Engineering Division

William J. Renault PE
Town Engineer

The Concord Public Works Engineering Division is responsible for the planning, design, engineering and construction of Town roads, sidewalks, drainage, bridges and stormwater infrastructure assets. The Division provides a wide range of professional engineering and construction management services for Concord Public Works (Administration, Water, Sewer and Highway/Grounds/Cemetery) and other Town departments and boards.

The Division provides Geographic Information System (GIS) services and maintains Town-wide inventories, database, mapping and document control for Concord's public right-of-ways, easements, infrastructure and natural resources.

Roads and Sidewalks Program

There are approximately 107 miles of public roads, classified as arterial roads, collector roads and local streets. Arterial roads provide movement between collector roads, other arterial roads and major highways and make-up approximately 34% of Concord's public roads. Collector roads, used primarily to connect local streets to other collector and arterial roads, make-up approximately 7% of Concord's public roads, and the remaining 59% of public roads consist of local streets. In addition, Concord has 55 miles of public sidewalks.

Concord's pavement management strategy and 20-year Roads and Sidewalks Program Plan emphasizes investment in road and sidewalk/handicap ramp rehabilitation, combined with preventive and routine maintenance. Pavement treatment and maintenance options are based on a condition survey of the roads and sidewalks that is performed every four years, pavement management software, in-house engineering operations knowledge, and Town-wide utility planning.

Extensive use of crack sealing, which enables CPW to maintain the integrity of existing road structures while improving selected roads by means of reclamation and cold plane/overlay pavement treatments is a key element in road pavement maintenance.

3.68 Miles of Roads Improved

Roadway improvements, including reclamation, were completed on Revolutionary Rd., Plainfield Rd., Walden Terrace, Laurel St., Ridge Rd., Walnut St., Chestnut St., Middle St., and College Rd. Sudbury Rd. and Academy Lane were selected to receive a mill and overlay treatment.

1.98 Miles of Sidewalks Improved

Construction included replacement and extension of sidewalk as part of the Route 62 project, sidewalk replacement/widening on Main St. from Old Stow Rd. to Damon Mill, sidewalk overlay on Old Bridge Rd., and extensions on Plainfield Rd. and Academy Lane. Reconstruction of the Laws Brook Rd. sidewalk (from Sorrell Rd. to Hill St.) and Main Street/Sudbury Road (from the Walden Street parking lot to Stow St.) was completed as remaining work from 2008.

Sidewalk Condition Summary

Sidewalk Condition Index (SCI)	SCI Range	Miles	Percent
Replace	0-50	6.7	12%
Localized Repair	50-70	6.4	12%
Shows wear –routine maintenance	70-90	28.0	50%
Shows No Distresses	90-100	14.4	26%
Total Miles		55.5	100%

Network Average (%)

Year	SCI	Year	SCI
1999	80%	2007	77%
2004	80%	2008	76%
2005	82%	2009	76%
2006	82%		

Road Condition Summary

	2006	2007	2008	2009*
Pavement Condition Index (PCI) Network Average	83	84	83	81
Recommended Repair(s)				
Rehabilitation	13%	14%	12%	9%
Routine Maintenance	46%	42%	52%	51%
No Maintenance Required	41%	44%	36%	40%

*Includes 2009 Roads Program work to be completed by June 30, 2010

Note: The above referenced table is based on an infinite budget.

- Using the $1M FY2010 budget, the *recommended* repair breakdown is: (Rehabilitation 1%, Maintenance 12%, No Work Performed 87%)
- Using the $1M FY2010 budget, the *performed* repairs breakdown is: (Rehabilitation 2%, Maintenance 1%, No Work Performed 97%)

Roads and Sidewalks in Sound Condition

The accompanying tables show that the condition of Town roads remains within the target range of 80-85 PCI (Pavement Condition Index). However the Town's sidewalks have fallen below the target SCI (Sidewalk Condition Index). Preliminary calculations show that

maintaining the current maintenance investment will allow the Sidewalk Program to meet its recommended range by 2011. The Town's overall investment in its road and sidewalk assets has resulted in cost effectively protecting and improving Concord's public way infrastructure for pedestrians and drivers while avoiding a multi-million dollar backlog to be paid by future residents of Concord.

Other Roads & Sidewalks Projects

The Engineering Division conducted weekly construction coordination meetings for the Route 62 Roadway Reconstruction Project with the design engineer, MassHighway/MassDOT, and contractor to ensure the Town has input on field changes and plan modifications required during the construction phase of the project.

