
CHARTER TOWNSHIP OF ROYAL OAK

Drinking Water Revolving Fund FY 2010 Project Plan

FOR SUBMITAL TO:

**The Michigan Department of Environmental Quality
(MDEQ)
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EXECUTIVE SUMMARY

The Charter Township of Royal Oak (The Township) is a suburb of the Detroit Metropolitan Area located within Oakland County. The Township provides water to a population of approximately 2,660 people since 2004 when the northern portion of the Township (2,786 people) was annexed by the City of Oak Park. The current Township has approximately 791 customers and is supplied water through two master meters from the Detroit Water and Sewerage Department (RT01 and RT02). The average flow in 2006 was 365,780 gallons per day. The water supply system includes approximately 11.9 miles of water main ranging in size from 6-inch to 12-inch. The majority of the water supply system was installed between 1920 and 1960.

As the Charter Township of Royal Oak water system ages, it is experiencing an increasing number of water main breaks. From 1998 to 2008, the Township has experienced 57 main breaks with four (4) breaks per year over the last five years. This document has been prepared to implement water system improvements which will permit Royal Oak Township to comply with the 1996 Amendments to the Safe Drinking Water Act (SDWA), and the Michigan Safe Drinking Water (P.A. 399, 1976).

To finance these water system improvements Royal Oak Township is seeking funding through the Drinking Water Revolving Fund (DWRF). The purpose of this Project Plan is to describe Royal Oak Township current demographics, the need for the system improvements, and provide a recommendation to implement the proposed improvements. This document provides an evaluation of alternatives as well as a recommended alternative to improve water quality. The recommended project includes 4,105 feet of water main system improvements which will replace failing water main. These water mains are on Woodside and Glen Lodge streets running from Northend Street down past Pasadena Street. The existing 6 inch cast iron pipe would be replaced with 8 inch ductile iron pipe. The recommended project will cost an estimated \$800,475 to complete.

1.0 BACKGROUND INFORMATION

1.1 Delineation of Royal Oak Township

The Charter Township of Royal Oak (The Township) is a suburb of the Detroit Metropolitan Area located within Oakland County. The Township provides water to a population of approximately 2660 people since 2004 when the northern portion of The Township (2,786 people) was annexed by the City of Oak Park. Census information and other statistics are based upon the 2000 census data and does not reflect the annexation in 2004.

1.1.1 Land Use

Land use and land cover information was collected from the Southeast Michigan Council of Governments (SEMCOG; 2000) for The Township and is summarized in Table 1-1.

CATEGORY	ACRES (YR 2000)	PERCENTAGE OF TOTAL
Residential	241	55
Commercial and Office	86	20
Institutional	34	7
Industrial	54	12
Transportation and Utility	8	2
Recreational, Cultural, and Cemetery	7	2
Grassland and Shrub	10	2
Woodland and Wetland	0	0
Extractive and Barren	0	0
TOTAL	440	100

Table 1-1 Land Use by Category

As shown in Table 1-1, the Charter Township of Royal Oak is primarily a residential community with some commercial, institutional, and industrial facilities. The total acreage for the study is less due to the annexation of a portion of The Township by the City of Oak Park in 2004. The 2004 post-annexation acreage of the Charter Township of Royal Oak is about 360 acres and would have the same percentages as described in the table.

1.1.2 Economic Conditions

The Township's median family income is \$23,710. Employment by industrial class figures for year 2000 were collected from SEMCOG and are summarized in Table 1-2. As shown in Table 1-2, the majority of employers engaged within The Township are devoted to communication, retail, and services. The post-2004 annexation employment figures have not been developed for The Township, but the percentages are likely not to vary.

