$183,409</td>
</tr>
<tr>
<td>YEAR 3</td>
<td>$231,530</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>$231,530</td>
</tr>
<tr>
<td>YEAR 4</td>
<td>-</td>
<td>$231,821</td>
<td>-</td>
<td>-</td>
<td>$231,821</td>
</tr>
</tbody>
</table>

**TOTAL COST FOR STRATEGY 4 =** $903,334

**AVERAGE ANNUAL COST FOR STRATEGY 4 =** $225,833
February 21, 2020

Stantec
55 Green Mountain Drive
South Burlington, Vermont 05403

Attn: Mr. Michael J. Fowler, PE
Senior Transportation Engineer

Re: Subsurface Investigation Services
Proposed Road Improvements
Jericho, Chittenden County, New York
ATL No. CD7397D-01-02-20

Ladies and Gentleman:

At the request of Mr. Michael J. Fowler, PE, representing Stantec, and in accordance with our proposal (ATL No. CD998-2231-09-19, dated September 23, 2019), Atlantic Testing Laboratories, Limited (ATL) performed a Subsurface Investigation for the referenced project. The field investigation was performed on January 30, 2020.

The proposed boring locations were selected and staked by representatives of Stantec. A Boring Location Plan is included in Attachment A.

Eight borings were advanced utilizing 3-inch and 2-inch split spoon samplers to a depth of approximately 6 feet below ground surface. Soil sampling and standard penetration testing was performed utilizing 3-inch and 2-inch outside diameter split spoon sampler in accordance with ASTM D 1586. Soil sampling was generally performed continuously to boring termination at a depth of approximately 6 feet.

The 3-inch and 2-inch split spoon samplers do not recover material larger than 2⅜-inch and 1⅜-inch in nominal dimension, respectively. Therefore, the recovered samples may not be representative of the entire soil matrix. The visual soil classifications contained in the subsurface investigation logs were performed in the laboratory and are presented on the Subsurface Investigation Logs included in Attachment B.

The borings were backfilled with on-site soils upon completion. It is important that the backfilled boreholes be monitored for settlement or subsidence. This will be the responsibility of Stantec and/or their Client. ATL assumes no liability for loss or damage resulting from borehole settlement.
Select soil samples were submitted to ATL’s geotechnical laboratory for physical analyses. Water Content Determination of Soil (ASTM D 2216) and Particle Size Analysis without Hydrometer (ASTM D 422) was performed on eight soil samples. The test results are located on the Subsurface Investigation Logs included in Laboratory Test Results, Attachment C.

Please contact our office if you have any questions or if we may be of further service. We look forward to our continued association to obtain a successful completion of the project.

Sincerely,

ATLANTIC TESTING LABORATORIES, Limited

Adam J. Schneider, PE  
Project Engineer

AJS/ADW/ajs  
Enclosures
ATTACHMENT A

BORING LOCATION PLAN
ATTACHMENT B

SUBSURFACE INVESTIGATION LOGS
Brown cmf SAND; some mf+ GRAVEL; little SILT (moist, non-plastic) \( w = 6.1\% \)

Greyish-Brown cmf SAND; little cmf GRAVEL; trace CLAY; trace SILT (moist, very slightly plastic)

Greyish-Brown cmf+ SAND; little mf GRAVEL; trace SILT (moist, non-plastic)

Boring terminated at 6.0 feet.

