

Water Supply System Master Plan

Robinson Township
Ottawa County, Michigan

June 2004

2040313

Prein & Newhof

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Table of Contents

Introduction	1
Population Projections	2
Existing Water Supply Systems	3
Existing Water Systems	4
Proposed Water Supply System	7
Water Use Projections	9
Cost Estimates	10
Financing Considerations	12

Figures

Detailed Cost Estimates

Supporting Information

I. INTRODUCTION

The purpose of this report is to update the Water Supply System Master Plan for Robinson Township. This report will examine specific areas where a proposed water system is needed based upon discussions with Robinson Township. The areas proposed for study are located in Sections 6 and 7 as shown in Figure 1.

A master plan for the remainder of the Township has been previously completed and will not be discussed further in this report. However, the recommended water system for the entire Township is shown in Figure 2.

II. POPULATION PROJECTIONS

The Township is continuing to grow at a steady rate. With the extension of a water supply system in the Township the rate of growth will increase. Population projections are shown in Table 1. Prior population data is from U.S. Census records. The projections were made by the West Michigan Regional Planning Commission through the year 2020.

Table 1

**Population Projections for Robinson Township
Ottawa County, Michigan**

<u>Year</u>	<u>Population</u>
1990	3,925
1995	4,900
2000	5,588
2005	6,595
2010	7,763
2015	9,132
2020	10,752

III. EXISTING WATER SUPPLY SYSTEMS

There are two existing public water supply systems in or adjacent to Robinson Township.

- A. The City of Grand Rapids has two large transmission mains that cross Robinson Township.
 - 1. A 46-inch transmission main is located in the M-45 right-of-way.
 - 2. A 60-inch transmission main is located in the Fillmore Street right-of-way.

- B. The Northwest Ottawa Water Supply System (NOWSS) has been constructed in Grand Haven Township up to the northwest border of Robinson Township along 144th Avenue from south of Lincoln Street to Green Street. Portions of these three existing public water supply systems are shown in Figure 2.

IV. EXISTING WATER SYSTEMS

A. Private Wells

There are substantial clay deposits in Robinson Township, which are not suitable for development of a water supply. The thickness of this clay deposit is from 100 feet to 200 feet. The top of the clay is approximately ten to twenty feet below the ground surface. Therefore, the private wells that have been developed in the Township usually are described as shallow wells, which are constructed in the sand deposits above the clay to a depth of ten to twenty feet, or as deep wells, which are constructed in sand deposits or possibly sandstone, below the clay at a depth of greater than 100 feet.

Shallow wells are usually not permitted by the Ottawa County Health Department because they are highly vulnerable to surface contamination from septic tanks, drain fields, fertilizers, pesticides and other wastes which are discharged on the ground surface. Deep wells frequently yield water of unsuitable quality because of the high mineral concentration (commonly brine) which makes the water unsuitable for potable uses.

B. Grand Rapids Water System

The City of Grand Rapids takes its water supply from Lake Michigan with two intakes located on the shore of Lake Michigan at the west end of M-45. The water treatment plant is located near the shore of Lake Michigan, in Grand Haven Township

at the intersection of M-45 and Lake Shore Drive. Treated water is pumped through two transmission mains, across Ottawa County, to the City of Grand Rapids.

The Ottawa County Road Commission negotiated agreements with the City of Grand Rapids for the County and each of the Townships through which the transmission mains are constructed. These agreements permit use of the water by Ottawa County and its various municipalities within certain limitations described in the contracts.

Water can be withdrawn from the transmission mains at designated connection points.

The 46" transmission main has several tees in the transmission main, which were installed for the purpose of connecting various appurtenances, which are required for normal function of the transmission main. Some of these tees can be used for connection points for service to the municipal customers. The contract provides for use of "A" chambers. There are two of these located in Robinson Township. The contract also permits use of "G" chambers provided prior approval by the City of Grand Rapids is obtained. There are two of these chambers in Robinson Township.

The contract also permits use of tees installed on the 60" transmission main. Several of these are located within Robinson Township.

The location of all of the suitable connection points to both transmission mains are shown in Figure 2.

C. Northwest Ottawa Water Supply System

The Northwest Ottawa Water Supply System serves the City of Grand Haven, the City of Ferrysburg, Spring Lake Village, Spring Lake Township, Crockery Township, Grand Haven Charter Township and Robinson Township.

