

**Report of the Paving Subcommittee  
Request for Evaluation of Options 2011  
July 7, 2011  
Summary of Options and Recommendations**

At the request of the South Church Board of Trustees, a parking lot subcommittee was formed to evaluate options for improving the South Church parking area. The committee is comprised of Steve Mabee, Alan Rainford, Allan Carpenter, Jim Smith and Dick Matthews. The committee met on March 7, 2011 to go over the history of parking lot planning and to outline a path forward for instituting improvements to the parking lot. Several email exchanges and a follow up meeting were held between Steve Mabee and Andy Bohne of New England Environmental to obtain price information for various paving options. The following presents a summary of the results of this subcommittee's work.

**Evaluation of Existing Soil Conditions and Drainage**

- A test pit dug by Curb to Curb was excavated in the parking lot sometime in 2010 to determine the soil type in the parking lot.
- The soil consists of 6-8 inches of compacted sandy gravel that was imported to act as a base for the existing gravel parking lot.
- Under the gravel is a very fine sand and silty clay. This unit comprises the lake bottom sediments of former glacial Lake Hitchcock and is very fine grained.
- This silty clay unit is not permeable but very sensitive to vibration when wet. Dynamic loading by vehicles when wet can cause this unit to liquefy and lose strength.
- **Accordingly, we are dealing with a unit that is potentially unstable if disturbed. Therefore, it is recommended that disruption or regrading of this unit be avoided at all cost or kept to a minimum. Any parking activities should be raised above current grade by filling rather than by cutting.**
- Drainage in the parking lot is toward the north and northeast as sheet flow across the surface of the parking lot. Runoff often accumulates in the northeast corner of the lot.
- There is an existing catch basin in the northeast corner of the existing paved area that is non-functioning due to bad grade. It will have to be reconstructed. It ties into a 6 inch PVC pipe.
- Roof drainage on both sides of the church is also picked up by 6 inch PVC pipes.
- All 6 inch pipes are tied together and pass under the parking lot and daylight on the slope east of the parking lot.

**Recommendations for Grading and Drainage Improvements**

Based on discussion among paving subcommittee members and based on informal talks with the Town, it is recommended that drainage be allowed to sheet flow across the parking lot rather than be collected in a formal drainage system and discharged at Station Road. Accordingly, the following grading and drainage improvements are recommended.

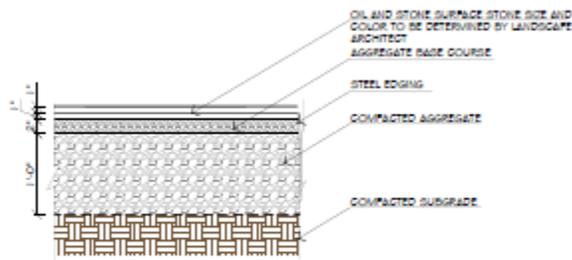
- Do not disturb the existing parking lot by cutting into the sensitive silty clay unit. Build up from the existing grade.
- Pitch the exit drive and parking lot to drain toward the northeast corner. Do not exceed 4% pitch.
- To prevent excessive wetness and saturation in the northeast corner, construct an elongated shallow stormwater detention pond around the corner. Design for a 25 year, 24 hour storm event.
- To prevent overtopping in extreme events construct an overflow pipe to the existing manhole and 12 inch storm drain on church property and thence to the existing headwall on Station Road.
- Reconstruct the existing catch basin on the existing paved parking so that it will accept runoff and connect all existing 6 inch PVC drain pipes to new detention pond.
- Install curtain drain along south side of parking lot to intercept subsurface drainage from the south. Daylight this drain on the slope east of the parking lot.

### Parking Lot Surface Options

Four paving options were examined and evaluated for their advantages, disadvantages and costs. The four options are: macadam (layer of asphalt with angular pea-sized stone chips spread over the top), grasscrete paver (waffle shaped precast concrete paver that allows topsoil and grass to be placed between the concrete), regular asphalt and pervious asphalt paving.

#### Macadam

Macadam consists of 1 foot of coarse compacted sandy gravel, followed by 2 inches of graded aggregate base, followed by an asphalt layer spread with angular pea-sized stone chips. The chips are spread on top of the oil and wheel traffic over time presses the aggregate into the oil and the top course hardens into a macadam surface. The figure below shows a typical section.