Notes:
1. Borehole backfilled with on-site soils.
2. A 3" split spoon sampler was utilized to obtain sample S-1. A 2" split spoon sampler was utilized to obtain samples S-2 and S-3.
### Subsurface Investigation

**Client:** Stantec  
**Project:** Subsurface Investigation  
**Jericho VT Soil Sampling**  
**Jericho, Vermont**

**Boring No.:** B-2  
**Sheet:** 1 of 1

**Coordinates**
- Latitude:  
- Longitude:  

**Sampler Hammer**
- Weight: 140 lbs.  
- Fall: 30 in.

**Hammer Type:** Automatic

**Ground Elev.:**  
**Boring Advance By:** 3” & 2” Split Spoon

---

### Classification of Material

<table>
<thead>
<tr>
<th>Depth of Sample</th>
<th>Blows on Sampler</th>
<th>Depth of Change</th>
<th>Recovery Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>From</td>
<td>To</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.0</td>
<td>2.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SS</td>
<td></td>
<td>141 157 93 67</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brown cmf SAND; and cmf GRAVEL; trace SILT (moist, non-plastic)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| 2.0 |
| SS | | 14 8 7 6 |
| | |
| Brown c-mf SAND; little SILT; little f GRAVEL (moist, non-plastic) w = 8.7% |

| 3.0 |
| SS | | 8 8 8 10 |
| | |
| Brownish-Grey cmf SAND; little cmf GRAVEL; trace SILT; trace CLAY (moist, very slightly plastic) |

**Notes:**
1. Borehole backfilled with on-site soils.
2. A 3” split spoon sampler was utilized to obtain sample S-1. A 2” split spoon sampler was utilized to obtain samples S-2 and S-3.

---

**ATLANTIC TESTING LABORATORIES, Limited**

**Report No.:** CD7397E-01-02-20  
**Boring Location:** See Boring Location Plan

**Start Date:** 1/30/2020  
**Finish Date:** 1/30/2020

---

**Drillers:** Brad Perry; Jake Crary  
**Inspector:**  

---

**Classification of Material**

<table>
<thead>
<tr>
<th>CLASSIFICATION OF MATERIAL</th>
<th>Recovery (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brown cmf SAND; and cmf GRAVEL; trace SILT (moist, non-plastic)</td>
<td>22</td>
</tr>
<tr>
<td>Brown c-mf SAND; little SILT; little f GRAVEL (moist, non-plastic) w = 8.7%</td>
<td>19</td>
</tr>
<tr>
<td>Brownish-Grey cmf SAND; little cmf GRAVEL; trace SILT; trace CLAY (moist, very slightly plastic)</td>
<td>13</td>
</tr>
</tbody>
</table>

---

**METHOD OF ADVANCE**

- From:  
- To:  

---

**DEPTH OF SAMPLE**

- Depth:  
- Sample Type:  

---

**BLOWSON SAMPLER**

- Sampler Type:  
- PER 6” 2” D.O.D. SAMPLER

---

**DEPTHS OF CHANGE**

- Depth:  
- Notes:  

---

**Project:** Jericho VT Soil Sampling  
**Client:** Stantec  
**Boring Location:** Jericho, Vermont  
**Report No.:** CD7397E-01-02-20  
**Boring Location:** See Boring Location Plan

---

**Drillers:** Brad Perry; Jake Crary  
**Inspector:**  

---

**Description:**

- 3” & 2” Split Spoon

---

**Notes:**

1. Borehole backfilled with on-site soils.
2. A 3” split spoon sampler was utilized to obtain sample S-1. A 2” split spoon sampler was utilized to obtain samples S-2 and S-3.
Subsurface Investigation

Jericho VT Soil Sampling
Jericho, Vermont

Report No.: CD7397E-01-02-20
Boring Location: See Boring Location Plan
Start Date: 1/30/2020 Finish Date: 1/30/2020

<table>
<thead>
<tr>
<th>METHOD OF ADVANCE</th>
<th>SAMPLE NO.</th>
<th>DEPTH OF SAMPLE</th>
<th>SAMPLE TYPE</th>
<th>BLOWS ON SAMPLER PER 6&quot; 2&quot; O.D. SAMPLER</th>
<th>DEPTH OF CHANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>From</td>
<td>To</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>S P L I T</td>
<td>1</td>
<td>0.0</td>
<td>2.0 SS</td>
<td>150 155 103 61</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2.0</td>
</tr>
<tr>
<td>2</td>
<td>S P H N O N</td>
<td>2</td>
<td>2.0</td>
<td>4.0 SS</td>
<td>13 6 4 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>3</td>
<td>4.0</td>
<td>6.0 SS</td>
<td>5 11 27 31</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6.0</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>4</td>
<td>4.0</td>
<td>6.0 SS</td>
<td>5 11 27 31</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Brownish-Grey cmf SAND; some mf GRAVEL; little SILT (moist, non-plastic) w = 6.0%

