



MOONSHOT
MISSIONS

Paterson Sewer Rate Alternative Analysis

April 22, 2021



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A) Initial Conditions, and the November 2018 Raftelis Sewer Rate Study

In November of 2018, Raftelis submitted a Sewer Rate Study to the City of Paterson. This study had three chief purposes:

- 1) To separate the sewer collection system expenses from the general budget so that the sewer system could be operated and maintained in a fiscally sustainable, and stand-alone manner.
- 2) To identify the amount of revenue that would be needed for the stand-alone Paterson sewer budget.
- 3) To develop a sewer rate structure that would raise the necessary revenues and in a manner that was equitable to all of Paterson's sewer customers.

Prior to the 2018 Raftelis report, Paterson had charged a flat rate to its residential customers, which comprise 85-90% of its customer base. The Raftelis report recommended that, instead, customers should pay a variable rate, based on actual water usage, based on the industrywide presumption that, for the most part, sewage generated is proportional to water usage.

It should be noted that, independent of the manner in which the sewer rates are structured, Paterson needed to increase its revenues in order to meet its costs and be financially sustainable and independent, without recourse to Paterson's general budget. Therefore, the implementation of the Raftelis report's recommendations resulted in changes to the rates charged to customers, based on two changes made at the same time:

- The aforementioned need to increase total revenues across the entire customer base.
- The desire to more equitably allocate the corresponding charges based on actual water usage, instead of the flat fee that had been charged previously.

B) Recent Request for Reconsideration

Earlier this year, as the result of the aforementioned rate increases, requests have been made by some members of the public and some members of the Paterson City Council to review and reconsider the rate structure set forth in the Raftelis report. Accordingly, Moonshot Missions was retained by the City of Paterson to review the matter and present its recommendations to the City of Paterson. In addition, Paterson implemented several internal improvements to its billing system in response to some initial billing problems that resulted, inadvertently, at the beginning of the new billing program.

C) Proposed Approach

Since the focus of the question is how to most equitably charge Paterson residential customers, this report will first look at ways to reduce the overall residential revenue



requirements, independent of the rate schedule. Then, it will evaluate the various alternatives for the residential rate structure, with respect to equity and feasibility.

D) Possible Ways to Reduce Paterson's Total Residential Revenue Requirements

- 1) Small Commercial and Direct Customers
There is no doubt that the volumetric charge, based on actual metered water usage, should remain in place for Paterson's small commercial and direct customers. Depending on Paterson's final revenue needs, increases may be needed to the base user rate for such customers.
- 2) Tributary Customers
The November 2018 Raftelis report noted that these customers, albeit estimated to comprise less than 1% of Paterson's total sewage flow, were non-metered. The report recommended that these customers should be required to install a meter at their connection point to the Paterson system and this should be done, if it has not been done so already.
- 3) Implementation of Operational Efficiencies - Paterson Sewer System
Implementation of operational efficiencies to reduce energy costs (pumping costs), chemical costs (corrosion control), etc., would correspondingly reduce the annual revenue requirements as well. It is recommended that Paterson consider such an analysis in the near future.
- 4) Implementation of Operational Efficiencies - Passaic Valley Sewage Treatment Plant
Work with Passaic Valley Sewerage Corporation (PVSC), the receiving treatment plant to see if they could implement operational or financial efficiencies that would result in a reduction of their sewer rate charges to satellite communities like Paterson, thereby reducing Paterson's annual costs correspondingly.
- 5) Application for Upcoming Water Infrastructure Funding
President Biden and the Congress are currently working on implementing a nationwide infrastructure bill, which is projected to include tens of billions of dollars for water infrastructure (President Biden's proposal was for \$111 billion in water infrastructure funding). Paterson should be poised to seek its share of this funding in order to reduce its annual operating costs via installation of new capital that is likely to have lower maintenance and energy costs. In addition, this funding could be used to offset the upcoming costs associated with implementation of the Long Term CSO Control Plan.
- 6) Reduction of Long Term CSO Control Plan Obligations
In addition, the City of Paterson has submitted comments to the NJDEP seeking to reduce their Long Term CSO Control Plan obligations by approximately \$25 million. This would also reduce Paterson's overall, long term, revenue requirements.



7) Sewer Connection Fee

The sewer connection fee currently being charged in the City of Paterson, for new hookups to the sewer system, may be lower than the statutory requirement. Specifically, any community interested in charging a connection fee must follow the statutorily specified formula, based on debt service paid and total customer base, or not charge a fee at all. Therefore, charging a fee that is different than that called for in the statutory formula is a violation of said statute. Therefore, it is strongly recommended that the Paterson CFO and City Engineer review the applicable connection fee statute and correct the sewer connection fee charge as necessary. If this fee is, in fact, increased as a result of this review, then there would be a corresponding reduction in the overall residential revenue requirements. The additional revenue that would be received depends on the amount of new development that comes into Paterson, but a reasonable order of magnitude estimate would be on the order of \$500,000 per year.

8) Stormwater Charge

Since Paterson has a combined sewer system, all of the rain that falls on impervious surfaces, such as large parking areas, ends up in the combined sewer system and it must be pumped to the Passaic Valley Sewage Treatment Plant and treated there in the same manner as ordinary sewage. Thus, these large areas of impervious surface cause additional pumping costs for the City of Paterson and additional treatment costs billed to the City of Paterson. If the City were to charge a stormwater fee, based on the area of impervious surface, then either owners of impervious surfaces would either control their stormwater on-site via green infrastructure measures and thereby reduce Paterson's costs, or pay a stormwater fee that would compensate Paterson for its additional costs. In either case, the additional revenues and/or lower costs would correspondingly reduce the residential revenue requirements for the City of Paterson.

It should be noted that this is not an insubstantial figure; combined sewer systems of similar size have shown that, in a year with normal levels of stormwater precipitation, the combined sewage generated from large areas of impervious surface can account to 25-35% of the total flow generated and treated. For example, the City of Camden (NJ) estimated that 35% of its total flow comes from combined sewage generated from impervious surface. Similarly, the City of Wilmington (DE) has estimated that 43% of its total flow comes from combined sewage. This demonstrates that the amount of combined sewage generated from impervious surfaces is a very significant percentage of flow that has to be pumped and treated in combined sewer communities like Paterson.

Wilmington generates about \$5 million per year in stormwater fees, according to a recent case study prepared by the United States Environmental Protection Agency (USEPA). Paterson (8.7 square miles) is about half the area of Wilmington (17 square miles). So, a reasonable order of magnitude calculation suggests that a similar stormwater fee program in Paterson would generate about \$2.5 million per year. (The



State of New Jersey is offering grant funding to undertake stormwater utility/fee studies so that a precise estimate of revenues can be developed.)

Therefore, if Paterson were to implement a stormwater fee, to pay for the significant costs of conveying and treating combined sewage generated from large areas of impervious surface, that would be much more equitable to all of Paterson's ratepayers and also would reduce the total revenue needs by about \$2.5 million. As a result, Paterson could offer a significant rate cut, across the board to all current ratepayers if it moved forward with such a program. It is recommended that Paterson seek a State grant to undertake the planning needed to implement such a stormwater fee, as the first step to reducing costs for all of its ratepayers. It should be noted that this would take some time to implement, not less than 9-12 months from the time that Paterson decided to move forward with implementation.

9) Summary

Each of the opportunities described above would reduce the total pie of residential revenue requirements for the City of Paterson, independent of how that pie is divided up among residential ratepayers.

E) Options for Equitably Charging Paterson's Residential Customers

As Paterson is able to reduce the total residential revenue requirements through some, or all, of the measures described in the preceding section, then what remains must still be collected from its residential customers so that Paterson can always meet the fiduciary responsibilities for its sewer system. Independent of the final decision on the residential rate structure, and no matter how the rate charges are divided, the total amount of residential revenue collected must be the same, the difference between the total revenue requirements less the other fees and revenues charged as described in the preceding sections. If one class of customer is to be charged less than they are currently being charged, then more must be charged to other customers in order to make up the difference, unless the total amount of revenue needed can be sufficiently reduced by means of the measures described in Section D above.

With that said, this section will now discuss the options open to Paterson, with regard to residential rate charges, and the corresponding equity considerations. The United States Environmental Protection Agency (USEPA) has developed the following summary of rate schedule options:

Flat Rates

- Simple and easy-to-understand billing structure.
- Inequitable, charges all customers the same fee regardless of water usage.
- Does not provide sufficient revenue to operate utilities.
- Does not signal water efficiency among customers.
- Rarely used today.

Consumption-Based Rates

Uniform Volumetric Rates

- Simplest consumption-based rate structure.
- Customers charged fixed rates per unit of water.
- Cost increases as customers use additional units of water.
- Requires metered service.
- Some utilities charge different rates for various user groups (e.g., residential, industrial)
- Encourages water efficiency.
- Unit price can change seasonally or at the discretion of the utility.

Increasing Block Rates

- Consumption-based rate structure
- Customers charged increasing unit price with each successive block of water usage.
- Encourages water efficiency.
- Rate structure often used in urban areas with limited water supply.

Decreasing Block Rates

- Opposite of increasing block rates, charges customers a lower unit price as water usage increases.
- Does not signal water efficiency.
- Often used in rural areas (e.g., agriculture, farming, industrial) with abundant water supply.

Water Budget-Based Rates

- Utilities provide customers with water budgets based on anticipated household water needs (e.g., number of people, property size).
- Customers charged a rate based on their water budget.
- Rates increase as water use exceeds water budget.

Mixed Rates

- Many utilities combine a fixed base fee to cover costs of maintaining infrastructure and consumption-based rates.

While the flat rate structure provides equal rates for all customers, it introduces inequities when households with higher water usage pay the same rate as households consuming less water (Pacific Institute, 2013). In addition to water usage, utilities charge customers to build and maintain infrastructure and pay the workers who provide water service. The flat rate structure does not provide sufficient revenue or promote water efficiency (EPA, 2021).

Consumption-based rates are the most widely used and equitable method to bill customers. Utilities base the bill on household water usage, producing revenue and signaling water conservation among customers.



Consumption based structures also vary by design, providing utilities options to meet the economic and environmental needs of the communities they serve.

The EPA and Pacific Institute studies clearly recommend a consumption-based rate, as opposed to a flat rate, as the most equitable approach since customers pay for their actual water usage, and also the rate structure most likely to promote water conservation measures as well.

If the City of Paterson does decide to return to a flat rate, nonetheless, then it must either significantly reduce its total residential revenue requirements, through the means discussed in the preceding sections, or accept that some customers' rates will have to increase significantly, in order to make up for other rates being reduced and meet the total fiduciary requirements for the sewer system. It has been estimated that returning to the original flat rate schedule would require a 65% increase to all residential ratepayers. This could be reduced, somewhat, by the correction of the connection fee charge and imposition of a stormwater fee, as discussed in the preceding sections.

Alternatively, another option would be to develop a hybrid approach, which would involve a flat fee up to a certain point, and then a volumetric component beyond that. The City of Paterson has developed a flat rate scenario and two hybrid scenarios, for residential revenue only as described in the following tables. As previously discussed, it is recommended that the non-residential components of Paterson's rate base remain unchanged.

Table E (1)

| Flat Rate - Based on House Size - Close Gap for Fully Self-Liquidating | | | |
|---|---------|-----------|---------------|
| Size home | Parcels | Flat rate | Total |
| 1 | 7525 | 358.40 | 2,696,960.00 |
| 2 | 7916 | 681.60 | 5,395,545.60 |
| 3 | 2544 | 969.60 | 2,466,662.40 |
| 4 | 359 | 1,292.80 | 464,115.20 |
| | | | 11,023,283.20 |

Table E (2)

| Hybrid Rate - Tiered Higher Fixed Rate Portion / Lower Volumetric Portion | | | |
|--|--------------|---------------|---------------------|
| Size home | Parcels | Fixed rate | Fixed rate portion |
| 1 | 7525 | 275 | 2,069,375.00 |
| 2 | 7916 | 425 | 3,364,300.00 |
| 3 | 2544 | 625 | 1,590,000.00 |
| 4 | 359 | 700 | 251,300.00 |
| | | | 7,274,975.00 |
| | Volume | Price per CCF | Volume rate portion |
| | 3,000,000.00 | 1.26 | 3,780,000.00 |
| | | | 11,054,975.00 |

Table E (3)

| Hybrid Rate - Meter Based | | | |
|----------------------------------|---------------|----------------------|----------------------------|
| Size home | Parcels | Meter/home | Fixed rate portion |
| 1 | 7525 | 250 | 1,881,250.00 |
| 2 | 7916 | 250 | 1,979,000.00 |
| 3 | 2544 | 250 | 636,000.00 |
| 4 | 359 | 250 | 89,750.00 |
| | | | 4,586,000.00 |
| | Volume | Price per CCF | Volume rate portion |
| | 3,000,000.00 | 2.11 | 6,330,000.00 |
| | | | 10,916,000.00 |

| Size home | Parcels | Meter/home | Fixed rate portion |
|-----------|---------------|----------------------|----------------------------|
| 1 | 7525 | 275 | 2,069,375.00 |
| 2 | 7916 | 275 | 2,176,900.00 |
| 3 | 2544 | 275 | 699,600.00 |
| 4 | 359 | 275 | 98,725.00 |
| | | | 5,044,600.00 |
| | Volume | Price per CCF | Volume rate portion |
| | 3,000,000.00 | 1.97 | 5,910,000.00 |
| | | | 10,954,600.00 |

| Size home | Parcels | Meter/home | Fixed rate portion |
|-----------|---------------|----------------------|----------------------------|
| 1 | 7525 | 300 | 2,257,500.00 |
| 2 | 7916 | 300 | 2,374,800.00 |
| 3 | 2544 | 300 | 763,200.00 |
| 4 | 359 | 300 | 107,700.00 |
| | | | 5,503,200.00 |
| | Volume | Price per CCF | Volume rate portion |
| | 3000000 | 1.83 | 5,490,000.00 |
| | | | 10,993,200.00 |

F) Other Considerations

In addition to the residential rate schedule considerations discussed above, it is also recommended that Paterson look at other aspects of its billing service. The concerns about the residential rate schedule being changed from a flat rate to a consumption-based rate were somewhat exacerbated by inadvertent billing errors. Paterson has been working diligently to correct the source of these errors, with positive results.



Another possibility to be considered is the notion of implementing a leakage forgiveness program, which has been adopted in other communities across the country. In general, some communities allow a customer, who is experiencing a significant increase in water billing, to get a rebate/credit for the marginal amount of water used if they can demonstrate that there was a leak and that the leak has since been repaired.

G) Conclusions

As stated previously, the paramount consideration for the City of Paterson is to collect enough revenue to meet the fiduciary responsibilities associated with owning, operating and maintaining its sewer system, regardless of its final decision with respect to the residential rate structure. The feasibility of any residential rate structure modification must meet this primary criterion.

It is recommended that Paterson first review the options set forth in section D above, to reduce the overall revenue requirements, before making any changes to its rate structure. In particular, it is anticipated that a significant amount of water infrastructure funding could be made available by this summer. This funding could be used for capital improvements which would reduce Paterson's operating costs (newer equipment which would require less maintenance, pumps that are more energy efficient, etc.). In addition, the new funding could go toward meeting Paterson's combined sewer overflow capital requirements which could significantly change Paterson's revenue requirements in the short and long run. Once Paterson has evaluated these options and has a clearer sense of its immediate term, short term and long-term revenue requirements, then it can make a more informed decision regarding its residential rate structure.

Therefore, in summary, the primary criterion is to find an equitable rate structure that also brings in enough revenue to meet Paterson's fiduciary responsibilities. Paterson must both continue to analyze and reduce its residential revenue requirements, via the means discussed above, while also regularly examining its residential rate structure to avoid unduly penalizing lower usage customers with higher rates.

Appendix 1

Billing Scenario Examples



| One Family Home | | | | |
|----------------------------|------------------------|------------------|----------------------|---------------------------|
| Scenario Comparison | | | | |
| CCU | Current Billing | Flat Rate | Hybrid Tiered | Hybrid \$300 Meter |
| 0 | 224.00 | 358.40 | 275.00 | 300.00 |
| 25 | 277.99 | 358.40 | 306.50 | 345.75 |
| 50 | 331.97 | 358.40 | 338.00 | 391.50 |
| 100 | 439.94 | 358.40 | 401.00 | 483.00 |
| 150 | 547.91 | 358.40 | 464.00 | 574.50 |
| 200 | 655.88 | 358.40 | 527.00 | 666.00 |
| 300 | 871.82 | 358.40 | 653.00 | 849.00 |

| Two Family Home | | | | |
|----------------------------|------------------------|------------------|----------------------|---------------------------|
| Scenario Comparison | | | | |
| CCU | Current Billing | Flat Rate | Hybrid Tiered | Hybrid \$300 Meter |
| 100 | 439.94 | 681.60 | 551.00 | 483.00 |
| 150 | 547.91 | 681.60 | 614.00 | 574.50 |
| 200 | 655.88 | 681.60 | 677.00 | 666.00 |
| 300 | 871.82 | 681.60 | 803.00 | 849.00 |
| 400 | 1,087.76 | 681.60 | 929.00 | 1,032.00 |
| 500 | 1,303.70 | 681.60 | 1,055.00 | 1,215.00 |
| 600 | 1,519.64 | 681.60 | 1,181.00 | 1,398.00 |



| Three Family Home | | | | |
|----------------------------|------------------------|------------------|----------------------|---------------------------|
| Scenario Comparison | | | | |
| CCU | Current Billing | Flat Rate | Hybrid Tiered | Hybrid \$300 Meter |
| 150 | 547.91 | 969.60 | 814.00 | 574.50 |
| 200 | 655.88 | 969.60 | 877.00 | 666.00 |
| 300 | 871.82 | 969.60 | 1,003.00 | 849.00 |
| 400 | 1,087.76 | 969.60 | 1,129.00 | 1,032.00 |
| 500 | 1,303.70 | 969.60 | 1,255.00 | 1,215.00 |
| 600 | 1,519.64 | 969.60 | 1,381.00 | 1,398.00 |
| 700 | 1,735.58 | 969.60 | 1,507.00 | 1,581.00 |

| Four Family Home | | | | |
|----------------------------|------------------------|------------------|----------------------|---------------------------|
| Scenario Comparison | | | | |
| CCU | Current Billing | Flat Rate | Hybrid Tiered | Hybrid \$300 Meter |
| 150 | 547.91 | 1,292.80 | 889.00 | 574.50 |
| 200 | 655.88 | 1,292.80 | 952.00 | 666.00 |
| 300 | 871.82 | 1,292.80 | 1,078.00 | 849.00 |
| 400 | 1,087.76 | 1,292.80 | 1,204.00 | 1,032.00 |
| 500 | 1,303.70 | 1,292.80 | 1,330.00 | 1,215.00 |
| 600 | 1,519.64 | 1,292.80 | 1,456.00 | 1,398.00 |
| 700 | 1,735.58 | 1,292.80 | 1,582.00 | 1,581.00 |
| 800 | 1,951.52 | 1,292.80 | 1,708.00 | 1,764.00 |

PATERSON SEWER RATE ALTERNATIVE ANALYSIS

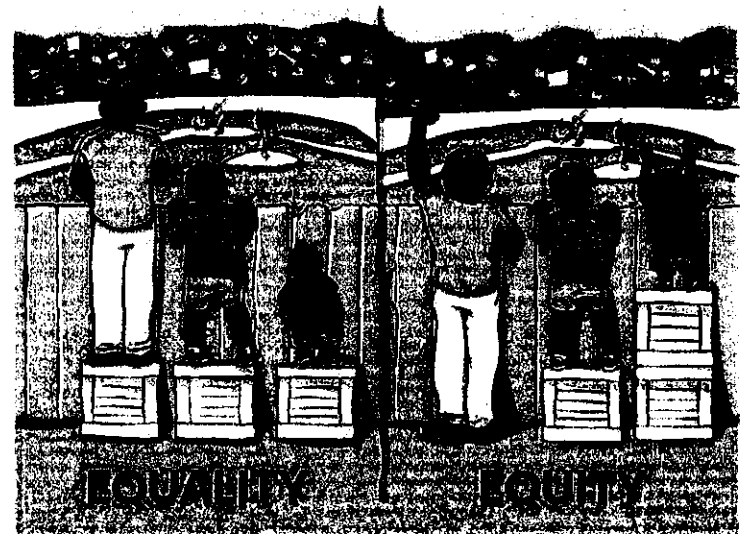
2017-2018

REQUEST FOR RECONSIDERATION OF SEWER RATE STUDY

- FOCUS OF THE QUESTION IS HOW DOES THE CITY OF PATERSON MOST EQUITABLY CHARGE PATERSON RESIDENTIAL CUSTOMERS?
 - **First, examine ways to reduce overall residential revenue requirements:**
 1. Keep volumetric billing for commercial, industrial, nonprofit
 2. Install meters for tributary customers
 3. Implement operational efficiencies – Paterson
 4. Implement operational efficiencies – Passaic Valley Sewerage
 5. Apply for water infrastructure funding
 6. Reduce Long Term Control Plan (LTCP) obligations for CSO
 7. Increase sewer connection fee
 8. Apply for grant to study and plan for stormwater/impervious surface fee

OPTIONS FOR EQUITABLY CHARGING RESIDENTIAL

- FLAT RATES
- CONSUMPTION-BASED RATES
 - Uniform volumetric rates
 - Increasing block rates
 - Decreasing block rates
 - Water budget-based rates
- MIXED RATES – HYBRID METHODS
 - Examples include a return to home-size billing



Flat rate - based on house size - close gap for fully self-liquidating

| Size home | Parcels | Flat rate | Total |
|-----------|---------|-----------|---------------|
| 1 | 7525 | 358.40 | 2,696,960.00 |
| 2 | 7916 | 681.60 | 5,395,545.60 |
| 3 | 2544 | 969.60 | 2,466,662.40 |
| 4 | 359 | 1,292.80 | 464,115.20 |
| | | | 11,023,283.20 |

Hybrid rate - tiered higher fixed rate portion /lower volumetric portion

| Size home | Parcels | Fixed rate | Fixed rate portion |
|-----------|--------------|---------------|---------------------|
| 1 | 7525 | 275 | 2,069,375.00 |
| 2 | 7916 | 425 | 3,364,300.00 |
| 3 | 2544 | 625 | 1,590,000.00 |
| 4 | 359 | 700 | 251,300.00 |
| | | | 7,274,975.00 |
| | Volume | Price per CCF | Volume rate portion |
| | 3,000,000.00 | 1.26 | 3,780,000.00 |
| | | | 11,054,975.00 |

Raftelis hybrid rate - meter based

| Size home | Parcels | Meter/home | Fixed rate portion |
|-----------|--------------|---------------|---------------------|
| 1 | 7525 | 250 | 1,881,250.00 |
| 2 | 7916 | 250 | 1,979,000.00 |
| 3 | 2544 | 250 | 636,000.00 |
| 4 | 359 | 250 | 89,750.00 |
| | | | 4,586,000.00 |
| | Volume | Price per CCF | Volume rate portion |
| | 3,000,000.00 | 2.110 | 6,330,000.00 |
| | | | 10,916,000.00 |

| Size home | Parcels | Meter/home | Fixed rate portion |
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| | | | 10,954,600.00 |

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| 2 | 7916 | 300 | 2,374,800.00 |
| 3 | 2544 | 300 | 763,200.00 |
| 4 | 359 | 300 | 107,700.00 |
| | | | 5,503,200.00 |
| | Volume | Price per CCF | Volume rate portion |
| | 3000000 | 1.830 | 5,490,000.00 |
| | | | 10,993,200.00 |

| One Family Home | | | | |
|----------------------------|------------------------|------------------|----------------------|-----------------------------|
| Scenario Comparison | | | | |
| CCF | Current Billing | Flat Rate | Hybrid Tiered | Raftelis \$300 Meter |
| 0 | 224.00 | 358.40 | 275.00 | 300.00 |
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| 50 | 331.97 | 358.40 | 338.00 | 391.50 |
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| 300 | 871.82 | 681.60 | 803.00 | 849.00 |
| 400 | 1,087.76 | 681.60 | 929.00 | 1,032.00 |
| 500 | 1,303.70 | 681.60 | 1,055.00 | 1,215.00 |
| 600 | 1,519.64 | 681.60 | 1,181.00 | 1,398.00 |

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| 500 | 1,303.70 | 969.60 | 1,255.00 | 1,215.00 |
| 600 | 1,519.64 | 969.60 | 1,381.00 | 1,398.00 |
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| 200 | 655.88 | 1,292.80 | 952.00 | 666.00 |
| 300 | 871.82 | 1,292.80 | 1,078.00 | 849.00 |
| 400 | 1,087.76 | 1,292.80 | 1,204.00 | 1,032.00 |
| 500 | 1,303.70 | 1,292.80 | 1,330.00 | 1,215.00 |
| 600 | 1,519.64 | 1,292.80 | 1,456.00 | 1,398.00 |
| 700 | 1,735.58 | 1,292.80 | 1,582.00 | 1,581.00 |
| 800 | 1,951.52 | 1,292.80 | 1,708.00 | 1,764.00 |