CATEGORY	TOTAL NUMBER EMPLOYED	PERCENTAGE
Manufacturing	99	11
Transportation, Communication, and Utility	241	26
Wholesale and Retail Trade	405	45
Finance, Insurance, and Real Estate	59	6
Services, Leisure and Hospitality	106	12
TOTAL	910	100

Table 1-2 Employment by Category

1.1.3 Population in Study Area

The Charter Township of Royal Oak is located within the Detroit metropolitan area in Oakland County and occupies approximately 0.56 square miles. The Township's population as of the 2000 census was 5,446. In 2004, a portion of The Township was annexed by the City of Oak Park. This left the population of the remaining Charter Township of Royal Oak at 2,660. Over the next 35 years, The Township's population is projected to decrease out to the year 2035. Population projections for 2020 were based on projections collected from SEMCOG and are provided in Table 1-3.

	2000 Census	2009 Population	2020 Population	2035 Population
Study Area	5,446	2,660	2,410	2,166

Source of population projections: SEMCOG

Table 1-3 Population Projections for The Township

1.2 Description of Water Supply System

The Charter Township of Royal Oak is a wholesale customer of the Detroit Water and Sewerage Department (DWSD) and is supplied from DWSD's water transmission system through two (2) master meters. The source of the water supplied to The Township by DWSD is drawn from the Detroit River and treated at two of DWSD's five water treatment plants.

The Charter Township of Royal Oak average day usage (2006 records) is 365,780 gallons per day with a maximum daily usage ranging from 506,000 to 585,000 gallons per day. The Township supplies approximately 790 retail customer accounts after the 2004 annexation.

Figure 1-1 on the following page shows The Township's water supply system including all existing water mains and sources of supply (master meters).

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Figure 1-1 Charter Township of Royal Oak Water Supply System

The Township's water supply system is comprised of approximately 11.9 miles of water main. Water mains within the system are primarily six (6) inch diameter cast iron with some eight inch (8), 10 inch and 12 inch mains. Table 1-4 summarizes The Township's water mains by size.

DIAMETER (IN)	TOTAL LENGTH (MI)	PERCENTAGE OF TOTAL
6	3.06	26
8	8.61	72
10	0.01	1<
12	0.24	2<
TOTAL	11.92	100

Table 1-4 Township Water Mains Summarized According to Size

Although the exact age of each water main in the Charter Township of Royal Oak is not known, it is known that the majority of The Township's water system is older than 50 years based on field information provided by Oakland County. The pipe material most commonly used during this period was cast iron. The cast iron pipe installed was unlined and therefore subject to a build up of corrosion known as tuberculation. Tuberculation increases the roughness of the pipe wall as well as decreases the effective size of the pipe which reduces the carrying capacity of the pipe. As a result of the decreased carrying capacity, system pressures must be kept higher than needed to provide sufficient pressure during high demand periods and needed fire flows.

The tuberculation within cast iron water mains also causes water quality issues. When the corrosion is released into the flow stream as a result of increased flow or reversal of flow direction, customers may receive discolored water which can adversely affect customer property or businesses due to water stains and degradation of equipment. Tubercles can also foster bacterial growth which may cause a potential health problem when ingested by customers. The tubercles also increase the rate of chlorine decay which decreases the time chlorine is effective as a disinfectant.

Cast iron pipe is it is subject a higher degree of breaks than other pipe due to the nature of the aging metal. From 1998 to 2008, The Township experienced 57 main breaks during this ten (10) year period. The Township has been averaging four (4) breaks per year over the last five years. Nearly all of the main breaks occurred on cast iron water mains. Table 1-5 summarizes The Township's main breaks since 1998.

YEAR	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	TOTAL
TOTAL	5	6	8	9	6	4	5	3	4	6	1	57

Table 1-5 Summary of Water Main Breaks - (1998 through 2008)

1.3 Charter Township of Royal Oak Water System Twenty Year Needs

The Charter Township of Royal Oak is nearly 100% developed and receives 100% of it's water from the Detroit Water and Sewerage System. Therefore, it is not expected there will be future

expansion of its water system or any modification to its source of supply. The Township's 20 year needs include replacement of aging water mains and the potential addition of a booster pump station.

A booster pump station may be needed to increase system pressures and provide consistent pressure throughout The Township. The Township's supply pressure averages between 35 psi and 50 psi based on 2007 DWSD wholesale customer meter data. Further investigation and analyses is required however, to identify the location, capacity, and discharge pressure of the pump station.