Brown c-mf+ SAND; little mf GRAVEL; trace SILT (moist, non-plastic)

Dark Brown cmf SAND; little mf GRAVEL; trace SILT; trace ORGANIC MATERIAL (root hairs) (moist, non-plastic) COBBLE Fragments

Boring terminated at 6.0 feet.

Notes:
1. Borehole backfilled with on-site soils.
2. A 3” split spoon sampler was utilized to obtain sample S-1. A 2” split spoon sampler was utilized to obtain samples S-2 and S-3.

Drillers: Brad Perry; Jake Crary
Inspector: 

---

<table>
<thead>
<tr>
<th>CLASSIFICATION OF MATERIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - fine</td>
</tr>
<tr>
<td>20-35%</td>
</tr>
<tr>
<td>2 - medium</td>
</tr>
<tr>
<td>10-20%</td>
</tr>
<tr>
<td>3 - coarse</td>
</tr>
<tr>
<td>0-10%</td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>x/later</th>
<th></th>
</tr>
</thead>
</table>

---

ATLANTIC TESTING LABORATORIES, Limited

Client: Stantec
Project: Subsurface Investigation

Jericho VT Soil Sampling

Coordinates
Latitude:
Longitude:

Sampler Hammer
Weight: 140 lbs.
Fall: 30 in.
Hammer Type: Automatic

Ground Elev.:

3" & 2" Split Spoon
## Classification of Material

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Method of Advance</th>
<th>Sample No.</th>
<th>Depth of Sample (ft)</th>
<th>Sample Type</th>
<th>Blows on Sampler (per 6&quot; 2&quot; O.D. Sampler)</th>
<th>Recovery (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Split Spoon</td>
<td>1</td>
<td>0.0</td>
<td>SS</td>
<td>164 197 89 74</td>
<td>17</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>2</td>
<td>2.0</td>
<td>SS</td>
<td>13 9 8 6</td>
<td>2.0</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>2</td>
<td>4.0</td>
<td>SS</td>
<td>6 6 14 3</td>
<td>6.0</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>3</td>
<td>6.0</td>
<td>SS</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Brownish-Grey cmf SAND**; and cmf GRAVEL; trace SILT (moist, non-plastic)
- **Brown cmf+ SAND**; and SILT; little f GRAVEL (moist, non-plastic)
  - w = 19.3%
- **Greyish-Brown cmf SAND**; some cmf GRAVEL; little SILT (moist, non-plastic)

Boring terminated at 6.0 feet.

Notes:
1. Borehole backfilled with on-site soils.
2. A 3" split spoon sampler was utilized to obtain sample S-1. A 2" split spoon sampler was utilized to obtain samples S-2 and S-3.
# Subsurface Investigation

**Client:** Stantec  
**Project:** Subsurface Investigation  
**Location:** Jericho VT Soil Sampling, Jericho, Vermont

**Boring No.:** B-5  
**Sheet:** 1 of 1  
**Date:** 1/30/2020  
**Notes:**  
1. Borehole backfilled with on-site soils.  
2. A 3" split spoon sampler was utilized to obtain sample S-1. A 2" split spoon sampler was utilized to obtain samples S-2 and S-3.

