STATE OF MAINE PUBLIC UTILITIES COMMISSION

DOCKET NO. 2008-255

CENTRAL MAINE POWER COMPANY
and
PUBLIC SERVICE OF NEW HAMPSHIRE
Request for Certificate of Public Convenience
and Necessity for the Maine Power Reliability Program
Consisting of the Construction of Approximately
350 miles of 345 kV and 115 kV Transmission Lines ("MPRP")

Central Maine Power

An Energy East Company

Public Service of New Hampshire

The Northeast Utilities System

VOLUME X

EXHIBIT I-4 (Lewiston Loop Studies & Information)

REDACTED

July 1, 2008

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EXHIBIT I-4
LEWISTON LOOP STUDIES AND INFORMATION
INDEX

[1] Exhibit number relates directly to paragraph number of Chapter 330 requirement.

EXHIBIT 6A1.0 - CONFIDENTIAL

Map Redacted

EXHIBIT 6A1.1 - CONFIDENTIAL

Map Redacted

EXHIBIT 6B - CONFIDENTIAL

EXHIBIT 6B

EXHIBIT: LEGEND FOR SYSTEM DIAGRAMS

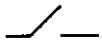
LEGEND:


GENERATOR


TRANSFORMER


FAULT INTERRUPTING DEVICE

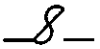

CIRCUIT SWITCHER


DISCONNECT SWITCH


AIR BREAK SWITCH


AUTO-SECTIONALIZING SWITCH


SECTIONALIZING SWITCH WITH SCADA CONTROL


POWER FUSE DISCONNECT

EnergyEast

CENTRAL MAINE POWER COMPANY
LEWISTON LOOP

Diagram Redacted

Diagram Redacted

EXHIBIT 6C

Lewiston Loop

§6(C) Description of Type of Line

The proposed 115 kV transmission line (the circuit designated Sections 255 and 256) will be built as:

Section 255

- Single-circuit construction on double wood poles (H-frame) from Gulf Island Substation crossing the Androscoggin River to Auburn (approximately 0.15 mile). This segment will consist of approximately 2 H-frame structures averaging 80 feet in height.
- Single-circuit construction on single poles of wood or steel with davit arms from the terminus of H-frame construction to Deer Rips Dam (approximately 1.3 miles). This segment will consist of approximately 15 structures averaging 75 feet in height.
- Double-circuit construction (with 34.5 kV Section 149) generally on single poles of wood or steel with davit arms from Deer Rips Dam to Veterans Memorial Bridge (approximately 1.4 miles). This segment will consist of approximately 19 structures averaging 85 feet in height.
- Single-circuit construction on double wood poles (H-frame) from Veterans Memorial Bridge crossing the Androscoggin River via Boxer Island to the westerly edge of Pan American Railways rail corridor (approximately 0.45 mile). This segment will consist of approximately 4 H-frame structures averaging 80 feet in height.

- Single-circuit construction generally on single poles of wood or steel with davit arm or line post construction along the westerly edge of the Pan American Railways rail corridor to the site of the proposed Middle Street Substation (approximately 0.91 mile). This segment will consist of approximately 13 structures averaging 90 feet in height.

Conductor is expected to be single conductor per phase utilizing 795 MCM aluminum conductor/steel reinforced (ACSR) code name "Drake" with a diameter of 1.108 inches. The lowest conductor will be a minimum of 25 feet above ground under maximum sag conditions (addition clearance required for river crossings and within the railroad corridor). The aerial shield wire is expected to be Optical Ground Wire (OPGW) with a diameter of 0.5 inches.

Structures will be spaced typically 350 to 550 feet apart, though any river crossing will be considerably longer spans. Wood structures will be directly embedded in the ground, while some steel structures may be erected on concrete foundations. Structure types and heights will vary depending on span length, terrain, and circuit configurations as noted above. CMP expects to install approximately 53 structures in total for Section 255.

