



Memorandum

To: Emad Hanna/NYSG
Subject: LSJ Pathway Lighting and Utility Trench
Date: July 15, 2005
Prepared By: Paul Gandy/Globaltech

Introduction

We have prepared a preliminary selection and budgetary estimate for installing pathway lighting for all outdoor pathways at LSJ. The intent of the lighting project is to provide illumination of the immediate pathway area to allow visibility of all pathway segments at night.

The original scope of the preliminary estimate was to provide information for the pathway lighting project only. However, it was brought to our attention that future utilities would be extended along the paths for irrigation water, potable water, power, communication and control, etc. For this reason it might be prudent to consider constructing the utility duct bank (all utilities in a common trench) at the same time as the lighting since similar construction equipment (trencher) would be needed for both projects.

A summary of the two approaches follows:

<u>Description</u>	<u>Lighting Only</u>	<u>Lighting and Ductbank</u>
Construction Time	4 months	9 months
Budget Estimate	\$ 430,000	\$1,000,000

Each of the above amounts includes 10-20% for engineering, legal, and permitting fees. A detailed estimate of the above options is included in the attached spreadsheet. It should be noted that several preliminary assumptions were made in arriving at the scope of the project. Costs and scope could vary based on final design and project specifics.

Lighting description

For the purpose of this estimate we assumed the use of 'bollard' style lighting fixtures which are between 36" and 48" in height. The primary reason for the shorter fixtures (as opposed to pole mounted types) is to limit the effects of wind damage and to control the amount of stray light. From a tour of the site it was decided that the fixtures would be installed in most every case on the high side of the path where the additional height of the retaining wall can be used to advantage. This would also alleviate the need to trench in rock for the individual light circuits because there is more soil adjacent to the retaining wall on the high side of the path. Hand digging is possible at this location. Trenching for the main electrical feeders would still be required in the pathways.

To serve the light fixture power requirements we are assuming the installation of 480 volt main feeders in the pathways with step-down transformers located approximately at 700 foot intervals. From each transformer the lower voltage (120 or 208 volts) would be distributed to the individual fixtures. We have also allowed a budget item for remotely controlling banks of fixtures (by pathway segment or transformer groups) from a central location so that all fixtures will not need to be illuminated at once.

Brochures for representative fixtures are attached. We recognize that the actual selection process is very subjective and could alter the type and spacing of the fixtures. The following are assumptions used in the layout of the fixtures:

Separation: 50 feet

Quantity: 380

Voltage: 120/208 v

Wattage: 60 (halogen or incandescent)

Material: Aluminum or Stainless Steel

Mounting: Concrete base slab

Total power consumption with all fixtures illuminated is approximately 22.8 kW.

Trenching Description

Due to the nature of the rock on LSJ, trenching is the controlling factor in the schedule and accounts for 25-35% of the budget. It is assumed that rock will be encountered for 80% of the trench path. As mentioned above, two approaches

were considered – lighting only and lighting with the installation of a duct bank for present and future services.

If lighting only is installed, a single narrow cut will be required to install one 4-inch power conduit and one 2-inch control conduit along the pathways. This accounts for the reduced schedule and much of the reduced cost. If a utility trench is installed the following is included:

Trench width:	36"
Trench depth:	18" minimum
Progress per day:	50 feet
Total installation time:	9 months

Conduits:

- 4" 480 volt power (4-wire)
- 2" lighting power (branch only)
- 2" Network-F/O
- 2" Communication
- 2" Irrigation
- 2" Potable Water
- 4" Spare

Pull boxes (concrete) will be installed at 500-700 foot intervals to accommodate installation of conductors.

It is assumed that the Owner will rent a trencher for the duration of the project and that the Owner's forces, along with existing equipment on site, will excavate the trench and install the conduits. As shown in the attached spreadsheet, an electrical contractor will be employed to do the electrical work. The largest expense associated with the trenching effort is associated with tooth wear on the cutting wheel. Rock of the type found on LSJ could use between one and two sets of teeth per day at approximately \$500 per set for the utility trench.

While there are 19,300 feet of pathway we have assumed that the utility trench would need to extend only along 15,500 feet of that distance in what could be considered a main loop to service outlying building and "outposts". The smaller and dead-end pathways would not need a main utility trench.

The budget for the utility trench assumes that only 480 volt power conductors are installed at this time. Under this option the conductors are larger (to

accommodate future facilities) than the lighting-only option. Network and communications conduits would be empty until future need.

One note of importance to the above considerations is that it has been assumed that trenching needs to occur along the pathways for the major utilities. This has been discussed in the past as an advantage because it allows a 'pathway' and access road for installing the utilities as opposed to a 'line-of-site' approach which would involve trenching along the vertical incline of the hill side. We have assumed using this method to a very minor degree in feeding some of the lighting circuits. Using this route for the primary utility trench may or may not be a cost saving factor however it may also prove more difficult to permit as the paths are already existing.

Once some preliminary decisions are made, a more detailed study could be employed to determine if a combination of the above methods could be used to save costs and improve on scheduling.