



February 27, 2014

Jonathan Harries
USDA Rural Development
87 State Street Suite 324
Montpelier, VT 05601

Re: PRELIMINARY ENGINEERING REPORT – Water & Sewer Utilities
Town of Colebrook, New Hampshire
CMA #889

Dear Mr. Harries,

On behalf of the Town of Colebrook, NH we are pleased to transmit the attached Preliminary Engineering Report (PER) for proposed water and sewer improvements in the community. The PER was prepared in accordance with the “SEARCH” grant to the Town of Colebrook, using USDA Rural Development guidance documents.

The PER describes the comprehensive evaluation of both water and sewer utilities serving Colebrook, and develops a phased program of capital improvements for both the water distribution and the wastewater collection systems. It describes that notable deficiencies are associated with the continued reliance on antiquated water mains and collection sewers, many of which date back to the late 1800s or early 1900s.

A series of six prioritized phases of utilities improvements has been recommended. The first – “Phase 1” is referred to as the Main Street Project. This project is driven by a significant issue in Colebrook, which is excessive water loss/leakage from the distribution system. Well pump records and water meter records were compared indicating that as much as 70% of the water pumped into the distribution system is not delivered to the users. This is attributed to continued reliance on old cast iron water mains in the Main Street area with original leaded joints which leak excessively. Not only is this a significant local problem, but it is a significant deficiency subject to regulatory enforcement by the New Hampshire Department of Environmental Services (NHDES). Replacement of water mains in the central core of the town is required to reduce losses/leakage. The sewer system along the Main Street corridor in Colebrook is in very close proximity to the water mains and much of the sewer pipe dates back to the early 1900s. The Town would plan to replace the sewer mains at the same time as the water mains on Main Street.

Future planned phases include establishing water main looping in key areas and replacement of undersized or older mains, replacement of aging sewers, reconstruction of sewers that cannot be maintained, and other improvements as outlined in the PER.

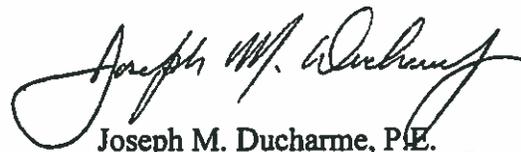
The initial focus for Colebrook is on the Phase 1 Main Street Project. The project is described in more detail, and cost estimates are presented in the PER. The Town desires to establish loan/grant funding assistance for design, bidding, and construction through USDA for this project. In addition to this PER, the Town plans on preparing the associated Environmental Review (ER) report in the coming months, as well as a funding application to the USDA. Other funding options may include CDBG, and coordination with the NH Department of Transportation for some of the roadway reconstruction costs. The Town's objectives are to obtain funding commitments in 2014, complete the design process in 2015, and commence construction in 2016.

We appreciate your review of the enclosed PER and look forward to receiving your comments. Should you have any questions, please do not hesitate to contact me at 603-431-6196 or Ms. Becky Merrow, Colebrook Town Manager at 603 237-4070.

Very truly yours,

CMA ENGINEERS, INC.


William A. Straub, P.E.
Project Manager


Joseph M. Ducharme, P.E.
Senior Project Engineer

Enclosure: Colebrook Preliminary Engineering Report

cc: Becky Merrow, Colebrook Town Manager
Anne Getchell, USDA Conway, NH

Water and Sewer System Improvements Project Colebrook, New Hampshire

PRELIMINARY ENGINEERING REPORT (USDA Rural Development)



February 2014

Prepared for:
Town of Colebrook, NH
17 Bridge Street
Colebrook, NH 03576

Prepared by:

CMA
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GENERAL AND INTRODUCTION

The Town of Colebrook (the Town) is located in Coos County, NH, in an area characterized as the “North Country” of the state. It is 140 miles north of Concord, NH, 52 miles north of Berlin, NH, and 10 miles south of the Canadian border along the Connecticut River on the border with Vermont. Primary access is via US Route 3 which extends north-south, and via Route 26 which extends east (see Locus Map, Figure 1). Colebrook Water Works is a department of town government. It owns and operates public water and sewer systems for approximately 460-480 separate users/customers in the center village area of Colebrook, with an estimated user population of 1,394 (2010 census). The Colebrook sewer department is a separate but related unit of Town government. The total population of the Town is 2,301 (2010 census), which includes both the village area served by public utilities and the rest of the Town. The population of the Town has been relatively constant in recent years. US Census data summarized since 1970 below:

2010: 2,031	1980: 2,459
2000: 2,325	1970: 2,094
1990: 2,453	

The population is fairly constant year-round, having small seasonal influences, with both a summer seasonal influence (camping and outdoor activities), and winter activities (snowmobiling).

Historically, Colebrook has been a center of agriculture, wood and forest products industries, other industries, and since the late 1800s a center for tourism and vacationers. Colebrook serves as a business center in this relatively rural region.

Colebrook’s public utilities systems, both water and sewer, were both initially established in the late 1800s and early 1900s. As described in this report, in the central part of the service area thousands of feet of the original water and sewer mains remain in service. The age and condition of this infrastructure is the primary reason for the proposed project.

Water System Overview

Colebrook’s water system dates back to the 1880s, when a local businessman (J. E. Lombard) started a private water company serving the central village area of the Town, which had already

developed with many of the original structures evident on Main Street today. As described in later sections of this report, many of the originally constructed water mains from that time remain in service, and are a primary cause of system leakage and required system improvements. The system has been expanded and improved since that time, and has evolved into the municipally owned and operated system it is today. The system currently includes:

- 10 miles of water mains from 4 to 12-in diameter, of widely differing ages and construction;
- Two supply well locations, with two well as at each location. The original location is in the village area of Colebrook next to the Mohawk River, and a recent expansion is north of the village;
- A 1 million gallon concrete storage tank.

Sewer System Overview

Colebrook's sewer system has evolved significantly since its original construction in the early 1900s. It was originally a series of pipes carrying combined sewage and stormwater to multiple discharges to surface water. In the 1960s the discharges were replaced with pump stations, collector and interceptor sewers, that conveyed raw wastewater to stabilization ponds which were later supplemented with surface aeration. Many of the original sewers constructed in the early 1900s remain in service, particularly in the central area of the village along, and adjacent to Main Street.

The water and sewer departments are run as Town departments. Separate accounting is done for each department, and for a related Town public works department. Four employees are accounted for part time to each of the water and sewer departments. Additionally, public works employees (part and full time), are assigned as needed to water and sewer work on an as-needed basis.

1. PROJECT PLANNING AREA

- **Location**

The area served by the Colebrook municipal water and sewer systems includes residential, commercial, institutional, and industrial properties within the town limits of Colebrook; and specifically within the central village area of the Town. The developed

area of the village is almost all served by public water and sewer. Expansion or extension of the system is possible to other areas of the Town. However, there has been little demand for such expansion and the service area has been stable over recent decades. The service area is expected to remain relatively stable into the foreseeable future.

- Environmental Resources Present

The water and sewer system improvements project includes primarily the replacement of public water and sewer mains in existing public rights-of-way (ROW). Little or no construction will occur on land which is not currently developed within those ROW. It is not anticipated that impacts to wetlands, floodplains, farmland, historic resources, or endangered species will be part of the project. These preliminary conclusions will be confirmed and documented as part of a separate Environmental Review which will be prepared in accordance with USDA and NEPA procedures. Preliminary characterizations are summarized below.

1. Farmland/Rangeland/Forestland – Since virtually all of the proposed water and sewer system improvements are within the alignment of the existing Town-owned or State – owned ROWs property (roadways and streets), no impacts to farmland/rangeland are anticipated.
2. Wetlands – There are no anticipated wetlands impacts associated with the proposed improvements to the existing water and sewer system improvements. There will be a crossing of the Mohawk River with these utilities. However, the Town has already obtained a NHDES wetlands permit for that crossing, which will be amended if necessary for the project.
3. Floodplain Impacts – There will be no (or insignificant) modifications to land elevations associated with the project, and therefore no impacts to floodplains. The utilities will be constructed underground. Flood Insurance Rate Maps (FIRM) from the Federal Emergency Management Agency were reviewed for flood plain information.

4. Historic/Archaeological Resources – Utilities replacement will be completed below existing grade, in soils which have been previously disturbed. However the New Hampshire Division of Historical Resources (NHDHR) will be contacted for their assessment of the potential for the proposed project to impact cultural resources. There are associated improvements to the Main Street streetscape when the utilities replacement is completed. NHDHR may request that an historic survey be completed. The project will follow NHDHR requirements during preliminary design.
 5. Endangered Species – There will be no (or insignificant) disturbance of any natural areas in the construction of the project, and therefore the potential disturbance of habitat for any endangered or threatened species is anticipated to be absent. During preliminary design the New Hampshire Natural Heritage Database will be consulted regarding the presence of known threatened or endangered species in the proximity of the proposed projects. In addition, the New Hampshire Fish and Game Department will be contacted for their assessment of the potential for the proposed project to impact threatened and/or endangered species, designated or critical habitats, and other wildlife issues.
 6. Soils Classification – No disturbance of soils outside public ROWs is anticipated as part of this project. Soil borings will be obtained as part of the design process for geotechnical and design purposes.
- Growth Area and Population Trends

The current population in the village area of Colebrook, where water and sewer service is provided, is 1,394 (in most recent 2010 census). This population is included in up to 480 separate water and sewer customers/user. (The users include a mix of residential, commercial, and institutional users). The total population of the Town is 2,301 (2010 census), which includes both the village area served by public utilities and more rural areas of the Town. The town wide population has varied by 15-20% over the past 40 years, from a peak of 2,459 in 1980 with a general decline since that time.

Projections are for the population to remain fairly stable, with further modest declines over the next 30 years. This trend is predicted for all of Coos County, as indicated in the table below (taken from the NH Office of Energy and Planning).

County/County Subdivision	<u>2010</u>	<u>2015</u>	<u>2020</u>	<u>2025</u>	<u>2030</u>	<u>2035</u>	<u>2040</u>
Coos County	33,055	32,292	31,791	31,233	30,442	29,461	28,209
Berlin city	10,051	9,706	9,417	9,251	9,017	8,726	8,356
Carroll town	763	796	832	817	797	771	738
Clarksville town	265	245	227	223	218	211	202
Colebrook town	2,301	2,244	2,198	2,160	2,105	2,037	1,951
Columbia town	757	745	736	723	705	682	653
Dalton town	979	984	994	976	952	921	882
Dummer town	304	295	288	283	276	267	256
Errol town	291	282	274	269	262	254	243
Gorham town	2,848	2,766	2,699	2,652	2,585	2,502	2,395
Jefferson town	1,107	1,134	1,164	1,144	1,115	1,079	1,033
Lancaster town	3,507	3,546	3,599	3,536	3,446	3,335	3,194
Milan town	1,337	1,312	1,294	1,272	1,239	1,199	1,149
Northumberland town	2,288	2,167	2,060	2,024	1,973	1,909	1,828
Pittsburg town	869	852	839	825	804	778	745
Randolph town	310	289	271	266	259	251	240
Shelburne town	372	361	352	346	337	326	312
Stark town	556	564	574	564	550	532	510
Stewartstown town	1,004	979	960	943	919	890	852
Stratford town	746	634	530	520	507	491	470
Whitefield town	2,306	2,390	2,481	2,438	2,376	2,299	2,202

Given this population history and projections, future demand for water and sewer service is not anticipated to increase in the coming years. Potential declines may occur. Economic factors will in part drive any pressure for increases or decreases in utility demand, separate from population itself.

For purposes of this report, a stable population is predicted, even though population trends appear to be predicated to decline about 0.5% per year. Despite a stable population, that for water, the proposed project will result in a significant reduction in total water pumped into the system (by reducing excessive water loss/leakage), while actual demand for metered water consumption (and sewage flow) will likely remain flat or decline slightly.

D. Community Engagement

The Town of Colebrook has actively engaged the community and elected officials in the planning for the water and sewer system improvements process. The project has been the subject of authorization for necessary actions at Town Meetings in 2012, and 2013. The overall concept is to construct parts of the project in 2015 and/or 2016. In order to move that process forward, the following are among the actions that have been taken by the Town:

- Selectmen voted to increase water rates significantly in 2012 (by over 500%).
- Town applied for and received grants for the planning of the project in 2013:
 - NHDES Water Asset Management Plan
 - USDA “SEARCH” Grant for preparation of Preliminary Engineering Report
- Project review meeting with Selectmen December 19, 2013 to review project needs, phasing, and preliminary cost estimates,
- Meeting with NHDOT District Office January 10, 2014 to review roadway improvements that will be associated with water and sewer replacement.
- Public Information Meeting (February 20, 2014).

The process is ongoing. Associated actions are planned for the 2014 Town Meeting, and planning is programmed throughout 2014 and 2015 to continue with planning and design with public review and comment.

2. EXISTING FACILITIES

- Location

The location of the water and sewer systems in Colebrook is primarily in the village area of the Town.

- An existing water system map is included as Figure 2; and
- An existing sewer system map is included as Figure 3.

These figures show the locations of mains, as well as the probable pipe type and age for each section of pipe.

- History

Water System

The water system was started as a private water company enterprise (the Colebrook Water Company), serving the center of the village. Water supply was originally springs above the Town in the vicinity of the existing water tank. In the center of Colebrook, along over 2,000 feet of Main Street (Route 3), the majority of the existing water mains in service are the original cast iron pipes constructed in the late 1800s. The system was expanded sequentially by the private water company, and has had different water sources, including shallow wells points that were converted to the existing water wells located in the village area between Bridge Street and the Mohawk River. The system was acquired and run by the Colebrook Fire Precinct as a quasi-municipal entity in the early 1950s. This ownership and organizational structure evolved in the 1980s to be directly owned by the Town of Colebrook, under the responsibility of the Colebrook Board of Selectmen. The system has been expanded modestly over the years to its existing extents.

In the late 1970s the Town replaced an open water reservoir located off Titus Hill and Reservoir Roads with a 1 Million Gallon (MG) enclosed concrete water tank immediately adjacent to the open reservoir. This tank provides the elevation for system pressure. Concurrently, as part of a federally funded economic development project, a 12-inch water main was constructed between the new tank and an area being developed as a community business/industrial park along the Connecticut River south of Bridge Street. This newer water main provides adequate fire flows and pressure to a significant portion of the Colebrook water system, in spite of continued use of the antiquated water mains described above.

In 2012, the Town completed construction of two supplemental water supply wells to the North of the village, between Route 3 and the Connecticut River. These wells were planned since the early 1990s and designed and constructed using State Revolving Fund and ARRA funding between 2010-12 partly in response to NH Department of Environmental Services (NHDES) concerns about reliance on the two shallow wells in village that have limited well-head protective areas surrounding them.

Water pumped from both the well locations is metered and disinfected. Regular sampling and monitoring of the water system indicates good compliance with water quality standards and NHDES requirements.

Sewer System

The sewer system in Colebrook was originally constructed as a combined drainage and wastewater system. The original sewage system was reportedly constructed in the same general period as the water system in the early 1900s. The original system included a series of pipes with direct discharges to the Mohawk and Connecticut Rivers. In 1965, the Town constructed major improvements to the wastewater system, eliminating the uncontrolled combined discharges. Improvements included construction of a series of six sewage pump stations in the collection system, over five miles of collector and interceptor sewers, construction of the main influent pump station and facultative sewage stabilization ponds, and establishment a single discharge to the Mohawk River. In the 1960s and 1970s mechanical aeration was added the stabilization ponds, as well as ultraviolet disinfection of the effluent. The location of the facility outfall has been modified, first to a wetland adjacent to the Connecticut River, and more recently directly to the Connecticut River.

Several sewer system extensions and expansions have been made, as well as pump stations upgrades and rehabilitations. Initially, in the 1960s and 1970s the system experienced a high level of non-sanitary flows, with seasonally high infiltration and inflow. The Town has systematically addressed locations of combined stormwater in the sewer system, and areas of high infiltration. These sequential improvements have been successful, and since the early 2000s the current levels of infiltration/inflow have not been excessive.

Sewage pump stations have also been rehabilitated throughout the collection system over the years. A series of other improvements have been made to the operations of the wastewater treatment facility, including baffles to re-configure flow through the lagoons, control systems, and new ultra violet disinfection. Overall, the treatment system operates well and meets its State and Federal discharge requirements.

- Condition of Existing Facilities

Water System

There is a significant amount of water loss in the Colebrook water system. Calculated leakage rates by the Town have been consistently between 60% and 80% of pumped water. Average water pumped into the system is in the range of 325,000 gallons per day (GPD). Metered and estimated water use by customers is approximately 100,000 gpd). Water use and demand is relatively stable year-round. The Town has recently completed several rounds of leak detection with the assistance of NHDES. Identified specific leaks have been addressed with repairs and minor replacements. However, the remaining water loss remains very high, and is attributable to the continued reliance on several thousand feet of antiquated cast iron water mains throughout the system. These mains were constructed with relatively small pipe lengths, and most have antiquated leaded joints. The remaining system leakage is not subject to repairs at isolated locations. As described in this report, reduction in system leakage requires replacement of antiquated water mains in the center of the system with modern piping.

This significant water loss has been an ongoing concern to NHDES, and has been the subject of both NHDES assistance and enforcement. Notices of Violation have been issued to the Town requiring assessment and action to address the high leakage rates. NHDES has assisted the Town with leak detection surveys. In 2013, the Town was awarded a grant from NHDES for completion of a Water System Asset Management Plan. The work completed in that plan is in part reflected in this report. Also of concern to NHDES has been inspection for and removal of any potential cross-connections in the system, back-flow prevention, and replacement of water meters. Working with NHDES, the Town has made substantial progress in each of these areas.

A summary of the total water pumped on a monthly basis in recent years is included in Appendix B.

There are several areas where the water mains date from the late 1800s or early 1900s and are attributed to the significant leakage in the system. These include:

- Main Street through the center of the village area, from the bridge over Beaver Brook south to the intersection of Main Street and South Main Street;
- Farther north on Main Street to between Edwards and Couture Streets;
- Route 145 between Main Street and Corliss Lane
- Spring Street East of Main Street

There are two areas where there are “dead end” water mains. Extending water mains to complete looping connections would greatly reduce the risks of restricted water service or reduced fire flows in the event of interruptions of service in the dead end mains:

- Between Corliss Lane and Rote 145. The Upper Connecticut Valley Hospital is at the end of Corliss Lane and is served by a single dead-end water main constructed in 1972. Looping between the end of Corliss Lane to the existing water main west on Route 145 will provide safety and redundancy to the hospital’s water service;
- At the southern terminus of the existing system are two dead end water mains: one on Main Street and one on South Main Street. They are not separated by much distance, and completing looping will provide improved service and fire safety in this area.

Sewer System

The roadway drainage system for most of Main Street (NH Route 3) through the center of Colebrook was constructed by NHDOT and is separated from the sewer system. However, the sewers serving most of Main Street are vitrified clay pipe dating back to the original construction of the sewer system in the early 1900s. These sewers are old, and have greatly exceeded their design life. In many locations, sewer pipes are in the same trench as existing water mains.

Wastewater flow does not vary significantly throughout the year. A summary of monthly wastewater flow in recent years is included in Appendix C.

Other identified sewer collection system deficiencies include:

- A sewer line exists through a private manufactured housing park east of route 145. The sewer line was reportedly constructed before the manufactured homes and

roadways were constructed. Easements have not been maintained, and there are numerous conflicts with private structures. Maintenance of the sewer is difficult or impossible in this area.

- The pump station at the end of Edwards Street was constructed to receive sewage flow from a cross-country line that originates at the Upper Connecticut Valley Hospital on Corliss Lane across Route 145, as well as sewage from the subdivision including Edwards and Couture Streets. The pump station was constructed in high groundwater and sand and gravel soils with high hydraulic permeability. Maintenance or repair of the wet well and force main is very difficult due to running sands and high groundwater.

- Financial Status

The Colebrook water and sewer departments have separate municipal budgets. The Colebrook budget for 2014 includes approximately \$259,300 for the water department, and \$238,300 for the sewer department. The table below includes summaries of the planned expenditures for each department.

<u><i>Expenditure Category for 2014</i></u>	<u><i>Water Dept. Budget 2014</i></u>	<u><i>Sewer Dept. Budget 2014</i></u>
Personnel (including direct and indirect)	\$98,869	\$94,328
Electricity	35,000	67,000
Equipment	20,694	49,094
Services and Supplies	16,200	8,500
Fuel	2,000	2,500
Administration	9,458	11,873
Testing	2,000	5,000
Debt Service	60,107	-
Capital Reserve	<u>15,000</u>	<u>-</u>
Total	\$259,328	\$238,295

Water billing rates were adjusted (increased) in 2012 to reflect the actual costs of the water department, and to reduce the department's reliance on general municipal funding. The base billing rate was set at \$60 per 1000 cubic feet metered per 3-month period

(quarter). However, if customers use less than 1000 cubic feet in a 3-month period, a minimum charge of \$60 is assessed. The total metered revenues in 2014 are projected to be \$247,378. Additional revenues of \$11,950 are estimated from interest and miscellaneous revenues, for total projected water revenue of \$259,328. For the metered revenue of \$247,378 a maximum average water use will average 84,557 gallons gal/day (converting to 1000s of cubic feet, and to gallons). As explained below, this represents a significant anticipated water loss/leakage in comparison to total water pumped per day (approximately 325,000 gal/day).

Sewer user charges are set at \$33 per the first 1500 cubic feet of metered water use per quarter, and \$23 for every 1000 cubic feet over that quantity. The minimum charge per quarter is \$33, even if water use is below 1500 cubic feet.

- Water/ Energy/ Waste Audits

As described below and in the next section, the Colebrook water system has significant water loss and leakage. The leakage is attributed to continued reliance on antiquated water mains in along Main Street and adjacent streets. These mains date from the late 1800s, and have short pipe lengths and leaded joints that are subject to leakage. The town has tracked water production (water pumped into the system) against metered water sold to users and otherwise tracked or estimated (ie: fire flows).

A recent 2012 water audit was completed by the town and concluded that year water loss totaled was 77.2% of water supplied to the system, or over 79 MG. A copy of that audit is included as Appendix D. Similar calculated percentages of water loss have been made for other recent years.

