Appendix C

Summary of Existing Operating Plans for Water Power Facilities and Water Control Structures

Table C1
Existing Flow and Water Level Operating Constraints for Muskoka River Dams

Area of Watershed	Control Structure	Purpose	Flooding	Fisheries and Wildlife	Water Quality	Recreation	Municipal/Industrial/Other
NORTH MUSKOKA RIVER							
BIG EAST RIVER							
West Harry Lake Dam	Controls levels on West Harry Lake Timber dam – 3 m high Spillway Crest– 14.9 m long Slide control valve 0.91 m diameter Valve not operated since 1993	Recreation	• Start of flood damage zone (FDZ) identified at 33.0 m (LCD), but no development on lake.			• Summer water levels maintained within wide operating range of 0.8 m for recreational use	
McCraney Lake Dam	Controls levels on McCraney Lake Concrete dam – 6 m high 1- 4.27 m wide sluice with stop logs – stop logs operated only during repairs/maintenance 1- 7.58 m wide spillwall Slide control valve - 0.76 m diameter Valve opened mid August and closed by mid October annually	Recreation, Low flow augmentation on Big East River Power production Fisheries protection	• Start of FDZ for McCartney Lake is 445.79 m (GSC).	• Lake must not be drawn down after October 15th to protect lake trout spawning.	• Low flow augmentation in Big East in late summer	• Summer water levels maintained within wide operating range of 0.8 m for recreational use	
Camp Lake Dam	Concrete dam – 3 m high 1 – 3.05 m wide sluice with stop logs Stop logs operated only for repairs/maintenance 1- 36.8 m wide spillwall Square slide control valve 0.76x 0.76 m Valve opened late Sept for 0.95 m drawdown, reduce opening to <5 cm prior to Oct. 15, close valve in November Valve settings coordinated with Tasso Lake Dam	Recreation, fisheries protection	• Start of FDZ for Camp Lake is 412.90 m (GSC) • Cottage development on lake moderately susceptible to flooding	• Valve opening reduced by Oct 15 prior to lake trout spawning,, closed completely in November to keep fish spawning shoals covered.	• No specified flow or water level requirement for water quality considerations	• Summer water levels maintained within wide operating range of 0.3 m for recreational use	
Tasso Lake Dam	Concrete dam with road across the top – 4 m high 1- 4.27 m wide sluices with 8 stop logs	Recreation Road	• Start of FDZ for Tasso Lake is 399.85 m (GSC). • Dam must not be overtopped as no spillwall and roadway embankments will erode • Cottage development on lake moderately susceptible to flooding • Dam is operated in flood periods, lake rises quickly during flooding	• No specified flow (leakage only) or water level requirements for fish or wildlife considerations.	• 0.5 cms minimum outflow maintained by leakage for downstream water quality	• Summer water levels maintained within operating range of ± 0.2 m for recreational use	The dam doubles as a road bridge over Tasso Creek
Distress Dam	Controls Distress Pond on Big East River Concrete overflow weir – 3.5 m high and 30.54 m in length containing a 4.0 m wide low flow notch	Recreation	• Start of FDZ is 101.3 m (LCD).	• No specified flow or water level requirements for fish or wildlife considerations	• No specified flow or water level requirement for water quality considerations		
AXE CREEK							
Axe Lake Dam	4 km downstream of Axe Lake outlet Concrete dam – 3 m high 2 – 5.8 m wide sluices with 1 stop log each and 2 overflow spill walls Operated as self regulating spill dam/weir	Recreation, fire protection for Yearley	• Long meandering upstream channel between dam and Axe Lake restricts outflow from lake in high flows	• No specified flow or water level requirements for fish or wildlife considerations	• No specified flow or water level requirement for water quality considerations	• Dam provides increased water levels for recreational pursuits on Axe Lake	Fire protection for Yearley
Buck Lake Dam	Also known as Campbell Dam - 2.2 km downstream of Buck Lake outlet. Controls levels on Buck and Fawn Lakes Concrete dam – 3 m high 2 – 4.27 m wide sluices with 3 stop logs each 3 - overflow spill walls	Recreation	• Start of FDZ for Buck Lake is 301.30 m (GSC). • Operation of dam required during any summer flood period • Flood storage capacity for downstream flood control in spring is small • Some flow restrictions at Buck Lake bridge at lake outlet under high flows	• No specified flow or water level requirements for fish or wildlife considerations	• No specified flow or water level requirement for water quality considerations	• Summer water levels are maintained within the normal summer operating levels for recreational purposes	
Fox Lake Dam	On outlet to lake on the Buck River Concrete dam 2 – 4.27 m wide sluices with 4 stop logs each 2- 2.15 m and 4.45 m wide spillwalls	Recreation	• Start of FDZ for Fox Lake is 295.72 m (GSC).	• No specified flow or water level requirements for fish or wildlife considerations.	• No specified flow or water level requirement for water quality considerations	• Maintain summer RWL of 294.45 (GSC) to within ± 0.2 m.	

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Area of Watershed	Control Structure	Purpose	Flooding	Fisheries and Wildlife	Water Quality	Recreation	Municipal/Industrial/Other
NORTH MUSKOKA RIVER							
Huntsville Dam	Regulated under Hackner-Holden Agreement 5 km downstream of Highway 11b bridge in Huntsville and 0.7 km downstream of outlet from Fairy Lake Controls levels on Fairy, Peninsula and Vernon lakes Concrete control dam – 4.5 m high 6 – stop log bays (5 – 6.1 m wide, 1 – 5.74 m wide) 7 to 8 logs/bay 2.85 m high from stop log sill to crest of retaining wall – medium degree of difficulty to operate Navigation lock – concrete retaining wall of dam is part of lock approach channel	Recreation, Navigation, Spring flood control, Winter power production, Fisheries	• Start of FDZ for Huntsville lakes is 284.62 m (GSC). • Huntsville lakes experience the largest fluctuations of all lakes in the watershed, due to uncontrolled runoff from the Big East River – frequent dam control required to react to the flows from the Big East • Flooding can be a major issue in summer when summer lake levels higher and more residents affected • Some flow restriction at bridge in Huntsville may cause higher water levels in Lake Vernon • Flooding can occur along channel below dam when flows exceed 141 m^3/s • If snow water content above normal by early March draw down may be lowered below Mar 15 normal • 0.54 m draw down Dec. 1 to March 15 for spring flood control	• Lake draw down of 24 cm from September 15 to October 15 prior to lake trout fall spawning period • Lake trout draw-down rule of maximum 0.45 m between October 15 and March 1 to help protect lake trout eggs on spawning shoals (Hackner-Holden agreement) • .Minimum outflow of 3 m^3/s to be maintained by leakage for water quality and fisheries throughout summer	• Minimum outflow of 3 m^3/s to be maintained by leakage for water quality and fisheries throughout summer	• Maintain summer (July 1 – Sept. 15) RWL of 283.77 m (GSC) within a normal summer operating range of 30 cm. • Navigation lock incorporated into east side of dam – channel adjacent to dam leading to lock entrance • Minimum crest elevation of earth dike along upstream lock approach channel of 284.25m must not be exceeded at dam or danger of washing out dike wall and draining lakes • River below dam is navigational to Mary Lake • During fall/winter thaws to stay within summer rule curve to protect docks otherwise lake ice will lift/damage docks	• Winter drawdown is for downstream hydro power production - 11 m^3/s is plant capacity at 3 Bracebridge Generation Limited plants on North Muskoka River No use of lake storage in summer for power production • Downstream dam at Port Sydney must be operated any time Huntsville dam is operated
Port Sydney Dam	Regulated under Hackner-Holden Agreement At outlet to Mary Lake on North Muskoka River –controls level on Mary Lake Concrete control dam – approximately 4 m high 7- stop log bays (~ 5.64 m wide) with 5 to 7 logs/bay - medium to high degree difficulty to operate 1 – 57.91 m long spillwall at 281.87m (GSC)	Recreation, Navigation Spring flood control Winter power production Fisheries	• Start of FDZ for Mary Lake 281.15 m (GSC) • 0.48 m draw down Dec 15 – Mar 15 for spring flood control and hydro power production • If snow water content above normal by early March draw down may be lowered below Mar 15 normal	• Winter draw down rule for lake trout is 0.45 m maximum Oct 15 to Mar 1 • Fall draw down 0.22 m from Sept 15 to Oct 15 prior to lake trout fall spawning • Minimum outflow of 3 m^3/s to be maintained by stop log manipulation and leakage for water quality and fisheries throughout summer	• Minimum outflow of 3 m^3/s to be maintained by stop log manipulation and leakage for water quality and fisheries throughout summer	• Maintain summer (June 15 – Sept. 15) RWL of 280.73 m (GSC) within a normal summer operating range of 0.34 m (+0.15 m / -0.18 m) • During fall/winter thaws to stay within summer rule curve to protect docks otherwise lake ice will lift/damage docks	• Winter drawdown is for spring flood control and downstream hydro power production - 11 m^3/s is plant capacity at 3 Bracebridge Generation Limited plants on North Muskoka River– maintain this flow where possible during drawdown • No use of lake storage in summer for power production • All stop log operations to be coordinated with Huntsville dam upstream and hydro operations downstream
High Falls	Located at immediately upstream of High Falls Concrete dam is 3-m high and 28-m in length and consists of a concrete overflow weir, an automated sluiceway and the power station intake Owned and operated by Bracebridge Generation Limited Estimated operating head of 14.63 m Run of river facility	Power production	• Run of river facility, with estimated plant capacity of 12 m^3/s - if river falls below the required plant capacity, generation is scaled back • Flow in excess of plant capacity is spilled by passing the plant • Normal summer water level 268.83 m	• No specified flow or water level requirements for fish or wildlife considerations	• No specified flow or water level requirement for water quality considerations	• No specified flow or water level requirement for recreational considerations	• Total installed capacity of 0.8 MW
Wilson Falls	Located approximately 2.4 km upstream from the Town of Bracebridge Main dam consists of a 109.5-m long overflow section and a 7-m wide electric gate Secondary dam consists of an 8-10 m high concrete dam with one sluiceway and the power intake gate	Power Production	• Run of river facility, with estimated plant capacity of 12 m^3/s - if river falls below the required plant capacity, generation is scaled back • Flow in excess of plant capacity is spilled by passing the plant • Normal summer water level 254.08 m	• No specified flow or water level requirements for fish or wildlife considerations	• No specified flow or water level requirement for water quality considerations	• No specified flow or water level requirement for recreational considerations	• Total installed capacity of 0.6 MW
Bird's Mill	Concrete and masonry dam – approximately 5 m high - spillways and 3 active spillways Owned by District Municipality of Muskoka Originally developed to power tannery, woolen mill and pump municipally supplied water	Historic site	• No established rule curve – operated to pass flood flows in conjunction with upstream and downstream structures	• No specified flow or water level requirement for water quality considerations	• No specified flow or water level requirement for water quality considerations	• No specified flow or water level requirement for recreational considerations	• Bracebridge historical site • Dedicated as an American Waterworks Association Canadian Waterworks landmark
Bracebridge Falls	Facility consists of a 32.3 m long dam (4 sluices, 3 spillways) and powerhouse located at Bracebridge Falls Owned and operated by Bracebridge Generation Limited	Power Production	• Run of river facility, with estimated maximum plant discharge of 12 m^3/s - if river flow falls below the plant capacity, generation is scaled back. • Excess flow is spilled by passing the plant • Normal summer water level 235.64 m	• No specified flow or water level requirements for fish or wildlife considerations	• No specified flow or water level requirement for water quality considerations • Walleye spawning area below falls	• No specified flow or water level requirement for recreational considerations	• Total installed capacity of 0.6 MW

Table C1
Existing Flow and Water Level Operating Constraints for Muskoka River Dams

Area of Watershed	Control Structure	Purpose	Flooding	Fisheries and Wildlife	Water Quality	Recreation	Municipal/Industrial/Other
DIVINE CREEK							
Clearwater Lake Dam	Located at outlet to Clear (water) Lake Concrete dam – 1 m high 1 – 1.83 m wide sluice with 1-2 x 8 inch board	Recreation, minor spring flood control	• No established FDZ • Board removed in October and replaced after run-off in May	• No specified flow or water level requirements for fish or wildlife considerations.	• Some low flow maintained downstream by notches in board	• Maintain summer RWL of 18 cm below top of dam - self regulating lake by the single gate	
Divine Lake Dam	Controls Divine Lake Concrete dam (1.5 m high) includes bridge deck 1 2m wide sluice with 4 – 10 cm stop logs	Recreation, Bridge, spring flood control	• No established FDZ • Fall draw down of 0.2 m after Oct. 1 for spring flood control	• No specified flow or water level requirements for fish or wildlife considerations.	• No specified minimum flow for water quality since minimum flow is maintained by leakage through the dam.	• Maintain summer RWL of 29.5 m (LCD).	• Single lane road bridge
SOUTH MUSKOKA RIVER							
OXTONGUE RIVER							
Burnt Island Lake Dam	Controls levels on Burnt Island Lake only Must coordinate log changes with Joe Lake and Tea Lake dams downstream Concrete dam – 4 m high 1 – 3.66 m wide sluice with up to 9 stop logs (normally 8 are used) 2 – overflow spill walls 1 – 0.76 x 0.76 m valve (not operational) Normal summer head – 2.82 m	Recreation, fisheries	• Start of FDZ for Burnt Island Lake is 429.0 m (GSC), although there is no development around the shoreline because it is within Algonquin Provincial Park	• Fall draw down must be completed by mid-October to protect fall-spawning fish populations	• No specified minimum flow for water quality since minimum flow is maintained by leakage through the dam.	• Summer levels maintained within wide operating range of 0.5 m for recreation within Algonquin Park	
Joe Lake Dam	Controls Joe, Little Joe, Tepee, Littledoe, Bluejay and Tom Thomson lakes Concrete dam – 4.5 m high Lake lowered 0.3 m between Sep. 15 – Oct. 15 and 0.55 m between Feb. 15 – Mar. 15 1 – 4.27 m wide sluice with 9 stop logs 1 – 20.73 m long spillwall Normal summer head – 2.91 m	Recreation, flood control, fisheries	• Start of FDZ for Joe Lake is 422.20 m (GSC) • Operated to try to reduce spring flooding in Lake of Bays, Lake Muskoka and the Muskoka River	• Fall draw down must be completed by October 15 to protect spawning lake trout • Winter draw down limit of 0.55 m to protect spawned fish eggs	• No specified minimum flow for water quality since minimum flow is maintained by leakage through the dam.	• Summer levels maintained within wide operating range of 0.4 m for recreation within Algonquin Park	• If lake rises after Oct. 15, water is stored for gradual release through the winter for downstream hydro power generation
Ragged Lake Dam	Concrete dam – 3.5 m high 1 – 2.44 m wide sluice with max. of 9 stop logs 2 – spillwalls with a total length of 110 m 1 – 0.76 x 0.76 m valve Dam acts as self-regulation overflow dam except in fall when valve is used for drawdown (1.2 m between Sep. 15 and Oct. 15) A 5 m long breach in the spill wall, about 0.75 m deep, controls summer water levels	Recreation, flood control	• Start of FDZ for lake is at 433.05 m (GSC) • Lake is used as a storage lake in spring and high flow periods to relieve flooding on downstream lakes	• No specified flow or water level requirements for fish or wildlife considerations.	• No specified minimum flow for water quality since minimum flow is maintained by leakage through the dam.	• Summer levels maintained within wide operating range of 0.6 m for recreation within Algonquin Park (i.e., canoeing)	
Tea Lake Dam	Controls Tea, Bonita, Canoe and Smoke Lakes Regulated under Hackner-Holden agreement Draw down of 0.34 m (Sep. 15 – Feb. 15) and 0.28 m (Feb. 15 – Mar. 15) (Total 0.62 m) Concrete dam – 4 m high 2 – 4.27 m wide sluices with 9 stop logs each 1 – 27.47 m long spill wall 1 – 0.91 x 0.91 m valve (kept closed but maintained operational) Normal summer head – 2.61 m	Recreation, navigation, spring flood control, winter power generation, fisheries	• Start of FDZ for Tea Lake is 418.20 m (GSC) • Tea Lake is used as storage to help reduce flooding on Lake of Bays	• Minimum outflow of 1.4 m^3/s	• Minimum outflow of 1.4 m^3/s	• Summer levels maintained within wide operating range of 0.35 m for recreation within Algonquin Park where there is less shoreline development	• Draw down in restricted until mid Feb. to prevent sloping and cracking of ice at the shoreline to allow MNR ski-equipped aircraft access to Smoke Lake hangar dock • If lake rises after Oct. 15 due to fall rains, store water for gradual natural release over winter for use in downstream hydro power generation
HOLLOW RIVER							
Livingstone Lake Dam	Controls Livingstone Lake only Concrete dam – 2 m high 1 – 4.27m wide sluice with 2 stop logs (not operated) 1 – 15.4 m long spillwall Normal summer head – 0.6 m	Recreation	• Dam has sufficient spill way capacity to pass most high flows without causing problems on the Lake	• No specified flow or water level requirements for fish or wildlife considerations.	• Free outflow at all flows	• Summer water levels maintained within the normal operating range by self-regulating nature of dam	

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Existing Flow and Water Level Operating Constraints for Muskoka River Dams

Area of Watershed	Control Structure	Purpose	Flooding	Fisheries and Wildlife	Water Quality	Recreation	Municipal/Industrial/Other
Fletcher Lake Dam	Controls Fletcher Lake Concrete dam – 3.5 m high Dam is a self regulating, 30.4 m long weir with no sluice There is one valve that is sealed shut, and is not operational Normal summer head – 2.29 m	Recreation	• Storage in lake is to small for downstream use • Lake has a small watershed area compared to its surface area and can store much of the spring run-off with only a small rise in lake level • Downstream road culvert may be exceeded during large flood events	• No specified flow or water level requirements for fish or wildlife considerations.	• Free outflow at all flows	• Summer water levels maintained within the normal operating range by self-regulating nature of dam	
Kawagama Lake Dam	Dam is regulated by Hackner-Holden agreement Concrete faced, stone filled dam – 5 m high 2 – 4.27 m wide sluice with 4 stop logs 2 spillways Summer drawdown of 0.38 m (May 15 – Sep. 1) (only lake in watershed) Fall drawdown of 0.28 m (Sep. 1 – Oct. 15) Winter Drawdown of 0.61 m (Oct. 15 – Mar. 1) Normal summer head (July 1) – 3.35 m	Recreation, navigation, spring flood control, winter power generation, fisheries	• Heavy rainfall periods or above average snowmelt will cause lake to exceed normal operating range • During winter thaws, if lake starts to rise, outflow must be increased to protect docks and boathouses from damage from rising ice layers. • Lake is used as a storage lake in spring to relieve high flows on Lake of Bays, Lake Muskoka and the connecting rivers • Channel restriction upstream from dam (i.e., old cofferdam) makes it difficult to get water out of the lake	• Fall drawdown of 0.28 m between Sep. 1 – Oct. 15 to set level at which fish are forced to spawn to help protect eggs from winter draw down for hydro production • Maximum winter drawdown rule of 0.61 m between Oct. 15 – Mar. 1 to protect lake trout eggs	• Minimum outflow of 2.8 m^3/s is maintained by summer drawdown	• Summer operating range of 0.40 m and a summer drawdown of 0.38 m (May 15 – Sep. 1)	• Winter drawdown (Jan. 15 – Mar. 15) for downstream hydro production at plants on the South Muskoka River • Coordinate all flow changes with downstream dams at Baysville and Matthiasville
SOUTH MUSKOKA RIVER							
Baysville Dam	Controls Lake of Bays Dam is regulated by Hackner-Holden agreement Fall drawdown of 0.06 m (Sep. 15 – Oct. 15) Winter drawdown of 0.76 m (Oct. 15 – Mar. 15) Concrete dam – 3.5 m high 9 – 4.27 m wide sluices 1 – 32.1 m long spillwall Normal summer head – 1.7 m	Recreation, navigation, spring flood control, winter power generation, fisheries	• During winter thaws, if lake starts to rise, outflow must be increased to protect docks and boathouses from damage from rising ice layers. • Full discharge capacity of dam can only be used with caution during extremely high water to prevent excessive downstream flooding • Stage large stop log removals over two or more days when possible to minimize sudden large flow increases downstream • Flooding damage on lake and river must be balanced in flood situations	• Minimum outflow for fisheries downstream • Fall drawdown completed by Oct. 15 to protect lake trout spawning • 0.45 m maximum winter drawdown rule from Oct. 15 to Mar. 1 to protect spawned lake trout eggs	• Minimum outflow of 2.8 m^3/s is to be maintained during dry periods	• Summer water level range limited to 0.22 m under normal conditions for recreational purposes (i.e., channel navigation, dock and marina access)	• Winter drawdown for hydro production at downstream generating stations – try to maintain flow of 16.8 m^3/s (plant capacity at Trethewey Power dam), while staying in normal operating range
Wood Lake Dam	Controls Wood Lake (a tributary to Lake Muskoka) Winter draw down of 0.40 m (Oct. 15 – Mar. 10) Concrete dam – 2.5 m high 1 – 4.27 m wide sluice with 4.5 stop logs 1 – 1.22 m wide spillway Normal summer head – 1.22 m	Recreation	• All stop logs not removed in spring unless above normal runoff threatens increased flooding in lake	• No specified flow or water level requirements for fish or wildlife considerations.	• No specified minimum flow for water quality since minimum flow is maintained by leakage through the dam.	• Moderately narrow summer operating range (0.30 m) because of extensive shoreline development and recreational use	
Matthias Falls	Dam and generating station owned by Orillia Power Corporation Concrete dam is 13.7-m high, approximately 270 m long and consists of 3 sluiceways (2 manual, 1 remotely operated)	Power generation	• Plant mainly limited to run of river operation – 2.7 days storage at maximum plant discharge • On an hourly and daily basis, the head pond typically fluctuates over a 0.92 m to maximum of 1.8 m range • Nominal head pond elevation 292.91 m, with maximum to 293.5 m	• OPC has issued a memorandum to its operators to release a minimum flow of 3.0 m^3/s to allow OPG to provide this minimum flow quantity to protect walleye spawning at the base of South Falls .	• No specified flow or water level requirements for water quality considerations.	• No specified flow or water level requirements for recreational considerations.	• Total installed capacity of 2.81 MW • Water passed to the powerhouse through a 4.6 m diameter penstock
Trethewey Falls	Dam and generating station owned by OPG Concrete dam (max. height 6 m) with 3 sluiceways and two flanking spillways for a total length of 67 m – powerhouse located approximately 22.9 m away from the sluices Dam provides total operating head of 10.7 m (natural head of 7.3 m at falls)	Power generation	• Area between Matthias and Trethewey – 20 summer cottages and a few permanent homes are located on the north side of the river within a flood hazard area. Access roads are located closer to the watercourse and are frequently inundated • Nominal head pond elevation 278.98 m with normal and absolute operating ranges of 0.91 (to 279.43 m) and 1.68 m (to 279.74 m) respectively	• No specified flow or water level requirements for fish or wildlife considerations.	• No specified flow or water level requirements for water quality considerations.	• No specified flow or water level requirements for recreational considerations.	• Structure consists of one , 1.74-MW hydroelectric generating unit • Discharges directly into the forebay of Hanna Chute • Maximum plant discharge 19.9 m^3/s
Hanna Chute	Dam and generating station owned by OPG Concrete dam consists of 35 m long wingwall, the powerhouse and a 12 m long wingwall joining the powerhouse to 3, 4.9 m wide sluices Normal head of 9 m above the tailwater (regulated by South Falls GS)	Power generation	• No specified water level or flow management for flooding considerations • Nominal head pond elevation 268.31 m with normal and absolute operating ranges of 0.39 (to 268.5 m) and 1.95 m (to 268.84 m) respectively	• No specified flow or water level requirements for fish or wildlife considerations.	• No specified flow or water level requirements for water quality considerations.	• No specified flow or water level requirements for recreational considerations.	• Plant consists of one generating unit with a maximum continuous power rating of 1.46 MW • Head pond extends to foot of Tretheway Falls GS, approximately 3.2 km upstream • Maximum plant discharge 23.7 m^3/s

