

HOME OWNERS ASSOCIATION

OVERLOOK AT QUALCHAN

ROAD MAINTENANCE STUDY

1/5/18



FLEET ENGINEERING LLC

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INTRODUCTION: Overlook at Qualchan is a series of private roads and common driveways connecting to city streets and managed by a Homeowners' Association. Lower West Boland is 835 ft long and 20 ft wide. It serves 12 homes and is in fair condition. Upper West Boland is 885 ft long by 20 ft wide and serves 10 homes. It is in very poor condition. The purpose of this report is to discuss the condition of the roads and recommend maintenance and repair strategies.

Although there are no design or construction records for either, a look at the Google Earth satellite views indicates that they were probably constructed about 2000. Information in this report is based on an on-site inspections and discussions with City Staff.

Regular preventive maintenance is always less costly than repair or reconstruction and should be done on all roads. Crack filling about every 3 to 5 years limits the amount of water that penetrates and softens the base, of subgrade. Expansion and contraction of asphalt pavement opens micro pores and develops small cracks that are seldom visible to the naked eye. The water that penetrates them and freezes enlarges them until they are visible. The roads should receive a surface treatment such as fog sealing or seal coating about every 5 years.

RECOMMENDATION FOR LOWER WEST BOLAN: The road is in relatively good condition for its age. It is probably because it receives so little truck traffic, the cause of most road damage. Once the construction and building is complete along a dead end road, the majority of truck traffic is the weekly visit by a garbage truck.

There is about 110 SY of alligator cracking; surprisingly little for a road this old, but more importantly, none of it is serious. Sometime in the next 4 to 5 years, it should be repaired. But in the mean time, regular crack sealing and surface treatments will keep it at bay. Right now the road is overdue for crack filling and fog sealing. Do that as soon as possible. See attachment 1 for details on a typical pavement repair.

RECOMMENDATIONS FOR UPPER WEST BOLAN: A good share of the road is already in total failure, and there is no preventive maintenance treatment that will restore that. The cause is a clay deposit and an active spring flowing through the area. Attempting to repair the pavement without addressing the water problem would be a futile exercise in throwing good money after bad. Right now, the road is ugly but usable. However, the problem is like a ticking time bomb. It might be useable for some time, but eventually the right combination of winter and spring weather conditions will occur and the road could become nearly impassable.

The usual strategy is to excavate the unsuitable soil approximately 4 ft deep, place a geotextile fabric and then backfill with 4-8 in diameter clean rock. The backfill is left about 12 in below the road surface. Then a new pavement section with layers of crushed rock and asphalt can be installed successfully. Provisions must also be made to collect and dispose of the ground water. It is done by installing a sub drain system to channel the water into an acceptable drainage facility. See Attachment 2 for details of unsuitable soil repair.



Problems like this are relatively easy to solve during the construction phase of a project. Once the road construction and home building phase is complete, the area is congested and there are limited options to dispose of ground water. The work is slow, inconvenient and costly. Frequently, the heavy equipment used on the project damages the surrounding pavement and that must be repaired.

The area that is causing the problem is approximately 400 ft by 10 ft. The repair process is referred to as "Sub-Excavation". A large hydraulic excavator is brought on site to remove and dispose of the unsuitable material. The excavated area is lined with a poly-ethylene geotextile fabric and a perforated pipe is installed to keep the water drained out of the area. Then the excavated area is backfilled with 8", or smaller, clean rock. After the sub-excavation is done a new roadway is constructed in that area. The exact quantity of work can only be determined during the repair work. It could be a much greater area, but it is probably less. See attachment 2 for more details.

Under conditions like these, road life is shortened when the roadside ditch is backfilled with drain rock. It restricts the flow of in the ditch line, and the water causes further road damage. In this case, it is critical to make the ditch as efficient as possible because that is the only practical way to dispose of the ground water. If the road is properly ditched the ground water can be directed into the properly constructed ditch and flow into to drainage pond at the Boland intersection. See attachment 3 for roadside ditch details.

SUMMARY: The estimated cost for required work is \$212,000, and all of the work will be required sooner or later. The majority of the cost is to restore failed pavement on Upper West Boland. It must be totally rebuilt and waiting will not increase the repair cost. The only expected cost escalation will be annual construction cost escalation which usually averages about 3% per year. On the other hand lack of preventive maintenance is likely to lead to additional damage and additional repair cost. It is recommended that preventive maintenance work be caught up as soon as possible to protect the investment.