This leakage is excessive compared to typical water system losses of 20% or less. Since all water is pumped into the system, it is directly related to energy and electricity costs for excess pumping. It has also been a significant regulatory deficiency with the NHDES, which has consistently expressed concerns to Colebrook about the poor system performance in this regard, and has expected and required actions to address this water loss.

3. NEED FOR PROJECT

For purposes of this report, the project planning period is 40 years, with a design life of over 40 years. Therefore, projections for population and service life are extended to year 2050.

A. Health, Sanitation and Security

Water System

Excessive water system leakage is a major concern of NHDES. Documented leakage/water loss ranges between 60% and 80% based on total water pumped into the system, and water used by customers/users. Typical water system losses are less than 20%. NHDES requires that water systems regularly monitor and report leakage/losses, and has a policy of requiring and encouraging water systems to eliminate excessive leakage/loss for system reliability, energy efficiency, and long term sustainability.

The NHDES has repeatedly expressed concerns to the Town of Colebrook regarding the high rate of leakage from the water system. NHDES has assisted Colebrook with leak detection surveys, and with grant in 2013 for NHDES Water Asset Management Plan.

The Town of Colebrook provided a Water Conservation Compliance report to NHDES (as is required every three years) in November 2012. The report included a 2012 water audit completed by the Town which concluded that in that year water loss was over 79 million gallons (MG), or 77.2% of water supplied to the system. Prior to and concurrently with that report, the Town had described to NHDES that the majority of leakage and water loss was due to leaking joints and connections to the antiquated cast iron water mains on Main Street and surrounding areas. Colebrook had described that it is continuing to plan for the so called “Main Street Project” which would include complete replacement of the water and sewer piping on Main Street, and that the project would be a significant part of the solution to the chronic high water loss in the system.

In response to this report, NHDES required regular updates to the Main Street Project as the anticipated primary solution to the water loss problem.

Appendix E includes selected correspondence between NHDES and Colebrook regarding the water system with a focus on the water conservation and water leakage issue. It also includes the 2012 triennial sanitary survey of the Colebrook water system conducted by the staff from the Drinking Water and Groundwater Bureau at the NHDES. This establishes the chronic nature of the problem, and NHDES' repeated concern with the loss.

NHDES has the authority to issue notices of violations and letters of deficiencies to water systems with excessive water loss and leakage, such as Colebrook. The agency has reportedly avoided such enforcement actions for Colebrook because of the Town's intentions to address the water loss with construction of a new water main and service connections as part of the Main Street project.

Project need is based on the obligation the Town has to comply with the NHDES Public Water Supply Regulations for providing a safe, reliable supply to system users and to update obsolete facilities to meet current standards of practice in the industry. The NHDES sanitary survey and related correspondence highlights the chronic system problem of excessive leakage and water loss. By implementing the proposed improvements the Town will significantly reduce water loss.

The Main Street project includes proposed Phase I of the water system improvements. Future phases of planned improvements will improve public safety by protection from interruptions in service and improved (and assured) fire flows by providing looping of water mains for critical facilities (the hospital). Replacing sections of undersized mains to provide looping and improve fire flows and pressures in the north end of the system is recommended on a future phase.

Sewer System

The sewers in Phase I of the project are similarly antiquated as the water system. The pipes for much of Main Street date back to the original construction of the sewer system in the early 1900s. In many locations, there is limited lateral distance (offset) between water mains and sewer mains. A minimum 10-ft separation is required by NHDES and

general construction standards. The pipe material for these old sewer mains is vitrified clay (VC) which can be brittle and subject to breaking, and does not have good joint material. In several areas, when the system was significantly modified in 1965 to eliminate the direct discharges to the Mohawk River, existing pipes which were left in service and plugged, are sloped backwards, and are constantly surcharged. Construction of water main replacement would necessarily disturb the aged sewer lines in close proximity to them. Replacement of the sewers in the area of water main replacement is necessary for long-term reliable service to users in the service area.

Other sewer collection system problems include:

- Replacement of the existing sewer north of Route 145 that is beneath the manufactured housing community. Replacement in the Route 145 ROW is necessary;
- Related to the above, extending the sewer north on Route 145 to intercept the sewer serving Corliss lane and the Upper Connecticut Valley Hospital.
- With the Corliss Lane sewer intercepted on Route 145, the cross country line to the Edwards Street pump station would no longer be necessary, and the Edwards Street pump station could be replaced farther to the west, and no longer be in the difficult high groundwater/rapid sand conditions.

B. Aging Infrastructure

As described above, the primary need for the project in Colebrook is due to the significant age of the water and sewer infrastructure in the central part of the town. Antiquated water distribution piping and sewers date back to the late 1800s and early 1900s and remain in service. The water mains are subject to significant leakage. Sewer mains are substandard, materials are severely outdated, and the placement and location are in conflict with the water system in many locations.

C. Growth

The current population in the service area in Colebrook is approximately 1,394 (2010 census of Village area). This area has had relatively stable population. The entire Town's population is 2,301 (2010 census), and is projected to have a minor decrease. However, the water and sewer service areas will likely remain stable. Private development and future economic conditions may affect actual growth. For planning purposes no significant increases or decrease are anticipated in the user area.

4. ALTERNATIVES CONSIDERED

A. Description

The Colebrook water and sewer systems have been evaluated and a series of six phased improvements have been formulated. Most of the phases include replacement of antiquated water and sewer mains, with deficiencies as described in earlier sections of this report. Some phases also include establishing looping connections of dead end water mains, and relocation of sewers from private property to public ROW.

While Phase I, replacement of the water and sewer system on Main Street and nearby adjacent streets, is the most important with the most immediate need, and is described in greater detail in Sections 5. and 6 below, the improvements included in all the phases are important into the future.

The phases of water distribution system are shown on Figure 4, while the phases of the sewer system are shown on Figure 5. The phased improvements are described as follows:

1. ***Phase I – The Main Street project.*** This is the initial project recommended in this report, and the focus of the Town's improvements program. It includes:
 - Replacement of all water and sewer mains on Main Street (Route3) through the central village area of Colebrook. Water mains will be 12-inch; sewers will be between 8 and 15-inch. The limits of Phase I are between the bridge over

Beaver Brook extending southerly to the split between Main Street and South Main Street. Approximate length of each utility is 2500 feet.

- The project also includes extending water and sewer replacement east and west on side streets to Main Street for limited lengths. (Approximately 2,000 feet).
- Replacement of all service connections is included and will be paid for beyond the ROW limits under separate agreements both with property owners and the town.
- Roadway rehabilitation in the areas of trenching for the replacement of mains. Separately, and outside the direct scope of this utility project, additional improvements to Main Street will also be pursued to make the project a “Complete Streets”, including modifications to roadway width, addition of bike lanes, added crosswalks and space for pedestrian safety, replacement of sidewalks and curbing and other related improvements. This element of the project will include close coordination with the NH Department of Transportation (NHDOT) who have indicated their intent to repave the Main Street portion of Route 3 in 2016 or 2017.

Future Phases:

2. Phase II – North Main Street Water and Sewer Replacement. Includes:

- **Replacement of the undersized and antiquated water main between the limits of Phase I and extend northerly to an existing newer 8-inch main** between Edwards Street and Couture Street. This will replace old CI pipe and also begin to create a strong hydraulic loop between Main Street and Route 145.
- In that same ROW, replace 1940s vintage vitrified clay (VC) sewer main between the Beaver Brook bridge and the existing terminal sewer manhole.
- Coordinate with NHDOT for roadway reconstruction and paving.

3. Phase III - Water Loop between Corliss Lane and Route 145. Includes:

- Establishment of a strong hydraulic loop between the dead end water main on Corliss Lane serving the Upper Connecticut Valley Hospital and the existing mains on Route 145. The Corliss Lane water main is a dead-end, and service to

the hospital could be potentially disrupted/interrupted without a hydraulic loop. Fire flows will be improved.

4. ***Phase IV - Route 145 Water and Sewer Replacement.*** Includes:

- Replacement of the antiquated CI water main between Academy Street and Corliss Lane along Route 145;
- Construct new sewer on Route 145 between the cross country sewer from Corliss Lane to Lombard Street, and decommission the existing sewer on private property under the manufactured housing community;
- Decommissioning of the cross country sewer between Route 145 and Edwards Street;
- Relocation of the Edwards Street pump station to a higher elevation.

5. ***Phase V - Spring Street Water and Sewer Replacement.*** Includes:

- Replace the antiquated CI water main between Main Street and the existing terminus;
- Replace the antiquated sewer lines located on Spring Street.

6. ***Phase VI - Water Loop between South Main Street and Main Street.*** Includes:

- Establishment of a strong hydraulic loop between the dead end water mains on South Main Street and Main Street.

The proposed improvements for both the water or sewer projects do not lend themselves to a traditional alternatives analysis. Water main replacements to eliminate leakage in antiquated pipes, replace chronically undersized mains, and to create water system loops for critical community infrastructure. In this case, alternative comparison is not readily applicable, as there are not equipment or process alternatives with different capital, operation and replacement costs. The replacements are prescriptive to meet regulatory requirements, and otherwise obvious to replace antiquated facilities. Similarly, the sewer replacements are common sense replacements of aged sewer mains in conjunction with water main replacement.

Alternative pipe materials will be considered during the final design process, or alternative material, will be bid as alternatives for cost comparison and final choice.

A general discussion follows of the design considerations, environmental impacts, land use requirements, and construction issues for implementing these improvements to the Colebrook water and sewer systems.

B. Design Criteria

Design criteria for all phases of the project will include conventional standards for design and construction of public utilities in New Hampshire and the region. As applicable, design criteria will include:

- NHDES standards for water and sewer facilities, including:
 - Standards of Design and Construction for Sewerage and Wastewater Treatment Facilities (Env-Wq 700);
 - Design Standards for Small Community Public Water Systems (Env-Ws 372).
- The “Ten States Standards” for wastewater and water facilities, as applicable.
- NHDOT “Standard Specifications for Road and Bridge Construction”

Additionally, any applicable design review comments by o the USDA Rural Development Program will be incorporated.

C. Map

Figure 4 depicts the location and size of the water main replacements and expansions on the Colebrook system, on a phased basis. Phases I through VI are shown.

Figure 5 depicts the phased sewer system improvements. Phases I through VI are shown.

Figure 6 depicts additional detail for the Phase I Main Street Project

D. Environmental Impacts

An Environmental Review for the Water and Sewer System Improvements Project will be prepared and will be submitted separately from this report. As described in previous sections of this report, the water and sewer system improvements project includes primarily the replacement of public water and sewer mains in existing public rights-of-

way (ROW). Little or no construction will occur on land which is not currently developed within those ROW, and therefore minimal or negligible impacts to wetlands, floodplains, farmland, historic resources, or endangered species are anticipated as part of the project. These preliminary conclusions will be confirmed and documented as part of the separate Environmental Review.

E. Land Requirements

The proposed improvements are to be made to existing system components primarily on lands and in Rights of Way (ROW) that is already owned by the Town, and no additional property acquisitions are required. The water looping projects (Phases III and VI) will require limited easements outside ROWs. The sewer improvements in Phase IV involving the manufactured housing community north of Route 145 will similarly require utility easements, but not property ownership.

F. Construction Problems

The project will involve conventional issues associated with major municipal utilities projects. There are no unique aspects of the project that would pose unusual construction challenges or problems

- It is anticipated that construction issues will require:
- Typical construction sequencing and methods;
- Traffic control plans to allow construction coordinated with ongoing traffic through the construction zone\, including coordination with NHDOT;
- Drainage, erosion, sedimentation, and dust control;
- Temporary water services to customers while water lines are replaced ;
- Maintenance of continual wastewater flows in sewers with sequencing of construction, bypass pumping, and temporary piping;
- Coordination with local fire department to maintain satisfactory fire flows while water mains are being replaced;
- Coordination with abutters to manage or mitigate construction impacts and replacement of service connections.

G. Cost Estimates

Cost estimates have been prepared for the six prioritized phases of water and sewer improvements in Colebrook. They include comprehensive costs for all utilities construction, roadway repair associated with the utilities replacement, contingencies due to the current level of design and design uncertainty, permitting, design, and engineering during construction. (The estimates exclude roadway and streetscape work not associated with utilities construction.)

Detailed breakdowns of these cost estimates are included in Appendix F. A summary of the cost estimates for Phases I-VI of utilities projects in Colebrook is presented as follows:

<u><i>Water and/or Sewer Improvements Phase</i></u>	<u><i>Estimated Costs</i></u>
<i>Phase 1 – Main Street Water and Sewer</i>	
-Water Main Replacement	\$ 1,417,400
-Sewer Replacement	1,135,900
-Water/Sewer Pavement Restoration	<u>631,000</u>
Subtotal	\$ 3,184,300
Const. Contingency (20%)	636,900
Design, Permitting, Construction services (25%)	796,000
<i>Total Estimate Phase I Cost</i>	<i>\$ 4,617,200</i>
<i>(Note additional estimated roadway/streetscape construction costs NOT associated with Utilities):</i>	<i>(\$ 1,800,200)</i>
<i>Phase 2 – North Main Street Water and Sewer</i>	
-Water Main Replacement	\$ 648,000
-Sewer Replacement	329,300
-Water/Sewer Pavement Restoration	<u>226,300</u>
Subtotal	\$ 1,203,600
Const. Contingency (20%)	240,700
Design, Permitting, Construction services (25%)	300,900
<i>Total Estimate Phase 2 Cost</i>	<i>\$ 1,745,200</i>
<i>(Note additional estimated roadway construction costs NOT associated with Utilities):</i>	<i>(\$ 912,800)</i>

<p>Phase 3 – Corliss Lane Water Loop</p> <ul style="list-style-type: none"> -Water Main Replacement -Sewer Replacement -Water/Sewer Pavement Restoration <p style="text-align: right;">Subtotal</p> <ul style="list-style-type: none"> Const. Contingency (20%) Design, Permitting, Construction services (25%) <p style="text-align: right;">Total Estimate Phase 3 Cost</p> <p><i>(Note additional estimated roadway construction costs NOT associated with Utilities):</i></p>	<p>\$ 420,600</p> <p>0</p> <p><u>22,100</u></p> <p>\$ 442,700</p> <p>88,500</p> <p>110,700</p> <p>\$ 641,900</p> <p>(\$ 32,100)</p>
<p>Phase 4 – Route 145 Water and Sewer</p> <ul style="list-style-type: none"> -Water Main Replacement -Sewer Replacement -Water/Sewer Pavement Restoration <p style="text-align: right;">Subtotal</p> <ul style="list-style-type: none"> Const. Contingency (20%) Design, Permitting, Construction services (25%) <p style="text-align: right;">Total Estimate Phase 4 Cost</p> <p><i>(Note additional estimated roadway construction costs NOT associated with Utilities):</i></p>	<p>\$ 491,100</p> <p>1,146,400</p> <p><u>197,300</u></p> <p>\$ 1,834,800</p> <p>367,000</p> <p>458,700</p> <p>\$ 2,660,500</p> <p>(\$ 524,200)</p>
<p>Phase 5 – Spring Street Water and Sewer</p> <ul style="list-style-type: none"> -Water Main Replacement -Sewer Replacement -Water/Sewer Pavement Restoration <p style="text-align: right;">Subtotal</p> <ul style="list-style-type: none"> Const. Contingency (20%) Design, Permitting, Construction services (25%) <p style="text-align: right;">Total Estimate Phase 5 Cost</p> <p><i>(Note additional estimated roadway construction costs NOT associated with Utilities):</i></p>	<p>\$ 347,400</p> <p>231,000</p> <p><u>45,600</u></p> <p>\$ 624,000</p> <p>124,800</p> <p>156,000</p> <p>\$ 904,800</p> <p>(\$ 98,300)</p>

Phase 6 – South Main /Colby Water Loop	
-Water Main Replacement	\$ 430,100
-Sewer Replacement	0
-Roadway repair for utilities	<u>27,900</u>
Subtotal	\$ 458,000
Const. Contingency (20%)	91,600
Design, Permitting, Construction services (25%)	114,500
Total Estimate Phase I Cost	\$ 664,100
(Note additional estimated roadway/streetscape construction costs NOT associated with Utilities):	(\$ 40,400)
<hr/>	
Total Water/Sewer Utilities Cost , all phases:	\$ 11,233,700
Total Non-Utility Costs, All Phases:	<u>3,408,000</u>
	\$ 14,641,700

5. SELECTION OF AN ALTERNATIVE

A. Life Cycle Cost Analysis

Conventional life cycle cost analysis does not apply to the alternatives developed for Colebrook. The phased water and sewer improvements have been developed to directly address known and documented deficiencies in the systems. Because the alternatives include primarily replacement of antiquated water and sewer mains in the village area of Colebrook, there are not separate alternatives that involve differing amounts of initial capital costs, operation and maintenance costs, power or chemical costs that can be compared in a life cycle cost comparison. (Such as is commonly applied to different treatment process, or combinations of gravity vs pumped service).

The improvements are necessary to address excessive leakage losses from the water system, which is a chronic problem and a significant regulatory concern of the NHDES in terms of the system’s ongoing ability to serve water users reliably and safely. Concurrently with replacing aged and undersized water mains that are subject to excessive leakage/loss, parallel and similarly aged and antiquated sewer mains are

proposed to be replaced. Leaving antiquated sewer mains in service that do not meet current design standards and have no remaining design/service life, while replacing water mains adjacent to the sewer mains, would be imprudent and fail to maximize the cost-effectiveness of the utilities rehabilitation program.

While not a driving factor in the development of the phased water and sewer plans, there will be a reduction in the power and chemicals used by the Colebrook water system due to significant reductions in leakage and water loss from the system. Current total water losses are estimated at approximately 75% of water pumped into the system. As water mains and service connections are replaced, this leakage/loss will be decreased. As water losses are reduced to 25% or less, total water pumped into the system will be reduced by up to 50%. Current costs for power to the two well fields are approximately \$35,000. If 50% less water is pumped into the system, for example, these costs will be reduced by half, or \$17,000/2.

B. Non Monetary Factors

The justifications for the Colebrook water and sewer projects are primarily:

- Reduce excessive water system leakage and improve reliability for service to system users,
- Improve the hydraulic performance and public safety of the water system by establishing loops and replacing undersized water mains,
- Replacing antiquated sewer mains with no remaining service life in vicinity of water main replacements to establish long term serviceability of the wastewater collection system,
- Replace sewer mains originally constructed on private property (in vicinity Route 145) that has since been developed with manufactured housing, and cannot be maintained by the Town, with mains in the public ROW on Route 145.

These objectives all are based on improving performance of the systems to continue to provide reliable service to system users, and do not have direct monetary or cost measures, but rather are necessary for the continued reliable service of the systems into the future.

6. PROPOSED PROJECT – Phase I, the Main Street Project

In this section, focus is on the initial phase of the project; Phase I, or the “Main Street Project”. It is the first phase of a comprehensive improvements program for the water distribution and wastewater collection systems. It is the first phase because it will have the most important results for the community in terms of addressing the water loss/leakage problem, and also the core sewer service to the village area. In addition, the Town is planning to “leverage” the required water and sewer system improvements with other improvements (including with NHDOT) to improve the safety and functioning of Main Street for vehicles, pedestrians, businesses, and institutions. The timing of the Phase I utilities improvements fits well with the NHDOT’s plans to repave the Main Street section of Route 3 in Colebrook in 2016 or 2017.

A. Preliminary Project Design

A preliminary layout of the Phase I Main Street improvements is shown in Figure 6. This layout includes additional detail than was included in the general water and sewer phasing plans (Figures 4 and 5). It depicts utilities improvements planned for Main Street from the bridge over Beaver Brook to the north, southerly to the area of intersection of Main Street and South Main Street. It also includes water and sewer main replacement a limited distance from the side streets to Main Street, and all individual user services in the ROW. The water and sewer mains in all these areas are antiquated, dating from the late 1800s or early 1900s. Integrated with the utilities replacement project are improvements to the “streetscape” of Main Street, with modifications to improve public safety, pedestrian use, and business use of the thoroughfare. A possible inclusion of a heating pipe distribution main for a separate downtown district heating system is also included may be taken on concurrently.

The water and sewer system replacements will all be designed and constructed to meet conventional municipal construction standards, and the requirements of NHDES for water and sewer construction, as well as any applicable standards of the USDA Rural Communities program.

B. Project Schedule

A preliminary project schedule is presented below. It includes continued development of the project in 2014, final design in 2015, and construction in 2016-17.

<u><i>Project Step- Phase I</i></u>	<u><i>Targeted Schedule</i></u>
<p>A. <u>Continued project development including:</u></p> <ul style="list-style-type: none"> - Environmental Review - Funding applications - Design development 	<p>Throughout 2014</p>
<p>B. <u>Project funding at 2015 Town Meeting:</u></p>	<p>March, 2015</p>
<p>C. <u>Final Design for Bidding:</u></p> <ul style="list-style-type: none"> - Final Design - Permitting - Bidding 	<p>March-December 2015</p>
<p>D. <u>Construction of Phase 1</u></p>	<p>2016 and 2017</p>

C. Permit Requirements

Project permitting requirements will be limited due to proposed work within existing public ROW, and limited or no disturbance of land that is not currently developed and/or previously disturbed. Anticipated permitting requirements will include:

- NHDES design review under Drinking Water and Wastewater Engineering Bureaus and programs;
- USEPA NPDES General Permit NOI for construction projects exceeding 1 acre in size;
- Limited NHDES Wetlands Bureau permitting for crossing of Mohawk River. (Note: existing wetlands permitting has been completed for previous designs of water crossings. See Appendix).

- Section 106 NEPA Cultural and Historical Resources review, including by NH Division of Historic Resources.

Note: An Alteration of Terrain Permit (sometimes required for disturbance of land over certain threshold areas) from NHDES is not likely to be required, because the majority of disturbance is within existing paved areas, and paved areas will likely be reduced by the project. The NPDES General Permit NOI will address erosion and sedimentation control requirements.