Table C1
Existing Flow and Water Level Operating Constraints for Muskoka River Dams

Area of Watershed	Control Structure	Purpose	Flooding	Fisheries and Wildlife	Water Quality	Recreation	Municipal/Industrial/Other
South Falls	Dam and generating station owned by OPG Located approximately 4 km upstream from the confluence of the North and South Muskoka Rivers Concrete dam is 6 m high and 11 m long Powerhouse is 308 m downstream, fed by three wood stave overland penstocks	Power generation	• No specified water level or flow management for flooding considerations • Nominal head pond elevation 258.96 m with normal and absolute operating ranges of 0.73 (to 259.32 m) and 1.56 m (to 259.75 m) respectively	• 3.0 m^3/s flow maintained through over-flow structure for walleye reproduction in the spring	• No specified flow or water level requirements for water quality considerations.	• No specified flow or water level requirements for recreational considerations.	• Plant consists of three generating units with a total capacity of 5 MW • Maximum plant discharge 19.2 m^3/s
LOWER MUSKOKA RIVER WATERSHED							
LAKE MUSKOKA WATERSHED							
Skeleton Lake Dam	Controls Skeleton Lake only Located on the Bent River, a small tributary flowing into Lake Rosseau Winter drawdown of 0.1 m (Jan. 1 – Mar. 31) Concrete overflow weir – 10 m long by 1.7 m high, with a low flow notch (0.19m) and an operational valve (0.91 m) Normal summer head – 0.53 m	Recreation	• Start of FDZ in Skeleton Lake is 281.00 m (GSC) • Weir is self-regulating during low flow conditions • Maximum outflow above which flooding problems in downstream community is 3.8 m^3/s and maximum downstream water level is 279.58 m.	• Minimum flow of 0.4 m^3/s maintained during normal summer conditions • Minimum flow reduced to 0.2 m^3/s during drought conditions.	• Minimum flow of 0.4 m^3/s for water quality downstream (for domestic use purposes).	• Low summer water levels cause navigation problems and dock access difficulty • Summer normal operating range of 0.2 m (Jul. 1 – Dec. 31) • Summer RWL (Jul. 1 – Sep. 15) of 280.5 m (GSC)	• Minimum downstream flow and water level requirements for water intakes and wells near river in community of Bent River • Downstream flow and water level requirements = 0.4 m^3/s minimum and 279.29 m in elevation minimum water level. During dry periods the minimum downstream flow decreases to 0.2 m^3/s
Port Carling Dam	Controls water levels on Lake Rosseau and Lake Joseph Dam is associated with two navigational locks Regulated under the Hackner-Holden Agreement Fall drawdown of 0.1 m (Sep. 15 – Oct. 15) Winter drawdown of 0.46 m max. (Jan – Mar. 15), although logs are gradually removed starting in November Concrete dam – 3.5 m high 6 – 4.27 m wide sluice gates with 8 stop logs 2 spillwalls with total length of 12.4 m Normal summer head – 0.62 m	Navigation, recreation, spring flood control, winter power production, fisheries	• Lake is slow to drop in high flows due to high tailwater level in the Indian River, influenced by backwater from Lake Muskoka • High lake levels cause high flows through the dam and high levels in the channel downstream causing flooding – flood damage starts at flows exceeding 42.5 m^3/s • Outflow from lake to dam (200 m channel in Indian River) is restricted by a natural rock narrows resulting in water level of up to 0.2 m between lake and dam during high flows	• Maximum winter drawdown rule of 0.45 m between Oct. 15 and Mar. 1 to protect incubating lake trout eggs	• Minimum flow discharge through dam is 0.7 m^3/s (the total of leakage flow and lock flow) during dry periods	• Lakes are maintained within a narrow summer operating range (0.2 m) to facilitate navigation of large boats (i.e., steam ships) through locks and access to the many docks around the lake • The large lock must be maintained with a minimum depth of 2.65 m over the sill • Valves in large lock are left open during winter to protect from freezing; insignificant effect on lake level	• If snow water content is above average, early spring drawdown may exceed normal levels, although not past bottom of buffer zone to protect water intakes • Water intakes may freeze if lakes drop below normal spring minimum level • Winter drawdown from Jan to mid Mar. to supplement river flows for downstream power production • Coordinate operation with Bala Dams downstream • Dam discharge greater than 20 cms (approximately) and flows can affect navigation into the small locks, and the large locks for bigger vessels
Gull Lake Dam	Controls Gull Lake levels and drains into Hoc Roc River and subsequently Lake Muskoka Non-operational weir -	Recreation	• Free flow past dam	• No specified flow or water level requirements for fish or wildlife considerations.	• No specified flow or water level requirements for water quality considerations	• Weir maintains water levels in Gull Lake for recreational and cottage purposes	

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Existing Flow and Water Level Operating Constraints for Muskoka River Dams

Area of Watershed	Control Structure	Purpose	Flooding	Fisheries and Wildlife	Water Quality	Recreation	Municipal/Industrial/Other
Bala North and South Dams	Dams controls Lake Muskoka, the largest lake in the watershed, as well as the Muskoka River up to the foot of Bracebridge Falls, and the Indian River to the Port Carling Dam North dam located at the top of Bala Falls, South dam discharges south of the falls Dams operated under the Hackner-Holden Agreement Concrete structures – 4 m high North Dam 6 sluices in total – 1 sluice with seven, 4.88 m long stop logs, 1 sluice with seven, 6.1 m long stop logs, and 2 sluices with eight, 6.1 m long stop logs, and 2 sluices with 6.47 m wide sluice gates. Water discharges over the top of the stop logs in the sluiceways containing stop logs. Water discharges underneath the sluice gates, in the sluiceways with sluice gates. No spillwall South Dam 8 – 4.27 m wide sluices with 8 stop logs each 2 spillwalls with a total length of ~24 m Winter drawdown (maximum of 0.7 m) starts in December and ends Mar. 15, taking into account the winter lake trout rule South dam is operated in winter because it has shorter stop logs and therefore easier operation (north dam is set for winter in Nov.) Normal head of water held by dams – 2.44m (South Dam) and 2.45 m (North Dam)	Recreation, navigation, fisheries, winter power production, flood control	• When outflows through Bala Dams are greater than approximately 283 m^3/s, flooding damages begin in the Bala Reach downstream from the dams (flooding complaints start at flows of 200 m^3/s) • Upstream flood damage to docks and boathouses occurs when levels are 0.3 m above the top of the summer operating range • During heavy rainfall events, dams require frequent operation to minimize flooding on the lake and balance flood damage between the lake and downstream Bala Reach • Both dams are left open up to and during the spring runoff • During the winter, dams can be opened to pass flow of up to 85 m^3/s, above this OPG must be contacted to coordinate flows with the Moon River dam • Lake Muskoka flood control range of 0.6 m above the normal summer operating level • Flood control capacity in Lake Muskoka reduced in summer because of requirement to keep lake high for recreation	• Fall drawdown (0.15 m) extends from Sep. 15 – Nov. 1 to protect spawning lake trout and help meet the 0.45 m maximum winter drawdown rule (Oct. 15 – Mar. 1) for lake trout protection • Lake Muskoka level held up to 12 cm above the normal summer level during lower base flow periods to provide steady flow for walleye spawning at the Mouth of the Moon River from late April to May • Minimum flows during the walleye spawning period are 14 m^3/s continuous from April 15 to June 1	• Minimum outflow of 3.0 m^3/s from each dam is to be maintained by leakage or log removal to maintain downstream water quality • Burgess Power Station provides an additional minimum flow of 4 cms	• Lake Muskoka is the largest lake in the watershed and recreation is the major use • Regulation range throughout the year is moderately wide to accommodate the high inflows • Summer operation is required to keep the dam in the normal summer operating range (0.24 m) after a normal rainfall • July and August are the peak recreational boating months, while commercial navigation occurs from April to December • Attempt to maintain summer level in upper range to provide enough depth at navigation locks at Port Carling	• Dam operation is coordinated with Baysville, Port Sydney and Port Carling dams upstream • Dams are operated on same day as Go Home lake dam to coordinate flow changes (except in winter when Go Home is not operated) • OPG must be contacted every time log changes are made • After Oct. 15, OPG has the right to store water in the lake up to the maximum normal summer water level if sufficient water is available • Maintain 85 m^3/s outflow if possible during the winter drawdown to sustain power plants near peak capacity
Burgess	Integral dam and generating station, owned and operated by Algonquin Power Located at the most northerly outlet from Lake Muskoka to Bala Reach	Power generation	• Flood flows are bypassed through MNR's Bala North and South dams • Maximum plant capacity approximately 5 m^3/s, no spill capacity	• No specified flow or water level requirements for fish or wildlife considerations	• No specified minimum flow for water quality since minimum flow is maintained by leakage through the dam	• No specified water level or flows required for recreational purposes	• Burgess facility requires a flow of 4.2-4.9 m^3/s during normal conditions – facility may be shut down if Lake Muskoka levels fall below the normal operating zone
MOON RIVER							
Moon Dam	Located less than 1 km downstream from the Moon and Musquash River Fork Owned and operated by OPG Dam stores and directs water away from the Moon River and into the Musquash River to feed the Big Eddy and Ragged Rapids hydro plants 8 sluice gates equipped with stop logs with a total length of 76.5 m	Power production, Bala Reach level control fisheries	• Moon dam is normally closed to divert water into the Musquash River to the downstream power facilities • When flows reach 85 m^3/s (that capacity of the downstream plants), the Moon Dam is progressively opened to pass water into the Moon River • Partially opening the Moon Dam will lower the water level in the Bala Reach to alleviate flooding which can occur there • Large sudden flow increase will cause flooding concerns to downstream residents (First Nations)	• Minimum flow of 14 m^3/s must be passed through the dam during the walleye spawning period (mid-April – June 1) • Minimum flow reduced to 8 m^3/s during 2001 and 2002 on an experimental basis • High flows during walleye spawning cause walleye to utilize substrates that are dewatered as flows recede • High flows may also scour previously deposited eggs	• No specified minimum flow for water quality since minimum flow is maintained by leakage through the dam	• No specified water level or flows required for recreational purposes	• Moon dam is normally closed to divert water into the Musquash River to the downstream power facilities • When flows reach 85 m^3/s (that capacity of the downstream plants), the Moon Dam is progressively opened to pass water into the Moon River • Moon Dam and Ragged Rapids GS are operated together to control water level in Bala Reach under low flow conditions. A summer range of 219.0 to 219.27 m is targeted. The range of the rest of the year is 219.21 to 219.51 m. Higher levels occur under high flow conditions.
Kapikog Lake Dam	Controls Kapikog Lake water levels Concrete structure with one 0.91 m x 1.22 m control valve, which is only operated when lake water level reaches 2.987 m 1 – 9.14 m long wing wall Normal head of 2.83 m	Recreation	• Lake has little to no inflow so valve must be closed completely following high water periods or low water will be experienced all summer	• No specified flow or water level requirements for fish or wildlife considerations	• No specified flow or water level requirements for water quality considerations	• Water levels maintained for recreational purposes (i.e., cottages, lake navigation)	