### OIL AND STONE PAVING

- When first applied there are loose chips that collect in piles and can be tracked into the church
- Chips can be plowed up by the snow plow

Estimated unit cost to install with a 30% contingency for grading, drainage and landscaping is \$3.00 to \$3.50 per square foot. Estimated initial cost would be \$62,000 to \$71,000.

Advantages – Inexpensive

Disadvantages –

- Lasts 6-10 years, so have to apply new asphalt and stone every 6-10 years the major cost being the asphalt, which experiences price volatility

- Forms a thin impervious surface that can crack easily and be broken up by a snow plow or frost heaving.

### Grasscrete Paver

Grasscrete is a proprietary name for a cast-in-place reinforced concrete slab that is waffled such that openings occur between the concrete. Topsoil is placed in the waffles allowing grass to grow. The surface area is 47% concrete and 53% holes. The main advantage is that the system



Figure1. Installed grasscrete paver.

provides drainage and reduces overland runoff. Figure 1 shows an example of the grasscrete pavers. A typical section is shown in Figure 2. Pavers must be placed on 12 inches of coarse aggregate base that must be permeable and pitched to allow for lateral drainage. Lateral drainage is imperative as the subgrade at the church is relatively impermeable. Unit costs to install the base, paver, topsoil and seed is \$18 per square foot according to Andrew Bohne. This would give an install cost of \$366,750.

#### Advantages –

- Provides an aesthetically pleasing surface that reduces heat adsorption in the summer and promotes infiltration
- May be easier to gain site plan approval or special permit approval if an effort is made to reduce overland runoff

#### Disadvantages

- High initial cost
- Snow plowing may destroy the grass and catch on concrete damaging the pavers
- May be difficult for traversing with high heels

- May be difficult for elderly to navigate due to the uneven ground
- Grass requires mowing and perhaps watering

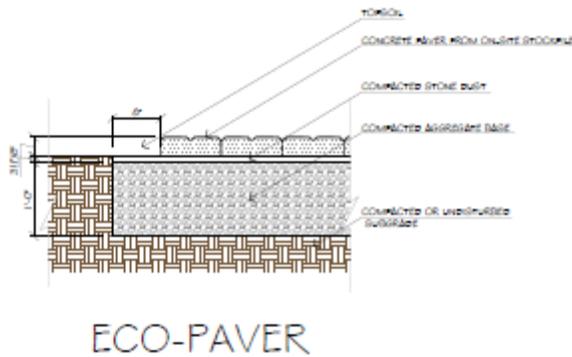
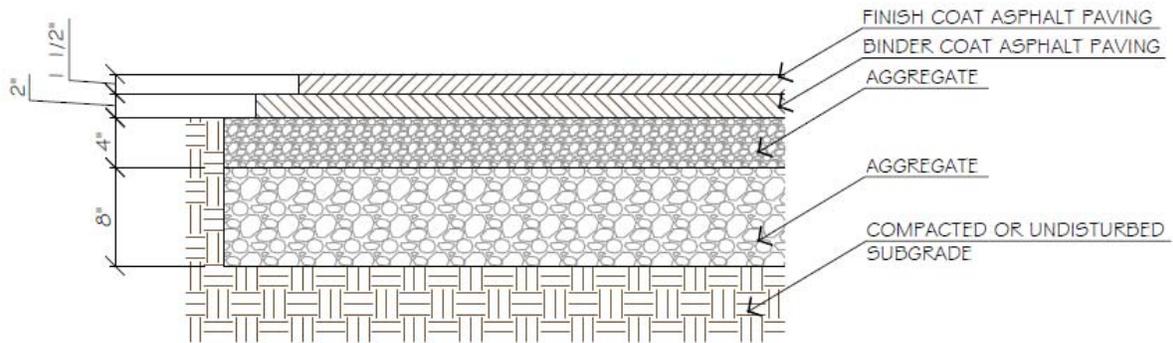


Figure 2 – Typical section of a grasscrete paver.