D. Sustainability Considerations

The project will result directly in reductions in power use by the water system due to significant reductions in water pumped from groundwater supply wells. Water will be conserved with electricity demand, and chemical consumption reduced. Savings in the range of 50% are anticipated.

The Main Street project will incorporate “complete streets” concepts, including application of Best Management Practices (BMPs) for improved stormwater performance. Where possible, measures for stormwater improvements will include integration of bioretention and rain garden facilities upstream of discharges and structural measures such as deep sumps and hooded catch basins to reduce sediment migration.

It is possible or likely that sewage may exfiltrate at undocumented rates from the antiquated VC sewers which will be replaced. Infiltration has not been measured to be significant, and the pipe joints of the old VC pipe network are commonly subject to leakage, so that if leakage is occurring, it would be out of the pipes into surrounding soils. To the extent that this is occurring, it will be eliminated for the sewer mains and services replaced in this Phase 1.

E. Opinion of Total Project Costs

As presented in the Section 4, the estimated costs of Phase 1 of the Colebrook Utilities project are as follows. The cost estimate is separated into water, sewer, and roadway repair for utility trenches; as well as a construction contingency based on the current level of design, and engineering in design and during construction. (Note planned

roadway/streetscape work not associated with utilities replacements excluded). A detailed breakdown of these estimated project costs is included in Appendix F.

<i>Phase I – Main Street Water and Sewer</i>	
-Water Main Replacement	\$ 1,417,400
-Sewer Replacement	1,135,900
-Water/Sewer Pavement Restoration	<u>631,000</u>
Subtotal	\$ 3,184,300
Const. Contingency (20%)	636,900
Design, Permitting, Construction services (25%)	796,000
<i>Total Estimate Phase I Cost</i>	<i>\$ 4,617,200</i>
<i>(Note additional estimated roadway/streetscape construction costs NOT associated with Utilities):</i>	
	<i>(\$ 1,800,200)</i>

F. Annual Operating Costs

The proposed Phase I Main Street project is a capital improvements project. It does not include operations of plants or equipment, other than conventional maintenance of a water distribution and sewage collection system. No changes to the pressure distribution of water, or the gravity collection of sewage will be included in the project.

It is noted that conventional and customary maintenance of the systems will decrease from current levels, due to the replacement of mains with modern pipes that will need less maintenance in comparison.

Another savings will be in electricity for pumping, because of the expected significant decrease in water to be pumped into the system by elimination of significant amounts of water leakage. Current budgeted electricity of the water department is \$35,000 per year. Currently, between 60% and 80% of pumped water is lost. If leakage/loss decreases to 10% to 20%, up to about 50% of the power for pumping will be eliminated. This relates to over \$17,000 in annual electricity costs.

7. CONCLUSIONS AND RECOMMENDATIONS

Based on the evaluation of the Colebrook water and sewer systems presented in this report, the following conclusions and recommendations are made:

1. The water and sewer infrastructure in much of the system is aged, dates back to the late 1800s and early 1900s, and has greatly exceeded its useful design life;
2. Documented water loss in the system is chronic, documented, and excessive. Between $\frac{1}{2}$ and $\frac{3}{4}$ of the water pumped into the system is lost through leakage.
3. This water loss is largely due to the age and condition of old cast iron water mains from the late 1800s that continued to serve the central Main Street section of the village core of Colebrook;
4. The sewer mains in the same areas of Colebrook were placed in over 100 years ago in the early 1900s, are located in the same trench or near the water mains, and are in need of replacement for reliable long term services.
5. The total costs of all identified water and sewer improvements (all phases) is over \$20Million. The Town cannot undertake a project of this magnitude, and must prioritize the improvements, including the most critical improvements as a first priority;
6. The first phase of recommended improvements is the so-called Main Street project. This has been recommended as the first phase because:
 - The excessive water system losses is associated with the cast iron water mains from the late 1800s located in this area,
 - Replacement of this central water main system connects the north and south sections of the distribution system,
 - Sewers in the same alignment are often in the same trench, or near the water main trench, have greatly exceeded their respective lives, and should be replaced when the water mains are replaced,

- The Town has the opportunity to coordinate the needed utility improvements with NHDOT and the agency's plans to complete paving improvements on Route 3 (Main Street) in 2016 and 2017,
- This phase will have the largest community improvements result of any of the identified phases, and replace the most critical infrastructure in the community.

It is recommended that Colebrook work with USDA to establish a funding arrangement for grants and loans to address Phase I of the recommended water and sewer improvements.

FIGURES

Figure 1 Project Locust Map

Figure 2 Colebrook Existing Water System

Figure 3 Colebrook Existing Sewer System

Figure 4 Phases Water System Improvements (Phases 1-6)

Figure 5 Phases Sewer System Improvements (Phases 1-6)

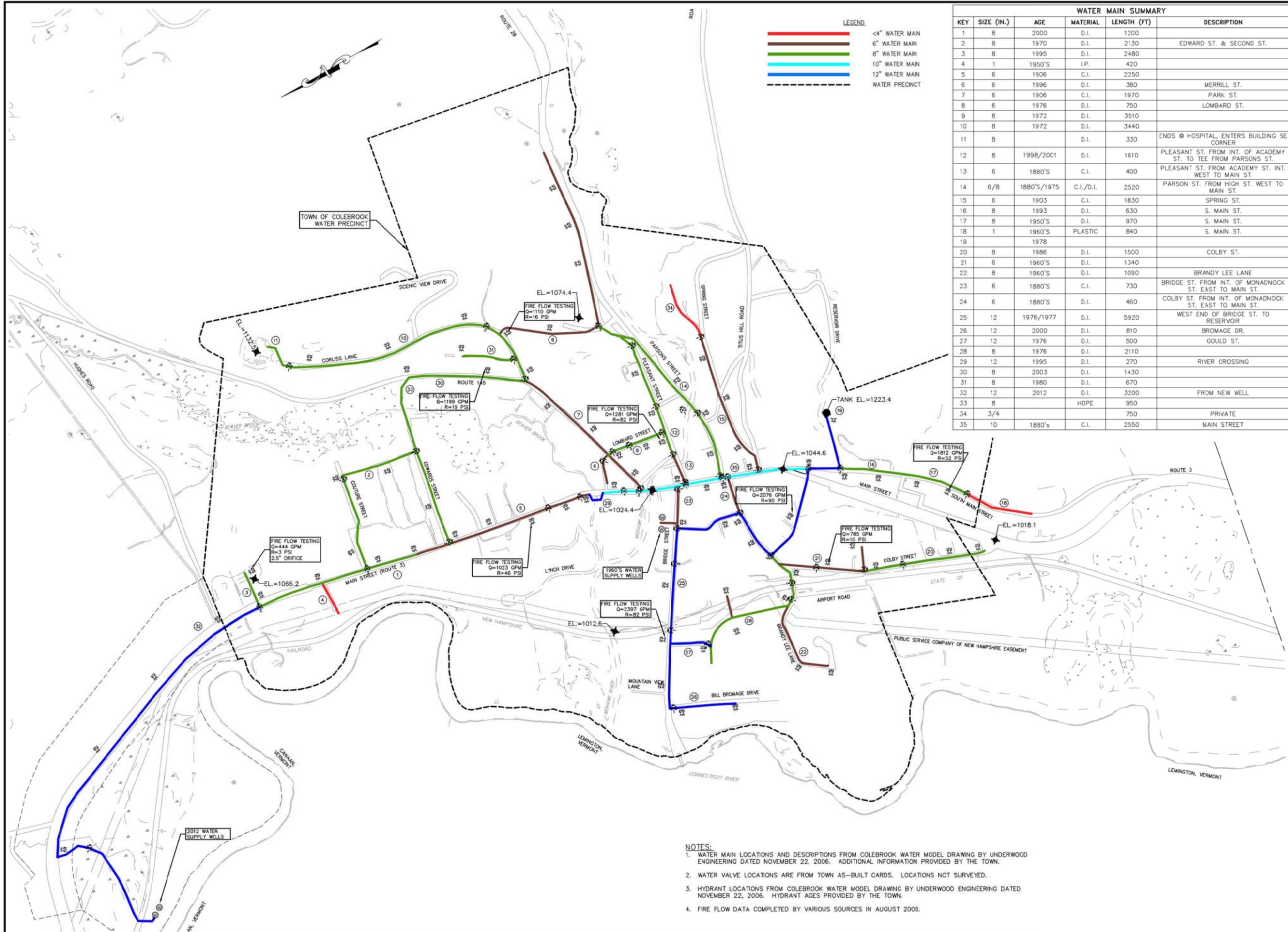
Figure 6 Phase I Main Street Project



Town of Colebrook, NH
Water and Sewer Improvements
USDA Preliminary Engineering Report
February, 2014

Figure 1





- NOTES:**
1. WATER MAIN LOCATIONS AND DESCRIPTIONS FROM COLEBROOK WATER MODEL DRAWING BY UNDERWOOD ENGINEERING DATED NOVEMBER 22, 2006. ADDITIONAL INFORMATION PROVIDED BY THE TOWN.
 2. WATER VALVE LOCATIONS ARE FROM TOWN AS-BUILT CARDS. LOCATIONS NOT SURVEYED.
 3. HYDRANT LOCATIONS FROM COLEBROOK WATER MODEL DRAWING BY UNDERWOOD ENGINEERING DATED NOVEMBER 22, 2006. HYDRANT AGES PROVIDED BY THE TOWN.
 4. FIRE FLOW DATA COMPLETED BY VARIOUS SOURCES IN AUGUST 2005.

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 603627-0708

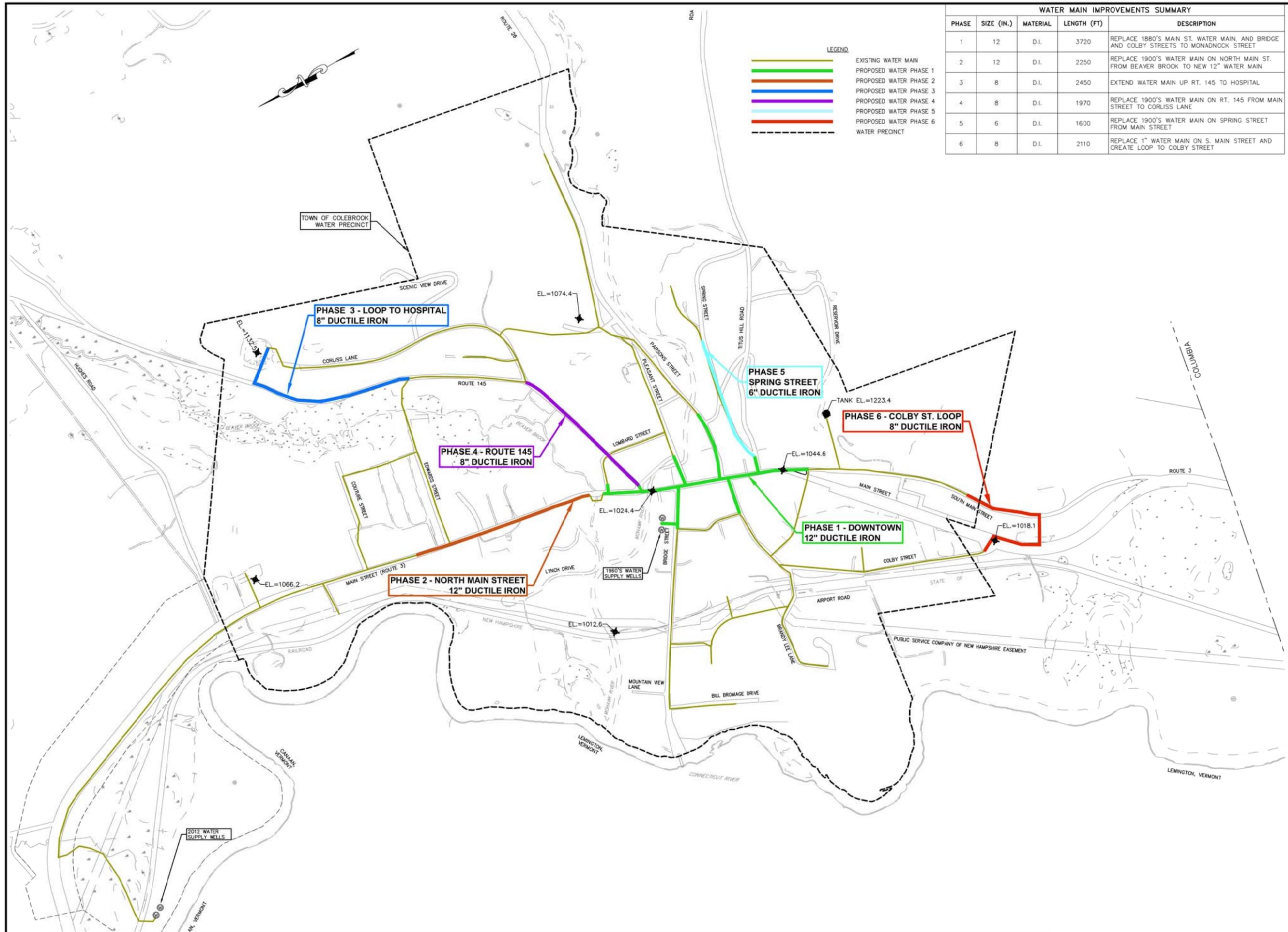
designed by: JWB
 date: December 2013
 project no: 890
 file name: 888-Utility Assessment.dwg
 scale: 1" = 800'

drawn by: JWB
 approved by: WAS

no. of
 revision
 date
 by

Town of Colebrook, New Hampshire
 Department of Public Works
 Utility System Assessment
 Water System
 Asset Management Plan

drawing no.
Figure 2
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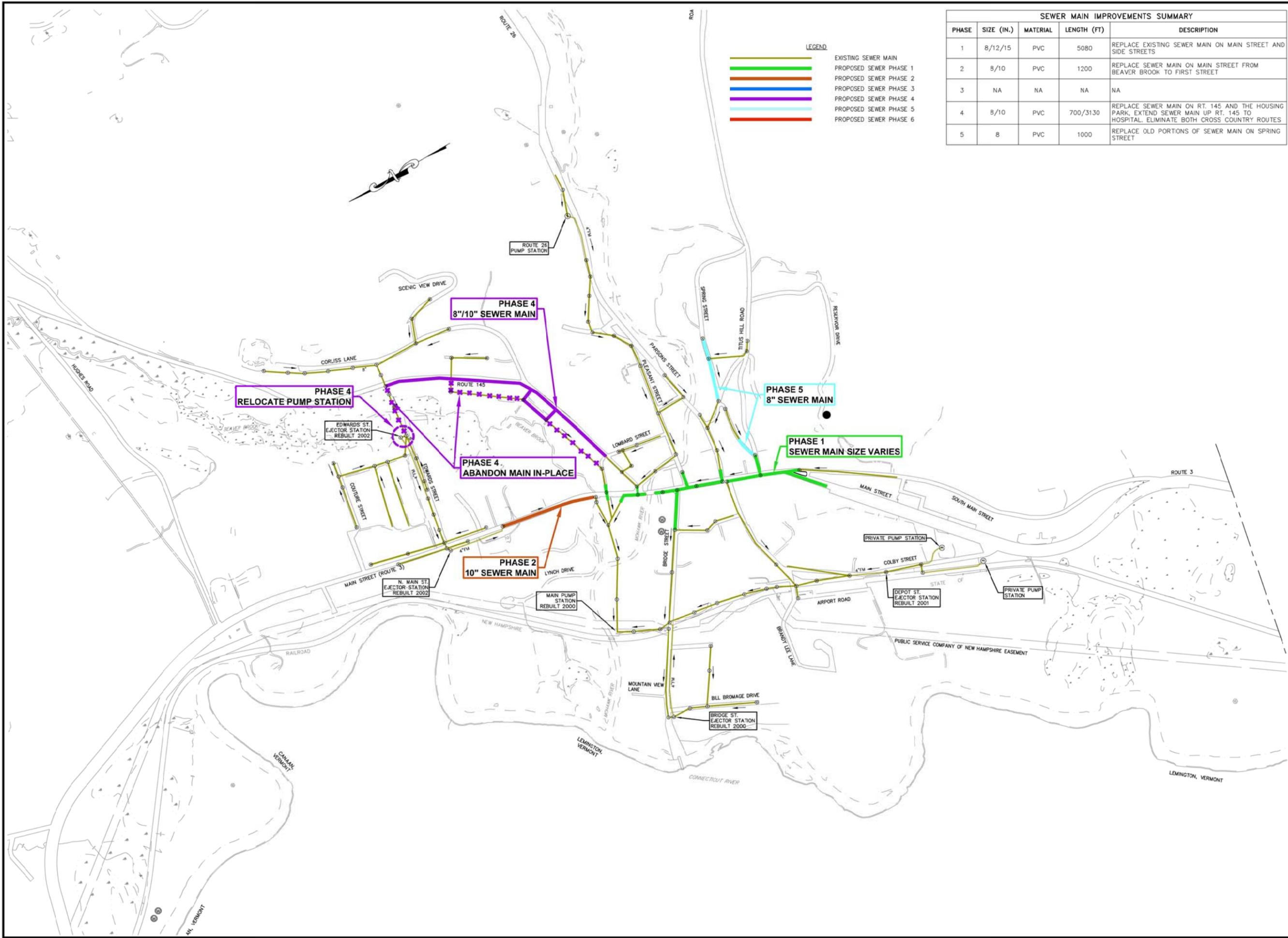


WATER MAIN IMPROVEMENTS SUMMARY				
PHASE	SIZE (IN.)	MATERIAL	LENGTH (FT)	DESCRIPTION
1	12	D.I.	3720	REPLACE 1880'S MAIN ST. WATER MAIN AND BRIDGE AND COLBY STREETS TO MONADNOCK STREET
2	12	D.I.	2250	REPLACE 1900'S WATER MAIN ON NORTH MAIN ST. FROM BEAVER BROOK TO NEW 12\"/>

LEGEND

- EXISTING WATER MAIN
- PROPOSED WATER PHASE 1
- PROPOSED WATER PHASE 2
- PROPOSED WATER PHASE 3
- PROPOSED WATER PHASE 4
- PROPOSED WATER PHASE 5
- PROPOSED WATER PHASE 6
- WATER PRECINCT

CMA ENGINEERS CIVIL/ENVIRONMENTAL ENGINEERS	Lafayette Center Stover Street Building Suite 208 Keene, NH 201985-8717	55 So. Commercial Street Manchester, NH 603627-0708	35 Bow Street Portsmouth, NH 603431-6196	www.cmaengineers.com info@cmaengineers.com
date: December 2013	designed by: JWB	project no: 890	drawn by: JWB	approved by: WAS
file name: 890-Utility Assessment.dwg				
Town of Colebrook, New Hampshire Department of Public Works		Utility System Assessment		
Water System		Phase Improvements Plan		
drawing no. Figure 4				
sheet: -	of -			by -



LEGEND

- EXISTING SEWER MAIN
- PROPOSED SEWER PHASE 1
- PROPOSED SEWER PHASE 2
- PROPOSED SEWER PHASE 3
- PROPOSED SEWER PHASE 4
- PROPOSED SEWER PHASE 5
- PROPOSED SEWER PHASE 6

SEWER MAIN IMPROVEMENTS SUMMARY				
PHASE	SIZE (IN.)	MATERIAL	LENGTH (FT)	DESCRIPTION
1	8/12/15	PVC	5080	REPLACE EXISTING SEWER MAIN ON MAIN STREET AND SIDE STREETS
2	8/10	PVC	1200	REPLACE SEWER MAIN ON MAIN STREET FROM BEAVER BROOK TO FIRST STREET
3	NA	NA	NA	NA
4	8/10	PVC	700/3130	REPLACE SEWER MAIN ON RT. 145 AND THE HOUSING PARK, EXTEND SEWER MAIN UP RT. 145 TO HOSPITAL, ELIMINATE BOTH CROSS COUNTRY ROUTES
5	8	PVC	1000	REPLACE OLD PORTIONS OF SEWER MAIN ON SPRING STREET

no.	revision	date	by

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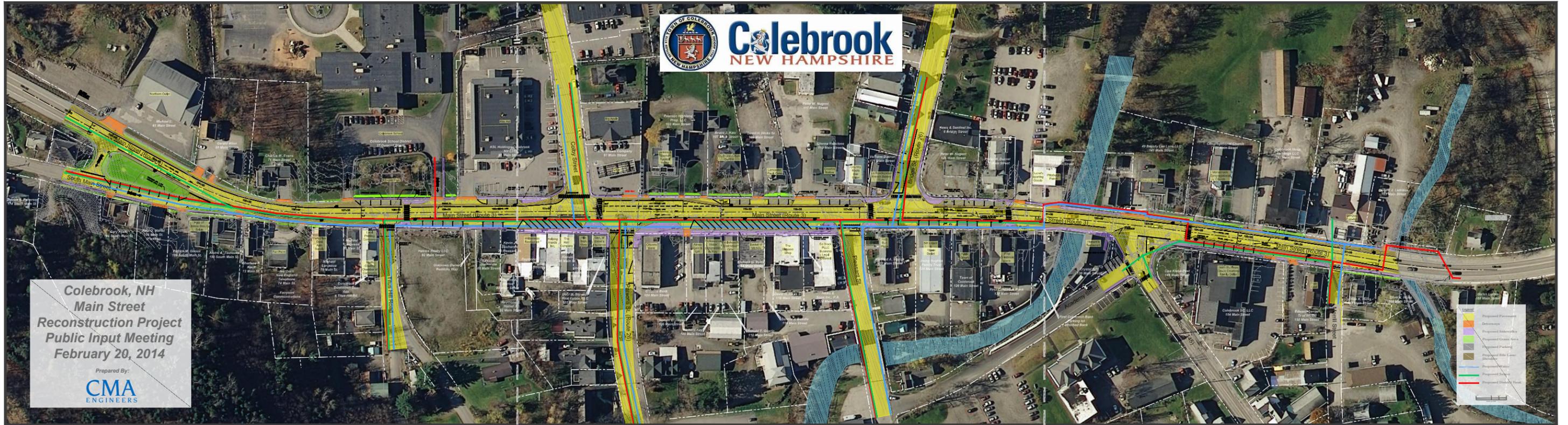
designed by: JWB
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date: December 2013
 project no: 890
 file name: 888-Utility_Assessment.dwg

scale: 1" = 500'