CPW completed the removal and reconstruction of the Main St. retaining wall at Old Stow Rd. The work included the reconstruction of the sewer service and the installation of a new sleeve to allow for future maintenance of the service without disturbing the wall. As outlined above, the work also included a sidewalk widening from Old Stow Rd. to Damon Mill.

CPW also began the reconstruction of the Sudbury Road and Thoreau Street intersection. The project included the replacement of signalization equipment within the intersection, the addition of turning lanes through curb widening and the installation of vehicle detection to improve the overall operations of the intersection. Remaining work includes the installation of the vehicle detection system, pavement milling and overlay and installation of pavement markings which will be completed in the spring.

Public Works Week poster

Stormwater/Drainage

Concord is a "rivers community" with a stormwater/drainage infrastructure consisting of 200+ culverts, 315+ drainage outfalls, 3,700+ catch basins; 1,700+ manholes; and 50+ miles of drain lines. The Town is also responsible for three dams. CPW plans, coordinates and performs drainage improvements in conjunction with the Roads and Sidewalks Program to minimize disruptions and to eliminate expensive emergency repairs. Drainage maintenance activities are coordinated with the Division of Natural Resources and are performed under the general maintenance permit issued by the Natural Resources Commission.

The Drainage System Inventory was integrated into the Town's Geographical Information System (GIS) providing the basis for developing a 20-year Storm water/Drainage Management Plan. The goal of the plan is to improve, protect and maintain Concord's public storm water/drainage infrastructure through scheduled maintenance and planned replacements and enhancements. The CPW Stormwater Team continues to inventory and assess the locations and condition of Concord's Stormwater/Drainage infrastructure. When completed, a stormwater/drainage condition index will be calculated for each structure, each category and for the overall system. During the catch-basin cleaning process, inspection report forms were provided to the staff accompanying the cleaning contractor to continue developing, inspecting and documenting the Town's catch-basin inventory. These forms are used to identify catch-basin deterioration, possible illicit connections, and needed repairs. Repairs are then performed by the Highway Division and incorporated in the Roads program designs or bid as stand-alone projects, based on the project scope.

Work related to the Town's compliance with the National Pollution Discharge Elimination System (NPDES) Phase II General Permit is funded and coordinated through the Drainage Program. The permit requires Towns to meet multiple objectives to improve water quality with the Commonwealth including public outreach, drainage system mapping, illicit discharge/detection and elimination (IDDE). The permit is planned to be updated by EPA in 2010 and will include sampling and testing requirements for outfalls. In August, the EPA issued an administrative order and complaint that the Town and 9 other communities were allegedly

in violation with the General Permit for storm water discharges from small municipal separate storm sewer system (MS4). The complaint focused mainly around the IDDE program. The Town and it's legal counsel has vehemently contested this and has provided overwhelming data and information refuting theEPA's claims during informal negotiations which demonstrate the Town was compliant with the NPDES permit and has implemented measures well beyond most communities in the Commonwealth. The Town is awaiting a decision from EPA during this informal process before determining if a formal hearing will be requested.

$205,000 was appropriated to continue a multi-year effort to improve the condition of the Town's stormwater system. A major purpose of the Stormwater/Drainage Management Plan is to prevent expensive emergencies from occurring in the future through a planned and scheduled maintenance and replacement program.

Multiple improvements to the Town's drainage system were constructed in coordination with the Roads Program. This work included the replacement of a corrugated metal arch culvert on Sudbury Rd. with a concrete box culvert. The replacement was designed and permitted by the Engineering Division for inclusion within the Roads Program contract. In addition, drainage replacements and extensions were installed on Plainfield Rd., Middle St., Academy Lane, Laurel St., College Rd., Chestnut St., and Walnut St. to correct flooding, puddling and erosion problems on the planned road reconstruction streets.

The drainage program also included CPW in-house projects. These projects are designed and permitted by the CPW Engineering Division and constructed by the CPW Highway Division and included the culvert replacement and required dewatering for a 30" corrugated metal pipe culvert. Smaller scale drainage improvement projects were conducted on Wilson Rd., Edgewood Rd., Hawthorne Rd., and Beharrell St. to repair minor flooding and puddling. This work included the drainage extensions, structure installations and berm/curb installations.