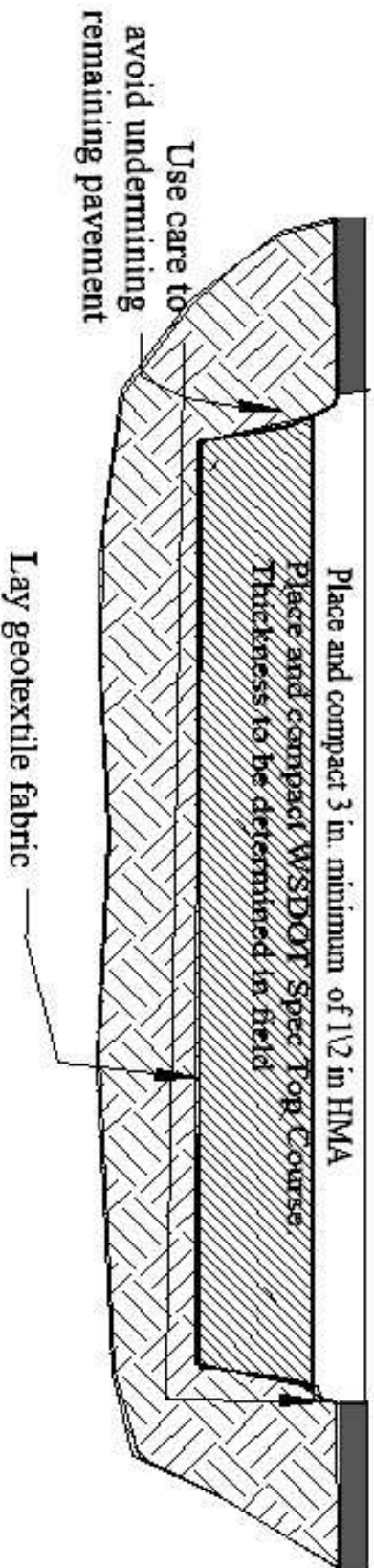
Respectfully submitted,

Phillip J. Barto, PE

ATTACHMENTS:

1. Standard Plan for Pavement Repair
2. Standard Plan for Unsuitable subgrade excavation
3. Standard Plan for roadside ditches
4. Cost Estimates