As a result of the increased system pressures from the new booster pump station, water main breaks throughout the system will most likely increase. Therefore, The Township has currently identified approximately 16,141 feet of 6-inch water main needed to be replaced. This is equal to approximately 26% percent of its total system.

2.0 NEED FOR PROJECT

This section of the project plan describes the need for system improvements which will permit the Charter Township of Royal Oak to comply with the 1996 Amendments to the Safe Drinking Water Act (SDWA), and the Michigan Safe Drinking Water (P.A. 399, 1976). This section defines the project area and the reasons the project is needed. The need of the project was determined based upon hydraulic modeling analysis and a maintenance review of the water mains within the project area.

2.1 Project Area Description

The project area consists of two streets located in The Township. The project area as described using the Congressional Land Survey System is described in Table 2-1.

TOWN	RANGE	SECTION
01 N	11 E	33

Table 2-1 Town, Range, and Section for Project Area 1

The streets affected by the planned construction are listed in Table 2-2.

Street	Between Streets		Length (ft)	Diameter (in)	Existing Material
Woodside	Northend	470' south of Pasadena	2,085	6	Cast Iron
Glen Lodge	Northend	380' south of Pasadena	2,020	8	Cast Iron

Table 2-2 Construction Area Water Main Replacement Summary by Street

As shown in Table 2-2, the water main in the project area is made of cast iron. This pipe material is known for having a history of breaking, especially as it ages. In addition, the cast iron pipe is most likely highly tuberculated.

2.2 Water Main Maintenance History in Project Area

A review of water main maintenance within the project area was performed. Since 1998, 32 water main breaks have occurred in the project area out of a total 57 main breaks throughout The Township. Main breaks within the project area account for more than 50% of all main breaks. In the last five (5) years, four (4) water main breaks per year have occurred. Table 2-3 summarizes the main break history within the project area as well as the total footage of pipe and Figure 2-1 shows the location of all known water main breaks system wide since 1998. Note that the main break history is only available beginning in 1998. Therefore, actual breaks within the project area may be higher.

Approximate Length of Water Main (ft)	Total No. of Breaks
4,105	32

Table 2-3 Summary of Water Main Breaks in Project Area

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Figure 2-1 Royal Oak Township Main Break Locations

3.0 ANALYSIS OF ALTERNATIVES

3.1 *Description of Alternatives*

Two alternatives were considered with the water main identified in the project areas, the “No Action” alternative (Alternative #1) and replacement and looping of dead end water mains (Alternative #2). While rehabilitation of the existing water main is a known practice it was not considered because while it does improve the carrying capacity of water main which is highly tuberculated, it is not known to what extent the structural life of the pipe is extended.

3.1.1 **Alternative 1 – No Action**

If no action is taken water main breaks will continue to occur resulting in temporarily depressurizing the system in the vicinity of the water main break in order to repair the break. When a water main is depressurized, the risk of ground water contaminants infiltrating the water supply exists. These contaminants are a risk to the health of the Charter Township of Royal Oak customers.

The project area includes water mains which were not looped when originally installed. These dead end mains will continue to potentially have high water age and low chlorine residuals. Based on the population projections for The Township from SEMCOG, the population is projected to decrease by nearly 20% by 2030. This reduction in population will reduce the system demand for water which will be a contributing factor increasing the water age within the project areas.

3.1.2 **Alternative 2 – Replace Water Main**

The second option considered is replacing the existing water main with new pipes. Replacing the old water main will minimize the chance of a water main break occurring and improve hydraulic capacity to the project area. This solution will have a long lasting positive impact because the new water main will be cement mortar lined ductile iron pipe which will not corrode and is known for its resistance to breaking.

3.2 *Cost Comparison of Alternatives*

A cost comparison of the two alternatives was performed using MDEQ guidelines for DWRP Project Plans.