The water supply system consists of two Lake Michigan intake beds and a pumping station in the Grand Haven State Park. A direct filtration water plant in the City of Grand Haven provides water treatment and high service pumping. Transmission mains deliver the water from the water plant to the various municipal customers.

Water supply for Robinson Township is delivered from the water plant through the Grand Haven Charter Township transmission mains and water distribution system to the northwest corner of Robinson Township. Connections to the Northwest Ottawa Water Supply System would be on 144th Avenue at Green Street and at Lincoln Street.

V. PROPOSED WATER SUPPLY SYSTEM

Figure 2 identifies a proposed water supply system in Robinson Township as well as the existing water supply systems in and adjacent to the Township.

A. Connection to Northwest Ottawa Water Supply System

In Section 6 of Robinson Township a connection to the Northwest Ottawa Water Supply System is proposed at or near Green Street and 144th Avenue. This connection will initially require a below ground metering chamber. However, according to the current agreement between Robinson Township and Grand Haven Charter Township, when the flow rate to Robinson Township exceeds 100,000 gallons per day an above ground metering station will be required. Based on the anticipated rate of development, it is recommended that the above ground metering station be considered at this time.

In Section 7 of Robinson Township a future connection is shown at Lincoln Street and 144th Avenue. This connection will also require a metering chamber.

Eventually, the connections to the Northwest Ottawa Water Supply System on Lincoln Street and Green Street will be linked and serve existing and future development in the northern area of the Township, as shown in Figure 2.

B. Service Areas

1. Existing

On the south side of Johnson Street, east of 144th Avenue, is the existing Woodlands Subdivision. The Woodlands Subdivision is connected to the Northwest Ottawa Water Supply System on 144th Avenue at Johnson Street.

The master plan is to connect the Woodlands Subdivision to the proposed Robinson Township system and close the valve on the connection to the NOWSS water main in 144th Avenue. This proposed connection is shown in Figure 2.

2. Proposed Water Supply System

The area north of Stearns Bayou along 136th Avenue is in need of a water supply system because of failing and/or contaminated wells. To serve this area with water the following is recommended:

- Construct a 16" water main northeast from the proposed metering station on Green Street, crossing Stearns Bayou to 136th Avenue. A 12" water main would then extend south on 136th Avenue from Green Street to the area in need of a water supply. An 8" water main would serve the local streets off from 136th Avenue near Stearns Bayou. This is shown in Figure 2.

VI. WATER USE PROJECTIONS

Water use projections are based on an average daily demand of 240 gallons per day per dwelling unit. As a water system is created in the northern area of the Township development will continue and even drive the continual extension of the system. The potential extensions discussed in this report will initially serve approximately 175 homes.

The average day demand and maximum day demand for the recommended extension are shown in Table 2. It has been assumed that the ratio between the maximum day water demand and the average day water demand is 4:1.

Table 2

**Water Use Projections for Robinson Township
Ottawa County, Michigan**

<u>Year</u>	<u>Average Day (gpd)</u>	<u>Maximum Day (gpd)</u>
2005	40,000	160,000
2010	100,000	400,000
2015	220,000	880,000
2020	320,000	1,280,000

VII. COST ESTIMATES

Project cost estimates have been made for the Robinson Township Water Supply System connected to the Northwest Ottawa Water Supply System. Water mains, both proposed and future, are shown in Figure 2. The water mains have been sized to be part of the ultimate system which will contain several loops for adequate distribution of water during periods of maximum demand and during fire demand conditions. Cost estimates do not include service connections from the water main to the property line with a corporation stop and curb stop and box. The estimate for construction of a service connection is \$1,000.

The cost estimate for the recommended extension includes construction of an above ground metering station on Green Street, a 16" water main on Green Street from 144th Avenue to 136th Avenue, including the crossing of Stearns Bayou, a 12" water main on 136th Avenue and 8" water main on the local streets off from 136th Avenue, north of Stearns Bayou. The estimated cost for the water main assumes construction taking place outside of the roadway with no road replacement. All road crossings within Ottawa County are now required to be accomplished by directional drilling or bore and jack. The estimated project cost is \$1,200,000.

The detailed breakdown of the project cost estimate is provided in the back of this report.

In the future, as development occurs, an elevated water storage tank will be necessary to provide adequate water supply during peak demand periods and for fire protection. Also, there is an 8" water main in Mercury Drive, west of 144th Avenue, in Grand Haven

Township that will have to be replaced in the future with a 16" water main to provide an adequate supply to Robinson Township. It is unknown exactly when these improvements will be necessary. However, by regularly reviewing the water demands in Robinson Township, the construction of major improvements, such as a tank or a transmission main, can be properly budgeted for.