PAVEMENT REPAIR DIAGRAM

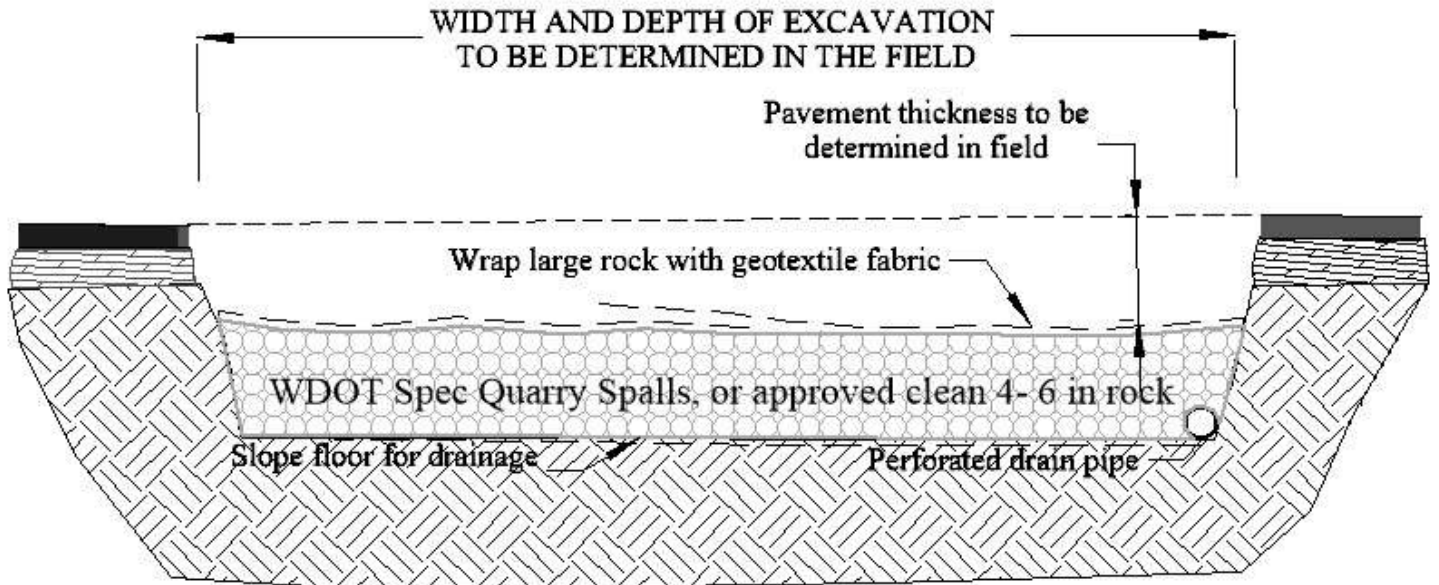


NOTES

1. Saw cut pavement along marked lines.
2. Excavate the area to specified depth then level and compact the subgrade.
3. Use care to avoid damaging or undermining remaining pavement.
4. Place geotextile fabric
5. Place and compact approved thickness of WSDOT specification CSTC, or approved equal. Place in 2 lifts if total thickness is more than 4 in.
6. Tack the existing pavement edges.
7. Place and compact 3 in, minimum of WSDOT 1/2 in HMA.
8. Coat the joints with tack material.



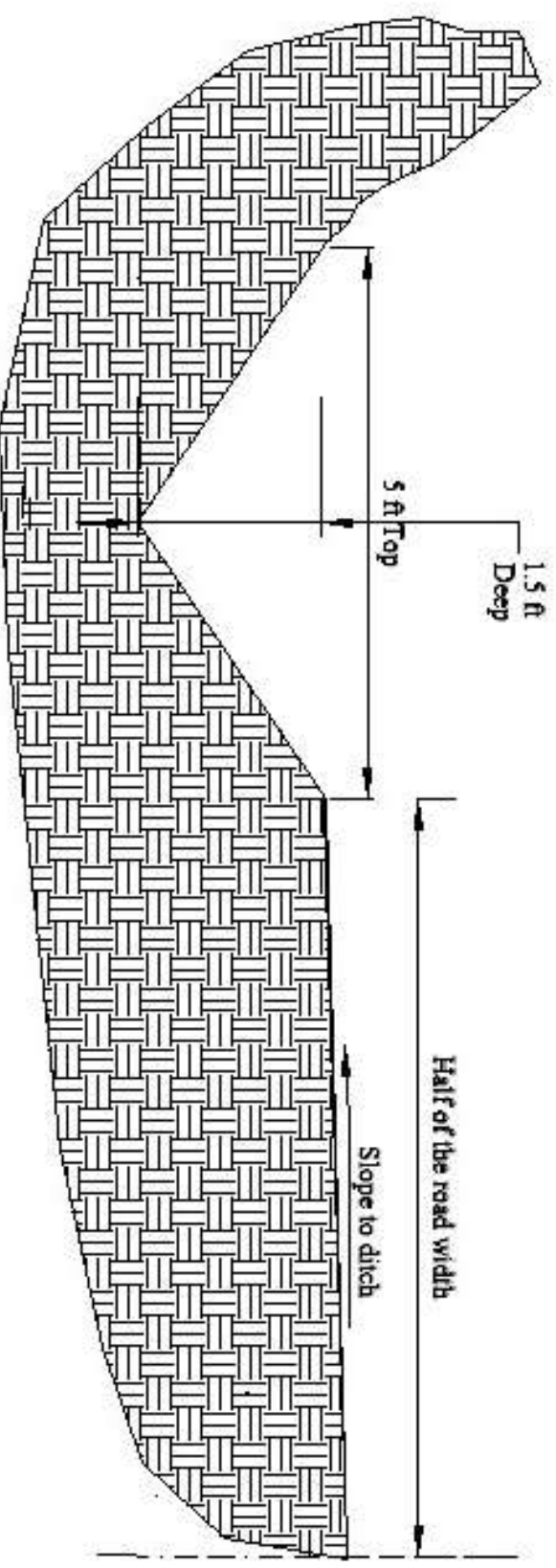
UNSUITABLE SUBGRADE EXCAVATION AND BACKFILL DIAGRAM IN AN EXISTING ROAD



NOTES

1. Use care in placing large rock to avoid damaging geotextile.
2. When severe pavement damage has occurred and excavation is required, it is best to place and compact 4" of asphalt (HMA) over 8" of crushed rock.