For Alternative 1, only operation and maintenance costs (O&M) were used. The Township estimated an individual main break **costs approximately \$6,500** to repair. Within the project area, an average of four (4) water main breaks has occurred per year since 2004. Therefore, it is estimated that over 20 years Royal Oak Township would spend approximately \$520,000 on main repairs within the project area (assuming no escalation in costs).

For Alternative 2 it was necessary to estimate the cost of construction including all engineering costs, the interest during construction, and the salvage value at 20 years. The capital cost for

the design and installation of water main was based on a per foot cost of \$150 for construction (\$150/ft x 4,105 ft = \$615,750) with additional engineering / inspection/ legal/ permit/ contingency costs equal to \$184,725. The sum of the construction and engineering costs is the total project cost which is \$800,475. The interest during construction was calculated using an equation provided by the MDEQ.

$$I = i \times 0.5 \times P \times C$$

Where:

I = the interest value

i = the EPA discount rate of 4.875%

P = the period of construction in years

C = the total capital cost

Using this equation, the total interest incurred during construction is \$39,023.

The guidelines established by the MDEQ state the useful life for pipelines is 50 years. The salvage value of the water main at 50 years is assumed to be zero because in many cases water main is abandoned in place because the cost of removing and restoring the area is far greater than the value of the salvaged pipe material. To determine the salvage value of the water main in 20 years straight line depreciation was used based on the capital cost of the water main design and installation capital cost. Using this rationale, the present worth estimated salvage value of the water main after 20 years is \$160,095. The total present worth was calculated using the following equations provided by the MDEQ.

Present Worth for One-Time Expenditures (Capital Costs)

$$PW = \frac{F}{(1+i)^n}$$

Where: PW = Present Worth

F = the future value (estimated project cost)

n = the number of years

i = the EPA discount rate of 4.875%

Recurring Equal Expenditures (O&M Costs)

$$PW = A \times \left[\frac{(1+i)^n - 1}{i} \right]$$

Where: PW = Present Worth

A = the annual expenditure

n = the number of years

i = the EPA discount rate of 4.875%

The final equation used to calculate the total present worth was:

$$PW = PWC + PWO + I - S$$

Where: PW = Present Worth

PWC = Present Worth Capital Costs

PWO = Present Worth O&M Costs

I = Interest During Construction

S = Present Worth Salvage Value

Table 3-1 summarizes the results of the cost analysis performed on each alternative.

Item	Alternative 1	Alternative 2
Capital Cost	\$0	\$800,475
Interest During Construction	\$0	\$39,023
Present Worth Salvage Value (at 20 years)	\$0	\$160,095
O&M Cost (Annual)	\$26,000	\$0
O&M Cost (20 years)	\$520,000	\$0
Present Worth - Capital and O&M Costs	\$57,326	\$308,964
Total Present Worth	\$57,326	\$187,892

Table 3-1 Cost Analysis Summary for Alternative 1 and 2

Table 3-1 shows Alternative 1 is less expensive than Alternative 2. However, Alternative 1 does not take into consideration the cost of the water lost to The Township from a main break or the cost of water due to undiscovered leaks which may exist. It is also important to note that the Operation and Maintenance (O&M) costs over 20 years is 74% of the Capital Cost to replace the water main.

3.3 Non-Monetary Considerations

The advantage of pipe replacement (Alternative 2) over continuing to repair water main breaks on an as needed basis (Alternative 1) is largely non monetary. The majority of water main breaks will occur during the coldest times of year and require the repair to be conducted on an emergency basis. This requires additional staffing to be on hand to be prepared to perform emergency repairs and at increased risk to injury due to the adverse weather conditions. Additionally, Alternative 1 does not quantify the reduction in service to the Charter Township of Royal Oak customers, the potential infiltration of contaminants, or the reduced fire fighting capacity.

3.4 Selected Alternative

The recommended project is Alternative 2. The proposed project construction includes the installation of new 8-inch class 54 ductile iron water main with 1/8-inch cement mortar lining and polyethylene outer wrap. The installation of the new water main will typically take place within the right of way (ROW). The majority of construction will require the excavation of an approximately three foot wide by five deep trench primarily within the right of way.

The water mains to be replaced will include all sections listed in Table 3-2.