VIII. FINANCING CONSIDERATIONS

Grant assistance for communities with moderate income levels is limited. There usually are more applications than money available to fund all of the projects. The Michigan Department of Environmental Quality has money available through the State Revolving Loan Fund. These loans are generally available for a period of 20 years with a low interest rate typically in the range of 2 to 2 ½ %.

Local financing could be provided through the sale of bonds through the Ottawa County Road Commission pledging the faith and credit of the Township and the faith and credit of the County. These bonds could be repaid through a combination of charges which could include the following:

- A. Frontage Charges – this is the cost to construct a minimum diameter water main across the front of the individual parcel.
- B. Trunkage Charges – this is the cost to construct larger water mains, meter stations, water towers, river crossings, etc. for the system as a whole; all users share equally in this charge.
- C. Connection Charges – this is the cost to construct a service line from the water main to the individual home or building.

Assuming the water supply system is constructed in Robinson Township on Green Street and 136th Avenue as recommended, the two developments between Green Street and

Lincoln Street are constructed as projected and the second meter station is built on Lincoln Street, the charges for each parcel would be as follows:

Frontage Charge	\$30.00 / l.f. of frontage
Trunkage Charge	\$3,300.00
Connection Charge	\$1,150.00

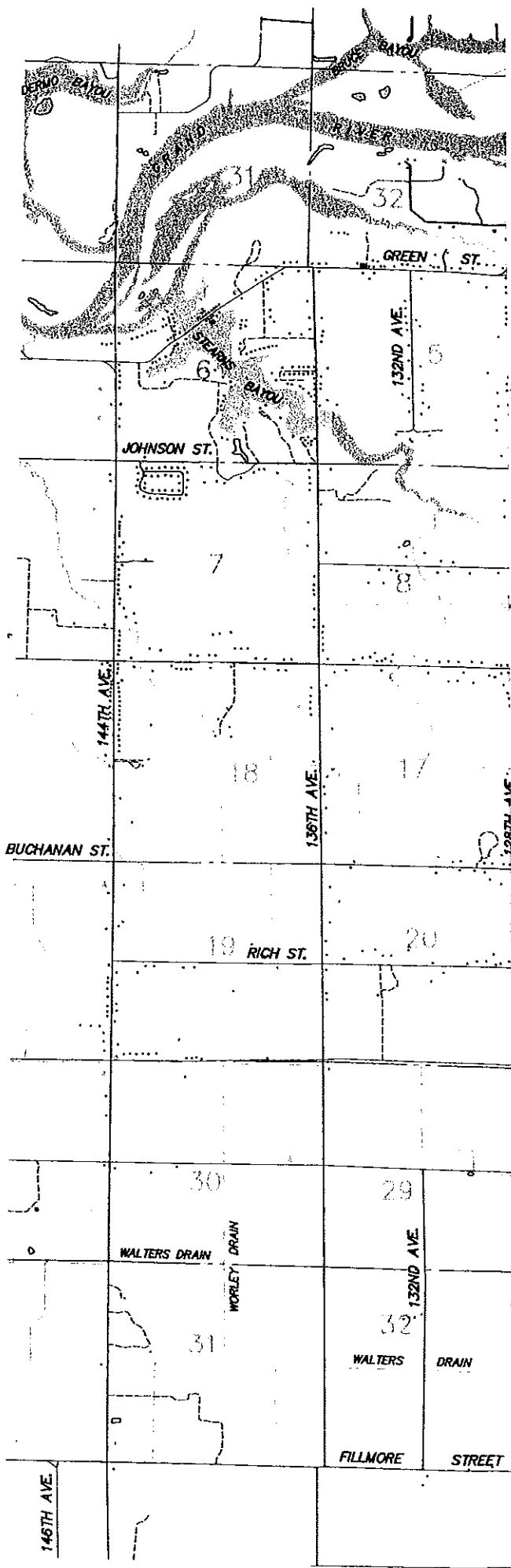
Based on the above charges, typical assessments for the Township would be as follows:

Lot Width (ft)	Frontage Charge	Trunkage Charge	Connection Charge	Total Assessment
100	\$3,000	\$3,300	\$1,150	\$7,450.00
150	\$4,500	\$3,300	\$1,150	\$8,950.00
200	\$6,000	\$3,300	\$1,150	\$10,450.00
250	\$7,500	\$3,300	\$1,150	\$11,950.00

A detailed breakdown of the calculation of the above charges is included in the back of the report.