Section 256

- Single-circuit underground high-pressure fluid-filled or gas-filled (HPFF/HPGF) pipe cable from the site of the proposed Middle Street Substation along Chapel Street, crossing Main Street, to the Upper Canal (approximately 0.21 mile);

- The pipe cable will be trenched into the bottom of Upper Canal from Main Street to the easterly end of the canal (approximately 0.79 mile);
- The pipe cable will cross Gully Brook and extend to Lewiston Lower Substation (approximately 0.1 mile).

Section 256, which will replace an existing lower voltage underground line between Lewiston Lower Substation and Lewiston (Steam) Substation, is expected to be an underground HPFF or HPGF pipe cable system. The pipe cable system will be rated at the equivalent of 795 MCM "Drake" conductor. The cable will be either 1250 MCM or 1500 MCM copper for the HPFF or 1500 MCM or 1750 MCM copper for the HPGF depending on final design conditions. The pipe will be 8 5/8" O.D. steel pipe with a 0.250" wall thickness and filled with insulating dielectric fluid or gas under a 200 psi static pressure. The pressure will be maintained by a pre-engineered fluid pumping plant or compressed gas supply located inside the proposed Middle Street Substation fence.

All construction will be in accordance with CMP's transmission standards, general industry standards, and "Good Utility Practice," including all necessary live-line working clearances, strength factors, and reliability factors as governed by the National Electrical Safety Code (NESC). In all instances, the line will be designed to meet or exceed the NESC and other standards, as applicable. The transmission line and all facilities will be operated in full compliance with CMP safety standards, which fully comply with Federal Occupational Safety & Health Administration requirements.

EXHIBIT 6D

Lewiston Loop

§6(D) Description of Proposed Corridor

Section 255

Gulf Island Substation is located at the end of Switzerland Road approximately 1.5 miles west of Route 202 and near Gulf Island Dam in Lewiston. Beginning from Gulf Island Substation, the proposed Section 255 corridor extends 0.15 of a mile westerly crossing the Androscoggin River to an angle point. This is an existing 200 foot wide corridor that will be increased to 300 feet and cleared to the full width. This portion of the corridor is shared with transmission line Sections 50 and 61. At the angle, Section 255 extends southerly and southeasterly for approximately 0.66 mile to the junction with transmission line Sections 45 and 46; this is new corridor which will be 100 feet wide and cleared to the full width. At the junction with Sections 45 and 46, the corridor extends southeasterly and southerly parallel and adjacent to Sections 45 and 46 for approximately 0.65 mile to the Deer Rips Dam. The existing 90 foot wide corridor for Sections 45 and 46 will be increased to 155 feet and will be cleared to the full width.

South of the Deer Rips Dam, the corridor continues generally southeasterly along the centerline of existing transmission line Section 149 (34.5kV Section 149 to be installed on double circuit poles of Section 255) for 1.4 miles to the south side of Mt. Auburn Avenue at Veterans Memorial Bridge. This portion of the existing corridor is 70 feet in width and will be increased to 100 feet in width, and cleared to the full width.

From this point, the corridor angles generally southeasterly for 0.45 mile, crossing the Androscoggin River via Boxer Island, to the Pan American Railways rail corridor. This is new corridor which will be 150 feet wide and cleared to the full width. For the remaining 0.91 of a mile to the Middle Street Substation site, the proposed pole centerline will be within the railroad corridor and be constructed 39 feet from centerline of the Pan American Railways track. The rail corridor is generally 80 feet in width and passes through an open residential/commercial area. Additional trim rights outside the rail corridor may be secured to provide additional clearance in some areas.

CMP has contacted all landowners, including Pan American Railways and the Maine Department of Transportation (MDOT), along this route and entered into discussions and negotiations to acquire the additional needed real estate interests for this project. Options to acquire land and/or rights have been obtained from several landowners along this route, and CMP continues to negotiate with the remaining landowners.