Street	Between Streets		Length (ft)	Diameter (in)	Existing Material
Woodside	Northend	470' south of Pasadena	2,085	6	Cast Iron
Glen Lodge	Northend	380' south of Pasadena	2,020	8	Cast Iron

Table 3-2 Construction Area 2 Water Main Replacement Summary by Street

A detailed map showing the planned project area is included in Appendix A.

3.5 Monetary Cost Estimate

The estimated cost for the proposed project is summarized in Table 3-3.

Item	Quantity	Unit Cost	Total
Construction (materials, installation and restoration)	4,105	\$150	\$615,750
Engineering / Inspection / Legal/ Permits/ Contingencies	-	-	\$184,725
Operation and Maintenance Costs (20 year period)	-	-	\$0
TOTAL			\$800,475

Table 3-3 Monetary Cost Estimate for Project

As the project moves forward, alternative construction methods, such as pipe bursting, will be evaluated for The Township. Given the fact that the mains being replaced are small in diameter, the pipe bursting methods may be much more costs effective.

3.6 User Cost

It is assumed that the Charter Township of Royal Oak will implement the proposed system improvements with funding received through the DWRF. Therefore, the cost to The Township customers is estimated based on the assumption the loan rate will be the same as the rate set for 2008 Project Plans. This assumes a loan rate of 2.5% with a 20 year amortization period. Table 3-4 summarizes the estimated cost to The Township customers annually over 20 years.

Total Capital Cost	\$800,475.00
Annualized cost of DWRF Projects (assuming 2.5% interest over 20 years)	\$51,348.17
Number of Customers	791
Cost/ Household/ Year	\$64.92

Table 3-4 User Cost Summary

The total annual increase in water rates for the average customer in The Township due to the proposed project is \$64.92 per year.

The annualized cost of the project was calculated using the following equation:

$$A = P \times \left[\frac{i(1+i)^n}{(1+i)^n - 1} \right]$$

where:

- A = Annualized cost of DWRF Projects over 20 years
- P = Total capital cost
- i = interest (2.5% assumed)
- n = number of years (20 years)

The cost per customer per year was calculated by dividing the annualized cost by the number of customers.

The loan will be repaid by including a \$4.07 charge per thousand cubic feet as part of the water rate for the Charter Township of Royal Oak water customers to be applied over the next 20 years.

3.7 Schedule

Table 3-6 summarizes the planned schedule to implement construction of the project.

Item	Date
Public Hearing on Draft Project Plan	April 21, 2009
Submit Final Project Plan	May 1, 2009
Complete Plans and Specifications	October 2009
Advertise for Bids	November 2009
Receive Bids	December 2009
Award Construction Contract	January 2010
Complete Construction	October 2010

Table 3-5 Schedule for Completion of Project Plan, Design, and Construction

4.0 EVALUATION OF ENVIRONMENTAL IMPACTS

The environmental impacts evaluated for the proposed construction of this Project Plan includes both beneficial and adverse, short and long term, and irreversible and irretrievable.

4.1 Direct Mail

As part of the evaluation of environment impacts, multiple government agencies were contacted to request input on the proposed project. The agencies contacted included:

1. Tribal Historic Society (14 Native Band Tribal Agencies)
2. U.S. Fish and Wildlife Services (Department of Natural Resources)
3. Michigan Natural Features Inventory (Department of Natural Resources)
4. South Eastern Michigan Council of Governments (SEMCOG)
5. Permit Consolidation Unit of the MDEQ Land and Water Management Division
6. State Historic Preservation Office (SHPO)

Copies of letters and applications sent to each agency and their responses are included in Appendix C. Additionally, the responses received from these agencies have been incorporated into this document. **(TO BE INSERTED UPON COMPLETION)**

4.2 Beneficial and Adverse Effects

The beneficial impact of the planned project includes improving portions of The Township's water system which have been identified as having a history of water main breaks. Implementing the proposed system improvements will help to prevent a non-compliance with the Safe Drinking Water Act. In addition to improving the water system, the construction project will provide employment to local construction companies and design firms.