## Groundwater Observations

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Depth</th>
<th>Casing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Classification of Material

<table>
<thead>
<tr>
<th>Depth of Change</th>
<th>Sample Type</th>
<th>Blows on Sampler Per 6&quot; 2&quot; O.D. Sampler</th>
<th>Recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>SS</td>
<td>170 263 184 53</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Brown c-mf GRAVEL; and cmf SAND; trace SILT (moist, non-plastic) w = 2.4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.0</td>
<td>SS</td>
<td>17 2 9 10</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Brown cmf SAND; and cmf GRAVEL; trace SILT (moist, non-plastic)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.0</td>
<td>SS</td>
<td>13 10 10 10</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Similar Soil (moist, non-plastic)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.0</td>
<td></td>
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<td>7.0</td>
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<td>8.0</td>
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<td>9.0</td>
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</tr>
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<td>10.0</td>
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<td>11.0</td>
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<td></td>
</tr>
<tr>
<td>15.0</td>
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</table>

**Drillers:** Brad Perry; Jake Crary  
**Inspector:**
### Subsurface Investigation

**Client:** Stantec  
**Project:** Subsurface Investigation  
**Location:** Jericho VT Soil Sampling, Jericho, Vermont

**Boring No.:** B-6  
**Sheet:** 1 of 1

**Coordinates:**
- Latitude ________  
- Longitude ________

**Sampler Hammer:**
- Weight: 140 lbs.  
- Fall: 30 in.

**Hammer Type:** Automatic

**Ground Elev.:** ____________  
**Boring Advance By:** 3" & 2" Split Spoon

**Start Date:** 1/30/2020  
**Finish Date:** 1/30/2020

### Classification of Material

<table>
<thead>
<tr>
<th>DEPTH</th>
<th>METHOD OF ADVANCE</th>
<th>SAMPLE NO.</th>
<th>DEPTH OF SAMPLE</th>
<th>SAMPLE TYPE</th>
<th>BLOWS ON SAMPLER PER 6&quot; 2&quot; O.D. SAMPLER</th>
<th>DEPTH OF CHANGE</th>
<th>CLASSIFICATION OF MATERIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>From</td>
<td>To</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>In.</td>
<td>Brown cmf SAND; and cmf GRAVEL; trace SILT (moist, non-plastic)</td>
</tr>
<tr>
<td>1</td>
<td>0.0</td>
<td>2.0</td>
<td>SS</td>
<td>146 222 163 98</td>
<td>2.0</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2.0</td>
<td>4.0</td>
<td>SS</td>
<td>44 62 31 7</td>
<td></td>
<td>23</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>4.0</td>
<td>6.0</td>
<td>SS</td>
<td>10 28 28 16</td>
<td></td>
<td>12</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
1. Borehole backfilled with on-site soils.
2. A 3" split spoon sampler was utilized to obtain sample S-1. A 2" split spoon sampler was utilized to obtain samples S-2 and S-3.
### Subsurface Investigation

**Client:** Stantec  
**Project:** Subsurface Investigation  
**Location:** Jericho VT Soil Sampling, Jericho, Vermont

**Boring No.:** B-7  
**Sheet:** 1 of 1  
**Start Date:** 1/30/2020  
**Finish Date:** 1/30/2020

**Hammer Type:** Automatic  
**Sample Hammer:**  
**Latitude:**  
**Longitude:**  
**Weight:** 140 lbs.  
**Fall:** 30 in.

**Coordinating Drillers:** Brad Perry; Jake Crary

---

**Groundwater Observations**

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Depth</th>
<th>Casing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**Classification of Material**

<table>
<thead>
<tr>
<th>DEPTH</th>
<th>METHOD OF ADVANCE</th>
<th>SAMPLE NO.</th>
<th>DEPTH OF SAMPLE</th>
<th>SAMPLE TYPE</th>
<th>BLOWS ON SAMPLER PER 6” 2” O.D. SAMPLER</th>
<th>DEPTH OF CHANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>From</td>
<td>To</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>0.0</td>
<td>2.0 SS</td>
<td>76 104 173 168</td>
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<td>2.0</td>
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<tr>
<td>2</td>
<td>2.0</td>
<td>4.0 SS</td>
<td>21 27 17 11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>4.0</td>
<td>6.0 SS</td>
<td>9 15 18 12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>6.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Description:**