Table C1
Existing Flow and Water Level Operating Constraints for Muskoka River Dams

Area of Watershed	Control Structure	Purpose	Flooding	Fisheries and Wildlife	Water Quality	Recreation	Municipal/Industrial/Other
Healey Lake Dam	Controls Healey Lake which drains through a short channel into the Moon River Concrete overflow weir (not operated) Approximately 17 m long	Recreation	• Flooding problems not normally experienced on lake as all cottages built at suitable shoreline elevations following dam construction	• No specified flow or water level requirements for fish or wildlife considerations	• No specified flow or water level requirements for water quality considerations	• Water levels maintained for recreational purposes (i.e., cottages, lake navigation)	
MUSQUASH RIVER							
Ragged Rapids	Generating Station owned by OPG Dam and powerhouse integrated into one unit Located approximately 1 km downstream from the fork of the Moon and Musquash Rivers 1 Sluice way opening 6 m wide with the sill 4.6 m below the normal water level 2 bulkhead wingwalls with top width of 0.9 m Operating range of 0.92 m	Power generation, Bala Reach level control	• Flow in excess of 113 m^3/s must be diverted down the Moon River to avoid flood related damage in Go Home Lake • Normal operating target is approximately 85 m^3/s • Start of FDZ in Bala Reach is 220.75 m. • Nominal head pond elevation 219.0 m with normal and absolute operating ranges of 0.92 (to 219.46 m) and 2.77 m (to 219.79 m) respectively	• During walleye spawning period in the spring (April 15 – June 1) a minimum flow of 14 m^3/s must be passed into the Moon River	• No specified flow or water level requirements for water quality considerations	• Water levels maintained for recreational purposes (i.e., cottages, lake navigation)	• The generating station consists of two units with a total capacity of 8.04 MW, each fed by 2 intakes from the dam • Maximum plant discharge 92.4 m^3/s • Moon Dam and Ragged Rapids GS are operated together to control water level in Bala Reach under low flow conditions. A summer range of 219.0 to 219.27 m is targeted. The range of the rest of the year is 219.21 to 219.51 m. Higher levels occur under high flow conditions.
Big Eddy	Dam and generating station owned by OPG Dam and separate powerhouse located approximately 7.2 km downstream from the Ragged Rapids GS 4 sluice gates, each 4.27 m wide, integrated into the 29 m long dam Sluice gates normally remain closed to create head of 4.9 m above the sluice sills Operating range of 0.95 m	Power generation	• Flow in excess of 113 m^3/s must be diverted down the Moon River to avoid flood related damage in Go Home Lake • Normal operating target is approximately 85 m^3/s • Nominal head pond elevation 206.83 m with normal and absolute operating ranges of 0.95 (to 207.3 m) and 1.47 m (to 207.82 m) respectively	• During walleye spawning period in the spring (April 15 – June 1) a minimum flow of 14 m^3/s must be passed into the Moon River	• No specified flow or water level requirements for water quality considerations	• Maintains water level on head pond upstream of facility	• Excavated power canal leading to the two units in the GS is approximately 230 m long • Total capacity of 8.08 MW • Facility located within Wahta First Nation Territory • Maximum plant discharge 95.2 m^3/s
Go Home Lake Control Dam	Controls Go Home Lake, located at the outflow of the lake into the Musquash River Last dam on the Muskoka River system before the outlet at Georgian Bay Concrete dam – 5.5 m high 4 to 4.27 m wide sluices with 8 stop logs each No spillwall due to narrow lake outlet Fall drawdown is 0.75 m (Nov. 15 to Feb. 15)	Recreation, flood control	• Flood storage capacity in lake is small and operation is required to pass summer floods without resulting flood damage • Flood complaints on Go Home lake start at 185.45 m while flood damage begins at 186 m • When sufficient flows exist, dam stop logs set before lake freeze up to accommodate spring freshet flows	• No specified flow or water level requirements for fish or wildlife considerations	• Minimum outflow maintained by leakage through the dam	• Maintains a summer operating range of 0.3 m for recreational purposes • Inflows from Ragged Rapids during the winter are restricted to less than 84 m^3/s to reduce slush on Go Home Lake to allow easier snowmobile travel	• Ontario Power Generation normally passes water released from Bala Dams through Go Home Lake Dam, as Moon Dam is only operated during high flows • Upstream storage for hydro production during the summer results in minor water level fluctuations
Go Home Lake Filter Dam	Located on the west side of Go Home Lake at the Go Home Chute Filter dam located at the head of the chute to maintain lake levels – No operation required Designed to leak to provide constant flow to downstream channel	Recreation	• Flood flows do not overtop filter dam	• Seepage flow through the dam may benefit spawning salmonids downstream	• Seepage flow through the dam is approximately 1.4 m^3/s during summer months	• Maintains lake levels for recreational purposes	

Note: FDZ - Flood Damage Zone
RWL - Regulated Water Level
LCD - Local Construction Datum
GSC - Geodetic Survey of Canada Datum

Hackner-Holden Agreement
(1940)

L. King

Hackner-Holden Agreement

Muskoka River
(1940)

And

Addendum No. 1
(1969)

Hydro-Electric Power Commission of Ontario
Ontario Department of Public Works

Hackner-Holden
(1940)

- 3.1
HACKNER-HOLDEN
AGREEMENT-1926.

MUSKOKA RIVER

NOTES OF CONFERENCES AND AGREEMENTS RE LAKE LEVELS AND RIVER FLOW

The Muskoka River, draining an area of some 1,800 square miles at Bala, including therein a large number of lakes, embraces one of the most highly developed tourist areas in the Dominion, and at certain of the various waterfalls provides a considerable portion of the power supply of the Georgian Bay System of the Commission. Many of the lakes in this area are controlled by dams owned and operated by the Department of Public Works of Ontario in the interest of maintaining satisfactory water levels and for the conservation of water. The Commission built and owns a dam at the outlet of ~~Hollow Lake~~ Kowagama Lake., which provides one of the largest blocks of storage available, and has contributed towards the cost of other dams built by the Department. In addition to the benefits to navigation and power, these various dams are also of considerable help in controlling spring freshets. To the end that the maximum benefits might be secured by all interests, including lumbering, when active, the Department of Public Works in 1926 undertook the control of all storage works on the watershed

and placed them under the direction of a resident representative.

Previous to the development of Ragged Rapids on the Musquash River, the interests of the Hydro-Electric Power Commission were, for the most part, on the South Branch of the Muskoka River and above Lake Muskoka level. With this latest development, however, the conservation of water in Lake Muskoka and on the total watershed has become of primary importance to the Commission. With the introduction of this further factor, and as a result of the low flows experienced during the 1939-40 season, it was suggested that the Department of Public Works and the Commission review the whole situation of the Muskoka River watershed with a view to determining what improvement could be made in river flow in conformity with the maintenance of satisfactory lake levels.

Following this suggestion several conferences were held between the undersigned. At the first of these conferences it was decided that the following matters should be investigated:

(a) The run-off and storage capacity presently available.

(b) The advisability and feasibility of further storage.

(c) The limiting elevations on various lakes in conformity with navigation requirements.

(d) The procedure to be followed to give effect to the method of operation agreed upon.

The preparation of all data necessary for carrying out the above investigation was allocated between the Department and the Commission. This information, when assembled, formed the basis of studies of the various features investigated. The capacities of the reservoirs and their limitations were considered, in conjunction with the requirements of navigation and power and the variation in stream flow, in order to determine the proper co-ordination of these various factors for the more effective utilization of the available resources and the provision of satisfactory water levels.

The conclusions reached and suggested means of procedure agreed upon as a result of these studies and discussions follow, along with recommendations to give effect to them.

The lakes now controlled are in two categories:

(1) Those in which there are no restrictions as to variations in levels; and

(2) Those subject to limitations to meet the requirements of navigation and other interests.

These several lakes, together with their physical characteristics and limitations, where required, are listed in the attached Statement A; while for greater clarity the ruling limitations of those subject to limitations are shown graphically on the attached drawings Nos. 140-a-148 to 140-a-151.

It is understood that the drawing down of Fairy,

Vernon and Peninsula Lakes below elevation 931 is subject to an arrangement with the owner of the mill operating on the Muskoka River at Huntsville Locks, Fairy Lake.

In addition to the storage available as shown in the statement referred to, investigation indicated that further storage might be advisable on Porcupine Lake on the headwaters of the Oxtongue River, and on the small lakes above Hollow Lake on the Hollow River. It was agreed, however, that in view of the amount of storage presently available by virtue of the range in lake levels agreed upon, the creation of such additional storage should be deferred for the present pending further observation and study.

In order that the information necessary to permit of the regulation being carried out in an efficient manner may be available, it is considered advisable to install gauges on all lakes under control, and that all records as to flows, elevations, etc., be interchanged between the Department and the Commission fortnightly. The method of operation to give effect to the beneficial use of the water available and to meet the requirements of navigation and other interests has been the subject of considerable study, and the following procedure has been agreed upon:

The first requirement from storage in early summer would be met by a minor withdrawal from the navigation lakes to bring these within their maximum elevation limits and to provide space for run-off from summer rains. Further demands would be met by withdrawals from lakes not subject to navigation levels, concurrently with a gradual lowering of the navigation lakes to their minimum navigation limit. After the close of navigation the remaining storage in all lakes would be drawn upon to gradually deplete them by the time of the spring freshet, following the general rules that the residual water in outlying lakes be moved downstream as early as possible.

Should such procedure result in an operating cost to the Department greater than previously, it was considered fair that the Commission reimburse the Department for such additional cost.

In order that the Department may be advised of the river flow desired by the Commission, it was agreed that from June 1st (commencement of navigation season) to March 15th (the approximate date of storage depletion) the Commission will from time to time notify the Department of its requirements, and that, subject always to the limitations as to lake levels, the Department would be guided by this advice.

Recommendations

The various proposals and conclusions discussed herein are summarized below and submitted as the recommendations of the undersigned:

1. That the control of the flows and lake levels remain in the Department of Public Works of Ontario, and that close co-operation will be maintained between the Department and the Commission.

2. That the various lakes be regulated to give the maximum use of the water available within the limits set out in Statement A and as shown on drawings Nos. 140-a-148 to 140-a-151, attached hereto.

3. That the Commission will advise the Department from time to time of its water requirements and, subject to the limitations as to lake levels set out in Statement A, the Department will be guided by this advice.

4. That the general procedure in the operation of the various reservoirs be as follows: The first requirement from storage in early summer would be met by a minor withdrawal from the navigation lakes to bring these within their maximum elevation limits and to provide space for run-off from summer rains. Further demands would be met by withdrawals from lakes not subject to navigation levels, concurrently with a gradual lowering of the navigation lakes to their minimum navigation limit. After the close of navigation, the remaining storage in all lakes would be drawn upon to gradually deplete them by the time of the spring freshet, following the general rules that the residual water in outlying lakes be moved downstream as early as possible.

5. That the records of flow and levels be interchanged between the Department and the Commission fortnightly.

6. That gauges be provided on all storage lakes; the Hydro-Electric Power Commission to undertake to have gauges and bench marks established where not now provided; the Department to arrange for the securing of gauge records by the forest or park ranger service where possible; and the Commission to arrange for the securing of other gauge records.

7. That the Commission reimburse the Department for any increase in operating costs shown to be due to the procedure outlined in 4.

8. That the Commission make the necessary arrangements with the mill owner operating at the Huntsville dam to permit of the lowering of Vernon, Fairy and Peninsula Lakes below elevation 931.

9. That no further storage will be developed until the full effect of the storage as set out in Statement A is determined.

For reference purposes, a copy of the drainage area plan of the Muskoka River (drawing No. 140-d-102) is attached hereto.