Adverse environmental impacts will be generated during construction of the project. Street congestion, dust, and noise will be a temporary condition throughout the construction phase.

Once the new water mains are installed the customer services will need to be disconnected from the existing main and connected to the new water main. During this time, customers will be temporarily out of service for approximately two to four hours. The benefit of the new water main however, is far greater than the temporary loss of service.

4.3 Short-Term and Long-Term

The short-term adverse impacts of the proposed construction activities are expected to be minimal and able to be mitigated. Short term impacts include minor disruption to traffic, dust, noise, and temporary disruption to water service and possibly other utilities. No adverse long-term impacts are anticipated.

4.4 Irreversible or Irretrievable

Because the proposed project will occur and benefit customers within a fully developed area, the impact on irreversible and irretrievable resources includes materials utilized during construction and fossil fuels utilized to implement project construction.

4.5 Analysis of Impacts

It is not expected the proposed construction will have any adverse effects on historical, archeological, or cultural areas. The State Historic Preservation Office responded to correspondence **(TO BE INSERTED UPON COMPLETION)**. In addition it is not anticipated the proposed project will have any adverse effects to the water quality, air quality, endangered species, wild scenic rivers, or agricultural lands. The DNR responded to inquiries that **(TO BE INSERTED UPON COMPLETION)**. Copies of the response from SHPO and the DNR are included in Appendix C **(TO BE INSERTED UPON COMPLETION)**.

4.6 Indirect Impacts

The proposed project will only benefit customers within the immediate area of the project area and therefore will not facilitate growth to the area.

4.7 Cumulative Impacts

Improved water quality and reliability of service to customers within the two construction areas are the cumulative effects anticipated by implementing the proposed project. The department will also experience years of maintenance free water main.

4.8 Mitigation

It is not anticipated any long-term adverse environmental impacts will be incurred as a result of the proposed project. Construction is planned to cause minor disruption to the immediate population.

4.9 Short-Term Construction Related Mitigation

Short-term impacts due to construction activities such as noise, dust and street congestion will be minimized by use of good design and construction techniques. The water main will typically be installed within the ROW to minimize any modification to private property. Access to properties will be maintained throughout construction and adherence to the Soil Erosion and Sedimentation Act will minimize the impacts due to disturbance of the soil structure. Specific techniques will be included as part of the contract documents.

The majority of the construction will be carried out in residential neighborhoods, therefore safety is a consideration. Typically, trenching will be filled in at the close of each working day to eliminate the hazard of an open trench. If the trench must be left open at the close of the work

day in unpaved areas, highly visible orange construction fencing will be used to barricade the trench. If the trench must be left open through paved areas, such as at street crossings, steel plates will be used to bridge the trench.

4.10 Long-Term Impacts

Restoration of all streets, driveways, and landscaping to pre-construction conditions will be performed upon completion of the water main installation, therefore the aesthetic and functional impacts due to construction will be mitigated through site restoration.

4.11 Mitigation of Indirect-Impacts

The purpose of the proposed project is to improve water quality and reliability within to fully developed areas. Therefore it is not anticipated any growth will occur as a result of the project and mitigation of indirect impacts does not need to be addressed as part of this Project Plan.

5.0 PUBLIC PARTICIPATION

The Charter Township of Royal Oak published a legal advertisement March 20, 2009 notifying the public of the intent to seek funding from the State Drinking Water Revolving Fund financed through the MDEQ to implement water system improvements. The legal advertisement was published in the Macomb Daily. In addition to the legal advertisement, FACT Sheets were posted in public places which summarized the proposed project. A copy of the draft of the Project Plan was made available for review by the public at the Clerks office of the Charter Township of Royal Oak and posted to the Oakland County Website.