### Standard Asphalt Paving (Bituminous Concrete)

This option consists of 12 inches of aggregate base (sandy gravel), followed by 2 to 2.5 inches of binder asphalt paving plus 1.5 inches of finish coat asphalt paving (Figure 3). The paving is impervious so all runoff will be via overland flow to the proposed detention

pond. Unit costs are estimated to be \$4.00 to \$4.40 per square foot (including a 30% contingency for drainage, landscaping, grading, striping, lighting) for a total of \$81,500 to \$89,650.



# ASPHALT

Figure 3. Typical section of standard asphalt paving.

#### Advantages

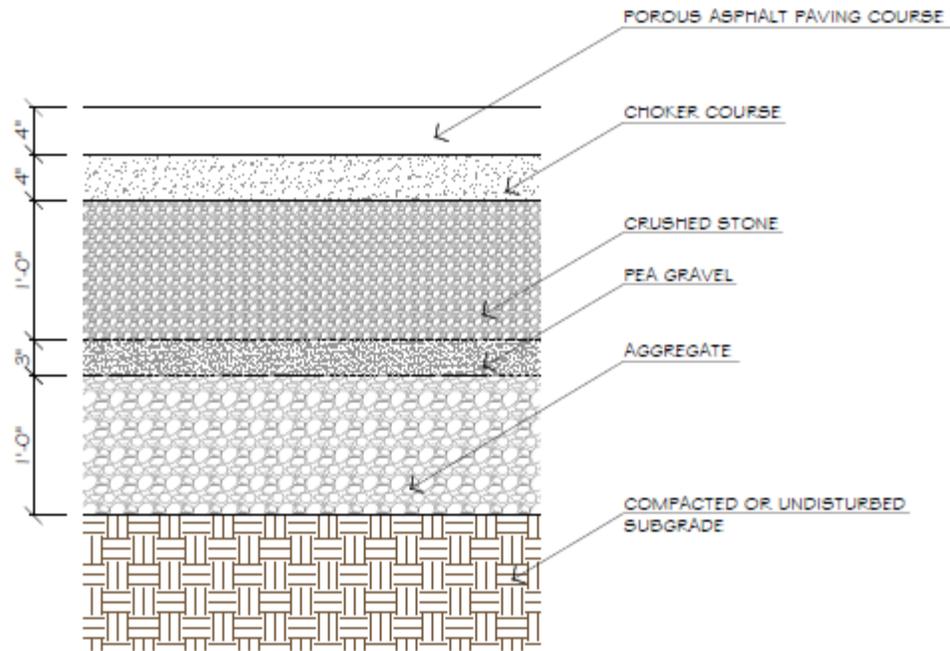
- Easy to install
- Long lasting, up to 20 years with minimal maintenance
- Stands up to snow plowing

#### Disadvantages

- Higher cost than macadam
- Produces 100% overland flow

## Porous Asphalt Paving

This option consists of a special mix of aggregate and asphalt such that when applied the asphalt is porous allowing water to infiltrate into the underlying base material where it can infiltrate the subgrade (not in the church's case) or flow laterally to the proposed detention pond. Typical section of porous asphalt consists of 12 inches of aggregate base, 3 inches of pea gravel, 12 inches of crushed stone, a 4 inch choker course to buffer crushed stone with paving, followed by 4 inches of porous asphalt paving (Figure 4). Porous paving requires more base material because



# POROUS ASPHALT

Figure 4. Typical section for porous asphalt paving.

surface runoff actually infiltrates into the base material where it is temporarily stored before it drains laterally. Since the subgrade at the church parking lot is relatively impermeable the subgrade must be pitched to allow for lateral drainage to the detention pond. Unit costs for the porous asphalt paving is \$5.50 to \$6.00 per square foot with 30% contingency built in. Total estimated cost is \$112,100 to \$122,250.

Advantages-

- Provides an excellent way to reduce runoff by providing temporary storage of runoff in the gravel base and attenuating peak runoff from the parking lot.
- Reports indicate that the runoff is wicked away rapidly and that during the winter ice does not form; as soon as the sun warms the asphalt water infiltrates immediately allowing the parking lot to clear of ice and snow quicker than regular asphalt.
- Can be plowed and is just as durable as regular pavement.
- May be easier to obtain site plan or special permit approval from the town because this option is considered green.

Disadvantages –

- You are not supposed to use sand on the pavement, fine grains can clog the pores over time, but you can use salt for deicing.
- Parking lot must be vacuumed once a year to remove fines from the pore spaces. There are vendors in Amherst that can do the vacuuming. Cost will be \$300 to \$450 annually.
- Is a more expensive option than standard paving.
- Special arrangements need to be made at the batch plant. Usual practice is to do special paving requests at the beginning of the paving season or at the end of the season. Accordingly, porous paving is more difficult to schedule and requires better planning.

**Summary of Costs for Each Option**

A recap of costs is as follows:

Option	Unit Costs <sup>1</sup>	Unit	Estimated Total
Macadam	\$3.00-\$3.50	SF	\$62,000-\$71,000
Grasscrete Pavers	\$18	SF	\$366,750
Standard Asphalt Paving	\$4.00-\$4.40	SF	\$81,500-\$89,650
Porous Asphalt Paving	\$5.50-\$6.00	SF	\$112,100-\$122,250

<sup>1</sup>Unit cost contains a 30% contingency for moderate grading, drainage, landscaping; no lighting.

**Preferred Option**

The preferred option is most likely standard asphalt paving but porous paving should be given a thorough examination by a professional. Standard asphalt paving will last longer and is more durable for New England winters than macadam. Macadam is too weak and requires frequent maintenance. Grasscrete pavers are too expensive and will not work well for snow plowing or high heels. However, it is considered a green option. Porous paving is attractive for its runoff control, water quality control (base materials act as a filter, which is important in the ARP), and the fact that reports indicate it becomes snow free faster than regular asphalt paving.

**Summary of Potential Obstacles**

There are several potential obstacles or issues that may come up on this project.

1. The project may require site plan review (SPR), which means the project will be open to scrutiny by the Planning Board and other town boards. It is not clear if site plan review is required. A strict reading of the Zoning By-laws by the committee indicates no obvious triggering mechanism yet unofficial word is that we will be subject to town review. Our position is that we are simply paving an existing grandfathered parking lot that already drains overland. Furthermore, the subcommittee believes that adequate review of our intent to improve the parking lot has already taken place. The Town is aware of our plan and no further action is required.
2. If SPR is required, then we may be scrutinized for the drainage plans, landscaped islands and lighting. All this review will add time and money to the project particularly if we are required to put in islands and lighting.
3. If we are required to do SPR then we would need to request a waiver on landscaped islands and request a waiver for lighting. Both of these add cost to the project. We have neither now. The arguments against landscaped islands are as follows: a) we have an elderly congregation and navigating spaces with islands would be too difficult; b) landscaped island would either make plowing more difficult or prevent overland drainage requiring a more sophisticated drainage system depending on how the islands are laid out; c) we use the parking lot for a staging area for many functions such as the Boy Scouts and Habitat for Humanity; islands will preclude that use by breaking up the space.
4. The town might require a special permit as well depending on how a “lot” is defined. In an ARP a special permit is required if more than 15% of a lot is rendered impervious. If you look at the church in total (that is, the combined R-N and R-LD lots together), the proposed parking lot and church building are under the 15% threshold. If a lot is considered by zoning designation then the parking area will exceed the 15% impervious threshold. This will have to be interpreted by the Town.

## **Funding and Timeline of Construction**

The estimated cost for parking lot improvements is likely to range from \$100,000 to \$150,000 depending on what option is selected and whether additional work is required by the town. Either way, the remaining capital campaign funds are likely to be inadequate to cover all the costs. Accordingly, options for seeking the additional funds will likely be through: a) taking out another mortgage or b) additional fund raising.

If we proceed with the project now it is possible work could be completed before the end of the paving season in the fall of 2011. If the project goes through full site plan approval it is likely construction could not begin until summer 2012 as more time will be needed to get through the approval and permitting process. Regardless of which approach is taken, any final design needs to be done by a professional to be sure we are in compliance with standard construction practices.

New England Environmental has offered to do the parking lot and drainage design and is offering a 20% in-kind donation on the total price. The price to help with the parking lot design is \$5700 and only includes one meeting with the town.

In addition, one of the great assets of the church property is its location and the view of the Pelham hills to the east. That view can be a source of income to the church if planned correctly. At some point the church may want to consider improving the space in the back to serve as a location for external functions such as weddings, reunions etc. that could generate income. Any parking plan should be fully integrated into such future planning.