- **Greyish-Brown cmf SAND; and mf GRAVEL; little SILT (wet, non-plastic) w = 9.6%**
- **Greyish-Brown cmf SAND; and cmf GRAVEL; trace SILT (moist, non-plastic)**
- **Brownish-Grey cmf+ SAND; little cmf GRAVEL; little SILT (moist, non-plastic)**

---

Notes:

1. Borehole backfilled with on-site soils.
2. A 3” split spoon sampler was utilized to obtain sample S-1. A 2” split spoon sampler was utilized to obtain samples S-2 and S-3.
Greyish-Brown cmf SAND; and cmf GRAVEL; trace SILT (moist, non-plastic) 20

Greyish-Brown c-mf+ SAND; some SILT; little mf+ GRAVEL (moist, non-plastic) w = 8.0% 23

Similar Soil (moist, non-plastic) 12

Notes:
1. Borehole backfilled with on-site soils.
2. A 3" split spoon sampler was utilized to obtain sample S-1. A 2" split spoon sampler was utilized to obtain samples S-2 and S-3.
ATTACHMENT C

LABORATORY TEST RESULTS
LABORATORY DETERMINATION OF MOISTURE CONTENT OF SOILS
ASTM D 2216

PROJECT INFORMATION
Client: Stantec Consulting Services, Inc.  ATL Report No.: CD73975L-01-02-20
Project: Packard and Raceway Roads  Report Date: February 21, 2020
Jericho, Vermont  Date Received: February 19, 2020

<table>
<thead>
<tr>
<th>Boring No.</th>
<th>Sample No.</th>
<th>Depth (ft)</th>
<th>Moisture Content (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-1</td>
<td>S-1 1</td>
<td>0-2</td>
<td>6.1</td>
</tr>
<tr>
<td>B-2</td>
<td>S-2 1</td>
<td>2-4</td>
<td>8.7</td>
</tr>
<tr>
<td>B-3</td>
<td>S-1 1</td>
<td>0-2</td>
<td>6.0</td>
</tr>
<tr>
<td>B-4</td>
<td>S-2 1</td>
<td>2-4</td>
<td>19.3</td>
</tr>
<tr>
<td>B-5</td>
<td>S-1 1</td>
<td>0-2</td>
<td>2.4</td>
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<tr>
<td>B-6</td>
<td>S-2 1</td>
<td>2-4</td>
<td>15.1</td>
</tr>
<tr>
<td>B-7</td>
<td>S-1 1</td>
<td>0-2</td>
<td>9.6</td>
</tr>
<tr>
<td>B-8</td>
<td>S-2 1</td>
<td>2-4</td>
<td>8.0</td>
</tr>
</tbody>
</table>

REMARKS
1. Sample mass was less than the minimum mass outlined in the referenced test method.

Reviewed By: [Signature]  Date: 02/21/20
Particle Size Distribution Report

Project: Packard and Raceway Roads, Jericho, Vermont
Client: Stantec Consulting Services, Inc.
Sample No: B-1, S-1
Location: In-place
Source of Sample: Boring Sample
Elev./Depth: 0-2'

Soil Description
Brown cmf SAND; some mf+ GRAVEL; little SILT

Atterberg Limits

PL= --
LL= --
PI= --

Coefficients

D_{85}= 9.2074
D_{60}= 2.8174
D_{50}= 1.3757

C_u= 0.3003
C_c= 

Classification
AASHTO=

USCS=

Remarks
Moisture Content = 6.1 %

Reviewed by: 

Date: 2/21/20
Particle Size Distribution Report

Project: Packard and Raceway Roads, Jericho, Vermont
Client: Stantec Consulting Services, Inc.
Sample No: B-2, S-2
Location: In-place
Source of Sample: Boring Sample
Elev./Depth: 2-4'