TYPICAL ROADSIDE DITCH



NOTES



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PRELIMINARY PROJCT COST ESTIMATE

PROJECT NAME: UPPER WEST BOLAND

PROJECT DESCRIPTION: Major road repairs on Upper West Boland Ln, constructed between 1995 and 2000. Correct road drainage problems and re-pave. Length is 885 LF, Width is 20 Ft.

SCOPE OF WORK:

1. Excavate unsuitable soils approximately 4 ft deep, and area 400ft X 10ft
2. Place geotextile fabric in excavated area, 450 sy
3. Install rigid perforated and tight line pipe
4. Place large clean subgrade backfill rock
5. Restore the roadside ditch
6. Replace crushed rock and HMA pavemnt roadway section in excavated area
7. Pavement removal and repair in other locations of the road.

| ITEM NO. | DESCRIPTION | QUANTITY | UNITS | UNIT COST | AMOUNT | ACCUM |
|----------|--|----------|-------|-----------|-----------|-------|
| 1 | Unsuitable excavation | 600 | CY | \$25.00 | \$15,000 | |
| 2 | Lay geotextile fabric | 450 | LF | \$4.00 | \$1,800 | |
| 3 | Inatall 6" perforated pipe | 500 | lf | \$10.00 | \$5,000 | |
| 4 | Backfill with large drain rock | 450 | CY | \$15.00 | \$6,750 | |
| 5 | Place and Compact Top Course gravel | 350 | CY | \$40.00 | \$14,000 | |
| 6 | Place and Compact HMA Paving | 2000 | SY | \$25.00 | \$50,000 | |
| 7 | Ditch excavation | 400 | LF | \$4.00 | \$1,600 | |
| 8 | Additional Pavement removal and Repair | 300 | SY | \$100.00 | \$30,000 | |
| | SUB TOTAL | | | | \$124,150 | |
| | Add 25% for contingencies | | | | \$31,038 | |
| | Add Sales Tax @ 8.7% | | | | \$13,501 | |
| | Add Engineering cost @ 5% | | | | \$7,759 | |
| | GRAND TOTAL | | | | \$176,448 | |
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PRELIMINARY PROJCT COST ESTIMATE

PROJECT NAME: LOWER WEST BOLAND

PROJECT DESCRIPTION: Perform major preventive maintenance.

Road segment lengths:

Entrance: 125LF
 West leg: 375LF
 East Leg: 335LF
 TOTAL: 835 LF

SCOPE OF WORK:

- Fill all cracks 1/4" or larger, including the crack between the pavement and curb and around all manholes, valve boxes and other pavement intrusions.
- Repair areas of failed pavement by excavating at least 9 in deep, placing Geotextile fabric, placing and placing and compacting 6in of WSDOT specification top course (CSTC), and at least 3in of asphalt pavement (HMA). The actual required depth shall be confirmed during excavation and depends on soil conditions.
- Fog seal entire road with dilute asphalt emulsion to seal microcracks and poarous pavement areas.

| ITEM NO. | DESCRIPTION | QUANTITY | UNITS | UNIT COST | AMOUNT | ACCUM |
|----------|----------------------------------|----------|-------|-----------|----------|-------|
| | Fill all cracks 1/4" and larger | 3000 | LF | \$1.00 | \$3,000 | |
| | Pavement dig-out and replacement | 200 | SY | \$100.00 | \$20,000 | |
| | Fog seaL with asphalt emulsion | 2000 | SY | \$1.00 | \$2,000 | |
| | SUB TOTAL | | | | \$25,000 | |
| | Add 25% for contingencies | | | | \$6,250 | |
| | Add Sales Tax @ 8.7% | | | | \$2,719 | |
| | Add Engineering cost @ 5% | | | | \$1,563 | |
| | GRAND TOTAL | | | | \$35,531 | |
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