Town of Colebrook, New Hampshire
 Department of Public Works
 Utility System Assessment
 Sewer System
 Phased Improvements Plan

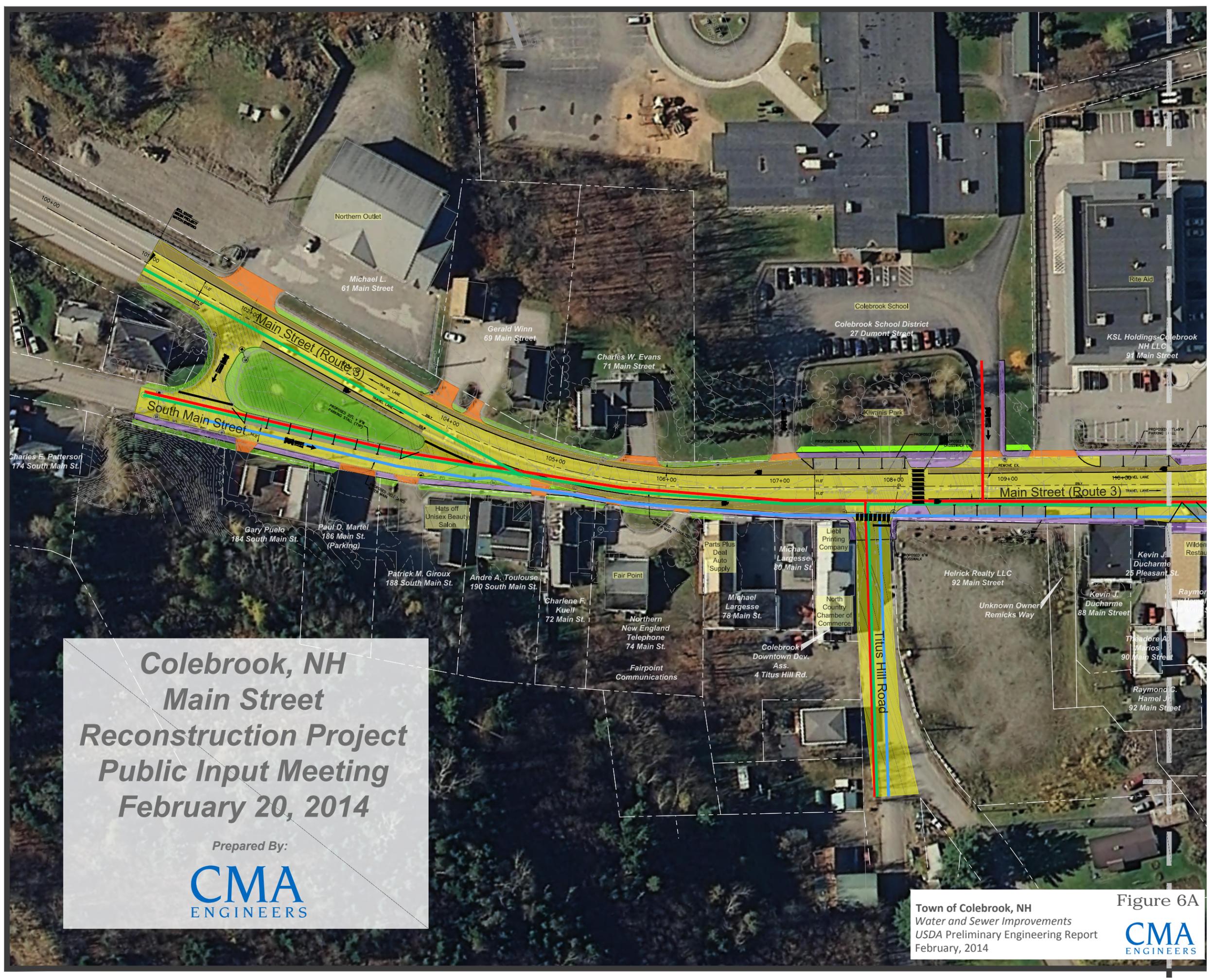
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See Figure 6A

See Figure 6B

See Figure 6C



Colebrook, NH
Main Street
Reconstruction Project
Public Input Meeting
February 20, 2014

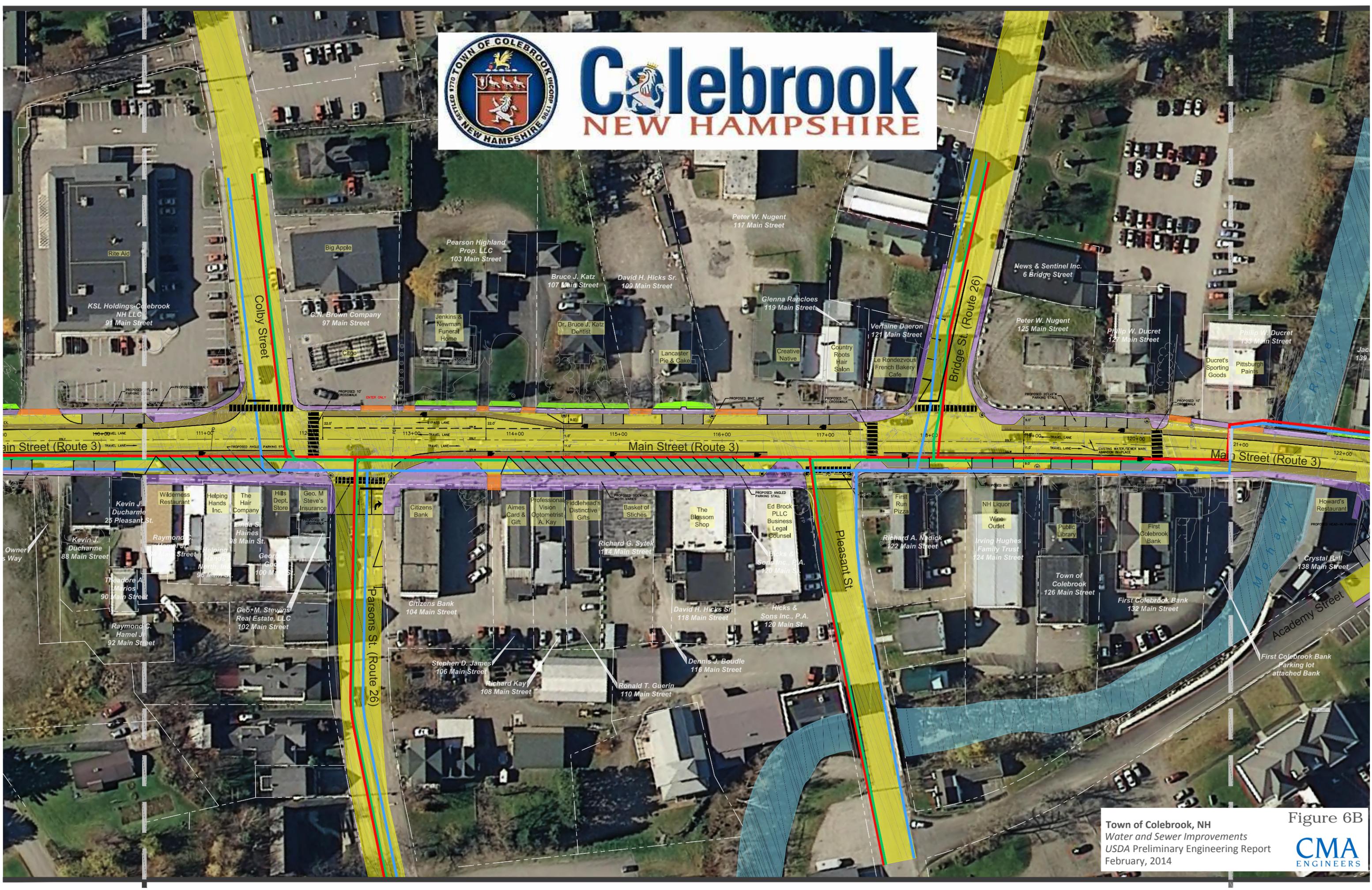
Prepared By:



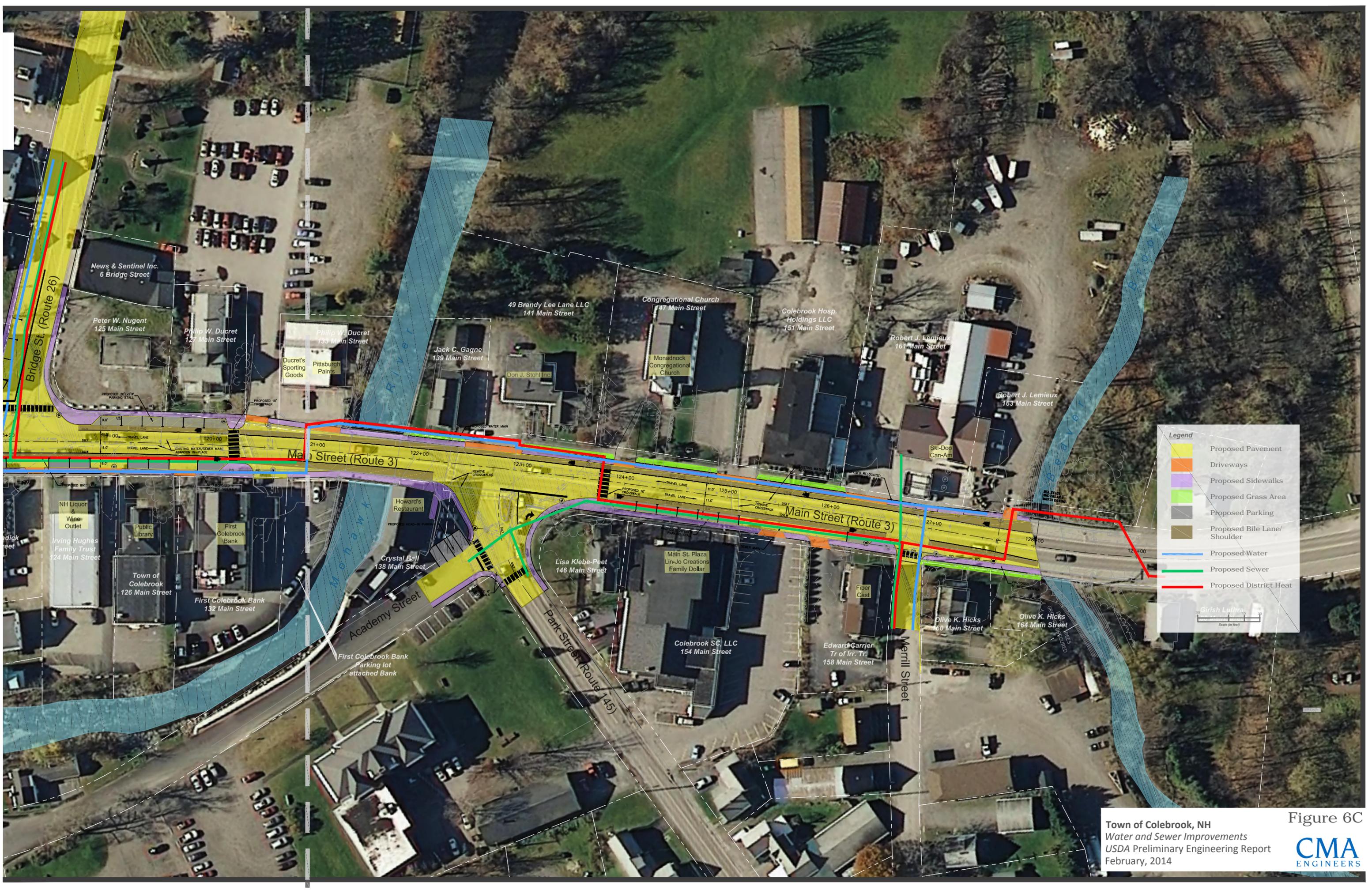


Colebrook

NEW HAMPSHIRE



Town of Colebrook, NH
Water and Sewer Improvements
USDA Preliminary Engineering Report
February, 2014



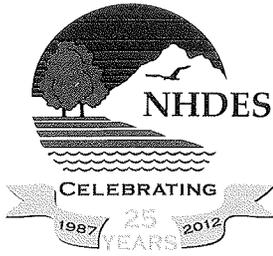
Legend

- Proposed Pavement
- Driveways
- Proposed Sidewalks
- Proposed Grass Area
- Proposed Parking
- Proposed Bike Lane/Shoulder
- Proposed Water
- Proposed Sewer
- Proposed District Heat

Girish Luthra
Scale (in feet)

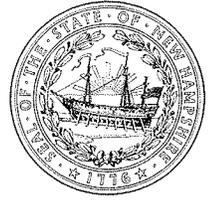
Appendix A

Existing NHDES Wetlands Permit- Main Street Water Crossing
Mohawk River



The State of New Hampshire
Department of Environmental Services

Thomas S. Burack, Commissioner



*Celebrating 25 Years of Protecting
New Hampshire's Environment*

WETLANDS AND NON-SITE SPECIFIC PERMIT 2012-01125

Permittee: Town Of Colebrook
17 Bridge St
Colebrook, NH 03576

Project Location: Main Street, Colebrook
Colebrook Tax Map/Lot No. 106 / 39

Waterbody: Mohawk River

**NOTE--
CONDITIONS**

Page 1 of 2

APPROVAL DATE: 07/17/2012

EXPIRATION DATE: 07/17/2017

Based upon review of the above referenced application, in accordance with RSA 482-A and RSA 485-A:17, a Wetlands Permit and Non-Site Specific Permit was issued. This permit shall not be considered valid unless signed as specified below.

PERMIT DESCRIPTION: Dredge and fill 3,670 square feet (includes 2,040 of temporary impacts) of the bed and bank of the Mohawk River to replace an exposed water main and stabilize 100 linear feet of the bank. Work in jurisdiction includes repairing an existing retaining wall and installing 50 linear feet vegetated rip-rap. A 10 foot wide riparian buffer will be planted along the top of the bank

THIS APPROVAL IS SUBJECT TO THE FOLLOWING PROJECT SPECIFIC CONDITIONS:

1. All work shall be in accordance with plans by CMA Engineers Town of Colebrook: Main Street Water Main Replacement and Bank Stabilization (sheets 3 & 5 of 9) as received May 04, 2012, and sheets 2 and 4 of 9 as received July 13, 2012; and Planting Standards (PL-1 and PL-2) as received June 05, 2012.
2. Following completion of work the areas of temporary impact shall be restored with native stream material and be restored to the original contours.
3. The river banks buffer plantings shall have at least 75% successful establishment after two (2) growing seasons, or it shall be replanted and re-established in a manner satisfactory to the DES Wetlands Bureau.
4. Work shall be done during low flow conditions.
5. The Permittee shall monitor the weather and will not commence work within flowing water, including the installation of cofferdams, when rain is in the forecast.
6. Appropriate siltation/erosion/turbidity controls shall be in place prior to construction, shall be maintained during construction, and remain in place until the area is stabilized. Silt fence(s) must be removed once the area is stabilized.
7. Appropriate turbidity controls shall be installed prior to construction, shall be maintained during construction such that no turbidity escapes the immediate dredge area, and shall remain until suspended particles have settled and the water at the work site has returned to normal clarity.
8. Prior to commencing work on a substructure located within surface waters, a cofferdam shall be constructed to isolate the substructure work area from the surface waters.
9. Discharge from dewatering of work areas shall be to sediment basins that are: a) located in uplands; b) lined with hay bales or other acceptable sediment trapping liners; c) set back as far as possible from wetlands and surface waters, in all cases with a minimum of 20 feet of undisturbed vegetated buffer.
10. No work within the confined area shall proceed until the cofferdam is fully effective, and water flow is controlled.
11. Temporary cofferdams shall be entirely removed immediately following construction.
12. All in-stream work shall be conducted in a manner that minimizes the duration of construction in the watercourse.
13. Extreme precautions shall be taken within riparian areas to limit unnecessary removal of vegetation during construction.
14. Work shall be conducted in a manner so as to minimize turbidity and sedimentation.
15. Dredged material shall be placed outside of the jurisdiction of the DES Wetlands Bureau.
16. Dewatering of work areas or of dredge materials, if required, shall be conducted in a manner so as to prevent turbidity.

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17. Construction equipment shall be inspected daily for leaking fuel, oil and hydraulic fluid prior to entering surface waters or wetlands. Faulty equipment shall be repaired prior to entering jurisdictional areas.
18. The contractor shall have appropriate oil spill kits on site and readily accessible at all times during construction and each operator shall be trained in its use.
19. All refueling of equipment shall occur outside of surface waters or wetlands during construction.
20. The contractor responsible for completion of the work shall utilize techniques described in the New Hampshire Stormwater Manual, Volume 3, Erosion and Sediment Controls During Construction (December 2008).
21. Within three days of final grading, all exposed soil areas shall be stabilized by seeding and mulching during the growing season, or if not within the growing season, by mulching with tack or netting and pinning on slopes steeper than 3:1.
22. Where construction activities have been temporarily suspended within the growing season, all exposed soil areas shall be stabilized within 14 days by seeding and mulching.
23. Where construction activities have been temporarily suspended outside the growing season, all exposed areas shall be stabilized within 14 days by mulching and tack. Slopes steeper than 3:1 shall be stabilized by matting and pinning.
24. All activities shall be in accordance with the Shoreland Water Quality Protection Act, RSA 483-B. The owner is responsible for obtaining any Shoreland Permit that may be required per RSA 483-B, for construction, excavation or fill that will occur within the Protected Shoreland.
25. Any future work on this property that is within the jurisdiction of the DES Wetlands Bureau as specified in RSA 482-A will require a new application and approval by the Bureau.

GENERAL CONDITIONS THAT APPLY TO ALL DES WETLANDS PERMITS:

1. A copy of this permit shall be posted on site during construction in a prominent location visible to inspecting personnel;
2. This permit does not convey a property right, nor authorize any injury to property of others, nor invasion of rights of others;
3. The Wetlands Bureau shall be notified upon completion of work;
4. This permit does not relieve the applicant from the obligation to obtain other local, state or federal permits, and/or consult with other agencies as may be required (including US EPA, US Army Corps of Engineers, NH Department of Transportation, NH Division of Historical Resources (NH Department of Cultural Resources), NHDES-Alteration of Terrain, etc.);
5. Transfer of this permit to a new owner shall require notification to and approval by DES;
6. This permit shall not be extended beyond the current expiration date.
7. This project has been screened for potential impacts to **known** occurrences of rare species and exemplary natural communities in the immediate area. Since many areas have never been surveyed, or have received only cursory inventories, unidentified sensitive species or communities may be present. This permit does not absolve the permittee from due diligence in regard to state, local or federal laws regarding such communities or species.
8. Review enclosed sheet for status of the US Army Corps of Engineers' federal wetlands permit.

APPROVED: _____


Sandra Mattfeldt
DES Wetlands Bureau

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BY SIGNING BELOW I HEREBY CERTIFY THAT I HAVE FULLY READ THIS PERMIT AND AGREE TO ABIDE BY ALL PERMIT CONDITIONS.