<table>
<thead>
<tr>
<th>GRAIN SIZE - mm</th>
<th>% +3&quot;</th>
<th>% Gravel</th>
<th>% Sand</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coarse</td>
<td>Fine</td>
<td>Coarse</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>13</td>
<td>11</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>SIEVE SIZE</th>
<th>PERCENT FINER</th>
<th>SPEC.*</th>
<th>OUT OF SPEC. (X)</th>
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</thead>
<tbody>
<tr>
<td>1&quot;</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/2&quot;</td>
<td>98</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#4</td>
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<td>76</td>
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</tr>
<tr>
<td>#200</td>
<td>20</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* (no specification provided)

Soil Description
Brown c-m+f SAND; little SILT; little f GRAVEL

Atterberg Limits
PL = --
LL = --
PL = --

Coefficients
D_{85} = 4.1843
D_{60} = 0.9319
D_{50} = 0.6078
D_{15} =
D_{10} =
C_{u} =
C_{c} =

Classification
USCS =
AASHTO =

Remarks
Moisture Content = 8.7%

Reviewed by: Judy Ames
Date: 02/21/20

Figure
Particle Size Distribution Report

Project: Packard and Raceway Roads, Jericho, Vermont
Report No.: CD7397SL-01-02-20
Client: Stantec Consulting Services, Inc.
Date: 02/21/20

Sample No: B-3, S-1
Source of Sample: Boring Sample
Location: In-place
Elev./Depth: 0-2'

---

<table>
<thead>
<tr>
<th>SIEVE SIZE</th>
<th>PERCENT FINER</th>
<th>SPEC.* PERCENT</th>
<th>OUT OF SPEC. (X)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&quot;</td>
<td>100</td>
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<tr>
<td>1/2&quot;</td>
<td>90</td>
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<tr>
<td>#10</td>
<td>59</td>
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<tr>
<td>#40</td>
<td>35</td>
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<td></td>
</tr>
<tr>
<td>#200</td>
<td>17</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

Soil Description
Brownish-Grey cmf SAND; some mf GRAVEL; little SILT

Atterberg Limits
PL= --
LL= --
PI= --

Coefficients
D85= 9.5147
D50= 2.0699
D30= 1.1205

USCS=

Classification
AASHTO=

Remarks
Moisture Content = 6.0%

---

Reviewed by: [signature]
Date: 02/21/20

ATLANTIC TESTING LABORATORIES, LIMITED
Particle Size Distribution Report

Project: Packard and Raceway Roads, Jericho, Vermont

Client: Stantec Consulting Services, Inc.

Sample No: B-4, S-2
Location: In-place
Source of Sample: Boring Sample
Elev./Depth: 2-4'

---

### Soil Description

Brown cmf+ SAND; and SILT; little f GRAVEL.

---

### Atterberg Limits

- PL = --
- LL = --
- PI = --

### Coefficients

- $D_{85} = 3.4148$
- $D_{80} = 0.2153$
- $D_{50} = 0.1164$

### Classification

USCS =

### Remarks

Moisture Content = 19.3%

---

Reviewed by: [Signature]

Date: 02/21/20
**Particle Size Distribution Report**

**Project:** Packard and Raceway Roads, Jericho, Vermont  
**Client:** Stantec Consulting Services, Inc.  
**Sample No:** B-5, S-1  
**Source of Sample:** Boring Sample  
**Location:** In-place  
**Elev./Depth:** 0-2'

---

**GRAIN SIZE - mm.**

<table>
<thead>
<tr>
<th>% +3&quot;</th>
<th>% Gravel</th>
<th>% Sand</th>
<th>% Fines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coarse</td>
<td>Fine</td>
<td>Coarse</td>
<td>Medium</td>
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<tr>
<td>0</td>
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<td>35</td>
<td>12</td>
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**SIEVE SIZE**  
**PERCENT FINER**  
**SPEC.* PERCENT**  
**OUT OF SPEC. (X)**