DEPARTMENT OF PUBLIC WORKS OF ONTARIO

J. W. Hackner

THE HYDRO-ELECTRIC POWER COMMISSION
OF ONTARIO

[signature]

Toronto, April 12, 1940

April 10, 1940

STATEMENT A

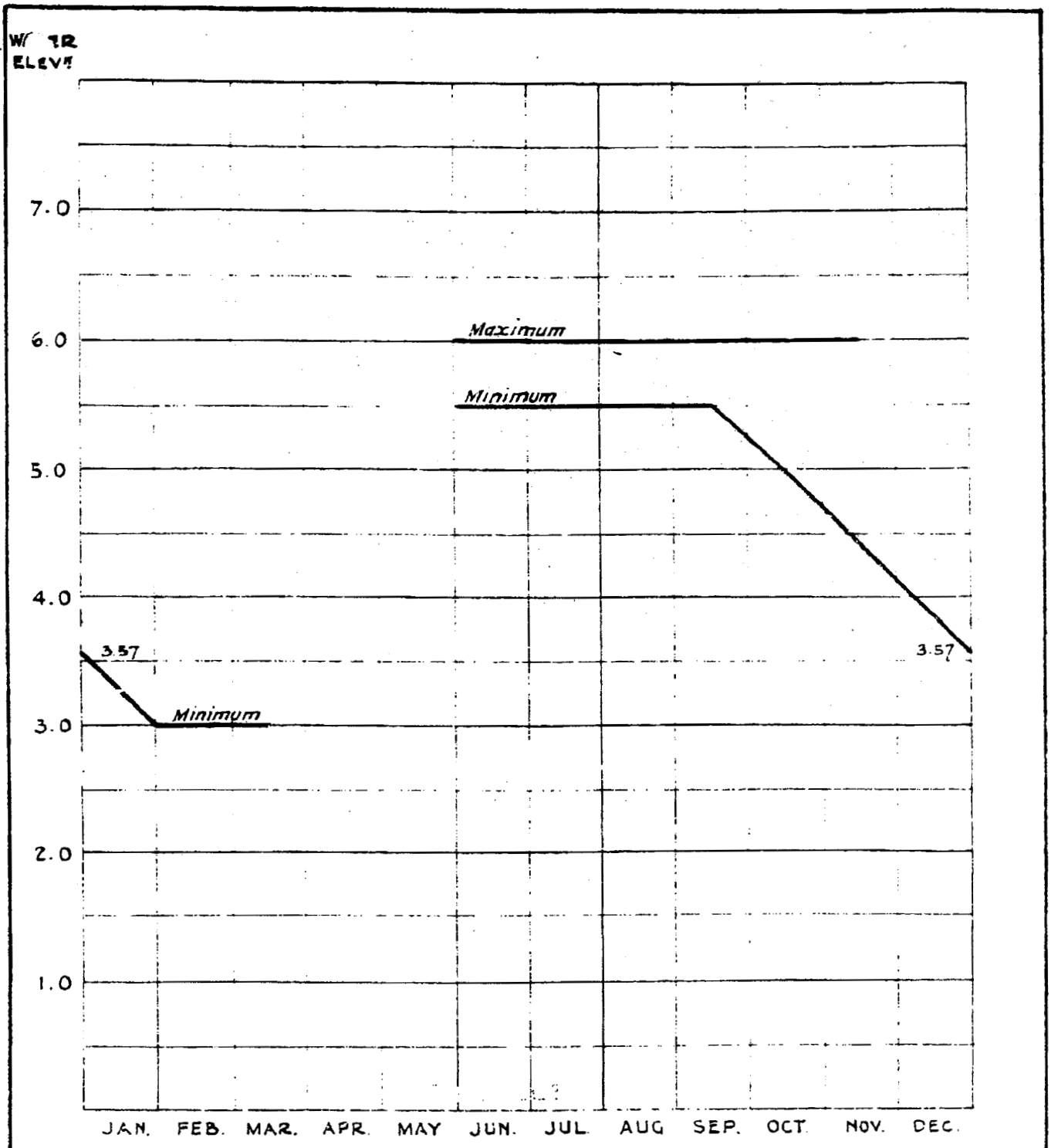
MUSKOKA RIVER WATERS

Particulars of Lakes and Storage

Lake	Area in Acres	Total Range in Feet	Storage in Acre-Feet: Navigation Lakes: Navigation Season	Navigation Lakes: Post-Navigation Season	Lakes without Limitations
			NORTH BRANCH		
(Moose) McCraney	800	~~14.0~~ 12.0	-	-	11,200
Camp	600	7.0	-	-	4,200
Tasso	300	~~7.0~~ 6.0	-	-	2,100
Vernon, Fairy) & Peninsula)	7,615	2.0	El.932.00 to 931.0 = 7,615	El.931.0 to 930.0 = 7,615	-
Mary	~~2,000~~ 2,534	2.75	El.922.75 to 921.5 = ~~2,500~~ 3160	El.921.5 to 920.0 = ~~3,000~~ 3790	-
			~~10,115~~ 10775	10,615	17,500
			SOUTH BRANCH		
Burnt Island	2,180	~~9.0~~ 6.0	-	-	19,620
Joe	466	4.0	-	1,860	-
Ragged	1,020	~~9.4~~ 10.3	-	-	9,590
Smoke, Canoe) and Tea)	2,625	4.0	20' to 18' = 5,250	18' to 16' = 5,250	-
Hollow	~~7,815~~ 7616	~~8.8~~ 8.3	-	-	68,770
Lake of Bays	~~15,260~~ 16,911	3.0	6.0' to 5.5' = 7,630	5.5' to 3.0' = 38,150	-
			12,880	45,260	97,980
			MUSKOKA LAKES		
Rosseau and) Joseph)	30,000	2.0	El.742.5 to 742.0 = 15,000	El.742.0 to 740.5 = 45,000	-
Muskoka	29,000	2.5	El.740.5 to 739.7 = 23,200	El.739.7 to 738.0 = 49,300	-
			38,200	94,300	-
		TOTALS	61,195	150,175	115,480

GRAND TOTAL = 326,850 acre-feet

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DEPARTMENT OF PUBLIC WORKS
OF ONTARIO

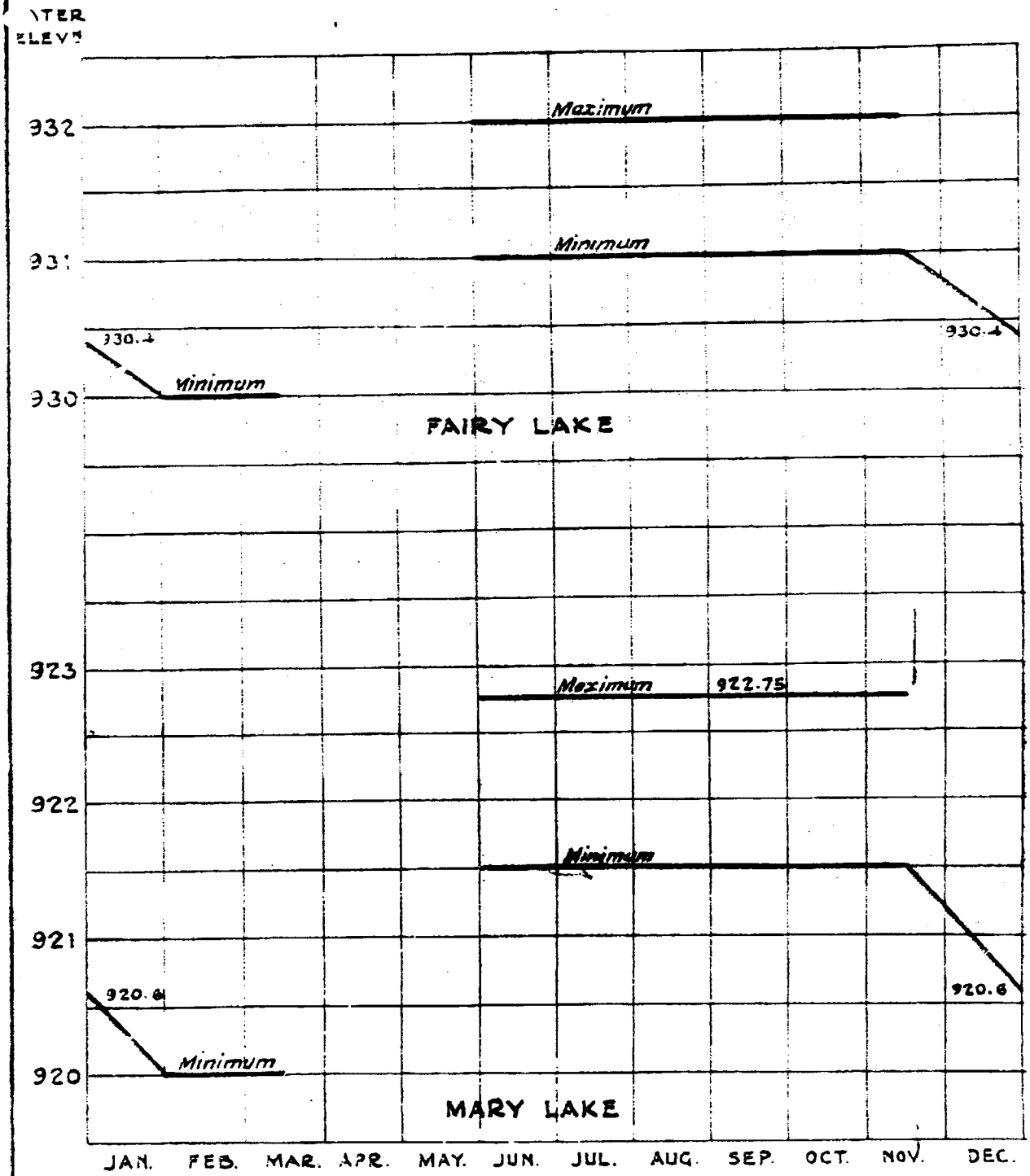
MUSKOKA RIVER STORAGE RANGE LAKE OF BAYS