In the previous Water Supply System Update for Robinson Township, a typical assessment for a 100' lot was \$11,200 and for a 250' lot it was \$14,650. The reason the assessments are less at this time are due to the proposed developments being included in the number of users. With more users included, the Trunkage Charge for each parcel is reduced.

Figures

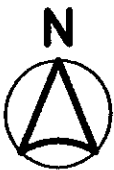


SCALE : 1" = 4000'

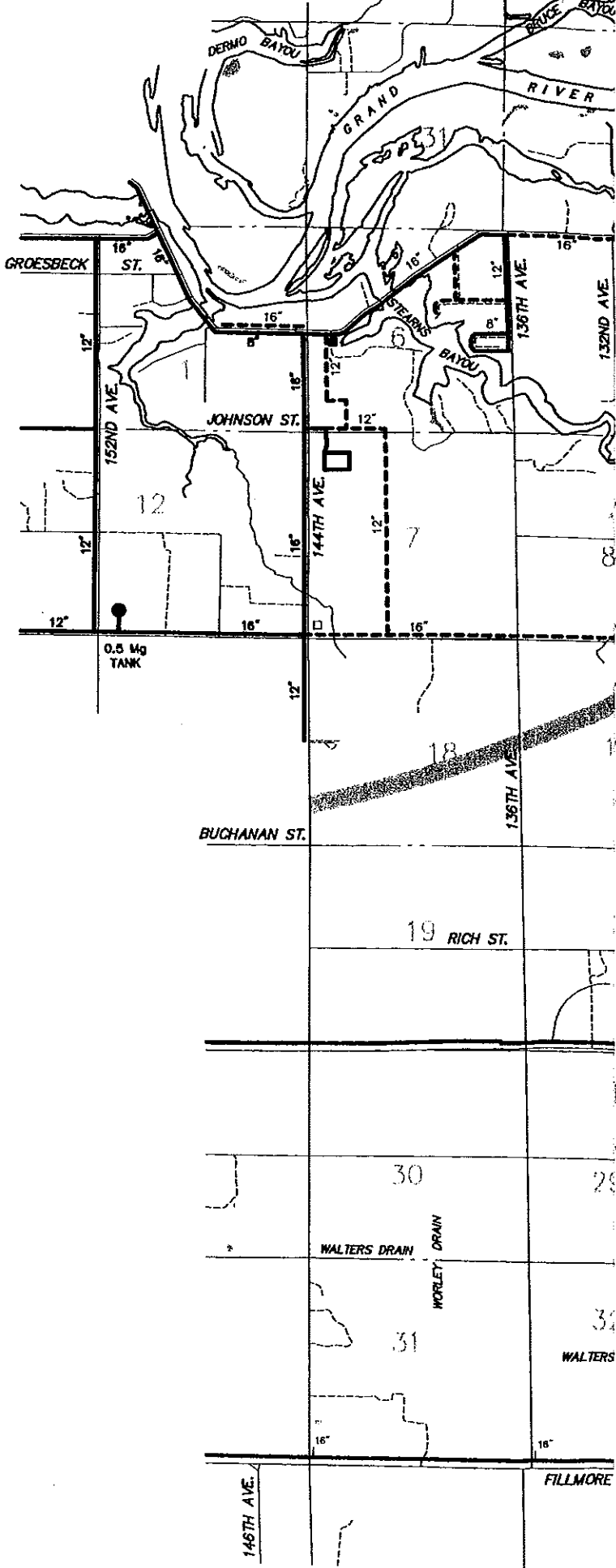
LEGEND

- HOUSE (1721)
- * BUSINESS (39)
- FARM (12)
- CHURCH/SCHOOL (5)
- DUPLEX (3)
- MHP PROPOSED MOBILE HOME PARK
- S PROPOSED SCHOOL
- AREAS PROPOSED FOR STUDY

ROBINSON TOWNSHIP
 OTTAWA COUNTY, MICHIGAN
R SUPPLY SYSTEM EXTENSION
 FIGURE 1



SCALE : 1" = 4000'



LEGEND

- CONNECTION POINT w/SIZE
- CHAMBER w/CONNECTION POINT (SIZE)
- GRAND RAPIDS WATER SUPPLY
- NORTHWEST OTTAWA COUNTY WATER SUPPLY
- ROBINSON TOWNSHIP - PROPOSED
- ROBINSON TOWNSHIP - FUTURE
- EXISTING ELEVATED TANK
- FUTURE ELEVATED TANK
- PROPOSED METERING STATION
- FUTURE METERING STATION
- APPROXIMATE LIMIT
(BETWEEN GRAND RAPIDS SUPPLY AND NW OTTAWA SUPPLY)

ROBINSON TOWNSHIP OTTAWA COUNTY, MICHIGAN SUPPLY SYSTEM MASTER PLAN

FIGURE 2

Detailed Cost Estimates

**ROBINSON TOWNSHIP
OTTAWA COUNTY, MICHIGAN**

WATER SUPPLY SYSTEM MASTER PLAN

COST ESTIMATE

April, 2004

Meter Station, 16" Water Main on Green Street and 12" Water Main on 136th Avenue

<u>Item</u>	<u>Description</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Total</u>
1.	16" DI, CL 52 Watermain	5,500	l.f.	\$50	\$275,000
2.	20" DR11 Directional Drilled Watermain River Crossing Pipe	800	l.f.	\$210	\$168,000
3.	12" DI, CL 52 Watermain	2,700	l.f.	\$40	\$108,000
4.	8" DI, CL 52 Watermain	2,250	l.f.	\$35	\$78,750
5.	16" Valve & Box	7	each	\$1,500	\$10,500
6.	12" Valve & Box	3	each	\$1,250	\$3,750
7.	8" Valve & Box	3	each	\$1,000	\$3,000
8.	Metering Station - Above Ground	1	lsum	\$200,000	\$200,000
9.	Bore and Jack of Green Street	100	l.f.	\$200	\$20,000
10.	Hydrant Assembly	21	each	\$2,800	\$58,800
11.	Restoration	10,500	l.f.	\$5	\$52,500
	SubTotal				\$978,300
	Allowance for Contingencies, Legal, Administration, and Engineering				\$221,700
	TOTAL PROJECT COST ESTIMATE				\$1,200,000

Supporting Information

**ROBINSON TOWNSHIP
OTTAWA COUNTY, MICHIGAN**

WATER SUPPLY SYSTEM MASTER PLAN

**FEE / ASSESSMENT CALCULATIONS
w/ ABOVE GROUND METER STATIONS**

Assumptions:

- A 3-Part Assessment
 - a. Frontage Charge
 - b. Trunkage Charge
 - c. Service Connection Charge

- Proposed construction includes meter stations on Green Street and Lincoln Street, 16" water main on Green Street and Lincoln Street, 12" water main on 136th Avenue and 8" water main on local residential streets

- Developers will pay for water main and all appurtenances within the developments

- The cost for the Meter Stations and oversizing of the water system will be paid for through the Trunkage Charge.

- The number of users assumed for the calculations include the proposed developments south of Green Street and between Johnson Street and Lincoln Street as well as users along Green Street and those bounded by Stearns Bayou, 136th Avenue and Green Street.

Data for Calculations

Total Project Cost (\$)	\$1,900,000
Total Number of Users in Area	340
Front Footage for Frontage Charge	26,100
8" Water Main Cost (\$/l.f.)	\$60.00
Service Connection Charge	\$1,150

Frontage Charge

The Frontage Charge is one-half of the cost per foot to construct an 8" water main including the pipe, valves, hydrants, restoration and engineering, etc.

$$\$60.00 / 2 = \quad \$30.00 / 1.f.$$

Trunkage Charges

The Trunkage Charge is the charge per Residential User to cover constructing a water system with larger diameter water main, meter station, bayou crossings, etc.

$$\frac{\text{Total Project Cost} - \text{Total Frontage Charges}}{\text{Number of Users for Trunkage}}$$

$$\frac{\$1,900,000 - \$783,000}{340} = \$3,285 \text{ say } \$3,300$$

Service Connection Charge

The Service Connection Charge is the charge for making a connection, constructing a 1" water line to the property line and installing a residential water meter.

The current Service Connection Charge for Robinson Township is **\$1,150**.

Typical Assessment for Various Lot Widths

Lot Width (ft)	Frontage Charge	Trunkage Charge	Connection Charge	Total Assessment
100	\$3,000	\$3,300	\$1,150	\$7,450.00
150	\$4,500	\$3,300	\$1,150	\$8,950.00
200	\$6,000	\$3,300	\$1,150	\$10,450.00
250	\$7,500	\$3,300	\$1,150	\$11,950.00