<table>
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<tr>
<th>SIEVE SIZE</th>
<th>PERCENT FINER</th>
<th>SPEC.* PERCENT</th>
<th>OUT OF SPEC. (X)</th>
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<tbody>
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<tr>
<td>#40</td>
<td>19</td>
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</tr>
<tr>
<td>#200</td>
<td>9.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* (no specification provided)

---

**Soil Description**

Brown e-mf GRAVEL: and e-mf SAND; trace SILT

**Atterberg Limits**

- PL=  
- LL=  
- PI=  

**Coefficients**

- D85= 22.0761
- D50= 9.8970
- D15= 0.2289
- D10= 6.2653
- C_u= 109.40
- C_c= 2.89

**Classification**

AASHTO=  

**Remarks**

- Moisture Content = 2.4%

---

Reviewed by: **Judith Ames**  
**Date:** 2/21/20
Particle Size Distribution Report

Project: Packard and Raceway Roads, Jericho, Vermont
Client: Stantec Consulting Services, Inc.
Sample No: B-6, S-2
Location: In-place
Source of Sample: Boring Sample
Elev./Depth: 2-4'

GRAIN SIZE - mm

<table>
<thead>
<tr>
<th>% +3&quot;</th>
<th>% Gravel</th>
<th>% Sand</th>
<th>% Fines</th>
</tr>
</thead>
<tbody>
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<td>Coarse</td>
</tr>
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<td>26</td>
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<td>7</td>
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</tbody>
</table>

SIEVE SIZE | PERCENT FINER | SPEC. PERCENT | OUT OF SPEC. (X) |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
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<tr>
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<td>77</td>
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<td></td>
</tr>
<tr>
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</tr>
<tr>
<td>#200</td>
<td>37</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Soil Description
Greyish-Brown SILT; and e+mf GRAVEL; some cmf SAND

Atterberg Limits
PL = --
LL = --
Pl = --

Coefficients
$D_{85}$ = 33.9658
$D_{50}$ = 3.0136
$D_{15}$ = 0.8141
$D_{10}$ =

Classification
AASHTO=

Remarks
Moisture Content = 15.1%

Reviewed by: [Signature]
Date: 2/21/20
Particle Size Distribution Report

Project: Packard and Raceway Roads, Jericho, Vermont
Client: Stantec Consulting Services, Inc.
Report No.: CD7397SL-01-02-20
Date: 02/21/20

Sample No: B-7, S-1
Location: In-place
Source of Sample: Boring Sample
Elev./Depth: 0-2'

### Soil Description
Greyish-Brown cmf SAND; and mf GRAVEL; little SILT

### Atterberg Limits

<table>
<thead>
<tr>
<th>PL</th>
<th>LL</th>
<th>PI</th>
</tr>
</thead>
<tbody>
<tr>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

### Coefficients

<table>
<thead>
<tr>
<th>( D_{85} )</th>
<th>( D_{60} )</th>
<th>( D_{50} )</th>
<th>( D_{15} )</th>
<th>( D_{10} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.3023</td>
<td>4.8842</td>
<td>2.7389</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Classification

USCS = AASHTO

**Remarks**
Moisture Content = 9.6%

---

Reviewed by: **Judyg Ames**
Date: **2/21/20**
Particle Size Distribution Report

Project: Packard and Raceway Roads, Jericho, Vermont  
Report No.: CD7397SL-01-02-20  
Client: Stantec Consulting Services, Inc.  
Date: 02/21/20

Sample No: B-8, S-2  
Source of Sample: Boring Sample  
Location: In-place  
Elev./Depth: 2-4'

Soil Description:
Greyish-Brown c-mf+ SAND; some SILT; little mf+ GRAVEL.

Atterberg Limits:
PL = --  
LL = --  
PI = --

Coefficients:

D_{85} = 4.5437  
D_{60} = 0.4617  
D_{50} = 0.2689  
D_{10} = --  

Classification:
AASHTO =

USCS =

Remarks:

Moisture Content = 8.0%

Reviewed by: _______________  
Date: 02/21/20