MARCH · 1940

Approved ..... H. E. P. C. of Ontario

Approved J. M. Jackson ..... Dept of Public Works

140 · a · 148



DEPARTMENT OF PUBLIC WORKS
OF ONTARIO

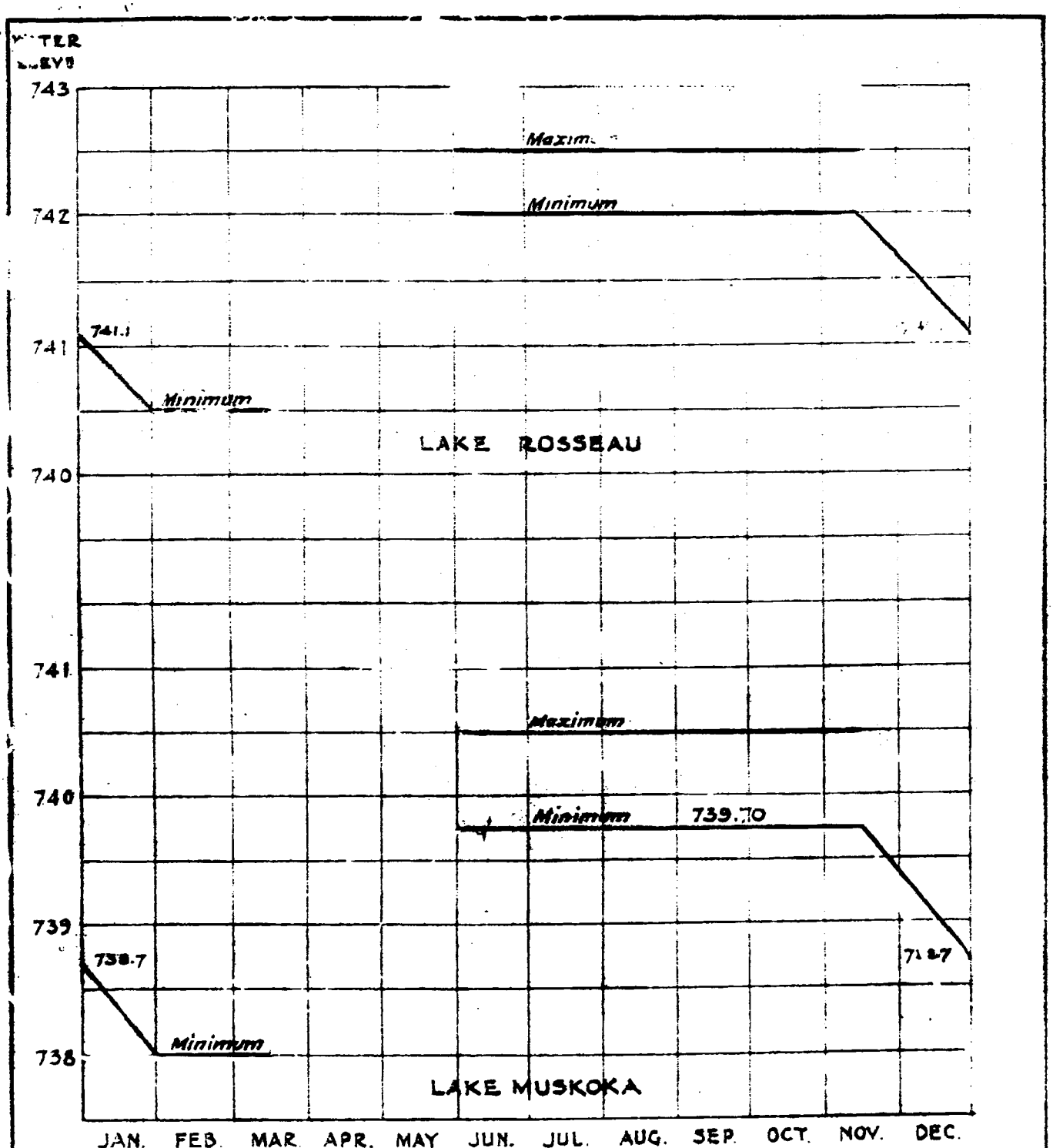
Approved ..... H.E.P.C. of Ontario

Approved ..... Dept. of Public Works

MUSKOKA RIVER STORAGE RANGE FAIRY & MARY LAKES

MARCH - 1940

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DEPARTMENT OF PUBLIC WORKS
OF ONTARIO

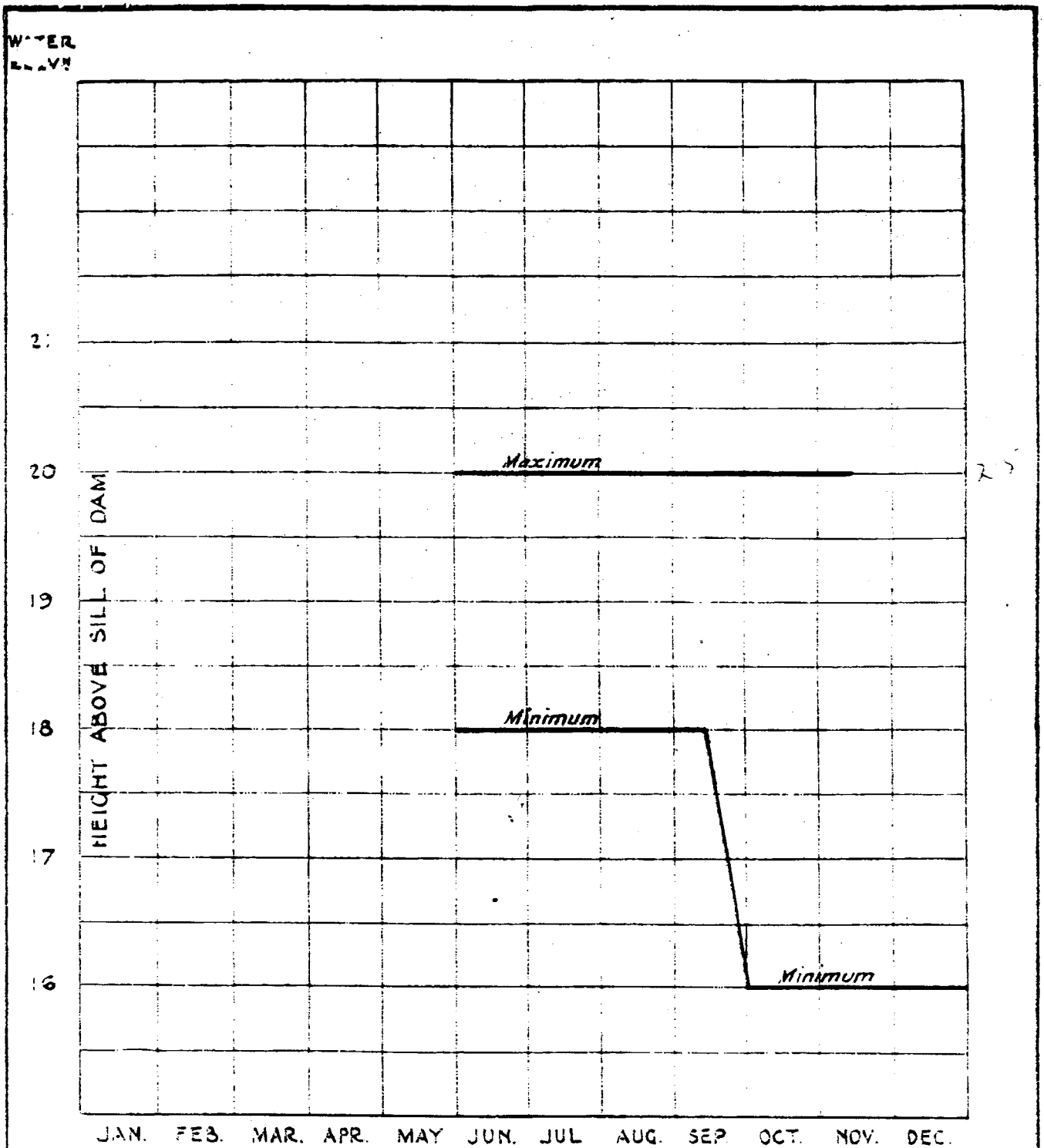
MUSKOKA RIVER
STORAGE RANGE
LAKES ROSSEAU & MUSKOKA

MARCH - 1940

Approved. ..... A.E.P.C. of Ontario

Approved. ..... Dept. of Public Works

140 - a - 150



DEPARTMENT OF PUBLIC WORKS
OF ONTARIO

MUSKOKA RIVER
STORAGE RANGE
CANOE, TEA, & SMOKE LAKES

MARCH 1940

Approved ..... M. S. P. C. of Ontario

Approved J. M. Stackhouse
Dept. of Public Works

140-d-151

Addendum No. 1
(1969)

The Hackner Holden Agreement.

March 6, 1969

HACKNER-HOLDEN

ADDENDUM NO. 1

TO

NOTES OF CONFERENCES AND AGREEMENTS RE

LAKE LEVELS AND RIVER FLOW

Such notes being the text of the "Hackner-Holden" Agreement of 1940, regarding the Muskoka River

In the twenty-nine years since the signing on April 12th, 1940, of the "Hackner-Holden" Agreement governing the use of water in the Muskoka River Drainage Area, the requirements of some of the different interests using this water have changed. While the use for hydro-electric power generation has remained constant, use by the tourist industry has expanded rapidly. In addition, experience has shown that drawdown periods other than those originally set out in the Agreement, allow more economic use of the water available. Changed, too, is the ownership of Kawagama (Hollow) Lake dam - from Ontario Hydro to the* Ontario Department of Public Works. In view of the above, the following operating procedure is agreed upon:

(A) The drawdown period on Lake of Bays, Mary Lake, Vernon, Fairy & Peninsula Lakes, Lakes Rosseau & Joseph and Lake Muskoka, shall begin December 1st, and proceed steadily downward to the allowable "Hackner-Holden" minimum levels by March 15th. This procedure will be followed, except as limited by minimum levels dictated by (D) and (E) below.

* Hollow Lake Dam Owned and Controlled by Ont. Dept. of Lands & Forests

(B) In accordance with request of Department of Lands and Forests concerning aircraft operations from Smoke Lake, and to facilitate travel by local residents, Canoe, Tea & Smoke Lakes shall not be lowered below the "Hackner-Holden" summer minimum level until after February 14th. The drawdown shall begin February 15th and proceed steadily downward to the allowable "Hackner-Holden" minimum level by March 15th.

(C) The regulation of Kawagama (Hollow) Lake shall continue normally to be according to the curve, known as "Rule Curve 1968" portrayed in drawing No. 140-A-389, Sheet 5 of 5, this curve representing a regulation pattern accepted by the following four parties as a fair compromise between their differing interests - The Hydro-Electric Power Commission of Ontario, the Orillia Water, Light and Power Commission, the Ontario Department of Lands and Forests (Fish and Wildlife Branch) and the Kawagama Lake Cottagers' Association. In years of high run-off Kawagama (Hollow) Lake may be allowed to rise above the normal maximum elevation of 1167.2' by 1.0' to an extreme maximum elevation of 1168.2'. (356.067m)

(D) In accordance with request of the Fish and Wildlife Branch, Department of Lands and Forests, in interests of trout propogation, the water level of Lake of Bays, Vernon, Fairy & Peninsula Lakes, Lakes Rosseau & Joseph and Lake Muskoka shall not be lowered more than 1.5' below the level that existed in the lake on October 15th, before March 1st following, nor shall the water level of Kawagama (Hollow) Lake be lowered more than 2' below the October 15th level, before March 1st following.

(E) In accordance with request from local residents, to protect water intake lines from freezing, Lakes Rosseau & Joseph shall not be lowered below elevation 740.7' before March 1st of any year.

The Department may, if excess water is available over and above the requirements of the Commission, hold any or all of the lakes at higher levels than those shown on the attached charts, but not above the chart maximum levels.

The Department shall store in the lakes, up to the level of the summer maximum, any water in excess of hydro generation requirements during the period from October 15th to December 1st of each year.

The Department shall endeavour at all times to give effective consideration, within the chart limits, to the Commission's flow requirements for generation.

Procedures and levels outlined in this addendum and/or shown on Statement A, revised March 6, 1969, and on drawings Nos. 140-A-389, Sheets 1 to 5, shall take precedence over and supersede conflicting procedures and levels outlined in the original Agreement.