Other Stormwater/Drainage Projects

The Mill Brook Culvert Project began in the 2008 construction season and was completed in summer 2009. The CPW Engineering Division facilitated public hearings during the planning phase of the project. The Engineering Division managed consulting engineering services for the design, permitting and construction administration for the project. The project scope included the installation of grouted in-place pipe liner with an existing corrugated metal pipe arch located under Main St. The project also included the installation of concrete channels upstream and downstream of the liner as well as the diversion of the Mill Brook thorough a temporary shallow bury pipe within Main St.

Bridges

Engineering staff continued to monitor the wearing conditions and structural integrity of the 5 Town-owned bridges: Flint Bridge, Heath's Bridge, Nashawtuc Bridge, Pail Factory Bridge and Pine Street Bridge. Staff coordinated inspections/repairs/construction planning with the Massachusetts Department of Transportation (MassDOT).

- Pine St. Bridge – MassHighway/MassDOT and project contractor completed the reconstruction of this bridge and it was reopened to vehicular and pedestrian traffic in August.
- Flint Bridge – MassHighway/MassDOT and project contractor completed the reconstruction of this bridge and it was reopened to vehicular traffic in January of 2010.

Flint Bridge on Monument Street

- Nashawtuc Bridge – CPW Engineering Division rebid the parapet wall restoration project and managed the consultant services for a re-design of the project and part-time construction inspection of the project. Environmental permitting and construction administration for the project was completed in-house by Engineering Division staff. Community Preservation Committee

funding in the amount of $250,000 was obtained by CPW for the project. The remaining project funding is through State aid (Chapter 90) program. The bridge was opened to vehicular traffic in November.

The failing parapet wall of the Nashawtuc Bridge was repaired with Community Preservation Act funding.

Geographic Information System (GIS)

Concord's GIS program continues to grow and become more integrated into daily operations. Water & Sewer field personnel now have the use of field laptops loaded with GIS software and data, saving them time in the field. The Engineering Division will utilize similar technology to develop a mobile right-of-way permit system which will increase overall productivity.

The Highway and Engineering Divisions have spent considerable time inspecting outfalls and other drainage system structures, and using the new information to update these layers in the GIS system. The drainage information within the GIS has been updated based on these inspections.

PeopleForms use continues to expand within the GIS Program. The GIS Program Coordinator coordinated theTown-wide project to develop a Web311 system, called "Ask Concord". The system is accessible to the public through the Town website and allows residents to view a frequently asked questions data base.

The Engineering Division continues to enhance the attribute information available for drainage system data as structures are cleaned and inspected. Every day, more and more pictures and inspection sheets become available to CPW staff through the CPW WebGISstaff site.

Technical Support

Engineering staff provides engineering and construction management support services for CPW and various Town departments, boards and commissions.

The Town Engineer represented the Town on the Route 2 Corridor Advisory Committee (CAC) to address several projects:

- Crosby's Corner – MassHighway/MassDOT has submitted a Notice of Intent to continue the final stage of the environmental permitting required for the project. The Engineering Division is in the process of obtaining peer review engineering services for the review of the stormwater management of the project. This will be used to supplement in-house review. CPW has been in discussions with MassHighway/MassDOTto provide improvements to Cambridge Turnpike to address the volume increase in stormwater that will be generated by the Crosby Corner Project. The construction bid advertisement for the project date is anticipated to be published in September.
- Route 2/Concord Rotary – MassHighway design consultant is in the process of preparing the filing of the Environmental Impact Report with MEPA along with preparing the 25% design plan set. Subsurface boring tests are being performed in critical locations of the project including proposed bridge, drainage basin, and retaining wall locations. No construction timeline is planned at this time as the project is not within the current Transportation Improvement (TIP) Program.

Highway & Grounds Division

Dickinson Fowler,
Highway & Grounds Superintendent

Approximately 107 miles of public streets and 55 miles of sidewalks are maintained by the Highway and Grounds Division of Concord Public Works. The compost facility is managed and cared for by the Highway staff as well as the maintenance and replacement of 2,700 road signs. More than 90 pieces of CPW equipment and vehicles are cared for by CPW mechanics and staff. The Park and Tree Supervisor, who is also the Town's Tree Warden, directs the care of all public shade and park trees. All 82 acres of public parks and grounds and 39 acres of active recreation areas, as well as ten athletic fields, including the new multi-use fields at Concord Carlisle Regional High School (CCRHS) are cared for by the Park and Tree staff.