OWNER'S SIGNATURE (required)

CONTRACTOR'S SIGNATURE (required)

Appendix B

Summary of Monthly Water Pumped Into Colebrook System

Aug-12							
Colebrook, NH 03576							
Monthly Report							
Date	Flow MGD Down Town	Flow Northside	C12 Pounds Calcium Hypochlorite Northsdie	C12 Gallons Sodieum Hypochlorite Downtown	C12 Residual	pH	Temp. C
1	0.3813	0.2056	9		0.00	7.23	19.9
2	0.3390	0.1986			0.00	7.20	17.6
3	0.3516	0.2082			0.03	7.26	19.5
4	0.0000	0.2042			0.01	7.21	19.5
5	0.3356	0.1905			0.02	7.23	19.3
6	0.3152	0.1184			0.03	7.37	19.8
7	0.1012	0.2049			0.02	7.38	20.1
8	0.3128	0.1946			0.02	7.35	20.5
9	0.3132	0.1980		4	0.02	7.41	20.3
10	0.0569	0.0337			0.04	7.33	20.9
11	0.4040	0.0000			0.02	7.42	20.9
12	0.4424	0.0000			0.03	7.38	20.6
13	0.4655	0.0000			0.02	7.42	20.9
14	0.4357	0.0000			0.02	7.43	20.7
15	0.3883	0.0000			0.04	7.28	21.2
16	0.4943	0.0000			5.00	7.25	21.3
17	0.3801	0.0000			0.04	7.31	20.6
18	0.3581	0.0000			0.05	7.36	19.8
19	0.4202	0.0000			0.03	7.31	20.5
20	0.4465	0.0000			0.01	7.35	20.6
21	0.4633	0.0000			0.03	7.30	20.6
22	0.4545	0.0000			0.03	7.20	18.6
23	0.3655	0.0000		4	0.01	7.15	18.6
24	0.4472	0.0000			0.04	7.15	20.2
25	0.4501	0.0000			0.04	7.19	20.6
26	0.4694	0.0000			0.03	7.26	20.4
27	0.4424	0.0000			0.01	7.24	20.6
28	0.4502	0.0000			0.06	7.11	20.2
29	0.3219	0.1320			0.02	7.10	20.2
30	0.2731	0.1415			0.05	7.19	20.3
31	0.2701	0.1608		4	0.02	7.20	20.1
Total	10.7683	1.9854	9.0000	12.0000			
	0.3474	0.0640					
Attn Deb Macdonnell							
DES Water Division							
95 Hazen Drive PO Box 25							
Concord New Hampshire							

Sep-12							
Colebrook, NH 03576							
Monthly Report							
Date	Flow MGD Down Town	Flow Northside	C12 Pounds Calcium Hypochlorite Northsdie	C12 Gallons Sodieum Hypochlorite Downtown	C12 Residual	pH	Temp. C
1	0.2701	0.1471			0.02	7.32	20.1
2	0.2564	0.1445			0.03	7.31	20.3
3	0.2879	0.1419			0.03	7.30	20.1
4	0.2524	0.1504	14.0000		0.05	7.26	20.4
5	0.2600	0.1474			0.04	7.34	20.3
6	0.2547	0.1499			0.03	7.19	20.2
7	0.2895	0.1442			0.01	7.31	20.1
8	0.2351	0.1471			0.03	7.20	19.9
9	0.2609	0.1519			0.01	7.29	19.9
10	0.2644	0.1507			0.02	7.23	20.0
11	0.2777	0.1541			0.02	7.20	19.2
12	0.2647	0.2052			0.05	7.12	19.5
13	0.2351	0.1729			0.02	7.04	18.7
14	0.2637	0.1416			0.02	7.28	19.1
15	0.2804	0.1701			0.03	7.25	19.3
16	0.2886	0.1604			0.03	7.20	19.1
17	0.2589	0.1156			0.03	7.30	19.3
18	0.2698	0.1434	12.0000		0.03	7.18	19.0
19	0.2411	0.1553			0.03	7.19	19.0
20	0.2581	0.1418			0.03	7.21	18.5
21	0.2540	0.1450			0.03	7.26	18.4
22	0.2545	0.1324			0.02	7.24	18.4
23	0.2443	0.1616			0.04	7.30	18.5
24	0.2368	0.1505			0.01	7.24	18.2
25	0.2336	0.1585			0.02	7.29	17.7
26	0.2418	0.1569			0.04	7.24	18.0
27	0.2356	0.2254			0.03	7.23	18.0
28	0.1991	0.1803			0.03	7.22	17.3
29	0.1188	0.1507			0.04	7.28	17.5
30	0.3276	0.1580			0.02	7.3	17.5
Total	7.3455	4.5073	26.0000	0.0000			
AVG	0.2449	0.1502					
Attn Deb Macdonnell							
DES Water Division							
95 Hazen Drive PO Box 25							
Concord New Hampshire							

Oct-12							
Colebrook, NH 03576							
Monthly Report							
Date	Flow MGD Down Town	Flow Northside	C12 Pounds Calcium Hypochlorite Northsdie	C12 Gallons Sodieum Hypochlorite Downtown	C12 Residual	pH	Temp. C
1	0.2398	0.1523			0.03	7.28	17.2
2	0.2311	0.1605	8.0000		0.02	7.19	17.1
3	0.4263	0.0099			0.03	7.33	16.5
4	0.4453	0.0000			0.03	7.19	17.2
5	0.2800	0.0000			0.03	7.21	17.1
6	0.3075	0.1854			0.02	7.24	16.7
7	0.3073	0.1630			0.03	7.33	16.5
8	0.2348	0.1683			0.03	7.32	16.4
9	0.2472	0.1511			0.02	7.23	16.3
10	0.2319	0.1560			0.05	7.26	16.1
11	0.2310	0.2277			0.05	7.25	16.0
12	0.2440	0.1311			0.03	7.24	15.7
13	0.2172	0.1675			0.02	7.33	15.5
14	0.2738	0.1746			0.02	7.31	15.6
15	0.2487	0.1298			0.09	7.15	15.5
16	0.2573	0.2171			0.00	7.13	14.5
17	0.2224	0.0918			0.06	7.23	15.1
18	0.4914	0.0002			0.01	7.12	14.0
19	0.3122	0.0000			0.05	7.13	15.4
20	0.4543	0.0000			0.03	7.13	15.6
21	0.3398	0.0000			0.05	7.14	13.8
22	0.3596	0.0000		4	0.00	7.18	13.9
23	0.4943	0.0000			0.03	7.20	14.0
24	0.3397	0.0000			0.05	7.11	147.1
25	0.3340	0.0000		3	0.05	7.23	14.0
26	0.3438	0.0000			0.05	7.31	14.0
27	0.5115	0.0000			0.05	7.25	14.1
28	0.3251	0.0000			0.03	7.31	15.1
29	0.3345	0.0003		5	0.04	7.37	13.7
30	0.3299	0.0619			0.05	7.3	13.7
31	0.3073	0.0627			0.05	7.32	13.9
Total	9.6832	2.1964	8.0000	12.0000			
AVG	0.3124	0.0732					
Attn Deb Macdonnell							
DES Water Division							
95 Hazen Drive PO Box 25							
Concord New Hampshire							

Nov-12							
Colebrook, NH 03576							
Monthly Report							
Date	Flow MGD Down Town	Flow Northside	C12 Pounds Calcium Hypochlorite Northsdie	C12 Gallons Sodieum Hypochlorite Downtown	C12 Residual	pH	Temp. C
1	0.5383	0.0072			0.08	7.36	13.9
2	0.3296	0.0000	4.0000		0.02	7.33	14.2
3	0.3526	0.0000			0.05	7.32	13.4
4	0.3472	0.0000			0.04	7.32	13.4
5	0.4837	0.0000			0.04	7.28	13.3
6	0.3931	0.0000			0.06	7.34	13.4
7	0.2750	0.0000	4.0000		0.05	7.31	13.5
8	0.3937	0.0000			0.03	7.41	13.5
9	0.4489	0.0000			0.02	7.23	12.6
10	0.2191	0.0000			0.04	7.31	12.3
11	0.0000	0.0632			0.05	7.33	12.1
12	0.4742	0.0616			0.04	7.31	12.3
13	0.2489	0.0583			0.07	7.30	12.0
14	0.3396	0.0667			0.05	7.28	11.4
15	0.3417	0.0589	4.0000		0.01	7.30	11.2
16	0.3263	0.0669			0.04	7.29	11.3
17	0.3381	0.0614			0.01	7.31	11.5
18	0.3637	0.0644			0.04	7.33	10.9
19	0.4966	0.0281			0.01	7.19	11.2
20	0.0000	0.0951			0.05	7.25	10.5
21	0.7450	0.0869	3.0000		0.05	7.21	11.3
22	0.0106	0.0464			0.05	7.31	11.0
23	0.6897	0.0478			0.04	7.33	10.8
24	0.3593	0.0122			0.03	7.32	11.3
25	0.4721	0.0000			0.05	7.20	11.5
26	0.3433	0.0576	4.0000		0.04	7.30	9.6
27	0.3514	0.0620			0.00	7.28	9.5
28	0.5105	0.0303			0.06	7.28	9.4
29	0.3869	0.0056			0.01	7.20	9.0
30	0.4980	0.0212	4		0.03	7.31	9.8
Total	10.5388	0.9947	23.0000	0.0000			
AVG	0.3513	0.0332					
Attn Deb Macdonnell							
DES Water Division							
95 Hazen Drive PO Box 25							
Concord New Hampshire							

Dec-12							
Colebrook, NH 03576							
Monthly Report							
Date	Flow MGD Down Town	Flow Northside	C12 Pounds Calcium Hypochlorite Northsdie	C12 Gallons Sodieum Hypochlorite Downtown	C12 Residual	pH	Temp. C
1	0.3411	0.0589			0.02	7.24	9.0
2	0.5469	0.0369			0.02	7.25	8.5
3	0.3407	0.0527			0.04	7.19	8.5
4	0.5226	0.0355		4	0.01	7.12	8.8
5	0.3565	0.0569			0.11	7.16	8.4
6	0.4013	0.0390			0.90	7.18	8.0
7	0.4007	0.0501			0.05	7.20	8.1
8	0.3383	0.0412			0.07	7.33	8.3
9	0.5248	0.1286			0.05	7.31	8.2
10	0.5166	0.0000			0.01	7.25	7.6
11	0.3676	0.0000			0.06	7.21	7.3
12	0.4605	0.0954			0.01	7.28	7.2
13	0.3751	0.0655			0.01	7.10	7.4
14	0.4286	0.0577			0.03	7.11	7.7
15	0.2996	0.0816			0.01	7.17	6.7
16	0.0970	0.0607			0.02	7.10	7.2
17	0.2055	0.0811			0.02	7.10	
18	0.3339	0.0990			0.01	7.08	7.4
19	0.3559	0.0837			0.03	7.08	7.3
20	0.3078	0.1137			0.01	7.08	7.5
21	0.2908	0.0887			0.00	7.03	7.7
22	0.3050	0.1210			0.03	7.04	7.7
23	0.3070	0.0894			0.02	7.10	7.6
24	0.4559	0.0684			0.02	7.13	7.5
25	0.2999	0.1567			0.02	7.00	7.8
26	0.1096	0.0743			0.01	7.11	7.5
27	0.2846	0.1011			0.02	7.13	7.3
28	0.3282	0.0741			0.03	7.21	7.6
29	0.2753	0.0840			0.01	7.10	6.3
30	0.2648	0.0895			0.00	7.01	7.2
31	0.3576	0.0942	10.0000		0.00	7.05	6.4
Total	10.4586	2.1267	10.0000	4.0000			
AVG	0.3374	0.0709					
Attn Deb Macdonnell							
DES Water Division							
95 Hazen Drive PO Box 25							
Concord New Hampshire							

Jan-13							
Colebrook, NH 03576							
Monthly Report							
Date	Flow MGD Down Town	Flow Northside	C12 Pounds Calcium Hypochlorite Northsdie	C12 Gallons Sodieum Hypochlorite Downtown	C12 Residual	pH	Temp. C
1	0.3709	0.0990			0.00	7.30	6.7
2	0.2543	0.1031			0.03	7.10	6.0
3	0.2582	0.1108			0.03	7.19	6.1
4	0.3763	0.1083			0.02	7.20	6.1
5	0.3328	0.0963			0.03	7.23	6.2
6	0.2191	0.1495			0.05	7.25	5.5
7	0.3206	0.0760			0.03	7.12	6.1
8	0.3128	0.1786			0.03	7.31	6.3
9	0.2638	0.1205			0.05	7.28	6.1
10	0.2607	0.1201			0.03	7.11	6.4
11	0.3766	0.1007			0.04	7.04	6.2
12	0.3492	0.1426			0.04	7.09	6.3
13	0.3376	0.1220			0.04	7.16	6.2
14	0.2659	0.1194			0.04	7.15	6.7
15	0.2751	0.1173			0.00	7.11	5.8
16	0.3442	0.0968			0.00	7.13	5.7
17	0.4189	0.1614			0.04	7.21	5.8
18	0.3157	0.1342			0.03	7.15	6.0
19	0.3348	0.0167			0.03	7.11	6.3
20	0.3304	0.1088			0.04	7.13	6.1
21	0.3367	0.1232			0.03	7.26	5.9
22	0.3312	0.1396			0.00	7.28	5.3
23	0.3312	0.1118			0.01	7.30	5.6
24	0.3312	0.1386			0.03	7.49	4.9
25	0.3312	0.1666			0.03	7.27	5.6
26	0.3312	0.1728			0.04	7.33	7.1
27	0.3312	0.1701			0.00	7.35	5.7
28	0.4752	0.0395			0.05	7.27	5.3
29	0.3312	0.0000			0.02	7.30	8.1
30	0.3312	0.1376			0.02	7.21	5.8
31	0.3276	0.1349			0.04	7.26	6.4
Total	9.7361	3.3829	0.0000	0.0000	0.02		
AVG	0.3141	0.1128					
Attn Deb Macdonnell							
DES Water Division							
95 Hazen Drive PO Box 25							
Concord New Hampshire							

Feb-13

Colebrook, NH 03576

Monthly Report

Date	Flow MGD Down Town	Flow Northside	Cl2 Pounds Calcium Hypochlorite Downtown	Cl2 Pounds Calcium Hypochlorite Northsdie	C12 Residual	pH	Temp. C
1	0.211	0.139			0.06	7.31	5.0
2	0.211	0.124			0.06	7.33	5.3
3	0.250	0.127			0.08	7.35	5.1
4	0.173	0.120			0.06	7.19	6.9
5	0.269	0.128			0.06	7.14	5.5
6	0.250	0.129			0.03	7.14	5.4
7	0.250	0.126			0.05	7.13	4.9
8	0.288	0.018			0.05	7.11	4.6
9	0.307	0.062			0.05	7.13	5.0
10	0.307	0.093			0.01	7.17	5.8
11	0.230	0.078			0.00	7.22	5.1
12	0.450	0.117			0.03	7.11	5.3
13	0.457	0.104		20	0.03	7.12	5.2
14	0.456	0.131	100		0.37	7.05	4.7
15	0.456	0.117			0.50	7.12	5.0
16	0.456	0.110			0.30	7.13	5.1
17	0.457	0.110			0.35	7.13	5.1
18	0.456	0.087			0.27	7.31	5.0
19	0.457	0.131			0.33	7.14	5.2
20	0.457	0.129			0.08	7.13	5.1
21	0.457	0.042			0.07	7.20	4.7
22	0.465	0.162			0.02	7.15	4.8
23	0.455	0.249			0.03	7.19	5.3
24	0.331	0.245			0.05	7.18	5.6
25	0.337	0.233			0.02	7.18	5.5
26	0.382	0.230			0.05	7.17	4.5
27	0.272	0.233			0.02	7.15	4.9
28	0.455	0.101			0.03	7.12	5.1
29							
30							
31							
Total	9.790	3.537	100.0000	20.0000	0.02		
AVG	0.350	0.126					

Attn Deb Macdonnell

DES Water Division
 95 Hazen Drive PO Box 25
 Concord New Hampshire

Note As of 2/23/13 we have been redoing out downtown station and installing a new flow meter. During the remainder of the month we had to estimate flow rates for the downtown station. There is a higher flow rate but we erred on the side of caution and used the higher flow rate of the pumps and the hour meter to calculate. We also discovered a leak and did not fix it until March 7th Our average daily flowrate is back to .350MGD

May-13

Colebrook, NH 03576

Date	Flow MGD Down Town	Flow Northside	Cl2 Pounds Calcium Hypochlorite Downtown	Cl2 Pounds Calcium Hypochlorite Northsdie	C12 Residual	pH	Temp. C
1	0.267	0.075			0.01	7.22	9.5
2	0.274	0.072			0.06	7.19	8.4
3	0.273	0.073			0.05	7.20	8.1
4	0.271	0.075			0.02	7.21	9.3
5	0.268	0.074			0.01	7.16	8.9
6	0.268	0.078			0.01	7.20	8.4
7	0.269	0.076			0.01	7.15	9.6
8	0.270	0.077			0.08	7.23	8.8
9	0.344	0.000			0.04	7.14	10.6
10	0.384	0.000			0.02	7.14	10.3
11	0.390	0.000			0.02	7.15	10.1
12	0.360	0.000			0.05	7.15	10.3
13	0.349	0.077			0.01	7.24	11.0
14	0.269	0.079			0.01	7.22	10.7
15	0.272	0.076			0.04	7.16	11.0
16	0.283	0.075			0.01	7.20	10.9
17	0.274	0.074			0.05	7.23	10.9
18	0.272	0.073			0.03	7.20	11.0
19	0.273	0.073			0.02	7.26	11.3
20	0.273	0.074			0.08	7.28	11.3
21	0.272	0.071			0.00	7.23	11.4
22	0.274	0.073			0.02	7.22	11.6
23	0.270	0.000			0.01	7.27	11.8
24	0.269	0.000			0.03	7.16	12.4
25	0.273	0.000			0.14	7.10	12.1
26	0.268	0.000			0.05	7.13	12.4
27	0.261	0.000			0.03	7.15	12.5
28	0.284	0.074			0.02	7.32	12.6
29	0.280	0.074			0.07	7.27	12.6
30	0.270	0.075			0.01	7.3	12.6
31	0.282	0.073			0.05	7.20	12.5
Total	8.357	1.493	0.0000	0.0000			
AVG	0.270	0.050					

Attn Deb Macdonnell

DES Water Division

Concord New Hampshire

Apr-13

Colebrook, NH 03576

Monthly Report

Date	Flow MGD Down Town	Flow Northside	Cl2 Pounds Calcium Hypochlorite Downtown	Cl2 Pounds Calcium Hypochlorite Northsdie	C12 Residual	pH	Temp. C
1	0.272	0.074		25	0.06	7.20	5.4
2	0.271	0.073			0.05	7.19	3.8
3	0.244	0.070			0.04	7.20	3.5
4	0.270	0.071			0.01	7.20	4.7
5	0.271	0.074			0.05	7.24	3.8
6	0.269	0.071			0.06	7.24	5.1
7	0.270	0.071			0.01	7.40	6.6
8	0.263	0.073			0.05	7.40	4.0
9	0.271	0.073			0.02	7.18	4.4
10	0.267	0.075			0.05	7.17	4.7
11	0.269	0.072			0.01	7.26	4.6
12	0.271	0.070			0.05	7.26	4.7
13	0.270	0.071			0.05	7.31	5.3
14	0.268	0.072			0.05	7.33	5.1
15	0.262	0.072			0.06	7.36	4.8
16	0.262	0.072			0.01	7.18	4.6
17	0.262	0.072			0.02	7.21	4.9
18	0.262	0.072			0.06	7.18	6.0
19	0.264	0.066			0.01	7.25	5.5
20	0.265	0.069			0.01	7.20	5.5
21	0.261	0.070			0.00	7.26	5.7
22	0.265	0.071			0.02	7.29	5.9
23	0.265	0.065			0.03	7.30	5.1
24	0.265	0.072			0.02	7.30	8.2
25	0.227	0.072			0.01	7.33	6.8
26	0.266	0.071			0.01	7.23	6.2
27	0.267	0.070			0.03	7.31	8.1
28	0.268	0.069			0.02	7.33	8.0
29	0.264	0.071			0.01	7.20	6.9
30	0.274	0.074			0.01	7.16	7.6
31							
Total	7.673	2.064	0.0000	25.0000			
AVG	0.256	0.069					

Attn Deb Macdonnell

DES Water Division
 95 Hazen Drive PO Box 25
 Concord New Hampshire

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 There is a higher flow rate but we erred on the side of caution and used the higher flow rate of the pumps and the hour meter to calculate. We also discovered a leak and did not fix it until March 7th Our average daily flowrate is back to .350MGD

Jun-13

Colebrook, NH 03576

Monthly Report

Date	Flow MGD Down Town	Flow Northside	Cl2 Pounds Calcium Hypochlorite Downtown	Cl2 Pounds Calcium Hypochlorite Northsdie	C12 Residual	pH	Temp. C
1	0.277	0.054			0.05	7.23	13.4
2	0.297	0.000			0.01	7.23	12.2
3	0.294	0.000			0.00	7.26	13.7
4	0.294	0.000			0.01	7.32	13.7
5	0.294	0.000			0.05	7.26	14
6	0.323	0.000			0.01	7.27	14.0
7	0.423	0.000			0.04	7.30	14.2
8	0.333	0.000			0.02	7.31	14.1
9	0.353	0.000			0.03	7.33	14.5
10	0.277	0.000			0.04	7.43	14.9
11	0.358	0.000			0.01	7.39	14.6
12	0.347	0.026			0.04	7.32	14.4
13	0.292	0.025			0.04	7.31	14.9
14	0.283	0.012			0.05	7.19	14.5
15	0.453	0.008			0.04	7.26	14.7
16	0.269	0.026			0.01	7.29	14.9
17	0.291	0.022			0.06	7.27	15.0
18	0.276	0.009			0.01	7.28	15.3
19	0.432	0.011			0.04	7.30	15.2
20	0.282	0.026			0.06	7.32	15.3
21	0.292	0.025			0.03	7.27	14.8
22	0.281	0.023			0.02	7.21	15.1
23	0.291	0.025			0.02	7.23	15.3
24	0.290	0.025			0.03	7.12	14.1
25	0.290	0.023			0.04	7.11	14.3
26	0.433	0.019			0.01	7.12	15.1
27	0.275	0.020			0.01	7.11	15.1
28	0.284	0.022			0.02	7.15	16.2
29	0.353	0.000			0.02	7.24	16.5
30	0.347	0.022			0.05	7.22	16.6
31							
Total	9.307	0.369	0.0000	0.0000			
AVG	0.310	0.012					

Attn Deb Macdonnell

DES Water Division
 95 Hazen Drive PO Box 25
 Concord New Hampshire

Note As of 2/23/13 we have been redoing out downtown station and installing a new flow meter. During the remainder of the month we had to estimate flow rates for the downtown station. There is a higher flow rate but we erred on the side of caution and used the higher flow rate of the pumps and the hour meter to calculate. We also discovered a leak and did not fix it until March 7th Our average daily flowrate is back to .350MGD

Jul-13

Colebrook, NH 03576

Monthly Report

Date	Flow MGD Down Town	Flow Northside	Cl2 Pounds Calcium Hypochlorite Downtown	Cl2 Pounds Calcium Hypochlorite Northsdie	C12 Residual	pH	Temp. C
1	0.293	0.025			0.06	7.17	17.2
2	0.285	0.020			0.05	7.20	17.3
3	0.443	0.010			0.05	7.20	17.3
4	0.229	0.023			0.07	7.26	17.1
5	0.290	0.023			0.05	7.16	15.5
6	0.335	0.022			0.05	7.13	15.1
7	0.290	0.023			0.04	7.20	15.3
8	0.293	0.025			0.01	7.24	18.4
9	0.274	0.000			0.05	7.18	17.9
10	0.452	0.019			0.02	7.19	18.8
11	0.265	0.024			0.03	7.20	18.1
12	0.269	0.022			0.04	7.24	19.1
13	0.416	0.000			0.04	7.25	19.1
14	0.289	0.029			0.04	7.26	19.5
15	0.294	0.024			0.04	7.31	19.6
16	0.302	0.000			0.03	7.33	19.4
17	0.414	0.019			0.05	7.25	19.0
18	0.281	0.026			0.05	7.31	18.7
19	0.277	0.020			0.02	7.15	20.4
20	0.278	0.020			0.02	7.23	20.1
21	0.279	0.021			0.03	7.20	20.3
22	0.285	0.023			0.03	7.27	19.7
23	0.279	0.000			0.01	7.31	19.3
24	0.436	0.019			0.05	7.19	20.4
25	0.262	0.026			0.04	7.15	19.6
26	0.289	0.025			0.05	7.14	18.4
27	0.290	0.000			0.04	7.18	19.7
28	0.426	0.019			0.07	7.24	20.0
29	0.262	0.026			0.04	7.23	20.2
30	0.284	0.024			0.02	7.25	20.3
31	0.272	0.000			0.04	7.14	19.1
Total	9.340	0.532	0.0000	0.0000			
AVG	0.301	0.018					

Attn Deb Macdonnell

DES Water Division
95 Hazen Drive PO Box 25
Concord New Hampshire

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Appendix C

Summary of Monthly Water Wastewater Flows to Colebrook WWTF

Appendix D

2012 Colebrook Leakage / Loss Audit Summary

AWWA WLCC Free Water Audit Software: Reporting Worksheet

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WAS v4.2

[Back to instructions](#)

[?](#) Click to access definition

Water Audit Report for: **Town of Colebrook Water Works**

Reporting Year: **2012** #VALUE!

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

WATER SUPPLIED

<< Enter grading in column 'E'

Volume from own sources:	<input type="text" value="6"/>	<input type="text" value="107.000"/>	Million gallons (US)/yr (MG/Yr)
Master meter error adjustment (enter positive value):	<input type="text" value="n/a"/>	<input type="text" value="2.660"/>	over-registered MG/Yr
Water imported:	<input type="text" value="n/a"/>	<input type="text" value="0.000"/>	MG/Yr
Water exported:	<input type="text" value="n/a"/>	<input type="text" value="0.000"/>	MG/Yr
WATER SUPPLIED:		104.340	MG/Yr

AUTHORIZED CONSUMPTION

Billed metered:	<input type="text" value="6"/>	<input type="text" value="22.230"/>	MG/Yr
Billed unmetered:	<input type="text" value="6"/>	<input type="text" value="1.526"/>	MG/Yr
Unbilled metered:	<input type="text" value="n/a"/>	<input type="text" value="0.000"/>	MG/Yr
Unbilled unmetered:	<input type="text" value="5"/>	<input type="text" value="1.304"/>	MG/Yr
AUTHORIZED CONSUMPTION:		25.060	MG/Yr

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

Click here: [?](#) for help using option buttons below

Pcnt: Value:

Use buttons to select percentage of water supplied OR value

WATER LOSSES (Water Supplied - Authorized Consumption)

79.280 MG/Yr

Apparent Losses

Unauthorized consumption:	<input type="text" value="5"/>	<input type="text" value="0.261"/>	MG/Yr
Customer metering inaccuracies:	<input type="text" value="5"/>	<input type="text" value="2.199"/>	MG/Yr
Systematic data handling errors:	<input type="text" value="5"/>	<input type="text" value="1.136"/>	MG/Yr
Apparent Losses:		3.595	

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Pcnt: Value:

Value:

Choose this option to enter a percentage of billed metered consumption. This is NOT a default value

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses:	<input type="text" value="5"/>	<input type="text" value="75.684"/>	MG/Yr
WATER LOSSES:		79.280	MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER:	<input type="text" value="5"/>	<input type="text" value="80.584"/>	MG/Yr
---------------------------	--------------------------------	-------------------------------------	-------

= Total Water Loss + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	<input type="text" value="3"/>	<input type="text" value="8.5"/>	miles
Number of active AND inactive service connections:	<input type="text" value="2"/>	<input type="text" value="481"/>	
Connection density:	<input type="text" value="57"/>	<input type="text" value="57"/>	conn./mile main
Average length of customer service line:	<input type="text" value="2"/>	<input type="text" value="40.0"/>	ft (pipe length between curbstop and customer meter or property boundary)
Average operating pressure:	<input type="text" value="1"/>	<input type="text" value="60.0"/>	psi

COST DATA

Total annual cost of operating water system:	<input type="text" value="4"/>	<input type="text" value="\$188,831"/>	\$/Year
Customer retail unit cost (applied to Apparent Losses):	<input type="text" value="1"/>	<input type="text" value="\$6.00"/>	\$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	<input type="text" value="1"/>	<input type="text" value="\$1,163.90"/>	\$/Million gallons

PERFORMANCE INDICATORS

Financial Indicators

Non-revenue water as percent by volume of Water Supplied:	<input type="text" value="77.2%"/>
Non-revenue water as percent by cost of operating system:	<input type="text" value="62.7%"/>
Annual cost of Apparent Losses:	<input type="text" value="\$28,838"/>
Annual cost of Real Losses:	<input type="text" value="\$88,089"/>

Operational Efficiency Indicators

Apparent Losses per service connection per day:	<input type="text" value="20.48"/>	gallons/connection/day
Real Losses per service connection per day*:	<input type="text" value="431.09"/>	gallons/connection/day
Real Losses per length of main per day*:	<input type="text" value="N/A"/>	
Real Losses per service connection per day per psi pressure:	<input type="text" value="7.18"/>	gallons/connection/day/psi
Unavoidable Annual Real Losses (UARL):	<input type="text" value="Not Valid"/>	
*** UARL cannot be calculated as either average pressure, number of connections or length of mains is too small: SEE UARL DEFINITION ***		
From Above, Real Losses = Current Annual Real Losses (CARL):	<input type="text" value="75.68"/>	
Infrastructure Leakage Index (ILI) [CARL/UARL]:	<input type="text"/>	

* only the most applicable of these two indicators will be calculated

WATER AUDIT DATA VALIDITY SCORE:

Add a grading value for 1 parameter(s) to enable an audit score to be calculated

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

- 1: Volume from own sources**
- 2: Master meter error adjustment**
- 3: Customer retail unit cost (applied to Apparent Losses)**

[For more information, click here to see the Grading Matrix worksheet](#)

Appendix E

NH DES Correspondence Re: Colebrook Water System



The State of New Hampshire
DEPARTMENT OF ENVIRONMENTAL SERVICES



Thomas S. Burack, Commissioner

December 13, 2011

Kevin McKinnon
Colebrook Water Works
37 South Hill Road
Colebrook, NH 03576

RE: Colebrook- Colebrook Water Works (PWS ID: 0481010)
Water Conservation Plan

Dear Mr. McKinnon:

On December 1, 2011, the New Hampshire Department of Environmental Services ("DES") Drinking Water and Groundwater Bureau received a report submitted by April Hyde, Chief Operator on behalf of the Town of Colebrook. The report was submitted to document compliance with DES requests included in a letter dated October 10, 2011 and more specifically to document compliance with Colebrook Water Works' Water Conservation Plan and Env-Wq 2101 *Water Conservation Rules*.

As stated in the letter dated October 10, 2011, by **June 1, 2012** you are requested to submit to DES the following:

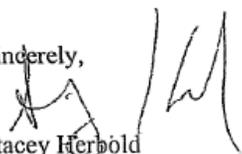
1. A completed Leak Detection and Repair Project Summary form for December 2011 - June 2012, summarizing leaks found, replaced pipes and valves, and gallons saved (attached);
2. Service meter registration and replacement information including how many service meters have been registered and replaced;
3. Summary of recent actions taken to move forward with the reconstruction of Main Street; and
4. Existing water rates. (Update on consideration for increasing water rates to reflect costs of maintenance of the water system.)

Based on review of the report recently submitted, by **June 1, 2012** you are also requested to submit to DES the following:

1. Documentation that a new water meter has been installed at the downtown pump station.

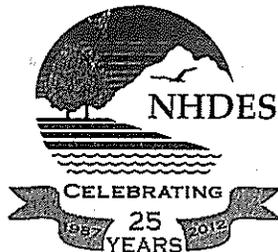
Please feel free to contact me with any questions at (603) 271-0659 or via e-mail at stacey.herbold@des.nh.gov.

Sincerely,


Stacey Herbold
Water Conservationist
Drinking Water and Groundwater Bureau

cc: Colebrook Board of Selectman

cc: Derek Bennett-DES



The State of New Hampshire
Department of Environmental Services

Thomas S. Burack, Commissioner



*Celebrating 25 Years of Protecting
New Hampshire's Environment*

November 26, 2012

0481010
Colebrook

Kevin McKinnon
Colebrook Water Works
17 Bridge Street
Colebrook NH 03576

SUBJECT: MWS COLEBROOK: COLEBROOK WATER WORKS EPA # 0481010
SANITARY SURVEY 12/13/2011

Dear Mr. McKinnon:

On December 13, 2011, a staff member from the Department of Environmental Services (DES) performed a sanitary survey on the Town of Colebrook water system. The purpose of the survey was to review the capacity of the water system's sources, treatment, distribution, and management to continually produce safe drinking water. We would like to thank Kevin McKinnon, Public Works Director, for his assistance in conducting this survey.

SUMMARY

The Town of Colebrook water system is operated in a professional manner and the operators are very knowledgeable of the components and operation of the water system: The system has undertaken several improvement projects since the last sanitary survey, including two new wells, a pump house, a water main extension to connect the new wells to the distribution system, and installation of a SCADA system. Colebrook also completed a water main extension to create a loop with the Edwards Street and Route 145 water mains. The system is also completing improvements to rehabilitate the pump house at the downtown wellfield. This sanitary survey did not identify any significant deficiencies. The following is a list of additional issues that we recommend the managers of the water system address to maintain compliance, and continue to provide an acceptable level of service to the customers.

- Closely monitor the turbidity levels at the new wells and evaluate the results to determine if system improvements are needed
- Review and update the cross connection control plan
- Continue efforts to implement the system's water conservation plan
- Increase the frequency of water main flushing to twice per year
- Install a chlorine residual analyzer at the downtown pump station.
- Install monitoring wells in the protective radius of the downtown wells
- Establish a five year inspection schedule for the water tank

A more descriptive discussion on each issue is included below.

www.des.nh.gov

29 Hazen Drive • PO Box 95 • Concord, NH 03302-0095

Telephone: (603) 271-2513 • Fax: (603) 271-5171 • TDD Access: Relay NH 1-800-735-2964

FACILITIES DESCRIPTION

The Colebrook Water Works provides domestic water and fire protection to approximately 480 service connections serving an estimated population of 1,200 people. The water system extends east along Routes 26 and 145, north along Route 3 to the new pump house, west to the Connecticut River, and south along Route 3. The system reports that the average reported water usage for 2011 was approximately 330,000 gallons per day, and the maximum daily usage was approximately 380,000 gallons per day. A large portion of this demand is unaccounted for water. The system is implementing a water conservation plan, which includes addressing system leakage and improving system metering.

In general, the water system is comprised of two gravel packed well fields, two pump houses, a one million gallon water storage tank, and associated piping and appurtenances.

The gravel packed wells at the downtown wellfield are located adjacent to a municipal parking lot near the corner of Bridge Street and Route 3. Each well is covered with a concrete cover. Well #1, located ten feet from the pump house is 40 feet in depth and has an estimated yield of 250 GPM. Well #2 is located approximately 60 feet east of the pump house and has an estimated yield of 400 GPM. The Town has installed a fence to restrict access to the wells and pump house. As mentioned in prior surveys, the existing radius is unprotected. Within the protective radius for both wells is a municipal parking lot with associated drainage, residential buildings, and abandoned service station. The service station storage tanks were removed and monitoring wells were installed and monitored for volatile organic compounds by the owner of the lot.

Water from Wells 1 and 2 is pumped from each well and the pipes are manifolded within the pump house. The pump house is a single story building set a half story below ground. The building houses the manifold piping, master meter, pressure relief valve, and chemical feed system. Currently, the water system continuously disinfects with 12.5% sodium hypochlorite. The target disinfectant residual is 0.1 mg/l. This building is in good condition, but the electrical equipment and piping is in relatively poor condition. The system plans to upgrade this station by replacing most of the electrical equipment, and interior piping. The upgrade will also include installation of a tablet chlorinator, and a flushing hydrant outside the pump house. There is no backup power at this wellfield, but there is a transfer switch and a generator connection on the building exterior to allow the well field to operate on a portable generator.

Two new gravel wells are located north of downtown Colebrook in a large field west of Route 3. The wells are approximately 1200 feet west of Route 3, and a long water main connects the wells to the pump house, which is near Route 3. Gravel well PW 5 is 160 feet deep, and well PW 7 is 150 feet deep. Each of the wells has a permitted production volume of 302,400 gallons per day (210 gpm). The new pump house is divided into two sections. The east half houses the piping from the wellfield which includes a magnetic flow meter and chemical injection points. This

room also houses VFDs, a SCADA panel, a sampling sink, and turbidity, chlorine and pH analyzers. The water from the new wells has low levels of turbidity, which tends to be elevated when the wells are first turned on. The turbidimeter is used to monitor the wells to ensure that high turbidity water is not discharged into the water system. The building includes a spare pipe through the floor, which could be used as an automatic flushing connection should it become necessary to flush the wells before introducing flow to the water system.

The west side of the new pump house contains a tablet chlorinator, and equipment for storage and feeding of sodium hydroxide. The chemical room also includes space for corrosion inhibitor feed, should its use become necessary. A propane generator provides backup power for the wells and pump house.

Water from the wells is pumped directly into the distribution system. The distribution system is comprised of piping ranging in size from 6 inch to 12 inches in diameter, with a small amount of 1 inch piping. The type of material is ductile iron, cast iron, with some small diameter galvanized steel. The operator indicated that the mains are flushed once per year. The water system is 100% metered.

Water not utilized by the users is discharged into a 1 MG concrete tank located in the south section of town, east of Route 3. The storage tank was built in 1980. The level in the tank fluctuates from approximately 24 to 28 feet, and the level is monitored by the new SCADA system. The well pump operations are controlled based on the water level in the storage tank.

OPERATOR CERTIFICATION VERIFICATION

The following certified operator is listed in our records for the water system:

<u>Name</u>	<u>Number</u>	<u>Grade</u>	
		Distribution	Treatment
Kevin McKinnon	970	III	II
April Hyde	2720	III	II

The current classification of the water system is Grade I Treatment and Grade I Distribution. The current operators are qualified at the proper grade for both treatment and distribution.

ISSUES AND RECOMMENDATIONS

New Wells/Turbidity

The Town of Colebrook recently completed construction of two new gravel wells at the north end of the system, and these wells were placed in service in January 2012. The system performed an extended period of well development following installation of the production

wells, but the wells still produce water that contains low levels of turbidity. The wells are currently being pumped at a low steady rate to minimize turbidity levels. The system should continue to closely monitor turbidity levels, and assess whether or not the levels are improving. If the levels do not improve to the point that the wells can be operated at full flow then the system should evaluate additional measures to resolve the issue.

Distribution System Maintenance

Water line flushing is an important part of maintaining the distribution system. Buildup of material inside the water mains can cause taste and odor problems, and can degrade water quality. The system flushes its mains once per year in April, and we encourage the operators to continue this practice. Flushing twice per year is preferable and recommended. In addition to flushing, maintenance and exercising of valves throughout the distribution system is important. We recommend that at least 20 percent of the valves in the distribution system be exercised each year, with the aim of exercising all valves over a five year period. Valve boxes should be raised to grade as needed and record drawings should be verified or updated if necessary to indicate accurate valve locations.

The water storage tank was constructed in 1980, and was last inspected on the inside in approximately 1997. It is good maintenance practice to have the tank inspected every five years. We recommend that the Town schedule a tank inspection in the near future, and establish a routine schedule for inspection at a five year interval.

Lead and Copper Compliance

The Lead and Copper Rule now requires all public water systems to provide the results of each lead sample to each customer who collected a sample. This consumer notification is required for each round of lead and copper tap monitoring. Also, it is required that systems send certification to DES that consumer notification was completed. Additional information on this subject is available at <http://des.nh.gov/> under "A to Z list" and "Lead and Copper in Drinking Water".

The system completed and passed its second round of lead and copper testing in 2010. The system is on a triennial sampling schedule, and the next round of lead and copper sampling is scheduled for 2013. Please consult your master sampling schedule for the next round of required testing.

We encourage the system to perform routine water quality monitoring for temperature, pH and alkalinity. This sampling is not mandatory, however, it is recommended for all water systems. It is recommended that samples be taken at the distribution entry point(s) every two weeks; and once every quarter from at least one distribution site. The definition of routine monitoring can be found at http://des.nh.gov/organization/divisions/water/dwgb/faq_pbcu.htm#faq6 . For more information please contact Joan Fitzsimmons at 271-2516.

Cross Connection Control

Cross connection control is a means by which water systems can minimize the risk of backflow of contaminated water from various customer users to the water mains in case of pressure drop in the distribution system. Containment of potential contamination is achieved by the installation of backflow prevention devices which range from dual check valves for residential services to reduced-pressure zone devices for services where the use of potable water on the premises represents a higher risk of contamination. For additional information please contact Wade Pelham, NH DES (271-2410).

The system has a cross-connection ordinance that was approved in 1991. We recommend that the managers of the water system review the ordinance to ensure that it remains current. Any changes or revisions must be submitted to DES for review and approval.

A cross-connection control program cannot be effective without the routine inspection and testing of the backflow prevention devices as required. In accordance with *Env-Ws* 364.05 suppliers must submit an annual inspection and testing report to DES each year by April 1, in which the results from the preceding year are detailed. At a minimum the annual inspection and testing report must provide the following information for each backflow prevention device:

- (1) The permit number of the backflow prevention device;
- (2) The name of the owner of the backflow prevention device;
- (3) The location of the backflow prevention device;
- (4) The date of each inspection and test performed during the year of reporting;
- (5) The name, certifying organization, and certification number of the certified backflow prevention device inspector who performed the inspection and test on the device;
- (6) The result of each inspection and test; and
- (7) If the inspection or test result is unsatisfactory, the date at which the backflow prevention device was found to be satisfactory following a subsequent inspection and test in that calendar year period.

The submittal should also confirm that high-hazard devices are inspected and tested at a minimum of twice per year. Individual test report forms are not required to be submitted to DES but should be retained in water supplier records. Please ensure the annual report is submitted to this office by April 1st of each year to the attention of Wade Pelham, NH DES (271-2410).

Bacterial Water Quality

The Colebrook Water Department is required to take two coliform bacteria samples per month from the distribution system. Our records indicate that the water system last had a positive coliform sample in August 2002. We commend the operators for their efforts in maintaining this level of operation.

Water Conservation

The water system developed a water conservation plan as part of the permitting process for the new wells, and is pursuing efforts to reduce the level of unaccounted for water. Our records indicate that at times over half of the system's total water production is unaccounted for water. The System is focusing on leak detection, main replacement, installing new service meters, and replacing the meter on Well 1 & 2. Colebrook applied for and received a leak detection services grant through DES. The survey will take place in 2013. The system should also review its water rates and set rates that ensure adequate revenue to meet the system's needs. Please note that the system's Water Conservation Plan 3-Year Ongoing Compliance Report is due on November 30, 2012.

Source Protection

Wellhead protection-minimizing the likelihood that contaminated groundwater reaches your well-is an important responsibility for every public water system. Wellhead protection is far less costly than treating contaminated water or replacing a well. DES recommends that you continue to implement your wellhead protection program in order to continue to qualify for the SOC chemical monitoring waiver, and consider additional wellhead protection measures such as expanded public education and land protection. It is noted that the VOC monitoring waiver was not granted for the downtown wells due to the presence of a source water hazard inventory site in the wellhead protection area, an underground storage tank within 1000 feet of the wells, and a parking area within 25 feet of the well.

One year of SOC and VOC sampling will need to be completed at the new wellfield before the new wells will be eligible for a monitoring waiver. This one year of testing consists of one SOC sample and four quarterly VOC samples. Questions on the monitoring waivers may be directed to Debra Sonderegger at 271-2862 or Debra.Sonderegger@des.nh.gov

Ground water supplies having a yield of greater than 144,000 gallons per day are required to maintain a sanitary protective radius of 400 feet within which no buildings, septic systems, leach fields, oil or other hazardous materials may be located or stored. As identified in previous surveys, the existing downtown wells do not have the proper sanitary protective radius. Should any property within the protective radius for the existing wells be for sale, we encourage the Town to purchase these properties. Also, as indicated in past sanitary surveys, we recommend that the town install monitoring wells in the protective radius of the downtown wells to monitor potential water quality impacts.

DES provides a variety of guidance materials as well as grant programs for wellhead protection and land protection to assist public water systems in this respect. DES has also assessed all public water supply sources in terms of their vulnerability to contamination. These source water assessment reports were mailed to all systems and are a valuable source protection tool. For more information about source protection, please contact DES's Drinking Water Source

Colebrook Water Works
November 26, 2012
Page 7 of 7

Protection Program at 271-0688.

Record Drawings

It is important that water systems have procedures in place for maintaining records of existing conditions and upgrades to the distribution system. Water system record drawings are stored at the public works garage, and the system recently developed a water system map in electronic format. We recommend that the system consider converting its existing paper record drawing information to electronic format.

Asset Management

As indicated above the system has completed significant capital improvements, and now is the time to put plans in place to ensure that the system will provide a high level of service to customers in the future. DES recommends developing an asset management plan to ensure that you get the most value from each of your assets and have the financial resources to rehabilitate and replace them when necessary. Asset management helps a system make critical decisions about how to achieve and maintain the desired level of service at the lowest appropriate cost to customers. For assistance contact Adam Torrey, by phone at (603) 271-2950, or email adam.torrey@des.nh.gov.

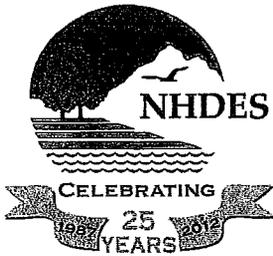
I can be reached at 271-2953 or daniel.dudley@des.nh.gov if there are any questions regarding this letter.

Sincerely,



Daniel Dudley, P.E.
Drinking Water and Groundwater Bureau

cc: Rebecca Merrow, Town Manager



The State of New Hampshire
Department of Environmental Services

Thomas S. Burack, Commissioner



*Celebrating 25 Years of Protecting
New Hampshire's Environment*

December 4, 2012

April Hyde
Colebrook Water Works
37 Hill Road
Colebrook, NH 03576

RE: Colebrook – Colebrook Water Works (PWS ID: 0481010)
Water Conservation Plan Compliance

Dear Ms. Hyde:

On November 26, 2012, the New Hampshire Department of Environmental Services (DES) Drinking Water and Groundwater Bureau received a Water Conservation Ongoing Compliance Form as well as an update on progress toward addressing large water losses at Colebrook Water Works. The submitted information fulfills the system's obligation to submit a three year compliance report documenting compliance with the water system's Water Conservation Plan ("WCP"), approved on November 2, 2009.

Based on review of the compliance report, DES has determined the following:

1. A water rate adjustment was approved and will be implemented in January 2013. The new rate will be \$60.00 per 1000 cubic feet used. This rate structure is considered a constant block rate structure and is consistent with water conservation regulations.
2. Water conservation outreach materials have been issued yearly.
3. Forty new service meters will be installed this year, and another forty will be installed next year.
4. Internal acoustic leak detection is ongoing and a total of 180 gpm leaks were discovered in the past year.
5. The meter on PW #5 and PW #7 was tested for accuracy and is working properly.
6. A meeting about the Main Street project had been scheduled and work will begin in 2013.
7. Colebrook has been awarded a leak detection grant through DES. A private leak detection company will survey the system next year.

www.des.nh.gov

29 Hazen Drive • PO Box 95 • Concord, NH 03302-0095
(603) 271-3503 • TDD Access: Relay NH 1-800-735-2964

8. Water losses remain high with 2012 water losses equaling 77% of water produced, 2011 water losses equaling 66% of water produced, and 2010 water losses equaling 69% of water produced.

9. The source meter at the downtown pump station has not yet been replaced, as the project at the pump house had not yet started, but will begin at the end of the month.

As the system recognizes, water losses are extremely high. DES remains concerned about this issue. Not only do water losses put unnecessary strain on water sources and water infrastructure, but pumping such excessive amounts of water wastes energy, chemicals, and money. Colebrook is continuing to take steps towards improving the system and DES looks forward to monitoring progress made

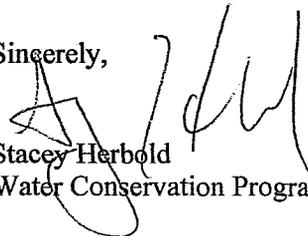
In response DES requests the following:

1. Please submit verification that/when the new meter has been installed in the downtown location.
2. By **November 2, 2013**, please submit a water audit and progress report to DES documenting the system's efforts to reduce water losses. The progress report should include the number of service meters replaced and plans for replacement the following year, an update on the Main Street project, and a summary of leaks detected and repaired.

Please also note that the next three year compliance report is due on **November 2, 2015**.

Please feel free to contact me with any questions at (603) 271-0659 or via e-mail at stacey.herbald@des.nh.gov .

Sincerely,


Stacey Herbold
Water Conservation Program

cc: Kevin McKinnon, Public Works Director

Appendix F

Cost Estimates
Phases 1-6 Waste and Sewer improvements



CIVIL ENVIRONMENTAL ENGINEERS
35 Bow Street
Portsmouth, New Hampshire
03801-3819
Phone: 603.431-6196
Fax: 603.431-5376

Larger Place
55 South Commercial Street
Manchester, New Hampshire 03101
Phone: 603.627-0708
Fax: 603.627-0746

Lafayette Center
Store Street Building, Suite 208
Kennebunk, Maine 04043
Phone: 207.985-8717
Fax: 207.985-5520

PROJECT NAME: **Phase 1 Cost Estimate - Main Street**

PROJECT NO.: 888/889/890

SHEET NO.: OF 1 1

CALCULATED BY: DATE: LBK 2/7/2014

EDITED BY: DATE: JWB 2/11/2014

CHECKED BY: DATE: WAS 2/17/2014

Summary of Quantities

ITEM	ITEM DESCRIPTION	UNIT	QTY	\$	TOTAL
NHDOT ROW					
	SURVEY	U	1	\$30,000.00	\$30,000.00
	GEOTECHNICAL SURVEY	U	1	\$15,000.00	\$15,000.00
202.41	REMOVAL OF EXISTING PIPE 0-24" DIAMETER	LF	2905	\$11.00	\$31,955.00
202.5	REMOVAL OF CATCH BASINS, DROP INLETS AND MANHOLES	EA	32	\$200.00	\$6,400.00
203.1	COMMON EXCAVATION	CY	14506	\$8.00	\$116,051.28
214	FINE GRADING	U	1	\$15,000.00	\$15,000.00
304.2	GRAVEL (F)	CY	8412	\$15.00	\$126,183.33
304.3	CRUSHED GRAVEL (F)	CY	3757	\$20.00	\$75,149.19
403.11	HOT BITUMINOUS PAVEMENT, MACHINE METHOD	T	4753	\$80.00	\$380,232.44
403.12	HOT BITUMINOUS PAVEMENT, HAND METHOD	T	144	\$120.00	\$17,221.20
603.00212	12" R. C. PIPE, 2000D	LF	371	\$50.00	\$18,550.00
603.00215	15" R. C. PIPE, 2000D	LF	1804	\$65.00	\$117,260.00
603.00218	18" R. C. PIPE, 2000D	LF	185	\$60.00	\$11,100.00
603.00224	24" R. C. PIPE, 2000D	LF	545	\$60.00	\$32,700.00
604.12	CATCH BASINS TYPE B	U	29	\$2,500.00	\$72,500.00
604.32	DRAINAGE MANHOLE	U	7	\$2,000.00	\$14,000.00
609.01	STRAIGHT GRANITE CURB	LF	4572	\$20.00	\$91,440.00
619.1	MAINTENANCE OF TRAFFIC	U	1	\$31,250.00	\$31,250.00
632.0106	RETROREFLECTIVE PAINT PAVE. MARKING, 6" LINE	LF	16800	\$0.70	\$11,760.00
692	MOBILIZATION	U	1	\$65,000.00	\$65,000.00
SUBTOTAL					\$1,233,752.44
Subtotal Roadway without Drainage or Sidewalk					\$929,287.44
	Average NHDOT ROW Width: 45 feet				
	Total trench width(s) : 20 feet				
	Percentage	44%			
	Road work for utilities				\$408,886.47
TOWN ROW					
	SURVEY	U	1	\$30,000.00	\$30,000.00
	GEOTECHNICAL SURVEY	U	1	\$20,000.00	\$20,000.00
202.41	REMOVAL OF EXISTING PIPE 0-24" DIAMETER	LF	465	\$11.00	\$5,115.00
202.5	REMOVAL OF CATCH BASINS, DROP INLETS AND MANHOLES	EA	7	\$200.00	\$1,400.00
203.1	COMMON EXCAVATION	CY	2136	\$8.00	\$17,089.38
203.6	EMBANKMENT-IN-PLACE (F)	CY	1000	\$9.00	\$9,000.00
214	FINE GRADING	U	1	\$10,000.00	\$10,000.00
304.2	GRAVEL (F)	CY	5608	\$15.00	\$84,122.22
304.3	CRUSHED GRAVEL (F)	CY	2804	\$20.00	\$56,081.48
403.11	HOT BITUMINOUS PAVEMENT, MACHINE METHOD	T	790	\$80.00	\$63,199.64
403.12	HOT BITUMINOUS PAVEMENT, HAND METHOD	T	130	\$120.00	\$15,594.00
603.00212	12" R. C. PIPE, 2000D	LF	267	\$50.00	\$13,350.00
603.00215	15" R. C. PIPE, 2000D	LF	198	\$65.00	\$12,870.00
608.13	3" BITUMINOUS SIDEWALK (F)	SY	2084	\$30.00	\$62,533.33
608.24	4" CONCRETE SIDEWALK (F)	SY	966	\$40.00	\$38,622.22
609.01	STRAIGHT GRANITE CURB	LF	5175	\$20.00	\$103,500.00
619.1	MAINTENANCE OF TRAFFIC	U	1	\$31,250.00	\$31,250.00
692	MOBILIZATION	U	1	\$65,000.00	\$65,000.00
SUBTOTAL					\$638,727.29
Subtotal Roadway without Drainage or Sidewalk					\$504,836.73
	Average Town ROW Width: 45 feet				
	Total trench width(s) : 20 feet				
	Percentage	44%			
	Road work for utilities				\$222,128.16
WATER MAIN REPLACEMENT					
202.41	REMOVAL OF EXISTING PIPE 0-24" DIAMETER	LF	5415	\$11.00	\$59,565.00
203.2	ROCK EXCAVATION	CY	325	\$150.00	\$48,735.00
304.2	GRAVEL (F)	CY	2407	\$15.00	\$36,100.00
304.3	CRUSHED GRAVEL (F)	CY	1075	\$20.00	\$21,499.56
403.11	HOT BITUMINOUS PAVEMENT, MACHINE METHOD	T	1360	\$80.00	\$108,781.33
403.99	TEMPORARY BITUMINOUS PAVEMENT	T	300	\$150.00	\$45,000.00
611.05206	6" CEMENT LINED DUCTILE IRON WATER PIPE, CL.52	LF	120	\$55.00	\$6,600.00
611.05208	8" CEMENT LINED DUCTILE IRON WATER PIPE, CL.52	LF	1570	\$75.00	\$117,750.00
611.05212	12" CEMENT LINED DUCTILE IRON WATER PIPE, CL.52	LF	3725	\$95.00	\$353,875.00
611.5	BUSINESS SERVICE	EA	45	\$4,000.00	\$180,000.00
611.5	FIRESUPPRESSION	EA	3	\$8,000.00	\$24,000.00
611.5	HOUSE SERVICE	EA	6	\$2,000.00	\$12,000.00
611.71006	6" GATE VALVE	EA	1	\$1,500.00	\$1,500.00
611.71008	8" GATE VALVE	EA	4	\$2,000.00	\$8,000.00
611.71012	12" GATE VALVE	EA	20	\$2,500.00	\$50,000.00
611.81	HYDRANT ASSEMBLY	EA	7	\$5,500.00	\$38,500.00
611.814	REMOVING HYDRANT	EA	7	\$500.00	\$3,500.00
611.99	TEMPORARY WATER LINE	LF	5415	\$40.00	\$216,600.00
619.1	MAINTENANCE OF TRAFFIC	U	1	\$31,250.00	\$31,250.00
628.2	SAWED BITUMINOUS PAVEMENT	LF	10830	\$5.00	\$54,150.00
692	MOBILIZATION	U	1	\$65,000.00	\$65,000.00
SUBTOTAL					\$1,417,405.89
SEWER MAIN REPLACEMENT					
202.41	REMOVAL OF EXISTING PIPE 0-24" DIAMETER	LF	5080	\$11.00	\$55,880.00
202.5	REMOVAL OF CATCH BASINS, DROP INLETS AND MANHOLES	EA	14	\$200.00	\$2,800.00
304.2	GRAVEL (F)	CY	2258	\$15.00	\$33,866.67
304.3	CRUSHED GRAVEL (F)	CY	1008	\$20.00	\$20,169.48
403.11	HOT BITUMINOUS PAVEMENT, MACHINE METHOD	T	1276	\$80.00	\$102,051.56
403.99	TEMPORARY BITUMINOUS PAVEMENT	T	300	\$150.00	\$45,000.00
612	SEWER BYPASS	U	1	\$50,000.00	\$50,000.00
612.31	SEWER MANHOLES	VF	140	\$500.00	\$70,000.00
612.5000	BUSINESS SERVICE	EA	45	\$4,000.00	\$180,000.00
612.5	HOUSE SERVICE	EA	6	\$2,000.00	\$12,000.00
612.73508	8" SDR 35 SEWER PIPE	LF	2020	\$70.00	\$141,400.00
612.73510	10" SDR 35 SEWER PIPE	LF	460	\$75.00	\$34,500.00
612.73512	12" SDR 35 SEWER PIPE	LF	1880	\$90.00	\$169,200.00
612.73515	15" SDR 35 SEWER PIPE	LF	720	\$100.00	\$72,000.00
619.1	MAINTENANCE OF TRAFFIC	U	1	\$31,250.00	\$31,250.00
628.2	SAWED BITUMINOUS PAVEMENT	LF	10160	\$5.00	\$50,800.00
692	MOBILIZATION	U	1	\$65,000.00	\$65,000.00
SUBTOTAL					\$1,135,917.70

Base Cost	\$3,184,338.23
Construction Contingency (20%)	\$636,867.65
Design Engineer/Permitting/Resident Engineer/Construction Administration (25%)	\$796,084.56
Total	\$4,620,000.00



35 Bow Street
Portsmouth, New Hampshire
03801-3819
Phone: 603.431-6196
Fax: 603.431-5376

Langer Place
55 South Commercial Street
Manchester, New Hampshire 03101
Phone: 603.627-0708
Fax: 603.627-0746

Lafayette Center
Storer Street Building, Suite 208
Kennebunk, Maine 04043
Phone: 207.985-8717
Fax: 207.985-5520

PROJECT NAME: **Phase 2 Cost Estimate - North Main Street**

PROJECT NO.: 888/889/890

SHEET NO.: OF 1 1

CALCULATED BY: DATE: LBK 2/7/2014

EDITED BY: DATE: JWB 2/11/2014

CHECKED BY: DATE: WAS 2/17/2014

Summary of Quantities

ITEM	ITEM DESCRIPTION	UNIT	QTY	\$	TOTAL
	NHDOT ROW				
	SURVEY	U	1	\$30,000.00	\$30,000.00
202.41	REMOVAL OF EXISTING PIPE 0-24" DIAMETER	LF	2724	\$11.00	\$29,964.00
202.5	REMOVAL OF CATCH BASINS, DROP INLETS AND MANHOLES	EA	14	\$200.00	\$2,800.00
203.1	COMMON EXCAVATION	CY	6650	\$8.00	\$53,202.56
214	FINE GRADING	U	1	\$15,000.00	\$15,000.00
304.2	GRAVEL (F)	CY	3857	\$15.00	\$57,847.50
304.3	CRUSHED GRAVEL (F)	CY	1723	\$20.00	\$34,451.40
403.11	HOT BITUMINOUS PAVEMENT, MACHINE METHOD	T	2179	\$80.00	\$174,313.80
403.12	HOT BITUMINOUS PAVEMENT, HAND METHOD	T	127	\$120.00	\$15,261.78
603.00212	12" R. C. PIPE, 2000D	LF	473	\$50.00	\$23,650.00
603.00215	15" R. C. PIPE, 2000D	LF	1200	\$65.00	\$78,000.00
603.00218	18" R. C. PIPE, 2000D	LF	1051	\$60.00	\$63,060.00
603.00224	24" R. C. PIPE, 2000D	LF	0	\$60.00	\$0.00
604.12	CATCH BASINS TYPE B	U	28	\$2,500.00	\$70,000.00
604.32	DRAINAGE MANHOLE	U	5	\$2,000.00	\$10,000.00
608.24	4" CONCRETE SIDEWALK (F)	SY	1600	\$40.00	\$64,000.00
609.01	STRAIGHT GRANITE CURB	LF	4052	\$20.00	\$81,036.00
619.1	MAINTENANCE OF TRAFFIC	U	1	\$33,000.00	\$33,000.00
632.0106	RETROREFLECTIVE PAINT PAVE. MARKING, 6" LINE	LF	9004	\$0.70	\$6,302.80
692	MOBILIZATION	U	1	\$43,890.00	\$43,890.00
	SUBTOTAL				\$855,779.84
	Subtotal Roadway without Drainage or Sidewalk				\$514,305.84
	Average nhdot ROW Width: 45 feet				
	Total trench width(s) : 20 feet				
	Percentage	44%			
	Road work for utilities				\$226,294.57
	WATER MAIN REPLACEMENT				
202.41	REMOVAL OF EXISTING PIPE 0-24" DIAMETER	LF	2251	\$11.00	\$24,761.00
203.2	ROCK EXCAVATION	CY	135	\$150.00	\$20,259.00
304.2	GRAVEL (F)	CY	1000	\$15.00	\$15,006.67
304.3	CRUSHED GRAVEL (F)	CY	447	\$20.00	\$8,937.30
403.11	HOT BITUMINOUS PAVEMENT, MACHINE METHOD	T	565	\$80.00	\$45,220.09
403.99	TEMPORARY BITUMINOUS PAVEMENT	T	100	\$150.00	\$15,000.00
611.05206	6" CEMENT LINED DUCTILE IRON WATER PIPE, CL.52	LF	0	\$55.00	\$0.00
611.05208	8" CEMENT LINED DUCTILE IRON WATER PIPE, CL.52	LF	0	\$75.00	\$0.00
611.05212	12" CEMENT LINED DUCTILE IRON WATER PIPE, CL.52	LF	2251	\$95.00	\$213,845.00
611.5	BUSINESS SERVICE	EA	2	\$4,000.00	\$8,000.00
611.5	FIRESUPPRESSION	EA	0	\$8,000.00	\$0.00
611.5	HOUSE SERVICE	EA	31	\$2,000.00	\$62,000.00
611.71006	6" GATE VALVE	EA	0	\$1,500.00	\$0.00
611.71008	8" GATE VALVE	EA	1	\$2,000.00	\$2,000.00
611.71012	12" GATE VALVE	EA	3	\$2,500.00	\$7,500.00
611.81	HYDRANT ASSEMBLY	EA	6	\$5,500.00	\$33,000.00
611.814	REMOVING HYDRANT	EA	6	\$500.00	\$3,000.00
611.99	TEMPORARY WATER LINE	LF	2251	\$40.00	\$90,040.00
619.1	MAINTENANCE OF TRAFFIC	U	1	\$33,000.00	\$33,000.00
628.2	SAWED BITUMINOUS PAVEMENT	LF	4502	\$5.00	\$22,510.00
692	MOBILIZATION	U	1	\$43,890.00	\$43,890.00
	SUBTOTAL				\$647,969.06
	SEWER MAIN REPLACEMENT				
202.41	REMOVAL OF EXISTING PIPE 0-24" DIAMETER	LF	1171	\$11.00	\$12,881.00
202.5	REMOVAL OF CATCH BASINS, DROP INLETS AND MANHOLES	EA	6	\$200.00	\$1,200.00
304.2	GRAVEL (F)	CY	520	\$15.00	\$7,806.67
304.3	CRUSHED GRAVEL (F)	CY	232	\$20.00	\$4,649.30
403.11	HOT BITUMINOUS PAVEMENT, MACHINE METHOD	T	294	\$80.00	\$23,524.09
403.99	TEMPORARY BITUMINOUS PAVEMENT	T	100	\$150.00	\$15,000.00
612	SEWER BYPASS	U	1	\$30,000.00	\$30,000.00
612.31	SEWER MANHOLES	VF	36	\$500.00	\$18,000.00
612.5000	BUSINESS SERVICE	EA	0	\$4,000.00	\$0.00
612.5	HOUSE SERVICE	EA	17	\$2,000.00	\$34,000.00
612.7351	10" SDR 35 SEWER PIPE	LF	1171	\$80.00	\$93,680.00
612.73508	8" SDR 35 SEWER PIPE	LF	0	\$75.00	\$0.00
612.73512	12" SDR 35 SEWER PIPE	LF	0	\$90.00	\$0.00
612.73515	15" SDR 35 SEWER PIPE	LF	0	\$100.00	\$0.00
619.1	MAINTENANCE OF TRAFFIC	U	1	\$33,000.00	\$33,000.00
628.2	SAWED BITUMINOUS PAVEMENT	LF	2342	\$5.00	\$11,710.00
692	MOBILIZATION	U	1	\$43,890.00	\$43,890.00
	SUBTOTAL				\$329,341.06

Base Cost	\$1,203,604.69
Construction Contingency (20%)	\$240,720.94
Design Engineer/Permitting/Resident Engineer/Construction Administration (25%)	\$300,901.17
Total	\$1,750,000.00



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PROJECT NAME: **Phase 3 Cost Estimate -Hospital Loop**

PROJECT NO.: 888/889/890

SHEET NO.: OF 1 1

CALCULATED BY: DATE: LBK 2/7/2014

EDITED BY: DATE: JWB 2/11/2014

CHECKED BY: DATE: WAS 2/17/2014

Summary of Quantities

ITEM	ITEM DESCRIPTION	UNIT	QTY	\$	TOTAL
TOWN ROW					
202.41	REMOVAL OF EXISTING PIPE 0-24" DIAMETER	LF	0	\$11.00	\$0.00
202.5	REMOVAL OF CATCH BASINS, DROP INLETS AND MANHOLES	EA	0	\$200.00	\$0.00
203.1	COMMON EXCAVATION	CY	0	\$8.00	\$0.00
214	FINE GRADING	U	1	\$10,000.00	\$10,000.00
304.2	GRAVEL (F)	CY	0	\$15.00	\$0.00
304.3	CRUSHED GRAVEL (F)	CY	0	\$20.00	\$0.00
403.11	HOT BITUMINOUS PAVEMENT, MACHINE METHOD	T	0	\$80.00	\$0.00
403.12	HOT BITUMINOUS PAVEMENT, HAND METHOD	T	0	\$120.00	\$0.00
603.00212	12" R. C. PIPE, 2000D	LF	0	\$50.00	\$0.00
603.00215	15" R. C. PIPE, 2000D	LF	0	\$65.00	\$0.00
608.13	3" BITUMINOUS SIDEWALK (F)	SY	0	\$30.00	\$0.00
608.24	4" CONCRETE SIDEWALK (F)	SY	0	\$40.00	\$0.00
609.01	STRAIGHT GRANITE CURB	LF	0	\$20.00	\$0.00
619.1	MAINTENANCE OF TRAFFIC	U	1	\$15,000.00	\$15,000.00
632.0106	RETROREFLECTIVE PAINT PAVE. MARKING, 6" LINE	LF	2451	\$0.70	\$1,715.70
692	MOBILIZATION	U	1	\$17,500.00	\$17,500.00
SUBTOTAL					\$44,215.70
Subtotal Roadway without Drainage or Sidewalk					\$44,215.70
		Average Town ROW Width: 40 feet			
		Total trench width(s) : 20 feet			
		Percentage	50%		
Road work for utilities					\$22,107.85
WATER MAIN REPLACEMENT					
202.41	REMOVAL OF EXISTING PIPE 0-24" DIAMETER	LF	2451	\$11.00	\$26,961.00
203.2	ROCK EXCAVATION	CY	147	\$150.00	\$22,059.00
304.2	GRAVEL (F)	CY	1089	\$15.00	\$16,340.00
304.3	CRUSHED GRAVEL (F)	CY	487	\$20.00	\$9,731.38
403.11	HOT BITUMINOUS PAVEMENT, MACHINE METHOD	T	497	\$80.00	\$39,796.09
403.99	TEMPORARY BITUMINOUS PAVEMENT	T	100	\$150.00	\$15,000.00
611.05206	6" CEMENT LINED DUCTILE IRON WATER PIPE, CL.52	LF	0	\$55.00	\$0.00
611.05208	8" CEMENT LINED DUCTILE IRON WATER PIPE, CL.52	LF	2451	\$75.00	\$183,825.00
611.05212	12" CEMENT LINED DUCTILE IRON WATER PIPE, CL.52	LF	0	\$95.00	\$0.00
611.5	BUSINESS SERVICE	EA	1	\$4,000.00	\$4,000.00
611.5	FIRESUPPRESSION	EA	0	\$8,000.00	\$0.00
611.5	HOUSE SERVICE	EA	2	\$2,000.00	\$4,000.00
611.71006	6" GATE VALVE	EA	0	\$1,500.00	\$0.00
611.71008	8" GATE VALVE	EA	6	\$2,000.00	\$12,000.00
611.71012	12" GATE VALVE	EA	0	\$2,500.00	\$0.00
611.81	HYDRANT ASSEMBLY	EA	2	\$5,500.00	\$11,000.00
611.814	REMOVING HYDRANT	EA	2	\$500.00	\$1,000.00
611.99	TEMPORARY WATER LINE	LF	0	\$40.00	\$0.00
619.1	MAINTENANCE OF TRAFFIC	U	1	\$30,000.00	\$30,000.00
628.2	SAWED BITUMINOUS PAVEMENT	LF	1981	\$5.00	\$9,905.00
692	MOBILIZATION	U	1	\$35,000.00	\$35,000.00
SUBTOTAL					\$420,617.47

Base Cost	\$442,725.32
Construction Contingency (20%)	\$88,545.06
Design Engineer/Permitting/Resident Engineer/Construction Administration (25%)	\$110,681.33
Total	\$650,000.00



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PROJECT NAME: **Phase 4 Cost Estimate-Route 145**

PROJECT NO.: 888/889/890

SHEET NO.: OF 1 1

CALCULATED BY: DATE: LBK 2/7/2014

EDITED BY: DATE: JWB 2/11/2014

CHECKED BY: DATE: WAS 2/17/2014

Summary of Quantities

ITEM	ITEM DESCRIPTION	UNIT	QTY	\$	TOTAL
NHDOT ROW					
	SURVEY	U	1	\$30,000.00	\$30,000.00
202.41	REMOVAL OF EXISTING PIPE 0-24" DIAMETER	LF	950	\$11.00	\$10,450.00
202.5	REMOVAL OF CATCH BASINS, DROP INLETS AND MANHOLES	EA	5	\$200.00	\$1,000.00
203.1	COMMON EXCAVATION	CY	5130	\$8.00	\$41,041.78
214	FINE GRADING	U	1	\$15,000.00	\$15,000.00
304.2	GRAVEL (F)	CY	2975	\$15.00	\$44,625.00
304.3	CRUSHED GRAVEL (F)	CY	1329	\$20.00	\$26,576.67
403.11	HOT BITUMINOUS PAVEMENT, MACHINE METHOD	T	1681	\$80.00	\$134,470.00
403.12	HOT BITUMINOUS PAVEMENT, HAND METHOD	T	27	\$120.00	\$3,201.67
603.00212	12" R. C. PIPE, 2000D	LF	0	\$50.00	\$0.00
603.00215	15" R. C. PIPE, 2000D	LF	600	\$65.00	\$39,000.00
603.00218	18" R. C. PIPE, 2000D	LF	350	\$60.00	\$21,000.00
603.00224	24" R. C. PIPE, 2000D	LF	0	\$60.00	\$0.00
604.12	CATCH BASINS TYPE B	U	0	\$2,500.00	\$0.00
604.32	DRAINAGE MANHOLE	U	5	\$2,000.00	\$10,000.00
608.24	4" CONCRETE SIDEWALK (F)	SY	1028	\$40.00	\$41,111.11
609.01	STRAIGHT GRANITE CURB	LF	850	\$20.00	\$17,000.00
619.1	MAINTENANCE OF TRAFFIC	U	1	\$25,000.00	\$25,000.00
632.0106	RETROREFLECTIVE PAINT PAVE. MARKING, 6" LINE	LF	14300	\$0.70	\$10,010.00
692	MOBILIZATION	U	1	\$29,750.00	\$29,750.00
SUBTOTAL					\$469,236.22
Subtotal Roadway without Drainage or Sidewalk					\$346,675.11
	Average NHDOT ROW Width: 45 feet				
	Total trench width(s) : 20 feet				
	Percentage	44%			
Road work for utilities					\$152,537.05
TOWN ROW					
202.41	REMOVAL OF EXISTING PIPE 0-24" DIAMETER	LF	0	\$11.00	\$0.00
202.5	REMOVAL OF CATCH BASINS, DROP INLETS AND MANHOLES	EA	0	\$200.00	\$0.00
203.1	COMMON EXCAVATION	CY	541	\$8.00	\$4,328.74
203.6	EMBANKMENT-IN-PLACE (F)	CY	1000	\$9.00	\$9,000.00
214	FINE GRADING	U	1	\$5,000.00	\$5,000.00
304.2	GRAVEL (F)	CY	209	\$15.00	\$3,137.78
304.3	CRUSHED GRAVEL (F)	CY	105	\$20.00	\$2,091.85
403.11	HOT BITUMINOUS PAVEMENT, MACHINE METHOD	T	142	\$80.00	\$11,346.20
403.12	HOT BITUMINOUS PAVEMENT, HAND METHOD	T	0	\$120.00	\$0.00
603.00212	12" R. C. PIPE, 2000D	LF	0	\$50.00	\$0.00
603.00215	15" R. C. PIPE, 2000D	LF	0	\$65.00	\$0.00
608.13	3" BITUMINOUS SIDEWALK (F)	SY	0	\$30.00	\$0.00
608.24	4" CONCRETE SIDEWALK (F)	SY	0	\$40.00	\$0.00
609.01	STRAIGHT GRANITE CURB	LF	0	\$20.00	\$0.00
619.1	MAINTENANCE OF TRAFFIC	U	1	\$25,000.00	\$25,000.00
692	MOBILIZATION	U	1	\$29,750.00	\$29,750.00
SUBTOTAL					\$89,654.57
Subtotal Roadway without Drainage or Sidewalk					\$89,654.57
	Average Town ROW Width: 40 feet				
	Total trench width(s) : 20 feet				
	Percentage	50%			
Road work for utilities					\$44,827.29
WATER MAIN REPLACEMENT					
202.41	REMOVAL OF EXISTING PIPE 0-24" DIAMETER	LF	1885	\$11.00	\$20,735.00
203.2	ROCK EXCAVATION	CY	113	\$150.00	\$16,965.00
304.2	GRAVEL (F)	CY	838	\$15.00	\$12,566.67
304.3	CRUSHED GRAVEL (F)	CY	374	\$20.00	\$7,484.15
403.11	HOT BITUMINOUS PAVEMENT, MACHINE METHOD	T	473	\$80.00	\$37,867.56
403.99	TEMPORARY BITUMINOUS PAVEMENT	T	100	\$150.00	\$15,000.00
611.05206	6" CEMENT LINED DUCTILE IRON WATER PIPE, CL.52	LF	0	\$55.00	\$0.00
611.05208	8" CEMENT LINED DUCTILE IRON WATER PIPE, CL.52	LF	1886	\$75.00	\$141,450.00
611.05212	12" CEMENT LINED DUCTILE IRON WATER PIPE, CL.52	LF	0	\$95.00	\$0.00
611.5	BUSINESS SERVICE	EA	2	\$4,000.00	\$8,000.00
611.5	FIRE SUPPRESSION	EA	0	\$8,000.00	\$0.00
611.5	HOUSE SERVICE	EA	22	\$2,000.00	\$44,000.00
611.71006	6" GATE VALVE	EA	0	\$1,500.00	\$0.00
611.71008	8" GATE VALVE	EA	7	\$2,000.00	\$14,000.00
611.71012	12" GATE VALVE	EA	0	\$2,500.00	\$0.00
611.81	HYDRANT ASSEMBLY	EA	4	\$5,500.00	\$22,000.00
611.814	REMOVING HYDRANT	EA	4	\$500.00	\$2,000.00
611.99	TEMPORARY WATER LINE	LF	1885	\$40.00	\$75,400.00
619.1	MAINTENANCE OF TRAFFIC	U	1	\$25,000.00	\$25,000.00
628.2	SAWED BITUMINOUS PAVEMENT	LF	3770	\$5.00	\$18,850.00
692	MOBILIZATION	U	1	\$29,750.00	\$29,750.00
SUBTOTAL					\$491,068.37
SEWER MAIN REPLACEMENT					
202.31	FILL ABANDONED PIPE	CY	2580	\$25.00	\$64,500.00
202.41	REMOVAL OF EXISTING PIPE 0-24" DIAMETER	LF	375	\$11.00	\$4,125.00
202.5	REMOVAL OF CATCH BASINS, DROP INLETS AND MANHOLES	EA	1	\$200.00	\$200.00
304.2	GRAVEL (F)	CY	1665	\$15.00	\$24,973.33
304.3	CRUSHED GRAVEL (F)	CY	744	\$20.00	\$14,873.01
403.11	HOT BITUMINOUS PAVEMENT, MACHINE METHOD	T	602	\$80.00	\$48,132.98
403.99	TEMPORARY BITUMINOUS PAVEMENT	T	100	\$150.00	\$15,000.00
612	SEWER BYPASS	U	0	\$50,000.00	\$0.00
612.31	SEWER MANHOLES	VF	114	\$500.00	\$57,000.00
612.5000	BUSINESS SERVICE	EA	36	\$4,000.00	\$144,000.00
612.5	HOUSE SERVICE	EA	2	\$2,000.00	\$4,000.00
612.73508	8" SDR 35 SEWER PIPE	LF	706	\$70.00	\$49,420.00
612.73510	10" SDR 35 SEWER PIPE	LF	3040	\$75.00	\$228,000.00
612.73512	12" SDR 35 SEWER PIPE	LF	0	\$90.00	\$0.00
612.73515	15" SDR 35 SEWER PIPE	LF	0	\$100.00	\$0.00
619.1	MAINTENANCE OF TRAFFIC	U	1	\$25,000.00	\$25,000.00
628.2	SAWED BITUMINOUS PAVEMENT	LF	7492	\$5.00	\$37,460.00
	RELOCATE PUMP STATION	EA	1	\$400,000.00	\$400,000.00
692	MOBILIZATION	U	1	\$29,750.00	\$29,750.00
SUBTOTAL					\$1,146,434.32

Base Cost	\$1,834,867.02
Construction Contingency (20%)	\$366,973.40
Design Engineer/Permitting/Resident Engineer/Construction Administration (25%)	\$458,716.76
Total	\$2,670,000.00

Summary of Quantities

ITEM	ITEM DESCRIPTION	UNIT	QTY	\$	TOTAL
TOWN ROW					
202.41	REMOVAL OF EXISTING PIPE 0-24" DIAMETER	LF	0	\$11.00	\$0.00
202.5	REMOVAL OF CATCH BASINS, DROP INLETS AND MANHOLES	EA	0	\$200.00	\$0.00
203.1	COMMON EXCAVATION	CY	1217	\$8.00	\$9,739.26
203.6	EMBANKMENT-IN-PLACE (F)	CY	1000	\$9.00	\$9,000.00
214	FINE GRADING	U	1	\$10,000.00	\$10,000.00
304.2	GRAVEL (F)	CY	51	\$15.00	\$762.22
304.3	CRUSHED GRAVEL (F)	CY	25	\$20.00	\$508.15
403.11	HOT BITUMINOUS PAVEMENT, MACHINE METHOD	T	9	\$80.00	\$689.05
403.12	HOT BITUMINOUS PAVEMENT, HAND METHOD	T	25	\$120.00	\$3,000.00
603.00212	12" R. C. PIPE, 2000D	LF	0	\$50.00	\$0.00
603.00215	15" R. C. PIPE, 2000D	LF	0	\$65.00	\$0.00
608.13	3" BITUMINOUS SIDEWALK (F)	SY	0	\$30.00	\$0.00
608.24	4" CONCRETE SIDEWALK (F)	SY	556	\$40.00	\$22,222.22
609.01	STRAIGHT GRANITE CURB	LF	1000	\$20.00	\$20,000.00
619.1	MAINTENANCE OF TRAFFIC	U	1	\$16,666.67	\$16,666.67
632.0106	RETROREFLECTIVE PAINT PAVE. MARKING, 6" LINE	LF	6356	\$0.70	\$4,449.20
692	MOBILIZATION	U	1	\$16,333.33	\$16,333.33
SUBTOTAL					\$113,370.10
Subtotal Roadway without Drainage or Sidewalk					\$91,147.88
Average Town ROW Width: 40 feet					
Total trench width(s) : 20 feet					
Percentage		50%			
Road work for utilities					\$45,573.94
WATER MAIN REPLACEMENT					
202.41	REMOVAL OF EXISTING PIPE 0-24" DIAMETER	LF	1589	\$11.00	\$17,479.00
203.2	ROCK EXCAVATION	CY	95	\$150.00	\$14,301.00
304.2	GRAVEL (F)	CY	471	\$15.00	\$7,062.22
304.3	CRUSHED GRAVEL (F)	CY	235	\$20.00	\$4,708.15
403.11	HOT BITUMINOUS PAVEMENT, MACHINE METHOD	T	319	\$80.00	\$25,537.00
403.99	TEMPORARY BITUMINOUS PAVEMENT	T	100	\$150.00	\$15,000.00
611.05206	6" CEMENT LINED DUCTILE IRON WATER PIPE, CL.52	LF	1589	\$55.00	\$87,395.00
611.05208	8" CEMENT LINED DUCTILE IRON WATER PIPE, CL.52	LF	0	\$75.00	\$0.00
611.05212	12" CEMENT LINED DUCTILE IRON WATER PIPE, CL.52	LF	0	\$95.00	\$0.00
611.5	BUSINESS SERVICE	EA	0	\$4,000.00	\$0.00
611.5	FIRESUPPRESSION	EA	0	\$8,000.00	\$0.00
611.5	HOUSE SERVICE	EA	22	\$2,000.00	\$44,000.00
611.71006	6" GATE VALVE	EA	1	\$1,500.00	\$1,500.00
611.71008	8" GATE VALVE	EA	0	\$2,000.00	\$0.00
611.71012	12" GATE VALVE	EA	0	\$2,500.00	\$0.00
611.81	HYDRANT ASSEMBLY	EA	3	\$5,500.00	\$16,500.00
611.814	REMOVING HYDRANT	EA	3	\$500.00	\$1,500.00
611.99	TEMPORARY WATER LINE	LF	1589	\$40.00	\$63,560.00
619.1	MAINTENANCE OF TRAFFIC	U	1	\$16,666.67	\$16,666.67
628.2	SAWED BITUMINOUS PAVEMENT	LF	3178	\$5.00	\$15,890.00
692	MOBILIZATION	U	1	\$16,333.33	\$16,333.33
SUBTOTAL					\$347,432.37
SEWER MAIN REPLACEMENT					
202.41	REMOVAL OF EXISTING PIPE 0-24" DIAMETER	LF	1006	\$11.00	\$11,066.00
202.5	REMOVAL OF CATCH BASINS, DROP INLETS AND MANHOLES	EA	4	\$200.00	\$800.00
304.2	GRAVEL (F)	CY	298	\$15.00	\$4,471.11
304.3	CRUSHED GRAVEL (F)	CY	149	\$20.00	\$2,980.74
403.11	HOT BITUMINOUS PAVEMENT, MACHINE METHOD	T	202	\$80.00	\$16,167.54
403.99	TEMPORARY BITUMINOUS PAVEMENT	T	100	\$150.00	\$15,000.00
612	SEWER BYPASS	U	1	\$25,000.00	\$25,000.00
612.31	SEWER MANHOLES	VF	30	\$500.00	\$15,000.00
612.5000	BUSINESS SERVICE	EA	0	\$4,000.00	\$0.00
612.5	HOUSE SERVICE	EA	11	\$2,000.00	\$22,000.00
612.73506	6" SDR 35 SEWER PIPE	LF	0	\$70.00	\$0.00
612.73508	8" SDR 35 SEWER PIPE	LF	1006	\$75.00	\$75,450.00
612.73512	12" SDR 35 SEWER PIPE	LF	0	\$90.00	\$0.00
612.73515	15" SDR 35 SEWER PIPE	LF	0	\$100.00	\$0.00
619.1	MAINTENANCE OF TRAFFIC	U	1	\$16,666.67	\$16,666.67
628.2	SAWED BITUMINOUS PAVEMENT	LF	2012	\$5.00	\$10,060.00
692	MOBILIZATION	U	1	\$16,333.33	\$16,333.33
SUBTOTAL					\$230,995.39

Base Cost \$624,001.69
Construction Contingency (20%) \$124,800.34
Design Engineer/Permitting/Resident Engineer/Construction Administration (25%) \$156,000.42
Total \$910,000.00

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PROJECT NAME: **Phase 6 Cost Estimate-S. Main/Colby Loop**

PROJECT NO.: 888/889/890

SHEET NO.: OF 1 1

CALCULATED BY: DATE: LBK 2/7/2014

EDITED BY: DATE: JWB 2/11/2014

CHECKED BY: DATE: WAS

Summary of Quantities

ITEM	ITEM DESCRIPTION	UNIT	QTY	\$	TOTAL
	TOWN ROW				
202.41	REMOVAL OF EXISTING PIPE 0-24" DIAMETER	LF	0	\$11.00	\$0.00
202.5	REMOVAL OF CATCH BASINS, DROP INLETS AND MANHOLES	EA	0	\$200.00	\$0.00
203.1	COMMON EXCAVATION	CY	0	\$8.00	\$0.00
214	FINE GRADING	U	1	\$10,000.00	\$10,000.00
304.2	GRAVEL (F)	CY	0	\$15.00	\$0.00
304.3	CRUSHED GRAVEL (F)	CY	0	\$20.00	\$0.00
403.11	HOT BITUMINOUS PAVEMENT, MACHINE METHOD	T	0	\$80.00	\$0.00
403.12	HOT BITUMINOUS PAVEMENT, HAND METHOD	T	0	\$120.00	\$0.00
603.00212	12" R. C. PIPE, 2000D	LF	0	\$50.00	\$0.00
603.00215	15" R. C. PIPE, 2000D	LF	0	\$65.00	\$0.00
603.00218	18" R. C. PIPE, 2000D	LF	0	\$68.00	\$0.00
604.32	DRAINAGE MANHOLE	U	0	\$68.00	\$0.00
608.13	3" BITUMINOUS SIDEWALK (F)	SY	0	\$30.00	\$0.00
608.24	4" CONCRETE SIDEWALK (F)	SY	0	\$40.00	\$0.00
609.01	STRAIGHT GRANITE CURB	LF	0	\$20.00	\$0.00
632.0106	RETROREFLECTIVE PAINT PAVE. MARKING, 6" LINE	LF	2104	\$0.70	\$1,472.80
619.1	MAINTENANCE OF TRAFFIC	U	1	\$25,000.00	\$25,000.00
692	MOBILIZATION	U	1	\$19,250.00	\$19,250.00
SUBTOTAL					\$55,722.80
Subtotal Roadway without Drainage or Sidewalk					\$55,722.80
	Average Town ROW Width: 40 feet				
	Total trench width(s) : 20 feet				
	Percentage	50%			
	Road work for utilities				\$27,861.40
	WATER MAIN REPLACEMENT				
202.41	REMOVAL OF EXISTING PIPE 0-24" DIAMETER	LF	2104	\$11.00	\$23,144.00
203.2	ROCK EXCAVATION	CY	126	\$150.00	\$18,936.00
304.2	GRAVEL (F)	CY	623	\$15.00	\$9,351.11
304.3	CRUSHED GRAVEL (F)	CY	312	\$20.00	\$6,234.07
403.11	HOT BITUMINOUS PAVEMENT, MACHINE METHOD	T	348	\$80.00	\$27,867.31
403.99	TEMPORARY BITUMINOUS PAVEMENT	T	100	\$150.00	\$15,000.00
611.05206	6" CEMENT LINED DUCTILE IRON WATER PIPE, CL.52	LF	0	\$55.00	\$0.00
611.05208	8" CEMENT LINED DUCTILE IRON WATER PIPE, CL.52	LF	2104	\$75.00	\$157,800.00
611.05212	12" CEMENT LINED DUCTILE IRON WATER PIPE, CL.52	LF	0	\$95.00	\$0.00
611.5	BUSINESS SERVICE	EA	3	\$4,000.00	\$12,000.00
611.5	FIRESUPPRESSION	EA	0	\$8,000.00	\$0.00
611.5	HOUSE SERVICE	EA	6	\$2,000.00	\$12,000.00
611.71006	6" GATE VALVE	EA	0	\$1,500.00	\$0.00
611.71008	8" GATE VALVE	EA	1	\$2,000.00	\$2,000.00
611.71012	12" GATE VALVE	EA	0	\$2,500.00	\$0.00
611.81	HYDRANT ASSEMBLY	EA	0	\$5,500.00	\$0.00
611.814	REMOVING HYDRANT	EA	0	\$500.00	\$0.00
611.99	TEMPORARY WATER LINE	LF	2104	\$40.00	\$84,160.00
619.1	MAINTENANCE OF TRAFFIC	U	1	\$25,000.00	\$25,000.00
628.2	SAWED BITUMINOUS PAVEMENT	LF	3468	\$5.00	\$17,340.00
692	MOBILIZATION	U	1	\$19,250.00	\$19,250.00
SUBTOTAL					\$430,082.49

Base Cost	\$457,943.89
Construction Contingency (20%)	\$91,588.78
Design Engineer/Permitting/Resident Engineer/Construction Administration (25%)	\$114,485.97
Total	\$670,000.00