On behalf of The Hydro-Electric Power Commission of Ontario

R.H. Hillary
Director of Operations

On behalf of the Ontario Department of Public Works

W. L. Rice
Director Water Control Branch

Signed at Toronto
(Date) Mar 31/69

STATEMENT A - REVISED MARCH 6, 1968

CRC FT. = ONE CFS DAY

MUSKOKA RIVERS WATERS

Particulars of Lakes and Storage

CES	Area in Acres	Total Range in Feet	STORAGE in CFS DAYS — NAVIGATION LAKES — Navigation Season	Post-Navigation Season	Lakes Without Limitations	DATUM
			NORTH MUSKOKA RIVER			
y (Moose)	800	12.0			4,840	Gauge Height
	600	7.0 - Not now available owing to Land Sales to Cottagers			2,118	" "
	300	6.0 - " " " " " " " " "			907	" "
Fairy)						Dept. Lands & Fores
sula	7,615	2.0	932.0 to 931.0 - 3,839	931.0 to 930.0 - 3,839		
	2,534	2.75	922.75 to 921.5 - 1,597	921.5 to 920.0 - 1,916		
			5,436	5,755	7,856	" " "
			SOUTH MUSKOKA RIVER			
Island	2,180	6.0	99.5	93.5	6,590	Assumed
	436	4.0	98.2 to 98.2	98.2 to 94.2- 940		"
	1,020	10.3	99.5	89.2	5,290	"
Tea)						"
	2,625	4.0	92.0 to 90.5 - 1,985	90.5 to 88.0- 3,309		Canadian Geodetic
na (Hollow)	7,866	7.3	1167.2 to 1161.9 21,018	1161.9 to 1159.9 7,932		" "
f Bays	16,911	3.0	1034.5 to 1034.0 4,263	1034.0 to 1031.5 21,315		
			27,266	33,496	11,880	
			MUSKOKA LAKES.			
u)						Dept. of Lands &
ph)	30,000	2.0	742.5 to 742.0 7,562	742.0 to 740.5 22,688		
A	29,000	2.5	740.5 to 739,7 11,697	739.7 to 738.0 24,855		
			19,259	47,543		
		TOTALS	51,961	86,794	19,745	
		GRAND TOTAL	158,500 cfs days			

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For office use

STATEMENT A - REVISED MARCH 6, 1968

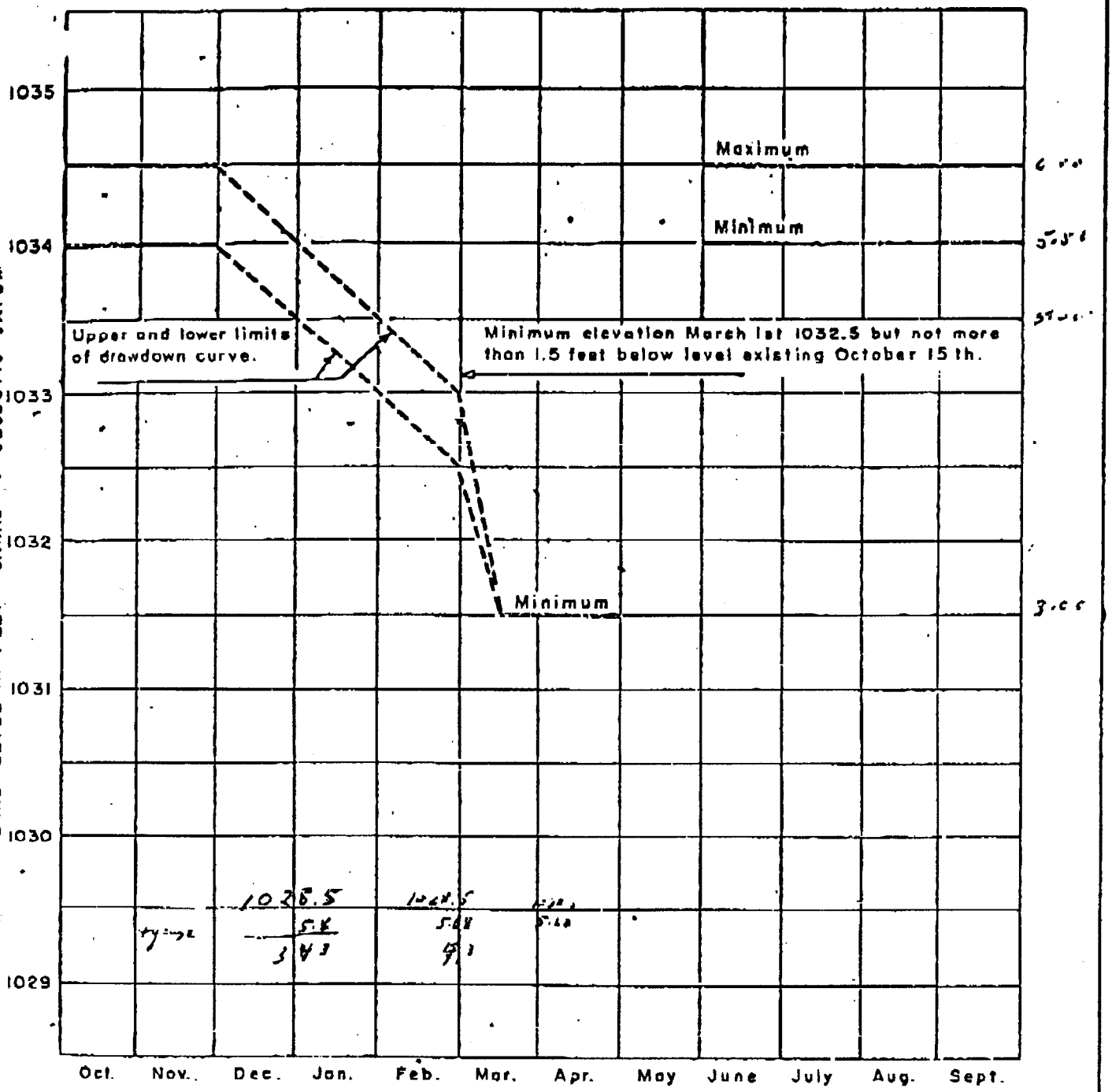
MUSKOKA RIVERS WATERS

WATERSHED				STORAGE IN C. F. S. DAYS			
NAME OF LAKE	AREA IN ACRES	TOTAL RANGE IN FEET	DRAINAGE AREA SQUARE MILES	NAVIGATION SEASON	POST NAVIGATION SEASON	C.F.S. DAYS	D.
NORTH MUSKOKA RIVER							
McCraney	800	12.0	18.0			4,840	Gaug
Camp	600	7.0	6.9			2,118	Gaug
Tasso	300	(6.0) 2'	9.1			907	Gaug
Vernon, Fairy Peninsula	7,615	2.0	448.2	931.20 to 930.20	930.20 to 929.20	3,839 Nav. 3,839 Post Nav.	Cdn.
Mary	2,534	2.75	514.0 66 Local	922.75 to 921.50	921.50 to 920.00	1,597 Nav. 1,916 Post. Nav.	Dept. Publi
SOUTH MUSKOKA RIVER							
Burnt Island	2,180	6.0	23.0	99.5	93.5	6,590	Assu
Joe	466	4.0	46.0	98.2	98.2 to 94.2		Assu
Ragged	1,020	10.3	27.0	99.5	89.2	5,290	Assu
Canoe, Tea, Smoke	2,625	4.0	133.0	92.0 to 90.5	90.5 to 88.0	1,985 Nav. 3,309 Post Nav.	Assu
Kawagama	7,866	7.3	147.0	1167.20 to 1161.90	1161.90 to 1159.90	21,018 Nav. 7,932 Post Nav.	Cdn.
Lake of Bays	16,911	3.0	572.0	1034.50 to 1034.00	1034.00 to 1031.50	4,263 Nav. 21,315 Post Nav.	Cdn.
MUSKOKA LAKES							
Rosseau and Joseph	30,000	2.0	308.0	742.50 to 742.00	742.00 to 740.50	7,562 Nav. 22,688 Post Nav.	Dept Publ
Muskoka	29,000	2.5	1,753.0	740.50 to 739.70	739.70 to 738.00	11,697 Nav. 24,855 Post Nav.	Dept. Publ

1.98 Acre feet = One C.F.S. day

Divide Lake acreage by 1.98 and multiply result by range to be drawn down for cfs-days.

Note: Drainage areas added in 1979



Approved ..... Ontario Hydro

Approved ..... Dept. of Public Works

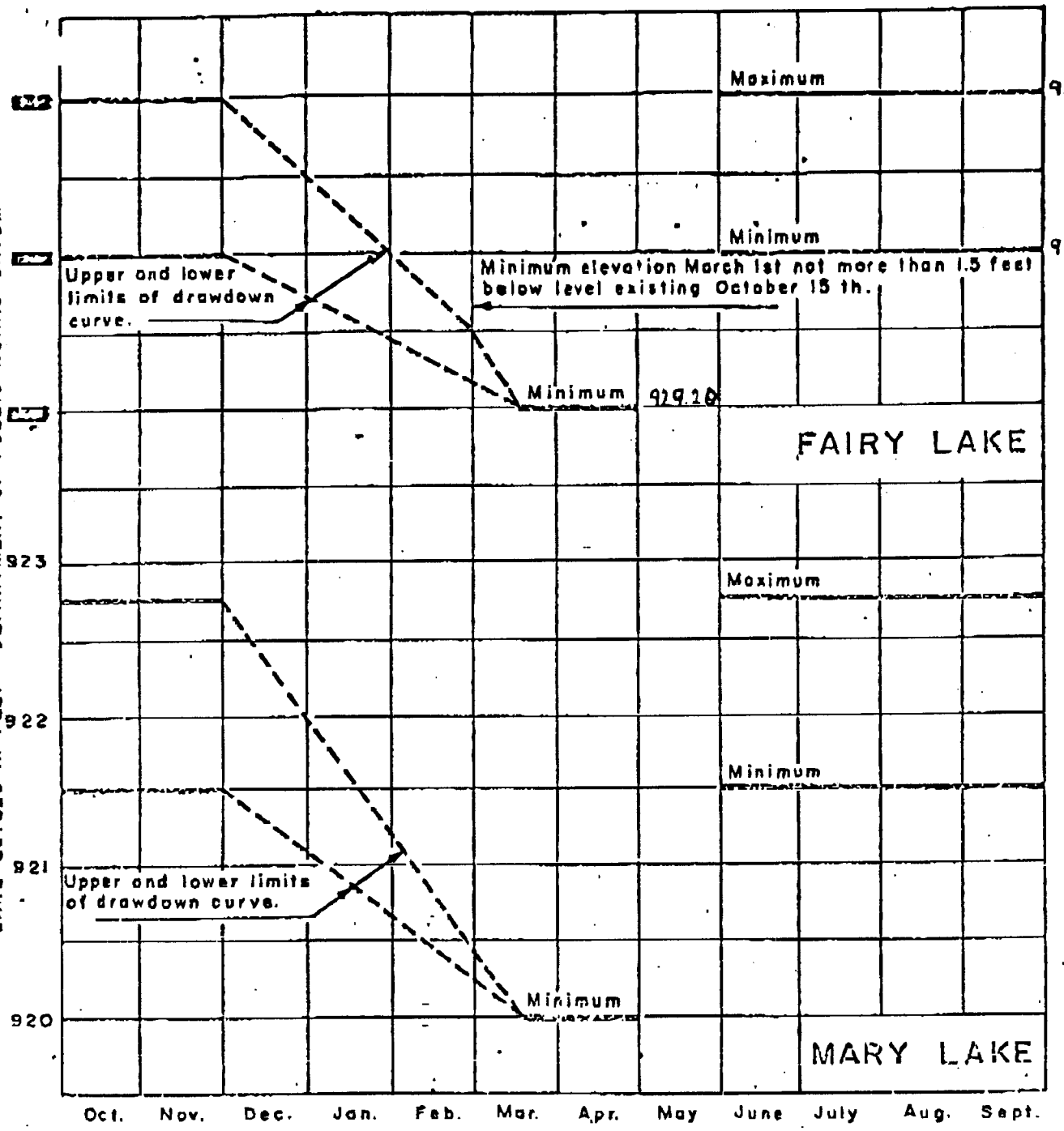
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OF ONTARIO

MUSKOKA RIVER
STORAGE RANGE

LAKE OF BAYS

MARCH, 1969

Dwg. No. 140-A-389
Sheet 1 of 5



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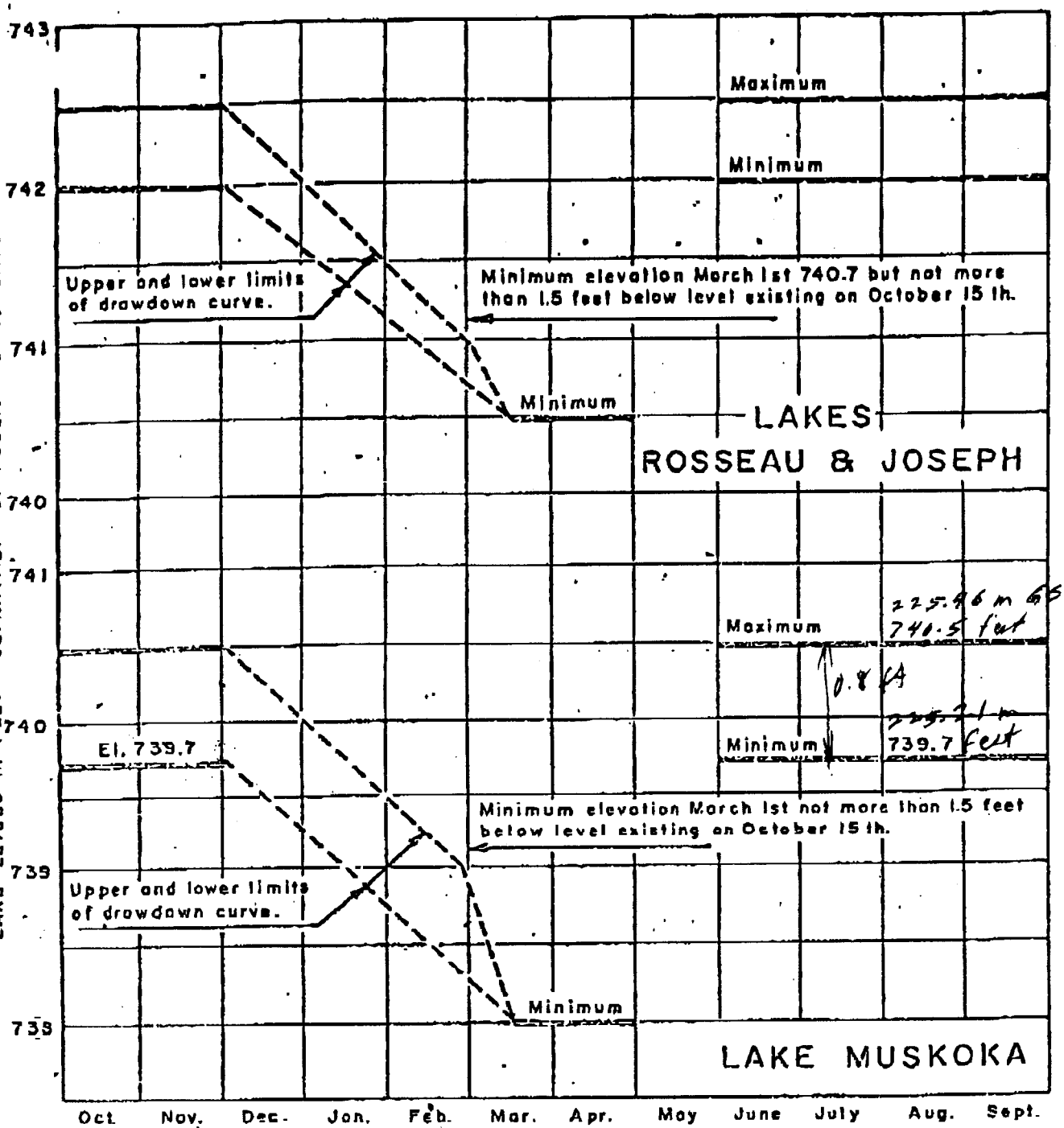
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MUSKOKA RIVER
STORAGE RANGE

FAIRY & MARY LAKES

MARCH, 1969

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Sheet 2 of 5



Approved R.W. Hallery
Ontario Hydro

Approved W. L. Rice
Dept. of Public Works

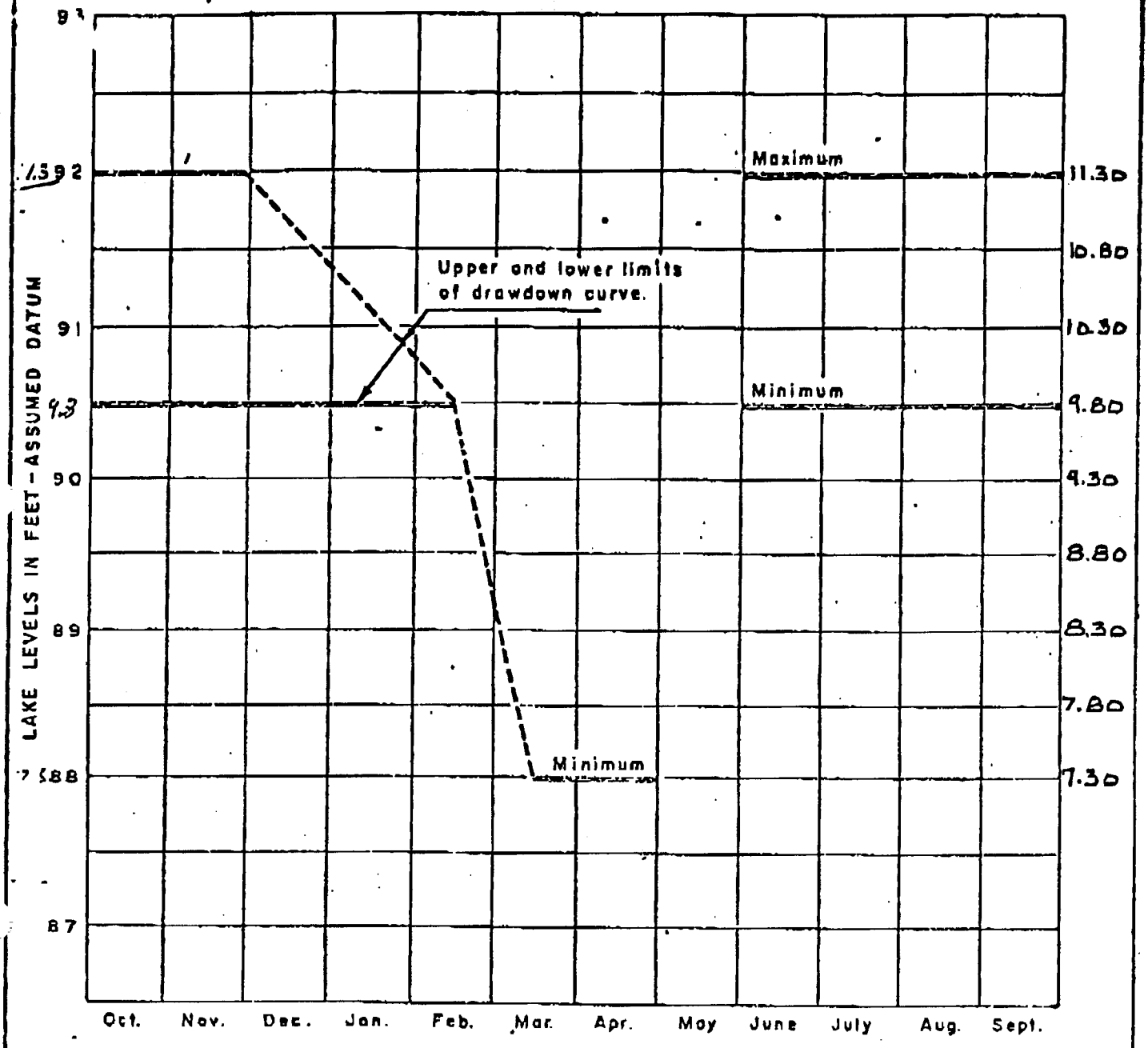
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MUSKOKA RIVER
STORAGE RANGE

LAKES ROSSEAU & JOSEPH AND MUSKOKA

MARCH, 1969

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Sheet 3 of 5



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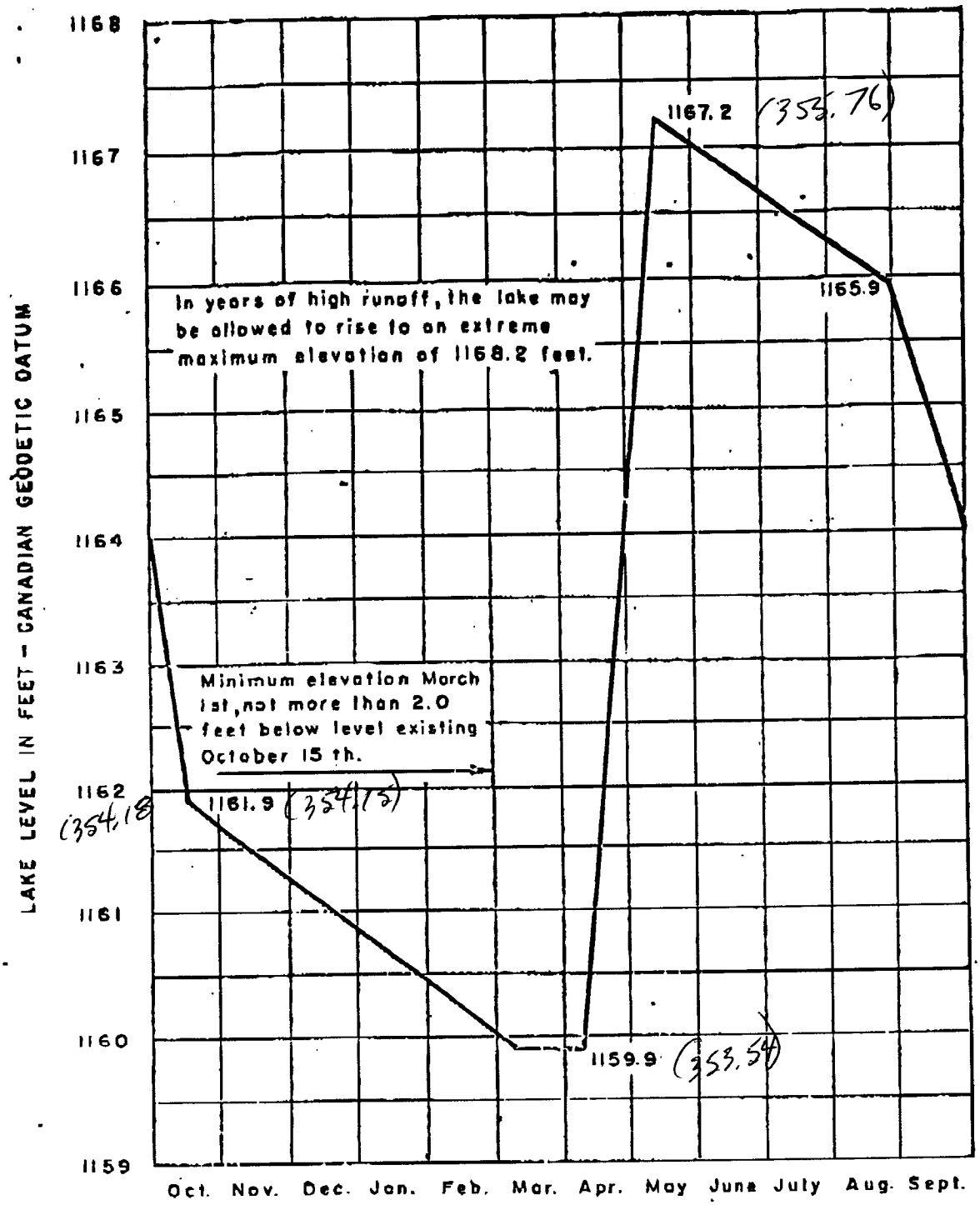
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OF ONTARIO

MUSKOKA RIVER
STORAGE RANGE

CANOE, TEA & SMOKE LAKES

MARCH, 1969

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DEPARTMENT OF PUBLIC WORKS
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KAWAGAMA LAKE
(FORMERLY HOLLOW LAKE)
STORAGE RANGE
(RULE CURVE - 1968)

MARCH 1969

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Sheet 5 of 5.

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Approved ..... Dept. of Public Works