



2013 CONCORD ANNUAL TOWN REPORT

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PUBLIC WORKS

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Engineering Division

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ENGINEERING DIVISION

William, J. Renault, P.E., Town Engineer

The CPW Engineering Division is responsible for the planning, design, engineering and construction of Town road, sidewalk, bridge, and stormwater/drainage infrastructure assets. The Division provides a wide range of professional engineering and construction management services for CPW and other Town departments and boards.

Roads Program

There are approximately one hundred and seven 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.

Concord's pavement management strategy and 20-year Roads Program emphasize adequate capital investment in the roadway network combined with preventive and routine maintenance activities to prolong the pavement life cycle. Capital roadway improvements typically include the reclamation, mill and overlay, and overlay pavement treatments. The reclamation treatment pulverizes the roadway pavement, re-grades the new subgrade material and installs two new layers of hot mix asphalt pavement. A mill and overlay treatment cold planes off the top wearing course of pavement and a new pavement layer is installed over the grooved pavement. An overlay treatment is a thin asphalt layer installed over an existing roadway.

A condition survey of the Town's roadway network is performed every

four years and inputted into the roads program software. The software utilizes the pavement condition data, estimated traffic volumes and treatment cost to recommend pavement improvement projects. CPW Engineering Division then utilizes this software output, engineering judgment and planned utility improvements to finalize the year's roads program.

Maintenance activities are used to preserve the integrity of the existing road structures while reducing the need for the more costly rehabilitation treatments. Crack sealing is utilized as the primary preventative maintenance activity, while full depth patching/spot repairs are the primary routine maintenance activities used by CPW.

4.15 Miles of Roads Improved

CPW Engineering Division completed the internal design and bid for the 2013 Roads Program. The program included the reclamation treatment of Powder Mill Road (Stone Root Ln. to Old Pickard Rd.), Allen Farm Ln., Gifford Ln., Baker Ave., Saw Mill Rd., Crescent Rd., Garland Rd., Wilson Rd., Nashoba Rd., and Hosmer Rd. as well as mill and overlay treatments on Fitchburg Tpk., Caterina Heights and Elm St. (Main St. to Bridge). The bid included significant drainage improvements within the Saw Mill/Baker and Crescent/Wilson neighborhoods. The 2013 road program work began in the late summer and extended into the fall of 2013. The balance of the contracted work is scheduled to be completed by the summer of 2014.

8.1 Miles of Roads Maintained

The 2013 crack seal program repaired 6.1 miles of roadway including: Old Bedford Rd., Laws Brook Rd., Court Ln., Strawberry Hill Rd., Lowell Rd., High Pine Circle, Juniper Circle, Hillcrest Rd., Maplewood Circle, Border Rd., Elm St. and Old Road to Nine Acre Corner.

CPW Highway Division completed over 2 miles of full depth patch spot repairs on Cambridge Tpk., Old Marlboro Rd., Coolidge Rd., Old Bedford Rd., Monument St., Prescott Rd., Westford Rd., and Hawthorne Ln.

Cambridge Turnpike Improvement Project

The Cambridge Turnpike Improvement Project proposes to construct improvements to the roadway to address a major flooding issue which causes frequent closure of the roadway in heavier rain events. The Town views this as an important opportunity to design and construct improvements to the roadway and other public infrastructure to enhance the experience of the people who use the area. To the extent

that is feasible, a project objective will be to integrate several modes of transportation in an aesthetically pleasing manner that complements the community's character and is sensitive to the nearby environmental and historical resources that Concord residents value and enjoy. CPW has initiated a significant public outreach program for the project to provide the residents multiple opportunities to provide input on the project's design.

CPW Engineering Division provided consultant management and technical engineering guidance for the public outreach, preliminary design and preliminary permitting efforts for the project. Work included significant review and comment on a Hydraulic and Hydrology study to support the development of a Letter of Map Revision (LOMR) with FEMA for the upper Mill Brook watershed. The LOMR, which was filed in the fall, requests a 3.5' - 4.5' reduction of the flood plain elevation of the upper Mill Brook watershed.

The Engineering Division provided assistance at the project's second public outreach meeting, which was held at the Public Work's Commission meeting. Presentations were developed to highlight the results of the preliminary design efforts and more specifically the contents of the preliminary design report. Items discussed at the meeting included proposed roadway cross section, pavement width, shoulder width, bicycle accommodation strategy and the bridge/wall type study.

Sidewalk Program

Concord's sidewalk management strategy emphasizes adequate capital investment in repair to the existing sidewalk network to maintain and/or improve the pedestrian experience for all sidewalk users. Upgrades to meet American with Disabilities Act (ADA) standards are also funded through the sidewalk program.

The sidewalk network contains approximately 59 miles of public sidewalks and approximately 700 curb ramps. A condition survey of the sidewalks is performed every four years in conjunction with the roadway condition survey. A Town-wide curb ramp inventory and condition assessment was completed in 2011. The inventories and conditions are updated annually based on repairs, reconstructions or installation of new ramps.

Sidewalks and curb ramp projects are prioritized for repair based on their proximity to high pedestrian generators, overall condition and compliance with current ADA accessibility standards. Sidewalk and

curb ramp reconstructions are bid as standalone projects, included within the roads program bid or completed as internal projects by CPW Highway Division.

1.20 Miles of Sidewalks Improved

The Sidewalk program bid included sidewalk replacements on Fairhaven Rd., Monument Sq., Commonwealth Ave., Old Bedford Rd., Fox Ln., Thoreau St., Monument St./Bartlett Hill Rd., and Rideout Playground. The program included the reconstruction of 53 curb ramp reconstructions to bring the ramps into current ADA standards related to width, slopes, and surface type. The roads program bid included an additional 30 curb ramp reconstructions.

Roads and

SIDEWALK CONDITION SUMMARY

<u>Sidewalk Condition Index (SCI)</u>	<u>SCI Range</u>	<u>Miles</u>	<u>Percent</u>
Replace	0-50	1.2	2%
Localized Repair	51-70	13.5	23%
Shows Wear	71-90	36	61%
No Distresses	91-100	8.3	14%
Total Miles		59	100%
Network Average (%)	Year		SCI
	2005		82%
	2006		82%
	2007		77%
	2008		76%
	2009		76%
	2010		75%
	2011		81%
	2012		81%
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Sidewalks in Sound Condition

The accompanying tables show the condition of Town roads and sidewalks. The roads are located within the target range of 80-85 PCI (Pavement Condition Index). The Town's sidewalk network has slipped slightly below the target range of 80-85 SCI (Sidewalk Condition Index), but the analysis shows that maintaining the current investment level will allow the Town's sidewalk network to reach the target range over the next two years. The Town's overall investment in its road and sidewalk assets have 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.

ROAD CONDITION SUMMARY									
	2005	2006	2007	2008	2009	2010	2011	2012	2013*
Pavement Condition Index									
(PCI) Network Average	82	83	84	83	81	82	80	80	81
(PCI) Arterial/Collector Average					88	86	84	82	87
(PCI) Local Road Average					75	79	78	77	77
* Includes 2013 Roads Program work to be completed by Sept. 2014.									
Recommended Repairs									
▪ Rehabilitation	8%	13%	14%	12%	9%	8%	8%	10%	6%
▪ Maintenance	56%	46%	42%	52%	51%	48%	52%	51%	40%
▪ No Maintenance Required	36%	41%	44%	36%	40%	44%	40%	39%	54%
<u>Note:</u> The above referenced table is based on an infinite budget.									
○ Using the FY2014 budget, the actual performed repairs breakdown was: (Rehabilitation 2%, Maintenance 13%, No Work Performed 85%)									

Stormwater/Drainage Program

Concord's stormwater infrastructure consists of approximately 165 culverts, 400 drainage outfalls, 3,200 catch basins, 1250 manholes, and 58 miles of drain line. The Town is also responsible for three dams. Concord Public Works plans, designs, coordinates and performs construction of drainage improvements in conjunction with the Roads and Sidewalks Programs to minimize disruptions and to eliminate expensive emergency repairs. Drainage maintenance activities are coordinated with the Division of Natural Resources and are typically performed under the general maintenance permit issued by the Natural Resources Commission.

In 2002 and 2003 the Town performed a closed drainage system inventory and in 2011 completed a culvert inventory. Within these inventory projects, condition assessments and rating systems were developed and integrated into the Town's geographical information system (GIS) to provide the basis for the development of the Town's 20-year Stormwater/Drainage Management Plan. This Plan is intended to provide a cost-effective framework for the upgrade and repair of the Town's stormwater/drainage system and to prevent expensive emergency repairs from occurring in the future through a planned and scheduled maintenance and replacement program.

Staff continues to update the location and condition data of Concord's Stormwater/Drainage infrastructure within the GIS system. CPW Highway Division staff verifies and supplements GIS drainage data during annual catch basin system cleaning operations. CPW Engineering Division also updates drainage data obtained through ground survey for various capital improvement projects. All updated inventory data are used in prioritizing replacement projects and/or CPW repair projects.

The National Pollution Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Phase II General

Permit issued by the EPA is also a major component of the Town's Drainage Program. The permit, issued in August 2003, requires Towns to meet multiple objectives to improve water quality within the Commonwealth including: public education and outreach, public involvement and participation, illicit discharge detection and elimination, construction-site stormwater runoff control, post-construction stormwater management in new development and redevelopment, pollution prevention and good housekeeping in municipal operations.

Stormwater/Drainage Projects

Multiple improvements to the Town's drainage system were constructed in FY14. CPW Engineering Division designed replacements for the drainage collection systems for inclusion within the 2013/14 Roads Program bid on Crescent St., Wilson Rd., Hosmer Rd., Garland Rd., Nashoba Rd., Baker Ave. and Elm St. A total of 4,875 feet of drain line, 800 feet of under drain, 56 catch basins and 40 drain manholes were programmed for replacement. Additionally two retrofit bioretention areas were constructed within the roads program bid on Baker Ave. and Nashoba /Wilson to improve water quality within the Town.

