



# Town of Chapel Hill

## Public Works

### Department

Report on Building Energy  
Improvements to the Police Station



# Town of Chapel Hill Public Works Department

- Seven young men, age ten to thirteen presented their findings from an energy audit of the Police station to Council on November 9, 2007.
- The audit was undertaken by the group as part of their entry into the Lego 'Mindstorms' competition.



# Town of Chapel Hill Public Works Department

- Audit involved examinations of :
- Lighting
- The Building Envelope
- The Mechanical System
- Major Appliances
- Electronic Devices
- Alternative Energy



# Town of Chapel Hill Public Works Department

## Lighting

### Mindstorms' Team Recommendation:

- Add occupancy sensors where practical
- Modernize ballasts in fluorescent fixtures
- Replace incandescent lights with LED type



# Town of Chapel Hill Public Works Department

## Lighting

### Staff Comment:

- Staff concurs with the findings.
- We have begun replacing incandescent lighting with LED and/or compact fluorescent lamps.
- We are replacing standard light switches with occupancy sensors and inspecting ballast as warranted.
- We are measuring light levels to ensure light levels are adequate.



# Town of Chapel Hill Public Works Department

## Building Envelope (Windows)

### Mindstorms' Team Recommendation:

- Replace the existing windows only on the south face of the building or;
- Refill the interstitial space with inert gas.



# Town of Chapel Hill Public Works Department

## Building Envelope (Windows)

### Staff Comment:

- We have sought the advice of local glazing contractors to assist with the analysis of these recommendations and they will provide us with their recommendations based on the glazing assemblies in place and current best practices.

# Town of Chapel Hill Public Works Department

## Building Envelope (Walls)

### Mindstorms' Team Recommendation:

- The group had several recommended options relative to types of insulation that could be added to the exterior walls of the building.



# Town of Chapel Hill Public Works Department

## Building Envelope (Walls)

### Staff Comment:

- We believe the construction and orientation of the facility is such that the impact on energy use would be modest.
- The exterior walls are constructed of twelve inch thick cast-in-place concrete.
- The building is set into the side of the hill. The North wall is largely sub-surface and the East and West walls covered by earth which slopes down to the ground floor along the length of the building axis.



# Town of Chapel Hill Public Works Department

## Building Envelope (Roofing)

### Mindstorms' Team Recommendation:

- The options presented relative to the building's roof were centered on installation of a "green roofing system."



# Town of Chapel Hill Public Works Department

## Building Envelope (Roofing)

### Staff Comment:

- The current roof assembly was installed in 2002 and is functioning well.
- When the roof has reached the point where it needs to be replaced, the possibility of a green roof assembly will be considered.



# Town of Chapel Hill Public Works Department

## Mechanical System

### Mindstorms' Team Recommendation:

- The recommendations presented regarding the HVAC systems included:
  - 1) Testing and balancing the system;
  - 2) inspecting the duct work;
  - 3) adhering to manufacturer's recommend maintenance schedules and
  - 4) evaluating the location and security of the thermostats.



# Town of Chapel Hill Public Works Department

## Mechanical System Staff Comment:

- The system was installed in 2002 under the guidance of a professional engineering.
- The maintenance is provided by an independent an authorized contractor.
- Inspecting the duct work is an excellent recommendation and our maintenance staff will undertake that effort as part of the routine maintenance of the building.
- Staff has met with energy management system providers to look at the feasibility of installing a comprehensive energy management system-similar to the system installed at the Town Operations Center.



# Town of Chapel Hill Public Works Department

## Major Appliances

### Mindstorms' Team Recommendation:

- As noted in the report, there are very few appliances at the Police Headquarters.



# Town of Chapel Hill Public Works Department

## Major Appliances Staff Comment:

- We concur that when these items are replaced, the new units should be Energy Star rated.
- More energy efficient water fountains will be addressed as the units reach the end of their service life.
- The possibility of having water coolers is a reasonable point, as there are energy star models available, but brings with it other sustainability issues (transport impact etc.) that would need further examination.



# Town of Chapel Hill Public Works Department

## Electronics

### Mindstorms' Team Recommendation:

- The primary recommendation of this section of the report concerned replacing CRT monitors with lower energy consuming LCD type monitors.





# Town of Chapel Hill Public Works Department

## Electronics

### Staff Comment:

- As part of the normal operating procedures of the Town, computers are replaced on a recurring cycle.
- With each cycle of replacement, the number of devices that are energy star compliant increases.



# Town of Chapel Hill Public Works Department

## Alternative Energy/Solar Power

### Mindstorms' Team Recommendation:

- The report noted that the facility was ideally oriented for solar power generation.



# Town of Chapel Hill Public Works Department

## Alternative Energy/Solar Power

### Staff Comment:

- The standing seam roofing on the South side would present many options for the installation of solar panels for either photovoltaic applications or domestic hot water production.
- However, the report also notes that the majority of this building exposure is blocked by mature trees.
- We do not recommend taking any action at this time that would be detrimental to these trees as we believe other facilities owned by the Town of Chapel Hill would be suitable candidate for such an installation.



# Town of Chapel Hill Public Works Department

## Tracking Energy Utilization

- We have established base line consumption information for electrical service at this facility.
- We will continue to track utilization to determine what effect our efforts have had on the overall energy efficiency of this facility.



# Town of Chapel Hill Public Works Department

- **SUMMARY**
- The Lego Mindstorms team made a number of useful recommendations for improving energy efficiency at the Police Department.
- We will implement those measures that we can and believe much of their report is consistent with our efforts to retrofit and upgrade existing buildings to directly reduce the carbon foot print of the Town.
- We will continue to provide updates to the SEE Committee and as requested to the full Council regarding these efforts.