A formal public hearing is planned for Tuesday, April 21, 2009 to present the Project Plan to The Township Board and the public. Documentation of the public participation is included in Appendix B. Documentation of the public participation includes **(TO BE INSERTED UPON COMPLETION)**:

- Authorization of the legal advertisement
- Publication of legal advertisement
- FACT Sheet which was posted in public area
- Board minutes schedule public hearing regarding the Project Plan
- Typed attendance list of the public hearing
- Transcript of the formal public hearing
- Resolution adopting the recommended alternative

APPENDIX

APPENDIX A – MAP OF STUDY AREA

APPENDIX B – PUBLIC PARTICIPATION

APPENDIX C – DIRECT MAIL CORRESPONDENCE

APPENDIX A Map of Study Area

Charter Township of Royal Oak Drinking Water Revolving Fund (DWRF) Project Area



APPENDIX B

Public Participation

- **Authorization of the legal advertisement**
- **Publication of legal advertisement (included)**
- **FACT Sheet which was posted in public area (included)**
- **Board minutes schedule public hearing regarding the Project Plan**
- **Typed attendance list of the public hearing**
- **Transcript of the formal public hearing**
- **Resolution adopting the recommended alternative within the Project Plan**

**Charter Township of Royal Oak
Water Main Improvements
Notice of Public Hearing: April 21, 2009**

Introduction

The Charter Township of Royal Oak (ROTwp) is pursuing a water main replacement program to replace aging water mains. Based on a review of ROTwp's water main break history, two sections of water main have been identified with a high priority and targeted for water main replacement in 2010. ROTwp is seeking funding through the Drinking Water Revolving Fund (DWRf) offered through the Michigan Department of Environmental Quality (MDEQ) to implement the replacement the two sections of water main.

Description of Work

The proposed construction project includes the installation of approximately 4,105 feet of new 8-inch class 54 ductile iron water main with 1/8-inch cement mortar lining. The installation of the new water main will typically take place within the right of way (ROW). The construction will require the excavation of an approximately three foot wide by five deep trench.

The locations of the proposed water system improvements are listed in the table below.

Street	Between Streets		Length (ft)
Woodside	Northend	470' south of Pasadena	2,085
Glen Lodge	Northend	380' south of Pasadena	2,020

Schedule

Design of the water main replacement project is scheduled to begin in the Fall of 2009. It is anticipated the design will be completed in the Fall of 2009. Bids for the construction of the project will be taken in the Winter of 2010. Construction of the project will begin in the Spring of 2010 and be completed in the Fall of 2010.

Traffic Control/Property Access

To accommodate the construction contractor's crews and equipment, it will be necessary to restrict traffic to local only. Access to property will be provided during the construction period.

Water Service Interruption

Property owners should expect a short term interruption of water supply service when and if they are connected to temporary water service and when their service is connected to the new water main. It is anticipated water service would be interrupted for no more than 24 hours.

Site Restoration

ROTwp will oversee the contractor to ensure the area impacted by construction is fully restored upon completion of the water main installation. This will include repaving streets, restoration of driveways, sidewalks, curbs, and gutters, and the restoration of landscaping; as well as addressing any unforeseen construction related problems. Property owners will be provided with contact information for follow up on any problems.

Public Participation

A formal public hearing is scheduled for Tuesday, April 21, 2009 at 6:30 p.m. at the offices of the Charter Township of Royal Oak (Grant School, 21131 Garden Lane, Ferndale, MI 48220). At this time the proposed construction project will be presented and comments from the public accepted. The project plan can be reviewed at the township clerk's office. Written comments may also be submitted to ROTwp through the Township Clerk, Gwendolyn Turner, at the address above.