Section 256

From the Middle Street Substation site, the pipe cable route will be underground extending from the substation generally southerly and southeasterly to Lewiston Lower Substation. Using a directional drill from the proposed Middle Street Substation, the cable will cross Main Street extending to the Upper Canal approximately 0.21 mile. From there, the pipe cable will be trenched into the bottom of the Upper Canal and covered by concrete planks for its entire length for protection for approximately 0.79 mile to Gully Brook, and then continue into Lewiston Lower

Substation by either crossing lower Gully Brook (approximately 0.10) or along the southerly edge of Lisbon Street and Strawberry Patch Road (approximately 0.18 mile). CMP is negotiating for an easement for the placement of the underground cable in Upper Canal with the canal owner. The easement required to construct and maintain the circuit will be approximately 30 feet in width (additional temporary width and setup areas may be required during initial construction operations).

CMP will acquire all municipal permits needed for locating any portions of the proposed 115 kV transmission line within, along, over, or under municipal streets and property.

Section 6(D) of Chapter 330 also requests a description of locations within the proposed corridor where the degree of slope is in excess of twenty degrees. There are several areas along the proposed routes where slopes exceed 20%. The majority of these areas are associated with the shorelines and banks of the Androscoggin River and its tributaries, and are depicted on Exhibit 6D1.0.

EXHIBIT 6D1.0 - CONFIDENTIAL

Map Redacted

EXHIBIT 6D2.0

LEWISTON LOOP
PROPERTY RIGHTS AND INTERESTS HELD BY CMP

Section 255 Original Rights				
Grantor	**Date**	**Book/Page**	**Ownership**	**Comments**
George W. Dill	8-4-1925	302-102	pole rights	
Arthur W. Niles	3-9-1922	302/74	pole rights	
Rose E. Warren	5-4-1923	302/90	pole rights	
George O. Bailey	5-11-1922	302/75	pole rights	
Frederic S. Sargent	5-12-1922	302/76	pole rights	
Frederic S. Sargent	8-4-1925	302/101	pole rights	
Amanda Leavitt	5-12-1922	302/72	pole rights	
George E. Tucker	3-23-1922	302/71	pole rights	
Charles D. Hasty	5-10-1922	302/73	pole rights	
Riverton Development	5-15-1922	302/77	pole rights	
Section 255 New Options				
Seller	**Date**	**Book/Page**	**Ownership**	**Comments**
FPLE	NA	NA	Easement	Per CSIA Vol 3 Ch 4
Bentley Rathbun	1-25-2008	NA	Easement	
G. Carlton Snowe	5-29-2008	TBD	Fee	Recording pending
D & J Sargent	1-18-2008	NA	Easement	Two parcels
Aaron Thorndike	2-28-2008	NA	Easement	
J & C Bernard	2-28-2008	NA	Easement	
J & J Betsch	2-15-2008	NA	Easement	
William Cummings	2-27-2008	NA	Easement	

Section 255 New Options cont'd.				
Seller	**Date**	**Book/Page**	**Ownership**	
Randy Letourneau	4-17-2008	NA	Easement	
J & N Keene	3-4-2008	NA	Easement	
Temple Shalom	5-14-2008	NA	Easement	
Starbird & Francetti	6-12-2008	NA	Easement	
Christopher Lewis	6-23-2008	NA	Easement	
Boxer Island			Fee	Pending
MDOT			Clearing Rights	Pending
Riverview Cemetery			Easement	Pending
Pan Am Railway			License	Pending
Lucien Clavette			Aerial Rights	Pending
P & T Strome			Easement	Pending
M & S Keene			Easement	Pending
Joseph Mahoney			Easement	Pending
Section 256				
FPLE			Easement	Pending

EXHIBIT 6E

Lewiston Loop

Table 6E
Proposed Transmission Line Section 255/256 and Associated Facilities
Estimated Costs ($,000s)*
June 2008

	Transmission Lines 115kV	Gulf Island Substation	Middle Street Substation	Lewiston Lower Substation	TOTAL
Construction					
Labor	$3,314	$606	$3,350	$500	**$7,770**
Material	$5,389	$321	$3,200	$300	**$9,210**
General	$1,420	$244	$600	$230	**$2,494**
Administrative	$21	$3	$9	$3	**$36**
Land	$556[1]	$0	$385	$0	**$941**
Total	**$10,700**	**$1,174**	**$7,544**	**$1,033**	**$20,451**

*The Lewiston- Auburn Area Reinforcement Project may also include additional costs associated with distribution facility changes.

[1] Includes annual fee to Pan American Railways

EXHIBIT 6G

EXHIBIT 6G
Page 1 of 2

Lewiston Loop
Description of Changes to Plant
Proposed 115kV Project

TRANMISSION LINE MODIFICATIONS AND CONSTRUCTION

Existing 34.5 kV Transmission line modifications:
- Termination of Section 144 from Monty Hydro into the new Middle St. S/S;
- Removal of Section 147 from Lewiston Steam S/S to Lewiston Lower S/S;
- Removal of 115kV-34kV power transformer at Lewiston Lower S/S; and,
- Termination of Section 148 from Great Falls S/S into the new Middle St. S/S.
- Rebuild approximately 1.4 miles of Section 149 to double circuit with Section 255.

New 115 kV Transmission line construction:
- Construction of Section 255 from Gulf Island S/S to the new Middle St. S/S; and,
- Construction of Section 256 from Lewiston Lower S/S to the new Middle St. S/S.

SUBSTATION MODIFICATIONS AND CONSTRUCTION

Existing Substations

Gulf Island 115kV Substation:

A new 115kV transmission line terminal addition (Section 255) will be added at Gulf Island for the system interconnection required for the new Middle Street Substation transmission supply. The new terminal equipment required for the interconnection will consist of an 115kV circuit breaker with galvanized steel dead-end structure, disconnect switches, capacitor voltage transformers and surge arresters mounted on separate structures. The existing yard area and fenceline will be increased to allow for the new line terminal equipment. The yard addition will include subgrade reinforced concrete foundations for the structures and equipment, extensions to the station ground grid, conduits and duct system the control house. Control house cabinet additions and interconnections will be included for the relay protection and control equipment upgrades.

Lewiston Lower Substation:

A new 115kV transmission line terminal addition (Section 256) will be added at Lewiston Lower for the system interconnection required for the new Middle Street Substation transmission supply. The new terminal equipment required for the interconnection will consist of an 115kV circuit breaker with galvanized steel dead-end structure, disconnect switches, capacitor voltage transformers and surge arresters mounted on separate structures. This arrangement will be complete with reinforced concrete foundations, grounding system, conduit and duct system additions necessary to

EXHIBIT 6G
Page 2 of 2

Lewiston Lower Substation cont'd.

support the new 115kV terminal protection equipment in the existing the control house. Control house cabinet additions and interconnections will be included for the relay protection and control equipment upgrades.

Existing electrical infrastructure rearrangements necessary at Lewiston Lower Substation include the removal and relocation of the 115/34kV 37MVA (T5) power transformer to Middle Street Substation. The related 34.5 kV circuit breaker and its ancillary equipment will also be removed.

Once the existing T5 transformer has been removed, the existing 115/12kV 14MVA T1 power transformer will be relocated to the vacated former T5 position. The existing underground 12kV cable interconnection to the existing Lewiston Lower Distribution's switchgear breaker will then be re-established.

New Electrical Facilities

Middle Street Substation:

A new transmission/distribution electrical substation facility will be constructed to address overloaded system conditions that exist in the Lewiston area. The addition of this substation will provide the transmission interconnection, and transformer capacity for increased distribution load, system reliability, and supply future capacity identified as essential for system demand in this area.

The new substation will be constructed to provide two 115kV line terminals, one from Lewiston Lower substation (Section 256), and one from Gulf Island (Section 255). Both of these circuits will enter the Middle Street substation aerially. The 115kV terminal equipment will consist of a circuit breaker with disconnect switches, and a set of line-side capacitor voltage transformers and surge arresters for each line terminal.

The open-air substation will be constructed using low-profile galvanized steel structures, with a main 115kV tubular aluminum bus supplying three power transformers. The T1 and T2 transformers will have high-side circuit switchers each feeding an enclosed 14 position 15 kV switchgear unit for local distribution. The low-side of each transformer will feed the switchgear unit via underground power cables.

The T3 transformer with high-side circuit switcher will feed a galvanized steel 34kV two-bay structure supplying two sub-transmission circuits – one to Great Falls (Section 148), and one to Monty Hydro (Section 144) substations.

This new substation arrangement will be complete with reinforced concrete foundations, grounding and duct system necessary to support the yard equipment functionality to a new 20' x 28' control house, all enclosed by an 8 foot chain-link fence with 3 strands of barbed wire above the fence fabric.

EXHIBIT 6H

Lewiston Loop

§6(H) Alternative Routes

CMP proposes to use existing transmission corridors for the new line to the maximum extent possible and feasible. Some portions of the existing corridors are suitably sized and other sections will need to be widened. Where existing transmission corridors are not available, other infrastructure corridors such as the Pan American Railways corridor and the Lewiston canal system are incorporated. The existing transmission and rail corridors provide a reasonably direct route for much of the distance from the Gulf Island Substation to the site of the proposed Middle Street Substation. Both river crossings will be in close proximity to existing infrastructure river crossings. The existing upper canal provides an ideal location for much of the remaining distance to Lewiston Lower Substation. By maximizing its use of existing corridors, the company will minimize (i) overall environmental impacts, (ii) community impacts, and (iii) the need to purchase new land or easement rights. Alternative routes and sites investigated for this project are:

Section 255: CMP evaluated two alternate options for Section 255 from a systems reliability and needs perspective. These alternatives are:

- *Alternative 1 - Bradman Street Crossing*: The Section 255 route will run from Gulf Island across the Androscoggin River parallel to existing Sections 50 and 61. The line will turn south and follow a route parallel to North River Road using the ROW of Sections 45 and 46 and part of Section 149 (same as the preferred route). The line will proceed to a point approximately 0.3 mile north of the Veterans Memorial Bridge/Mt. Auburn Avenue near Bradman Street. The line will angle easterly, crossing the Androscoggin River, and extend approximately 0.36 mile on new right-of-way to the Pan American Railways

railroad corridor, and from there, southerly approximately 1.31 miles along the railroad corridor to the proposed Middle Street Substation site.

- *Alternative 2 - Great Falls Crossing*: The Section 255 route will run from Gulf Island, across the Androscoggin River and then southerly to Veterans Memorial Bridge (same as preferred route). The line will continue south and follow a route parallel to North River Road and Route 4 using the approximate centerline of existing Section 149 (34.5kV Section 149 would be installed on double circuit poles of Section 255) and continue to the existing river crossing just upstream of Great Falls into the proposed Middle Street Substation site. The route distance from Veterans Memorial Bridge to the Middle Street Substation along this route is approximately 1.7 miles (with approximately 1.3 miles roadside).

Alternative 1 will require acquisition of 0.36 mile of new transmission line corridor from private ownership and obtaining approval for an additional 0.8 mile on the Pan American Railways corridor (in addition to the original 0.91 miles). The river crossing will be upstream of the existing bridge/highway corridor, thereby establishing a "green field" infrastructure river crossing. This route will also require spanning two elevated streets/ramps on the easterly end of the Veterans Memorial Bridge.

Alternative 2 will require approximately 1.3 miles of roadside construction along North River Road and Center Street (Rte 4) through densely populated residential and business areas. Pole locations will have to approximate those of existing 34.5kV Section 149 due to the very constrained openings between the traveled ways and buildings. Existing Section 149, distribution circuits and all other existing utilities will have to be accommodated on taller, multi-circuit structures with the 115kV. Since there are numerous changes in direction and very limited opportunities for guying, some of these new poles will need to be steel and installed on substantial concrete foundations. Although it appears possible to maintain NESC

clearances, the addition of these 115kV structures as a roadside installation will present a significant change of character to the area. In addition, constructing portions of Section 255 roadside is in sharp contrast to CMP's longstanding policy of locating critical 115kV transmission facilities within dedicated rights. This line would be exposed to vehicular impacts and the ramifications of limited trimming clearance.

Middle Street Substation: CMP considered two alternatives to the construction of a new substation at this location:

- *Alternative 1*: Use the existing substation at Great Falls.

The Great Falls Substation is undersized with no opportunity or area to expand to accommodate the proposed 115 kV overhead line. The new Middle Street site is surrounded by development including a parking garage, and is proposed to be located where a manufacturing facility formerly operated (the area is now an empty foundation and parking area). This substation would be compatible with the existing uses and aesthetics of the area.

- *Alternative 2*: Use the existing substation at Lewiston Steam.

The Lewiston Steam Substation is located inside a brick building and offers no room for expansion. The existing facility must be kept in service until a new substation can be commissioned. In addition, redevelopment of this site by CMP will conflict with the City of Lewiston's ongoing redevelopment plans for the Great Falls area.

Section 256: CMP evaluated three primary alternatives. These alternatives are:

- *Alternative 1 – Existing Duct Bank System*: Use the existing duct banks between Lewiston Steam and Lewiston Lower for possible installation of the 115kV solid dielectric cable for a portion of the route for the Section 256

underground circuit from the new Middle Street 115kV substation to Lewiston Lower substation.

- *Alternative 2 – City Street Route*: Construct an underground line from the proposed Middle Street Substation following Bates Street. The underground line will pass underneath Main Street, Adams Ave, and Lisbon Street. The conductor will be enclosed in an oil-filled pipe or duct bank and will be buried. The route is approximately 1.29 miles in length.

- *Alternative 3 – Overhead Transmission*: Construct an overhead line following Canal Street, between the street and the Upper Canal. The line will exit the proposed Middle Street Substation using the foundations of the existing Monty Hydro structures and span over Main Street and follow Canal Street/Upper Canal to Lewiston Lower Substation, approximately 1.09 miles.

Alternative 1 requires the use of the existing duct banks between Lewiston Steam substation and Lewiston Lower substation. These duct banks are too small to contain the cable of a size that would be needed for this circuit. The existing ducts are either 3-1/2" Transite or 4" PVC or steel. The individual phase conductors for Section 256 would be approximately 4" in diameter and could not be pulled in to the small conduits. Even if the ducts could have been used, the Section 256 phase conductors would have to be de-rated due to thermal impacts from to the compact spacing and size of the existing conduits.

Alternative 2 requires the installation of an underground line along Bates Street. This route will require excavating along and across several public streets and disrupting in-town traffic. This option is also the longest route of the three (approximately 1.29 miles).

Alternative 3 requires construction of an overhead line along Canal Street and/or the Upper Canal. This route may not be feasible due to

aesthetics, structural limitations of the historic canal, and the number and close proximity of buildings, roadways, and existing overhead utilities along this route; these obstructions may make it impossible for a new overhead transmission line in this area to conform to electrical safety standards.

In view of the uncertainties primarily relating to safety, costs, environmental impacts, and potential community impacts, CMP has determined that pursuing the preferred routes for Section 255 and Section 256 is a just and reasonable choice.

EXHIBIT 7 - CONFIDENTIAL

Exhibit Redacted