CPW Engineering Division also completed construction oversight and management of the Junction Park low impact development (LID) stormwater demonstration project. The project, which included porous paver and bioretention area LID retrofits, was designed and bid internally by CPW Engineering Division staff and provides another example of CPW commitment to improve water quality within Concord. The park design also included significant landscape improvements such as a new planting design, masonry sitting walls, park benches, lighting, a water fountain, etc. The project was funded largely by grants obtained by CPW Engineering Division from the Organization for the Assabet River, bringing the total General Fund contribution to less than 35% of the park cost. The park's construction was completed for a June 2013 grand opening ceremony.

CPW Engineering Division was also successful in obtaining supplemental grant funding for the Town's stormwater program through FEMA's Hazard Mitigation Grant Program (HMGP) for the Fitchburg Tpk. and Westford Rd. Culvert replacement projects. The Town will receive a total of \$135,000 in Federal funds toward these projects which will be constructed within 2014.

CPW Engineering Division and Public Works Director continued the

permitting of the Sleepy Hollow Culvert Replacement. CPW Engineering Division filed a Notice of Intent in June 2012 and has prepared three subsequent submittals in October 2012, December 2012 and July 2013 addressing the various comments provided for the project while still stabilizing the area, restoring lost flood plain and providing improved Blanding's Turtle habitat. The current project design proposed the replacement of a deteriorated CMP culvert adjacent to the Sleepy Hollow Cemetery with a natural bottom culvert at the existing invert as well as the cleanout/lining of an existing stone box culvert which flows under the former reformatory branch railroad right of way. The railroad culvert would also be installed with a weir structure to create the Blanding's Turtle habitat pool. The Department of Natural Resources (DNR) requested additional stream survey data be collected, which was completed by staff in September.

CPW continued meetings and site walks throughout 2013 with members of the Natural Resources Commission, DNR, the Massachusetts Natural Heritage and Endangered Species Program, abutting residents and stream crossing experts. CPW received an Emergency Certification on March 1, from DNR to install a temporary sandbag repair to stabilize the embankment adjacent to the main culvert as the impounded water began to erode through the adjacent embankment. CPW Engineering Division has noted that a similar erosion area developed on the embankment of the reformatory branch railroad culvert; however, this area appeared to stabilize itself in the fall. CPW has some concern on the proximity of this erosion area to the Town's 16" sewer force main located within in the railroad right of way. CPW Engineering Division works with the Water/Sewer Division to frequently monitor the situation to determine any potential for interruption to the Town's sewer system as well as to complete the project permitting so a permanent repair to this unstable flooded condition can be constructed.

EPA - NPDES MS4 Permit

As outlined above, the work related to the Town's compliance with the National Pollutant Discharge Elimination System (NPDES) Phase II General Permit is funded and coordinated through the Drainage Program. Major accomplishments within Permit Year 10 included the development of a new NPDES tracking matrix for all projects meeting erosion control plan disturbance thresholds. Stormwater technical review and environmental monitoring review/administration were completed for 4 redevelopment projects meeting NPDES permit thresholds. Fieldwork was continued to further update Concord's stormwater system inventory data to provide improved location and

system condition accuracy. CPW updated condition data for approximately 58% of the Town's drainage system and improved the surveyed location accuracy of roughly 52% of the Town's system.

Bridges

CPW Engineering Division is responsible for the management and monitoring of the 5 Town-owned bridges: Heath's Bridge (Sudbury Rd.), Pine St. Bridge (Pine St.), Flint's Bridge (Monument St.), Hurd's/ Nashawtuc Bridge (Nashawtuc Rd.) and Pail Factory Bridge (Commonwealth Ave.). Bridge inspections are completed every two years by MassDOT bridge staff and forwarded to CPW Engineering Division for inclusion within Town records and to prioritize any needed repairs. Inspections are completed to evaluate the structural condition of bridge components as well as underwater stability/erosion issues to meet National Bridge Inspection Standards. When required, bridge rehabilitation project scopes are developed and managed by CPW Engineering Division. Bridge repair funding comes from a variety of sources including: Chapter 90 State aid, local funding, State accelerated bridge program, etc.

Geographic Information System (GIS)

The GIS Program was significantly reorganized as the Needs Assessment and Strategic Plan project was finalized. Consistent with the recommendations within the strategic plan, the Town began the migration of the Town-wide GIS Program responsibilities from CPW Engineering Division to the IT Department. The GIS Program Coordinator position was reclassified into two positions: a GIS Technician/Analyst and a GIS Program and Applications Manager. The GIS Technician/Analyst position will remain within Public Works providing support to all Divisions of CPW with a major concentration in Engineering and Water/Sewer. The GIS Program and Applications Manager will provide support to the other Town departments while ensuring coordinated efforts on GIS and layer development projects as well as integration with applications.

CPW GIS program for 2013 included the finalizing of a new GIS street sign layer development and asset management protocol. The project will allow CPW Highway Division to manage the future replacement of signs and meet new Federal sign reflectivity guidelines and street sign letter height standards.