CHARTER TOWNSHIP OF ROYAL OAK

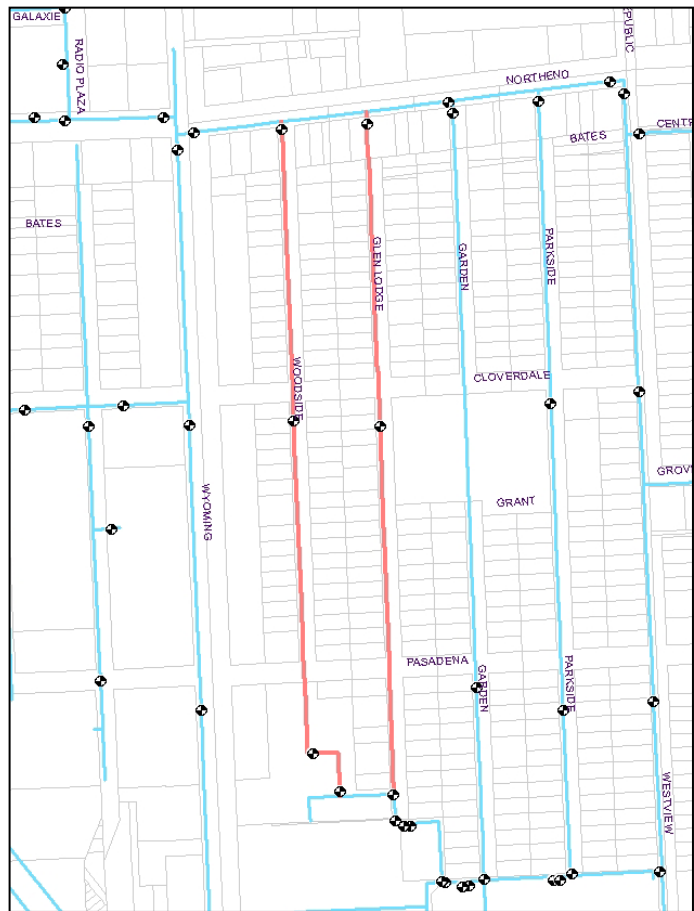
DRINKING WATER REVOLVING FUND PROJECT PLAN

The Charter Township of Royal Oak (The Township) is a suburb of the Detroit Metropolitan Area located within Oakland County. The Township provides water to a population of approximately 2660 people since 2004 when the northern portion of the Township (2,786 people) was annexed by the City of Oak Park. The current Township has approximately 791 customers and is supplied water through two master meters from the Detroit Water and Sewerage Department (RT01 and RT02). The average flow in 2006 was 365,780 gallons per day. The water supply system includes approximately 11.9 miles of water main ranging in size from 6-inch to 12-inch. The majority of the water supply system was installed between 1920 and 1960.

As the Charter Township of Royal Oak water system ages, it is experiencing an increasing number of water main breaks. From 1998 to 2008, The Township has experienced 57 main breaks with four (4) breaks per year over the last five years. This document has been prepared to implement water system improvements which will permit The Township to comply with the 1996 Amendments to the Safe Drinking Water Act (SDWA), and the Michigan Safe Drinking Water (P.A. 399, 1976).

To finance these water system improvements The Township is seeking funding through the State of Michigan's Drinking Water Revolving Fund (DWRF). The purpose of this Project Plan is to describe Royal Oak Township current demographics, the need for the system improvements, and provide a recommendation to implement the proposed improvements. This document provides an evaluation of alternatives as well as a recommended alternative to improve water quality. The recommended project includes 4,105 feet of water main system improvements which will replace failing water main. These water mains are on Woodside and Glen Lodge running from Northend down past Pasadena. The existing 6 inch cast iron pipe would be replaced with 8 inch ductile iron pipe.

The recommended project will cost an estimated \$800,475 to complete.



APPENDIX C

Direct Mail Correspondence

Letters To:

SEMCOG

United States Department of the Interior - U.S. Fish and Wildlife Service

MDEQ Permit Consolidation Unit

DNR Michigan Natural Features

Sault Saint Marie Tribe of Chippewa

Saginaw Chippewa Native Tribe of Michigan

Pokagon Band of Potawatomi

Match-e-be-nash-shee-wish Band of Potawatomi Natives

Little Traverse Bay Band of Odawa

Little River Band of Ottawa

Lac Vieux Desert Band of Lake Superior Chippewa Natives

Keweenaw Bay Native Community

Hannahville Potawatomi Native Community

Grand River Band of Ottawa Natives

Grand Traverse Band of Ottawa Chippewa Natives

Burt Lake Band of Ottawa Natives

Bay Mills Native Community

State Historic Preservation Office

Responses From: