CENTER FOR
PORTLAND CEMENT CONCRETE
PAVEMENT TECHNOLOGY

Field Evaluation of Elliptical Fiber Reinforced Polymer Dowel Performance

Final Report
June 2005

IOWA STATE UNIVERSITY

Sponsored by
the Federal Highway Administration,
U.S. Department of Transportation
(DTFH61-01-X-00042, Project 5)

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Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.	
DTFH61-01-X-00042, Project 5			
4. Title and Subtitle		**5. Report Date**	
Field Evaluation of Elliptical Fiber Reinforced Polymer Dowel Performance		June 2005	
		6. Performing Organization Code	
7. Author(s)		**8. Performing Organization Report No.**	
Max. L. Porter, James. K. Cable, John F. Harrington, Nathan J. Pierson, and Anthony W. Post			
9. Performing Organization Name and Address		**10. Work Unit No. (TRAIS)**	
PCC Center Iowa State University 2901 South Loop Drive, Suite 3100 Ames, IA 50010-8634		**11. Contract or Grant No.**	
12. Sponsoring Organization Name and Address		**13. Type of Report and Period Covered**	
Federal Highway Administration U.S. Department of Transportation 400 7th Street SW, HIPT-20 Washington, DC 20590		Final Report	
		14. Sponsoring Agency Code	
15. Supplementary Notes			
Visit www.ctre.iastate.edu for color PDF files of this and other research reports.			

16. Abstract

Fiber reinforced polymer (FRP) composite materials are making an entry into the construction market in both buildings and pavements. The application to pavements so far has come in the form of joint reinforcement (dowels and tie bars). FRP resistance to salt corrosion in dowels has made it an alternative to standard epoxy-coated steel dowels for pavements. Iowa State University has completed a large amount of laboratory research to determine the diameter, spacing, and durability of FRP dowels.

This report documents the performance of elliptical FRP dowels installed in a field situation. Ten joints were monitored in three consecutive test sections, for each of three dowel spacings (10, 12, and 15 inches) including one instrumented dowel in each test section. The modulus of dowel bar support was determined using falling weight deflectometer (FWD) testing and a loaded crawl truck. FWD testing was also used to determine load transfer efficiency across the joint. The long-term performance and durability of the concrete was also evaluated by monitoring faulting and joint opening measurements and performing visual distress surveys at each joint. This report also contains similar information for standard round, medium elliptical, and heavy elliptical steel dowels in a portion of the same highway. In addition, this report provides a summary of theoretical analysis used to evaluate joint differential deflection for the dowels.

17. Key Words		**18. Distribution Statement**	
dowels—fiber reinforced polymer applications—load transfer		No restrictions.	
19. Security Classification (of this report)	**20. Security Classification (of this page)**	**21. No. of Pages**	**22. Price**
Unclassified.	Unclassified.	93	NA

Form DOT F 1700.7 (8-72) **Reproduction of completed page authorized**

FIELD EVALUATION OF ELLIPTICAL FIBER REINFORCED POLYMER DOWEL PERFORMANCE

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Principal Investigators
Max L. Porter
Professor
Department of Civil, Construction and Environmental Engineering, Iowa State University

James K. Cable
Associate Professor
Department of Civil, Construction and Environmental Engineering, Iowa State University

Research Assistants
John F. Harrington
Nathan J. Pierson
Anthony W. Post

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A report from
PCC Center
Iowa State University
2901 South Loop Drive, Suite 3100
Ames, IA 50010-8634
Phone: 515-294-8103
Fax: 515-294-0467
www.ctre.iastate.edu

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ACKNOWLEDGMENTS

The research described herein was conducted at Iowa State University in the Department of Civil, Construction, and Environmental Engineering through the Center for Portland Cement Concrete Pavement Technology with contractual administration conducted by the Center for Transportation Research and Education. Sponsorship of this research was provided by the U.S. Department of Transportation via the Federal Highway Administration (FHWA).

Additional sponsorship for this project was made possible by the combined efforts of the Hughes Brothers, Inc., of Seward, Nebraska, to supply FRP bars and baskets for the project. Without the donation of the materials, this project most likely would not have taken place.

The authors would also like to recognize and thank Mr. Mark Swanlund of the FHWA and the FHWA staff personnel for aiding in processing the sponsorship of this project and providing information related to this work. In addition, the authors wish to thank Doug Gremmel from Hughes Brothers, Inc. for arranging the supply of the dowel bars and baskets, as well as providing the information about the dowels.

Special recognition is also given to the staff of Cedar Valley Construction, Inc., for their support in the placement of the dowel baskets and cooperation in conducting paving operations around the instrumented sites. They made the research a reality in the field.

The authors would like to acknowledge the support provided by Douglas L. Wood, Iowa State Structural Engineering Laboratory Supervisor, for his expertise and assistance in preparing the specimens and collecting the data. Appreciation is also extended to the many hourly laboratory assistants. Additional thanks and recognition is extended to the Iowa Department of Transportation personnel for their dedicated work in providing a loaded crawl truck and their assistance in collecting the needed data.

1. INTRODUCTION

1.1. Background

Transverse joints are used in concrete paving to mitigate cracking effects caused by moisture infiltration, temperature changes, and concrete shrinkage. The joints purposely create weak areas in the concrete and, therefore, require the use of load transferring devices to maintain continuity in the pavement. The most common load transfer device currently in use is the epoxy-coated steel dowel. The dowel is usually round with a diameter of 1.25 or 1.5 inches, depending upon the slab thickness. The dowels present two main problems to the lifespan of the joint: corrosion and oblonging within the joint.

Corrosion occurs in the steel bar because of a chloride ion exchange caused by the environment and various salts applied to the roadway during adverse winter weather conditions. The corrosion weakens the dowel by causing a reduction in the effective load bearing area in the steel dowel. The corroded steel will also cause chipping and spalling in the surrounding concrete. The epoxy coating is designed to prevent the chloride from interacting with the steel. However, there are usually flaws in the epoxy coating caused by careless handling, storage, placement, or manufacturing, which in turn causes nicks, pin-holes, and scrapes. Moisture attacks the coating flaws and causes pitted corrosion beneath the surface of the coating [1].

Corrosion also causes the steel dowels to expand and thus freeze or lock the joints, preventing the intended normal slip required of a dowel bar within the joint. The dowel bar must slip to accommodate the expansion and contraction that results from temperature, shrinkage, and moisture changes in the slabs. A locked joint will cause cracking to occur outside of the intended doweled joint, resulting in pavement failure.

Oblonging occurs in the concrete around the dowel due to excessive bearing stresses between the bar and the concrete surface under repeated reversed loadings. The high stresses weaken the concrete and eventually loosen the connection between the dowel and the pavement.

To date, all fiber-reinforced polymer (FRP) dowel bar-related research in the United States has centered on the chemical makeup of materials in the bars and their laboratory strength evaluations. Iowa State University (ISU) has done much of this research [1-11]. Currently, research is underway to evaluate field installations for round dowels. A recent ISU study indicated that elliptical-shaped dowels could offer pavement performance benefits by reducing bearing stresses above and below the dowel [12-15]. This assertion is currently being tested further at ISU under the direction of Dr. Max Porter and Dr. James Cable. A field evaluation of the performance of elliptical-shaped steel and FRP dowels is being performed on U.S. Highway 330 near Melbourne, Iowa, in Marshall County.

Other FRP dowel bar research is being and has been conducted in Illinois, Ohio, Minnesota, and Wisconsin. Research in Iowa and Ohio has suggested that corrosion deterioration comparisons between FRP and steel dowels require longer-term evaluation. Research from these states has shown that steel generally provides a higher load transfer efficiency than FRP for round dowels of the same size and at the same spacing. Combinations of size, shape, and spacing affect this load transfer efficiency. Therefore, studies are needed of the performance of larger FRP dowels with smaller spacing between bars to improve load transfer efficiency. Studies conducted at ISU and in Illinois have recommended the testing the ability of elliptical-shaped dowels (both FRP and steel) to improve load transfer efficiency [16].

The research given in this report provides the opportunity to compare elliptical-shaped FRP bars in a roadway section immediately adjacent to (but separate in construction from) a roadway segment with round and elliptical-shaped steel bars (Federal Highway Administration, Project DTFH6103C00119) [12]. The advantage of this comparison on the same highway is that the same traffic will most likely use both segments of roadway and the environmental conditions will be very similar over the research period. This comparison can result in one measure of the relative stiffness, durability, cost, and strength of each material installed.

1.2. Research Objectives

The objective of this research is to evaluate the load transfer capabilities of elliptical-shaped FRP dowels and basket assemblies across pavement joints. The intent of this work is to estimate the performance of the individual dowel configurations in terms of stiffness, durability, modulus of dowel support, and deflection predictions. The following comparisons will be made after analyzing field data from Highway 330:

- Performance of elliptical FRP dowels versus that of conventional 1.5-inch diameter circular epoxy-coated steel dowels
- Performance of FRP versus conventional steel dowels with respect to long-term resistance to corrosion
- Effect of an elliptical versus circular shape in reducing the bearing contact stress between the concrete and the dowel bar

1.3. Research Approach

The life cycle of the project, as described in the proposal, lasts from September 30, 2002 through September 30, 2005. The investigators performed biannual testing. These tests were conducted once each spring and once each late summer. The objective of testing in the spring was to take advantage of a weaker subbase due to ground thaw. The late summer tests were conduced in hopes of having a very dry foundation. All tests were taken during similar times of day in order to best control the variance in temperature during the day to ensure comparable results from year to year. The tests consisted of the following procedures to monitor the pavement’s performance:

- Falling weight deflectometer (FWD)
- Strain gage analysis under two conditions
- Load application with a standard Department of Transportation dump truck (crawl truck)
- Load application with FWD
- Joint faulting measurement
- Joint widening measurement
- Visual distress survey

The final report provides a comprehensive summary of the project's research, including installation, evaluation, and subsequent conclusions and recommendations.

2. THEORY

2.1 Joint Load Transfer

If dowel bars achieved 100% efficiency in load transfer, 50% of the wheel load would be transferred to the subgrade while the other 50% would be transferred through the dowels to the adjacent slab [2]. However, repetitive loading of the joint results in the creation of a void directly above or beneath the dowel at the face of the joint. According to Yoder and Witczak [17], a 5% to 10% reduction in load transfer occurs upon formation of this void. Therefore, a design load transfer of 45% of the applied wheel load is recommended.

$$P_t = 0.45P_w \qquad (2\text{-}1)$$

Where,

P_t = load transferred across the joint (lbs)

P_w = applied wheel load (lbs)

Not all dowels are active in transferring the applied wheel load across the joint. Friberg [18] was the first to examine the distribution of transferred load to the dowels within a transverse joint. He assumed that dowel bars close to the load were more effective in transferring load than those farther away. For joints containing 0.75-inch or 0.875-inch diameter dowel bars spaced from 12 to 20 inches apart, Friberg postulated that only the dowels contained within a distance of $1.8\ell_r$ from the load are active in transferring the load, where ℓ_r is the radius of relative stiffness, defined by Westergaard [19] as follows:

$$\ell_r = \sqrt[4]{\frac{E_c h^3}{12(1-\mu)^2 K}} \qquad (2\text{-}2)$$

Where,

E_c = modulus of elasticity of the pavement concrete (psi)

h = pavement thickness (in.)

μ = poisson’s ratio for the pavement concrete

K = modulus of subgrade reaction (pci)

Friberg also proposed a linear distribution of the load transferred across the joint as shown in Figure 2.1. For transverse joints containing dowel bars having a larger diameter or closer spacing, the stiffness of the joint increases and a distance of $1.8\ell_r$ is no longer applicable.

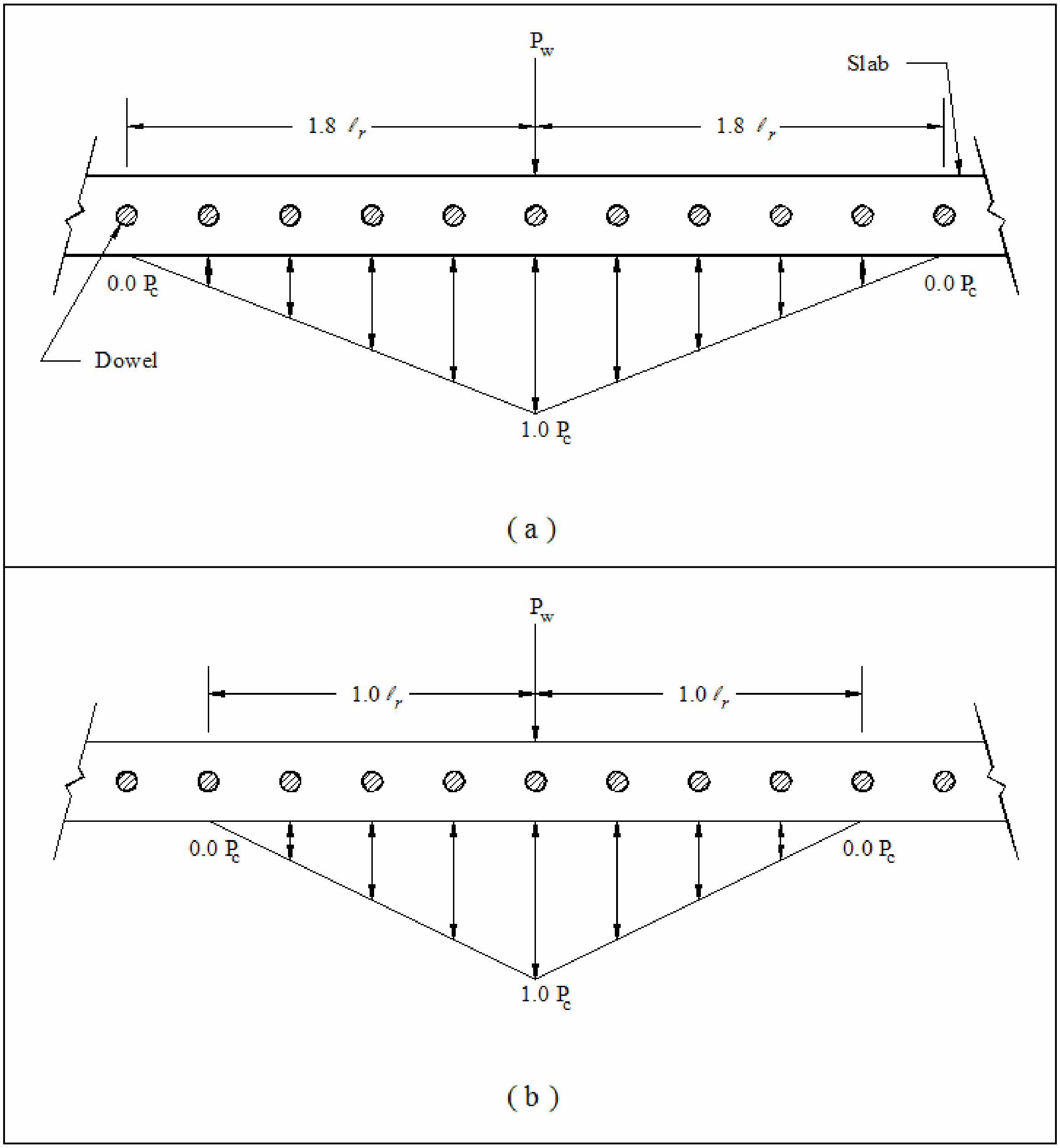

Figure 2.1. Load distribution model by Friberg (a), and Tabatabaie (b)

Finite element modeling of doweled joints by Tabatabaie [20] showed that an effective length of $1.0\ell_r$ from the applied wheel load is more appropriate for dowels used in practice today. A linear approximation was also shown to exist with the maximum dowel shear occurring directly beneath the load and decreasing to a value of zero at a distance of $1.0\ell_r$ from the load.

If the force transferred by a dowel located directly beneath the wheel load is designated as P_c, then the shear force in any other active dowel can be determined by multiplying the height of the triangle below that particular dowel by P_c. A value of 1.0 is assumed for the height of the triangle directly below the load as shown in Figure 2.1.

The shear force in the dowel directly under the load is obtained by dividing the transferred load, P_t, by the number of effective dowels, as shown by Equation 2-3.

$$P_c = \frac{P_t}{\#\,Effective\ Dowels} \tag{2-3}$$

The sum of the heights of the triangle under each dowel gives the number of effective dowels.

2.2. Modulus of Dowel Support

The deflection of a dowel bar within pavement can be modeled using Timoshenko's model of a beam on an elastic foundation [21].

$$-ky = EI\frac{d^4 y}{dx^4} \tag{2-4}$$

Where,

k = Modulus of foundation (psi)

y = Vertical dowel deflection (in)

E = Young's modulus for dowel (psi)

I = Moment of inertia for dowel (psi)

The general solution of Timoshenko's differential equation is as follows in Equation 2-5.

$$y = e^{\beta x}\left(A\cos\beta x + B\sin\beta x\right) + e^{-\beta x}\left(C\cos\beta x + D\sin\beta x\right) \tag{2-5}$$

Where,

β = Relative stiffness of beam on foundation $= \sqrt[4]{\dfrac{k}{4EI}}$

When applying appropriate boundary conditions to Equation 2-5, the constants A, B, C, and D can be obtained. In the case of a semi-infinite beam with a point load, P, and moment, M_0, Timoshenko's equation becomes the following:

$$y = \frac{e^{-\beta x}}{2\beta^3 EI}\left[P\cos\beta x - \beta M_0\left(\cos\beta x - \sin\beta x\right)\right] \tag{2-6}$$

Equation 2-6 was applied by Friberg to evaluate a dowel with semi-infinite length and an elastic base. In order to calculate the deflection at the face, Equation 2-6 is applicable by setting x=0. Equation 2-6 then becomes the following:

$$y_0 = \frac{P_t}{4\beta^3 EI}(2 + \beta z) \qquad (2\text{-}7)$$

and

$$\beta = \sqrt[4]{\frac{k_0 b}{4EI}} \qquad (2\text{-}8)$$

Where,

k_0 = Modulus of dowel support (pci)

b = Dowel bar width (in.)

P_t = Load carried by dowel (lbs)

z = Joint width (in.)

Equations 2-7 and 2-8 can be solved by calculating a y_0 value from the data, solving for β using Equation 2-7, and finally obtaining k_0 from Equation 2-8.

The deflection of the dowel at the face of the joint can be calculated using the relative displacement between slabs and the joint width. A diagram of the interaction between the two slabs is shown in Figure 2.2.

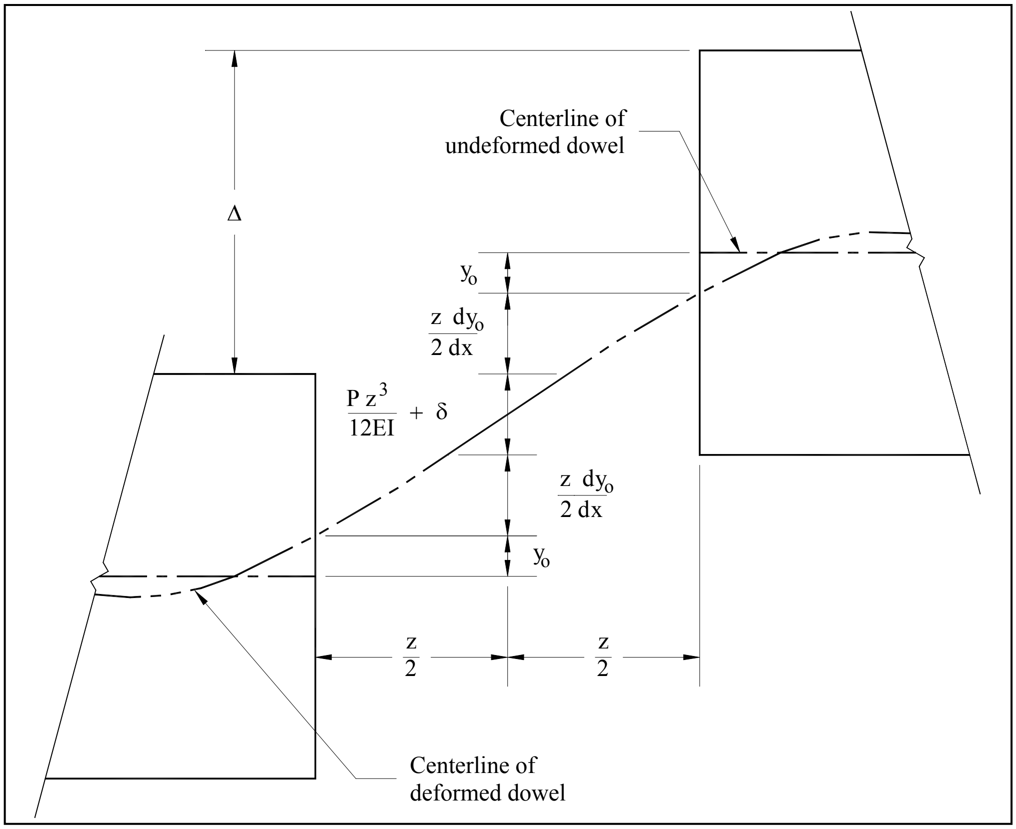

Figure 2.2. Relative deflection between slab sections

According to the above figure, the relative deflection, Δ, is dependent on four main components:

- Deflection at each joint face, y_0
- Deflection due to the slope of the dowel, $\frac{zdy_0}{dx}$
- Moment deflection, $\frac{Pz^3}{12EI}$
- Shear deflection, δ

The relative deflection, Δ, can be calculated by using Equation 2-9:

$$\Delta = 2y_0 + z\frac{dy_0}{dx} + \frac{Pz^3}{12EI} + \delta \qquad (2\text{-}9)$$

Where,

δ = Shear deflection= $\frac{\lambda Pz}{AG}$

P = Load carried by dowel (lbs)

A= Cross-sectional area of dowel (in.^{2})

λ = *Form Factor* = 10/9 (assumed) for elliptical dowels

G= Shear modulus (psi)

For this report, the joint widths are very narrow, roughly 0.125 inches. Due to the small differential displacement and joint width, both moment deflection and slope deflection were neglected. The authors assumed that the numbers would be insignificant due to the total deflection calculation. The following equation was used to calculate y_0 after making the appropriate changes to Equation 2-10:

$$y_0 = \frac{(\Delta - \delta)}{2} \qquad (2\text{-}10)$$

3. TESTING PROGRAM

3.1. Project History

The project site for the elliptical FRP dowel bars is located just west of Melbourne, Iowa, on Iowa Highway 330. Field installation of these dowel bars was done as part of a 7.864-mile (12.656-km), four-lane divided-highway construction project. The project's pavement construction was completed using the metric system; therefore, all stationing is measured in meters (see Figure 3.1).

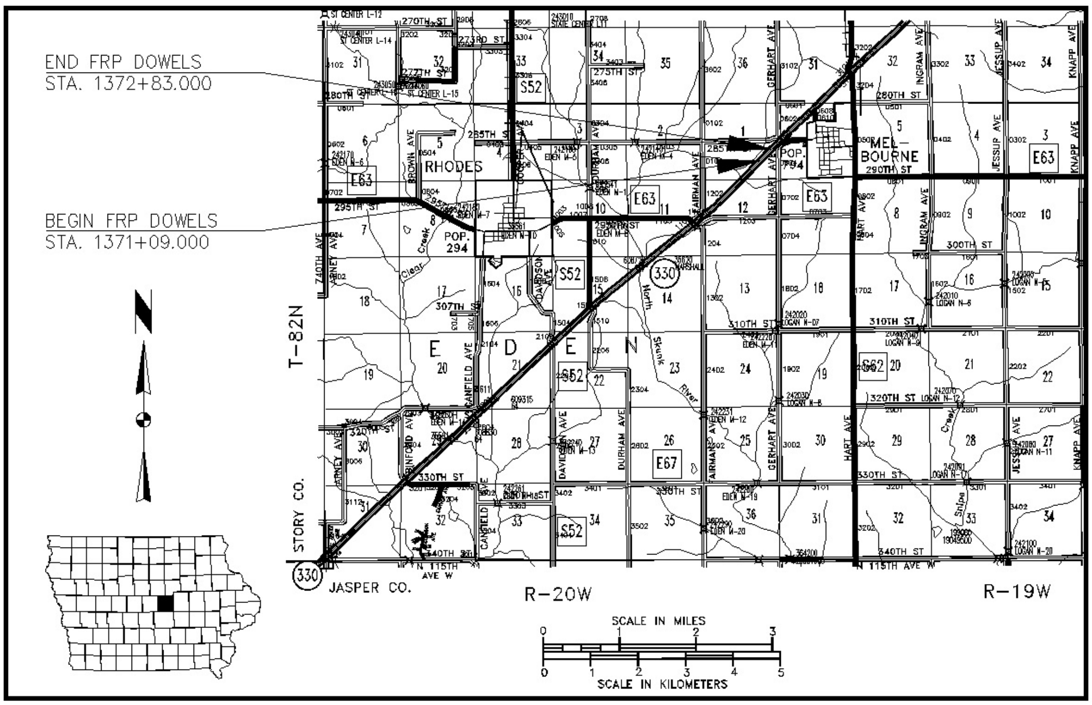

Figure 3.1. Project site map

3.1.1. Dowel Bar Locations

Placement of the dowel bars occurred in the northbound lanes at thirty joint locations beginning at Station 1371+09 and ending at Station 1372+83. The spacing between each joint is 19.69 feet (6 m) and all joints were constructed perpendicular to the edge of the concrete pavement. Spacing of the dowel bars within each joint was varied, with three different dimensions of 10, 12, and 15 inches (254, 305, and 381 mm). Table 3.1 and Figure 3.2 illustrate the layout and location of the elliptical FRP dowel bars installed for this project.

Table 3.1. Stationing and spacing of elliptical FRP dowel bars

Begin Station	End Station	Number of Joints	Dowel Spacing, in. (mm)
1371+09	1371+61	10	10 (254)
1371+69	1372+23	10	12 (305)
1372+29	1372+83	10	15 (381)

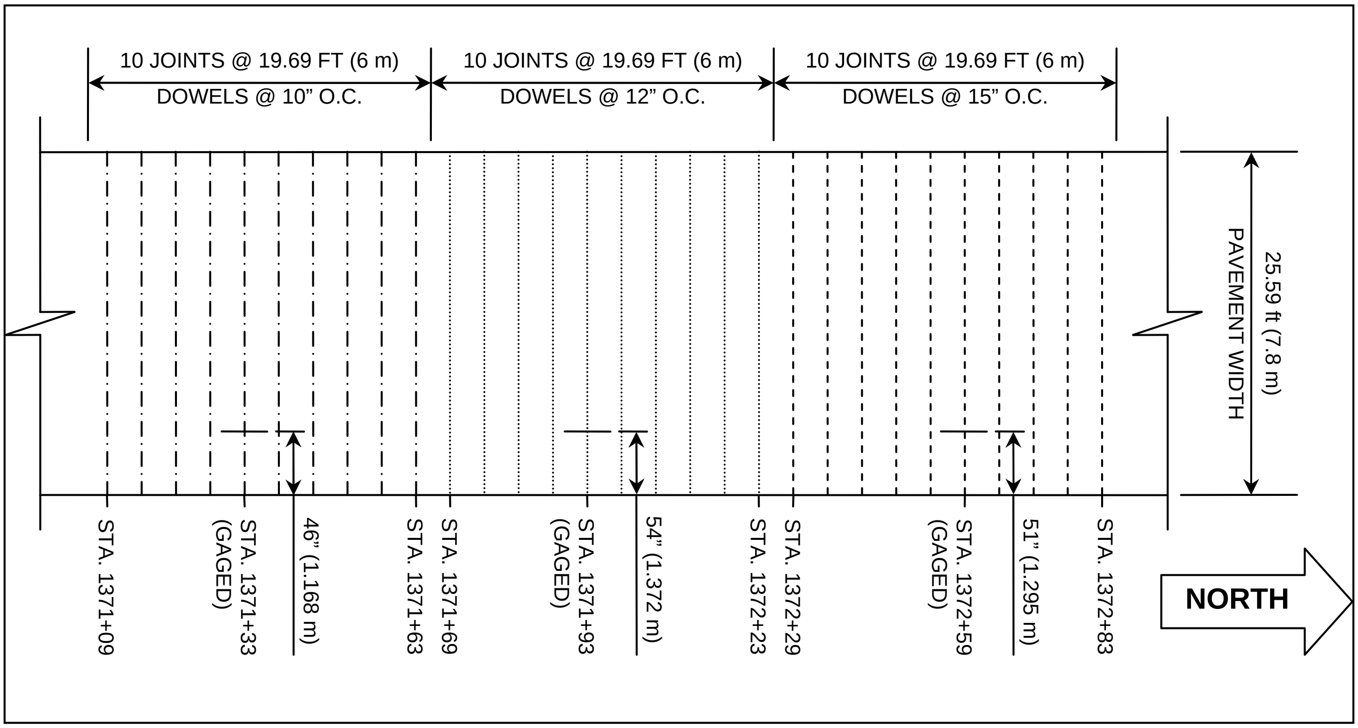

Figure 3.2. Stationing and spacing of elliptical FRP dowel bars

3.1.2. Construction History

Specially built elliptical dowel bar basket assemblies were used to install the dowel bars in this portion of the project in order to elevate the center of the bars 5 inches (127 mm) from the subgrade, placing them in the center of the 10-inch (254-mm) slab pavement. Figure 3.3 shows a photo of a typical dowel bar basket assembly. Conventional welding methods for attaching the dowel bars to the baskets, as used with steel dowel bars, could not be used with the FRP material. Therefore, plastic ties and epoxy were used to attach the FRP dowel bars to the baskets. Special care was taken to ensure that the epoxy was strong enough to hold the bars in place during concrete placement, yet brittle enough to crack and allow the bars to move in the longitudinal direction after the concrete had cured.

Figure 3.3. Dowel bar basket assembly (bars at 10-inch spacing)

Each of the basket assemblies were originally placed and staked at six inches (152 mm) from the proposed edge of the pavement. However, during the paving process, adjustments had to be made along the east edge of the northbound lane due to the discovery that some of the basket assemblies extended beyond the actual edge of the pavement. The eastern-most bar and basket end was removed from the dowel bar basket assemblies at Stations 1371+09, 15, 21, 87, and 1372+65 to prevent any contact between the basket assemblies and the paver.

Strain gage wires were buried just beneath the subgrade over the width of the shoulder to avoid interference with the pavement construction. After the paving was complete, the wires were uncovered and threaded through a protective PVC pipe and again buried under the shoulder. Strain gage wires for the dowel bars at Station 1371+33, which correspond to the 10-inch (254-mm) spacing, were destroyed during the shoulder construction process.

3.2. Test Descriptions

The testing for this project involved both mechanical and visual tests during the period of observation beginning in the fall of 2002. During the contract period, the following tests were conducted:

- Strain gages

- Falling weight deflectometer (FWD)
- Faulting
- Joint opening
- Visual distress surveys
- Laboratory tests

3.2.1. Strain Gages

In order to determine the stresses on the dowel bars at different spacings, one dowel bar from each of the 10- , 12- , and 15-inch (254- , 305- , and 381-mm) spacings was fitted with eight strain gages. The strain-gaged dowel bars were located as follows:

- 10-inch (0.254-meter) spacing: at Station 1371+33 on fifth bar in from right edge of pavement (46 inches [1.168 meters] from edge of pavement)
- 12-inch (0.305-meter) spacing: at Station 1371+93 on fifth bar in from right edge of pavement (54 inches [1.372 meters] from edge of pavement)
- 15-inch (0.381-meter) spacing: at Station 1372+59 on fourth bar in from right edge of pavement (51 inches [1.295 meters] from edge of pavement)

Four gages were placed on the top and bottom of each dowel bar. Strain gages were located at a distance of 1.5 and 4.5 inches (38 and 114 mm) from the centerline of the 18-inch (457-mm) long dowel bars. These distances were chosen to be the same as the strain gages placed on the coinciding elliptical steel dowel bar project so that a comparison between the two types of bars would be made easier. Gages were glued to the bars and strain gage wire was then soldered to each strain gage. The gage and wires were then covered to prevent damage before installation. Gages were labeled A through H, as listed in Figure 3.4.

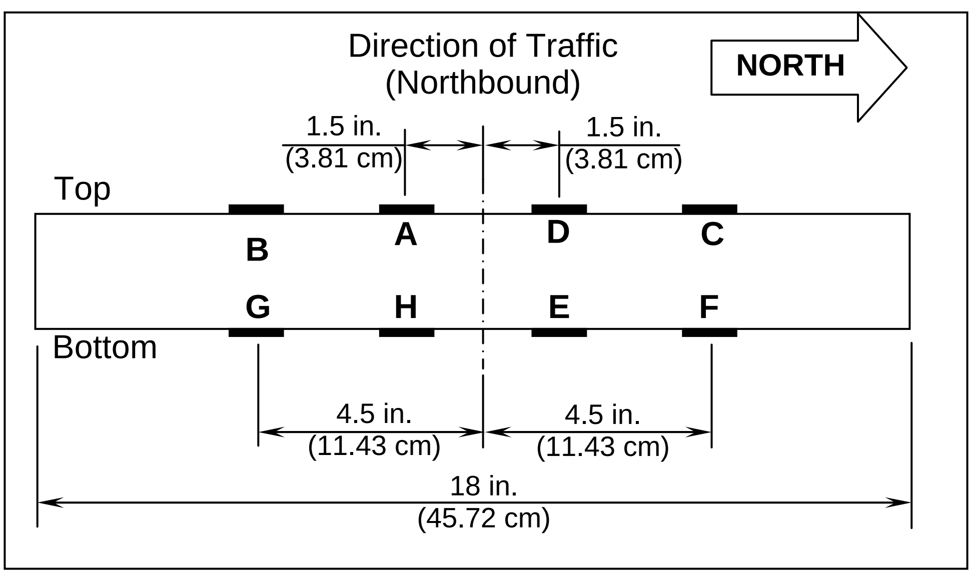

Figure 3.4. Location of strain gages on elliptical FRP dowel bars

Strain gage readings were taken twice, during each measurement period. One set of readings was taken during FWD testing, and the other set was taken while a loaded truck traversed the joints containing the gaged dowels at crawl speed (Figure 3.5) during each measurement period.

Figure 3.5. Loaded dump truck

Since not all strain gages were working properly, k_0 cannot be calculated directly; however, the deflected shape can be determined based on Friberg's semi-infinite beam theory, and y_0 can be found and directly compared to the y_0 value from FWD testing. The equation for the deflected shape of a dowel bar is given in Equation 2-6:

$$y(x) = \frac{e^{-\beta \cdot x}}{2 \cdot \beta^3 \cdot E \cdot I_z}\left[(V - M \cdot \beta) \cdot \cos(\beta \cdot x) + (M \cdot \beta) \cdot \sin(\beta \cdot x)\right] \quad (2\text{-}6)$$

Where,

$$\beta = \sqrt[4]{\frac{k_o \cdot b}{4 \cdot E \cdot I_z}} \quad (2\text{-}8)$$

To solve this equation, the moment, M, and shear, V, must be determined for any position across the length of the dowel. The moment at each strain gage can be determined using the following equation:

$$\sigma = \frac{M \cdot c}{I_z}$$

Where,

$$\sigma = \varepsilon \cdot E$$

Therefore,

$$M = \frac{\varepsilon \cdot E \cdot I_z}{c}$$

ε = strain from strain gages (microstrains)

σ = the stress based on the strain reading (psi)

E = the modulus of elasticity (psi)

I_z = the moment of inertia (in^4)

c = the radius of the minor axis of the elliptical dowel bar (in.)

The moment for any given location on the bar can be interpolated from the moments determined from the strain gages and the following assumed boundary conditions:

- Shear is zero at each end of each dowel
- Moment is zero at each end of each dowel
- Moment is zero at the center of each dowel
- The inflection point occurs at the center of each dowel
- k_0 = 939,000 psi for an FRP elliptical dowel or 1,052,000 psi for a steel elliptical dowel (both determined from current lab testing at ISU as discussed in Section 3.2.6)

The shear at any point on the dowel can be determined from [13]:

$$V(x) = -\frac{e^{-\beta \cdot x}}{2} \cdot \left[\left(P_c - M_o \cdot \beta\right) \cdot \left(2 \cdot \cos(\beta \cdot x) - 2 \cdot \sin(\beta \cdot x)\right) + M_o \cdot \beta \cdot \left(4 \cdot \sin(\beta \cdot x) + 2 \cdot \cos(\beta \cdot x)\right) \right]$$

Where,

$$M_0 = \frac{P_c \cdot z}{2}$$

P_c = the load applied to the dowel determined by load distribution (see Section 2.2 and Figure 3.6)

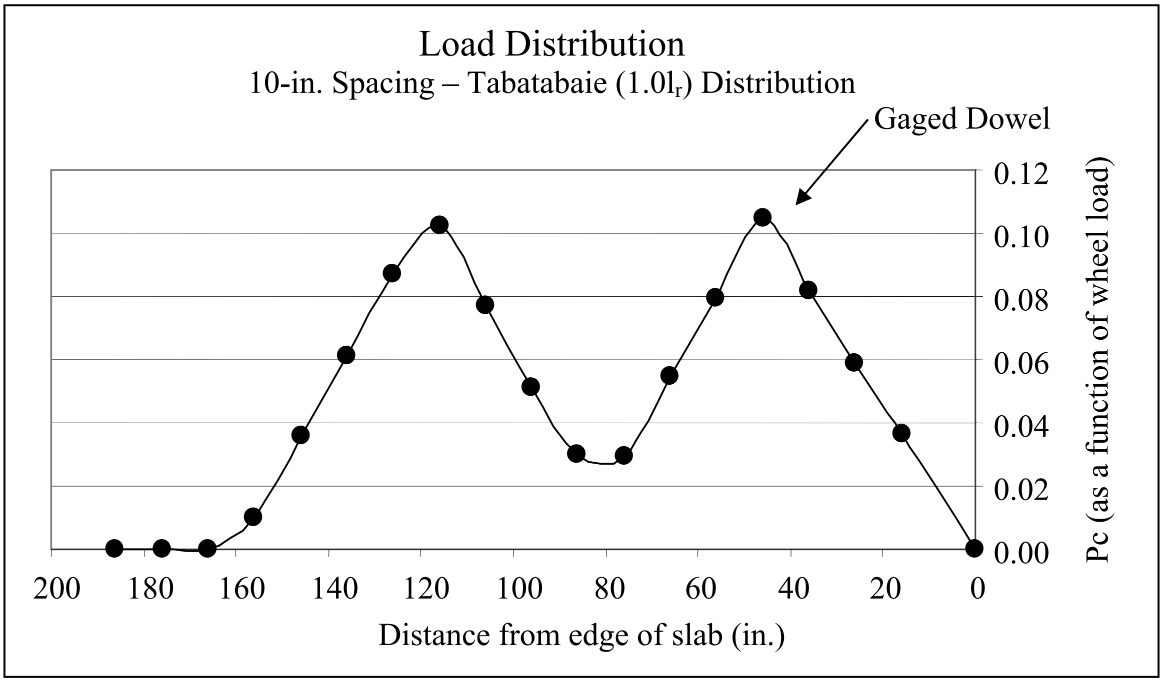

Figure 3.6. Load distribution

Once moment and shear are calculated from the strain gage readings and given boundary and loading conditions, deflection along the dowel, y(x), can be plotted. See Figure 3.7 for an example plot of deflected shape. Note that this figure illustrates a general deflected shape for the dowel bars. Therefore, no values are given for the actual deflections. These deflections, however, typically have an order of magnitude of 1/10,000 of an inch for the tests included in this report.

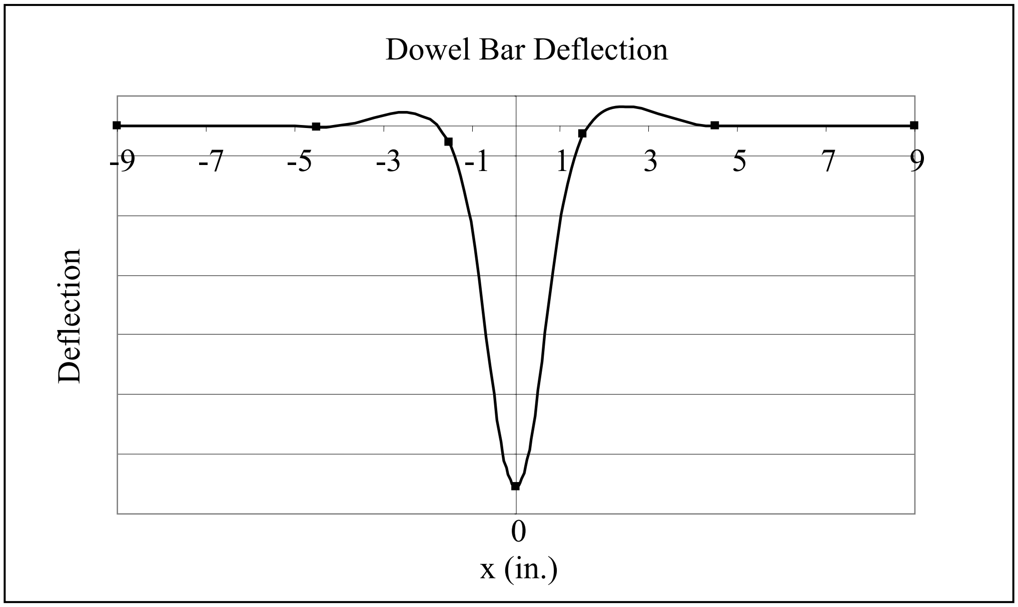

Figure 3.7. Deflected shape of dowel bar

3.2.2. Falling Weight Deflectometer

The FWD is a nondestructive test that involves applying a known load near a pavement joint. Loads and their corresponding deflections obtained from the FWD test were placed into a spreadsheet program. The deflections corresponding to each load were plotted with each sensor's distance from the load. The program was used to calculate a second-order equation relating downward deflection (in 0.001 inches) to distance from the load (in inches). The deflection equation was used to determine relative displacement between each slab surface at the joint.

The FWD tests were conducted by the Iowa Department of Transportation (see Figure 3.8).

Figure 3.8. Falling weight deflectometer

Tests were made on three transverse joints and three mid-panel locations per test section per lane. Testing was performed in the outside wheelpath, 2 feet (0.6 m) from the outer edge, in each lane.

FWD tests utilized nine deflection sensors placed at -4, 4, 12, 18, 24, 36, 48, and 60 inches (-102, 102, 305, 457, 610, 914, 1219, 1524 mm) from the center of the load plate (See Figure 3.9).

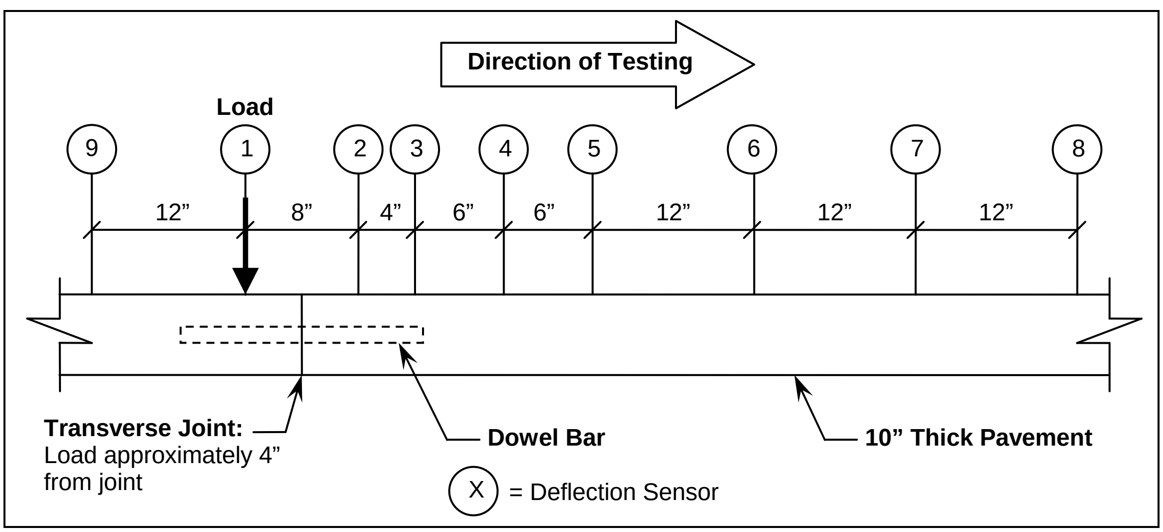

Figure 3.9. Location of FWD loading and deflection sensors

One seating drop and three separate load test drops were conducted at each test location with a target load of 9,000 force pounds (40.033 kN). Results from the FWD testing are discussed in the “Analysis and Results” portion of this report in Appendix A, with actual measurement data and graphs.

3.2.3. Faulting

The Georgia fault-meter was used to measure faulting at the inside and outside wheelpaths of the driving lane (see Figure 3.10).

Figure 3.10. Georgia fault meter

The digital readout of the fault meter indicates positive or negative faulting in millimeters. To obtain the readings, the fault meter was set on the pavement facing traffic, on the leave side of the joint, and the measuring probe was in contact with the approach slab. Movement of the probe was then transmitted to a linear variance displacement transducer to measure the difference in elevation between the two sides of the joint or the amount of faulting. A slab that is lower on the leave side of the joint indicates positive faulting, and a slab leaving the joint that is higher will register as a negative fault. Measurements are taken in the driving lane, outside wheelpath 30 inches (762 mm) from the edge of the pavement and in the passing lane, inside wheelpath some 18 inches (457 mm) from the edge of the pavement. Results of the faulting measurements are discussed under “Analysis and Results” in Appendix B, with actual measurement data [14].

3.2.4. Joint Opening

To monitor the transverse joint opening, surveyor mag nails were placed in the wet concrete (flush with the surface) on either side of the joints in the outside lane to serve as a point of reference for measurement. Transverse joint movement was monitored at 10 consecutive joints in the middle of each test section. At these locations, nails were placed in the concrete within the first hour of paving 12 inches (305 mm) in from the edge of the slab with 10 inches (254 mm) between nails (5 inches [127 mm] offset either side of the joint).

Figure 3.11. Calipers and surveyor nails (nails not installed)

Figure 3.11 shows an example of the nails and calipers used. Initial measurements between the nails shortly after paving served as a benchmark for future joint movement. Joint opening measurements were made at the same time as faulting and visual distress surveys. Measurements from each joint opening survey can be found in Appendix B, and graphs displaying the trends are in Appendix C [14].

3.2.5. Visual Distress Surveys

Visual distress surveys were performed concurrently with the biannual joint opening and faulting measurements by ISU research staff. Completed in accordance with the Strategic Highway Research Program, the visual distress surveys consisted of a visual evaluation of the pavement surface for any signs of horizontal slab movement, spalling, or cracking. No signs of visual distress were recorded for the elliptical FRP dowel sections.

3.2.6. Laboratory Tests

Tests were performed at ISU in the structures laboratory located in Town Engineering Building. The tests are a part of ongoing research to investigate the current AASHTO T253-76 [22] testing method for dowel bars. The test specimens were constructed using concrete and various dowel shapes. Steel and glass fiber reinforced polymer (GFRP) dowels were tested. Each specimen consisted of three concrete blocks connected with two dowel bars (see Figure 3.12).

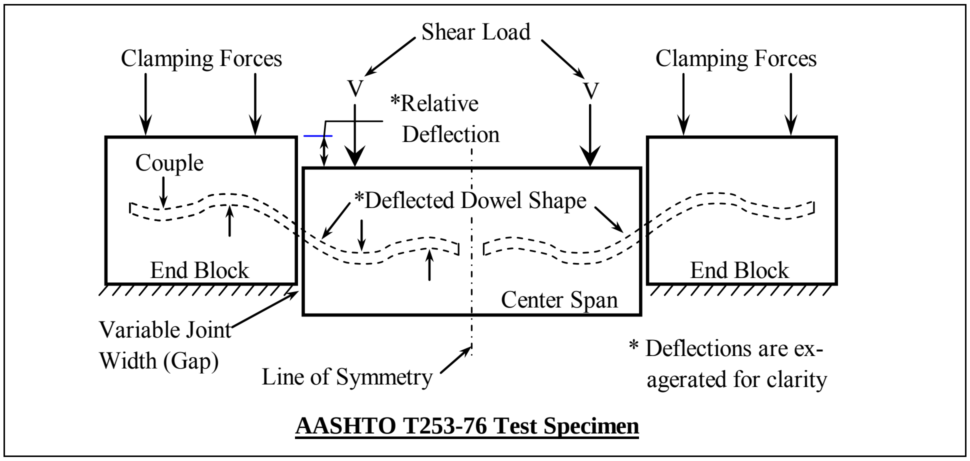

Figure 3.12. AASHTO T253-76 test diagram [13, 22]

The specimens featured in this report all contained 2.25 x 1.25-inch elliptical GFRP dowels. The GFRP test results are included in this report because there is insufficient data from previous research to compare k_0 values calculated using lab data and field data. Previous research involving k_0 for steel dowels was available for comparison in this report.

Figure 3.13. Load test frame

The load frame used to test the lab specimens is shown in Figure 3.13. The vertical pipes supporting the top cross beam were post-tensioned to the structural tie-down floor using a 1.25-inch diameter steel Dywidag rod in each pipe. This was done to ensure smooth load transfer from the hydraulic actuator to the concrete test specimen. Downward load was transferred from the hydraulic jack to the test specimen by using a six–inch-deep wide flange steel beam with web stiffeners. Two 1.25-inch diameter solid steel bars were placed 3 inches from each end of the center block in order to transfer the downward load from the beam to the concrete. Thin sheets of neoprene were placed beneath the loaded rollers to allow for an even transverse load application along each bar.

The end blocks of the specimen were clamped down to the lower steel support plates using high-strength Dywidag steel rods. The goal of each end support was to create a fixed-end condition on each side of the specimen. The bars were tightened to prevent end-block rotation. The clamping mechanisms were tightened using wrenches in lieu of using a hydraulic jack to avoid external stresses acting on the dowels and affecting the deflection behavior of the bar. The goal of the fixed-end conditions is to promote shear behavior in the sample dowel bars. Another reason for the fixed-end condition is to minimize the effect of bending forces on the dowel.

The specimens were instrumented with direct current deflection transducers (DCDTs). A total of eight DCDTs were used. Four were used to measure relative deflections on the right and left ends of the specimen. Two were placed at the far ends of the end blocks to monitor the movement in the restrained ends. Two more were placed on the base plates that support the specimen in order to monitor movement of the entire testing surface.

The procedure used to calculate k_0 with field data was also implemented with lab data. The force acting on each dowel was assumed to be half the total load acting on the apparatus. All deflections not pertaining to the relative deflection of the middle block were neglected due to their small magnitude.

4. ANALYSIS AND RESULTS

4.1. FRP Dowels

4.1.1. Falling Weight Deflectometer

The FWD test deflection readings (see Appendix A) can be used to determine k_0. First the relative deflection, $\Delta_{REL,}$ is determined from the deflection readings (see Figure 2.2 and Section 2.3). Next, shear deflection, δ, is determined by the following:

$$\delta = \frac{\lambda \cdot P_c \cdot z}{A \cdot G}$$

Where,

$\lambda = \frac{10}{9}$ (approximate) for ellipses

P_c = the load applied to the dowel (lbs)

z = the width of the joint (in.)

A = the cross-sectional area of the dowel (in.^{2})

$G = \frac{E}{2(1+\nu)}$ = the shear modulus (psi)

E = the modulus of elasticity (psi)

ν = Poisson's ratio

Then, y_0 can be calculated:

$$y_0 = \frac{\Delta_{REL} - \delta}{2}$$

Finally, Equation 2-7 is solved for β and k_0 is determined. Figure 4.1 shows the average k_0 values for the three dowel bar spacings taken from various FWD testing dates.

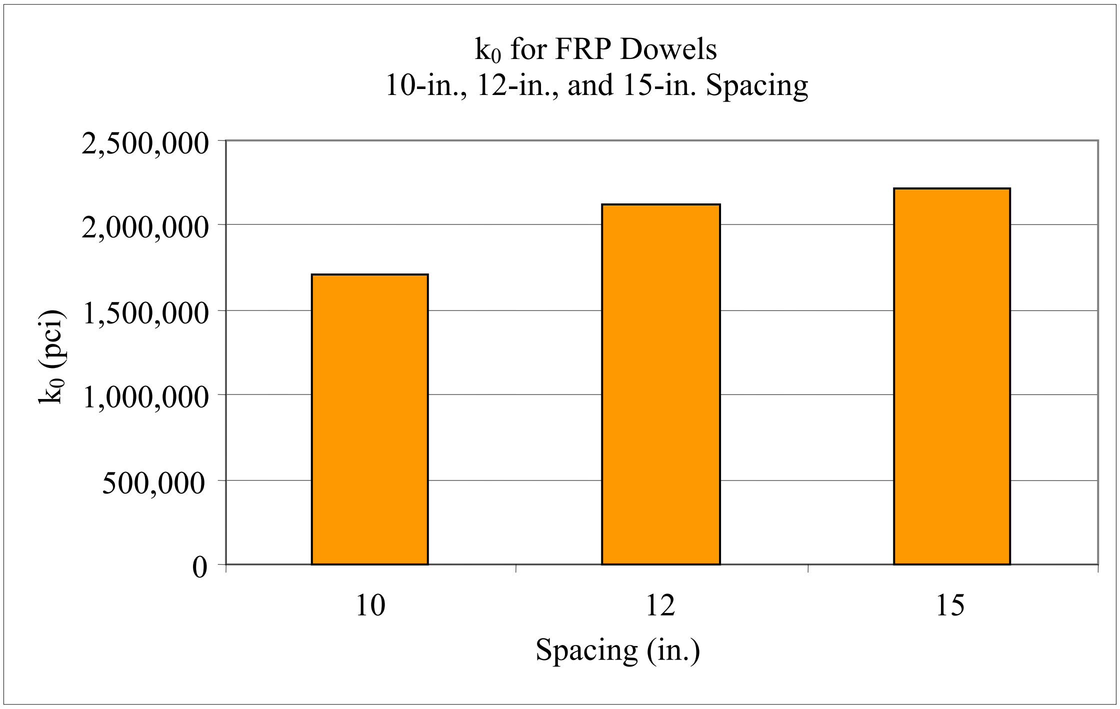

Figure 4.1. Average k_0 for each FRP dowel bar spacing

4.1.2. Strain Gages

Due to several malfunctioning strain gages, the results from the strain gages were limited. However, enough data was available to estimate the deflected shape of an FRP dowel for the 10-inch spacing. Figure 4.2 shows this deflected shape. In this case, the applied load on the dowel bar due to the crawl truck was 830 lbs. Using the method described in Section 3.2.1, the maximum deflection due to the crawl truck was determined to be 0.56 mils (0.014 mm) for the dowel placed directly under the wheelpath (i.e., the dowel that receives the greatest load due to the truck).

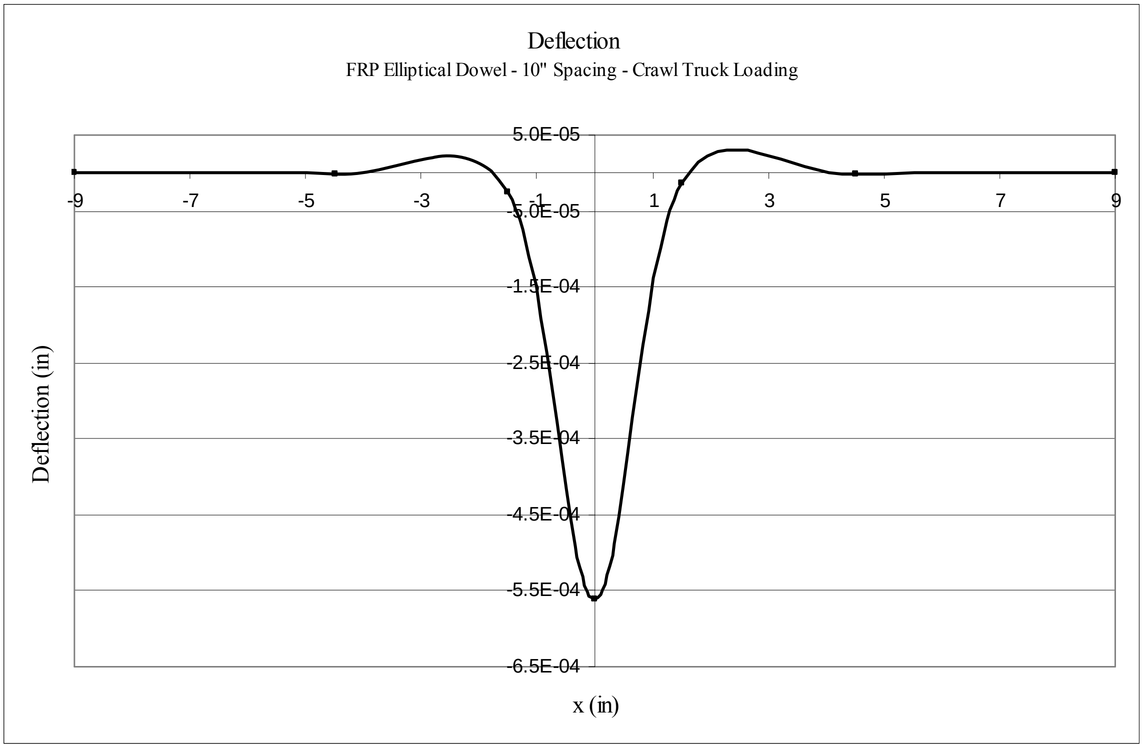

Figure 4.2. Deflected shape of an FRP dowel

4.1.3. Faulting

Analysis of the faulting data revealed no significant trends in the behavior of the elliptical FRP dowel bars between the variable spacings. Faulting measurements and graphs depicting the significance of these measurements are shown in Appendix B. Table B.1 lists the field measurements taken during each data collection period, along with the temperature of the pavement. Table B.2 lists the average faulting measurements calculated at each dowel spacing (10- , 12- , and 15-inch). Figures B.1 and B.2 display the average faulting in the driving and passing lanes, respectively, and Figure B.3 displays the average faulting across the entire section of pavement from each data collection period. No significant seasonal effects are shown in the faulting data between the spring and fall data collection periods. However, one item of note is that through the life of the project, average faulting measurements have shifted from negative to positive. Due to the small order of magnitude of these measurements, which ranged from 0.1 to 0.8 mm (0.0039 to 0.031 inches)*, the accuracy of the measuring device, which was in 0.1-mm (0.0039-inch)* increments, and the short life of the project, there is not enough detailed information to make a statistical relationship between these results, and no accurate conclusions can currently be made.

* These measurements were taken using the metric system; therefore, the actual metric measurement is listed first and is shown for the true measurements in Appendices B and C.

4.1.4. Joint Opening

The change in joint opening data over the life of the project for the elliptical FRP dowel bars can be found in Appendix C. Table C.1 lists the field measurements taken during each data collection period. Table C.2 and corresponding Figure C.1 display the average joint opening for each dowel spacing. The change in joint opening generally relates to the change in temperature between the testing periods. Increased temperatures cause the pavement slabs to expand, thereby decreasing the joint opening. Decreased temperatures result in contraction of the pavement slab, which in turn increases the joint opening. Figure C.1 shows that the joints located in the sections of 10-inch and 12-inch dowel spacing performed about the same, with a change in opening of about 0.6 mm (0.024 inches)[*] whereas the joints with 15-inch dowel spacing underwent a change in joint opening of about 1.0 mm (0.039 inches)[*]. This indicates that the joints are operating properly by exhibiting free movement through the change in temperature, while on average the FRP dowels spaced at 15 inches are allowing more movement than the other dowel spacings.

4.2. Steel Dowels

4.2.1. Falling Weight Deflectometer

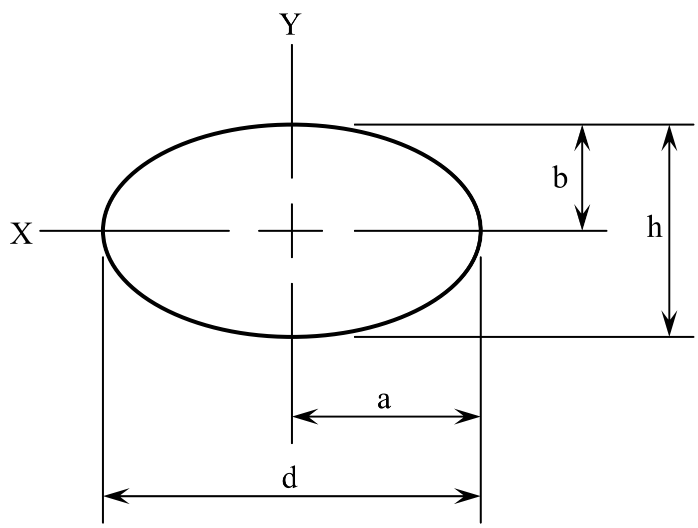

Figure 4.3. Steel dowel bar detail

The k_0 values for elliptical steel dowel bars from FWD testing were calculated in the same way as the values for elliptical FRP dowels, as outlined in Section 4.1.1. The elliptical steel dowels tested were not a part of this project, but part of a similar project on the same highway. That project included two elliptical steel sizes (in addition to 1.5-inch diameter standard round bars) with dimensions shown in Figure 4.1 and Table 4.1.

Table 4.1. Steel dowel bar dimensions

Dowel Type	a (in)	b (in)	d (in)	h (in)	A (in^2)	I (in^4)
Standard Round	0.75	0.75	1.5	1.5	1.767	0.2485
Medium Elliptical	0.827	0.558	1.654	1.115	1.473	0.1125
Heavy Elliptical	0.985	0.669	1.969	1.338	2.084	0.2315

These dowels were placed at 12-inch, 15-inch, and 18-inch spacings, respectively. Charts showing the k_0 values for the heavy elliptical, medium elliptical, and standard round dowels can be found in Appendix D.

4.2.2. Strain Gages

Strain gage readings were used as outlined in Section 3.2.1 to estimate the deflected shape, due to crawl truck loading, of the heavy elliptical (1.969-inch major axis and 1.338-inch minor axis) steel dowels for 12- , 15- , and 18-inch spacing. Figures of these deflected shapes can be found in Appendix D.

Table 4.2 summarizes the dowel loading and y_0 value determined using the strain gages for each spacing.

Table 4.2. Estimated y_0 from strain gage readings for heavy elliptical steel dowels

Spacing (in)	Dowel Load (lbs)	y_0 (mils)
12	1012	0.50
15	1196	0.59
18	1530	0.75

4.2.3. Faulting

Faulting data for standard round, medium elliptical, and heavy elliptical steel bars were compiled from a segment of the same highway. This information is tabulated and plotted in Appendix F. Table F.1 lists the field measurements taken during each data collection period, along with the temperature of the pavement. Table F.2 lists the average faulting measurements calculated at each test section, along with the respective dowel bar types and spacings. Average faulting values for the standard round dowel bars are listed in Table F.3 and plotted in Figures F.1, F.2, and F.3. Average faulting values for the medium elliptical dowel bars are listed in Table F.4 and plotted in Figures F.4, F.5, and F.6. Average faulting values for the heavy elliptical dowel bars are listed in Table F.5 and plotted in Figures F.7, F.8, and F.9. These tables and graphs display the average faulting in the driving and passing lanes and also the average faulting across the entire section of pavement from each data collection period.

4.2.4. Joint Opening

Joint opening data were also compiled for standard round, medium elliptical, and heavy elliptical steel bars were compiled from a segment of the same highway. This information is tabulated and plotted in Appendix G. Table G.1 lists the field measurements taken during each data collection period. Table G.2 lists the average changes in joint opening calculated at each test section, along with the respective dowel bar types and spacings. Table G.3 and corresponding Figure G.1 display the average joint openings for each steel dowel type and spacing. Again, these results indicate that the joints are operating properly by exhibiting free movement through the change in temperature.

5. SUMMARY OF PERFORMANCE

The vertical dowel deflections, y_0, calculated at the center of each joint in the FRP dowel sections for 10-inch, 12-inch, and 15-inch spacing from FWD testing averaged values less than 1 mil (0.0254 mm). Results obtained from strain gage data also displayed y_0 values of less than 1 mil (0.0254 mm). Additionally, the relative deflections associated with the FWD testing were less than 2 mils (0.0508 mm). Faulting data, representing the effects of repeated loading, subgrade conditions, and weather over time, give maximum displacements across the joint of 0.067 inches (1.7 mm) and an average of 0.020 inches (0.508 mm). These small deflections show that the FRP dowels at each spacing provide adequate load transfer across the joints. Furthermore, the deflections are of magnitudes small enough to provide adequate rider comfort as vehicles traverse the joints.

The average value for the modulus of dowel support, k_0, calculated for elliptical FRP dowels from the field FWD testing was about 2,000,000 pci. This value was an average of all dowel spacings; however, the data showed a trend of an increased k_0 with increased spacing. Moreover, the steel data showed the same trend for medium elliptical dowels but the opposite trend for heavy elliptical dowels. Thus, no general conclusion can be made about the effect of spacing on the value of k_0. Therefore, parameter testing is needed to learn more about the spacing effects. However, previous ISU research [2] arrived at preliminary effects. See the conclusions of Porter et al. (2001). The value of k_0 determined from the lab testing was about 939,000 pci. Previous research also indicates that k_0 values determined from lab testing tend to be less than k_0 values calculated from field results.

Overall, this study has shown that FRP dowel bars performed adequately, as demonstrated by this field application of over 700 FRP dowel bars in Iowa Highway 330. The overall small measured deflections demonstrated that the FRP dowel bars provided adequate load transfer across all of the joints. These deflections were small enough to provide adequate rider comfort for vehicles crossing joints containing FRP dowel bars. Faulting and joint opening measurements were similar and demonstrated that the joints were operating properly.

6. FUTURE RESEARCH NEEDS AND IMPLEMENTATION

Several problems exist with the current theory used here to determine the deflected shape of the dowel, including the following:

- Inoperative strain gages due to unforeseen field conditions
- Test loads provided by the FWD and crawl truck were not large enough to provide relative deflections of sufficient magnitude to calculate k_0 accurately
- Additional tests are needed to determine an appropriate location of the inflection point of the dowel within the joint
- Additional research is needed to verify the boundary conditions

In the future, more precautions and care should be taken during construction and when installing strain gages to ensure proper performance. Also, additional strain gages should be implemented at the ends and center of the dowel bars to better estimate boundary conditions. By obtaining these boundary conditions and by having properly functioning strain gages, Timoshenko's finite beam theory (Equation 2-6) can be applied to calculate the deflected shape of the dowel more accurately.

Faulting and joint opening is valuable in determining the long term performance of the dowel bars; therefore, more long term testing is needed to determine the true behavior of the FRP dowels more accurately. The use of more test sections would also be invaluable, in that it would create a wider range of data to be analyzed.

Corrosion and other long term effects may affect the performance of the FRP dowel bars through time and therefore should also be monitored and analyzed over a longer testing period.

Additionally, full-scale lab testing of slabs with multiple dowel bars needs to be performed to determine the effects of dowel spacing on load distribution more accurately. Along with the load distribution testing, fatigue testing is needed to better evaluate the long-term capabilities of the elliptical FRP dowels subjected to cyclical loadings.

Expansion joints are placed in roadways wherever pavement meets a fixed structure, and therefore additional analysis, design, and testing of FRP dowels within expansion joints is needed. Additional research is needed for all types of joints to determine the effects of gap sizes other than 0.125 inches. The additional effects of deflection due to flexure will be necessary for joints containing larger gaps.

The polymer matrix of a fiber composite is hydroscopic, which means that it can potentially absorb water. The absorption of water and subsequent swelling of FRP dowels could possibly be a concern for the slippage mechanism of concrete pavement joints over a period of time. Therefore, this phenomenon should be investigated more fully [2].

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APPENDIX A. FALLING WEIGHT DEFLECTOMETER DATA FOR FRP

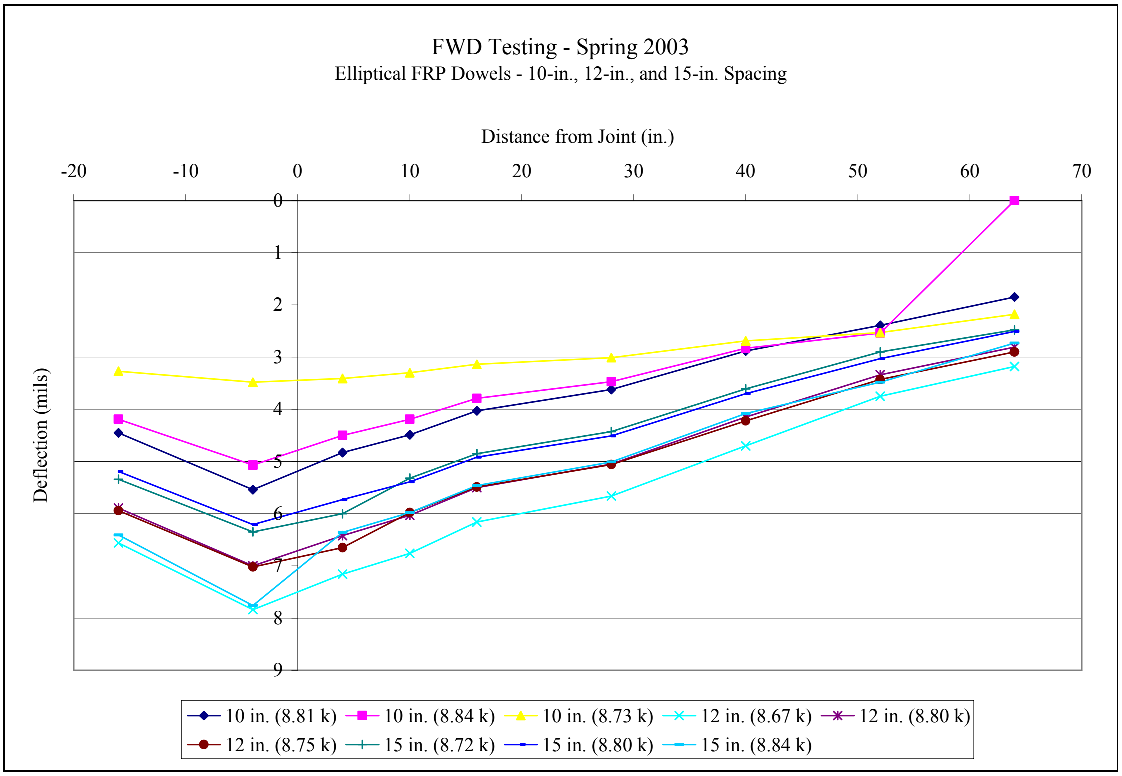

Figure A.1. Spring 2003 FWD testing: elliptical FRP

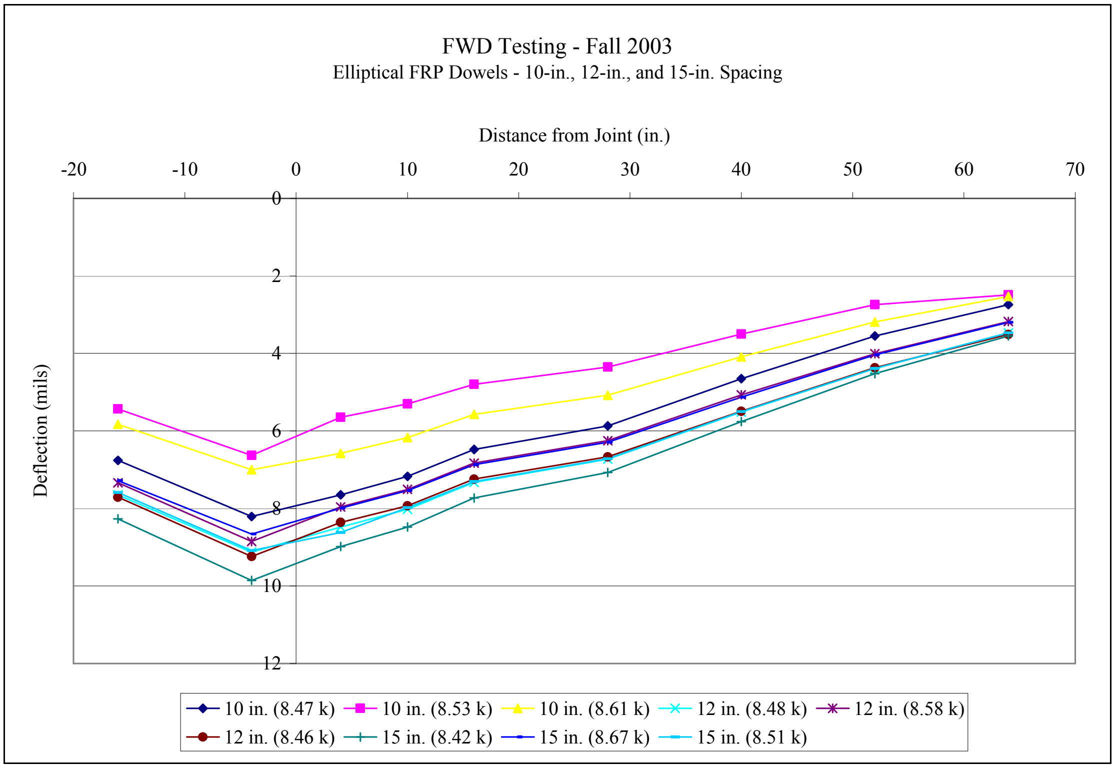

Figure A.2. Fall 2003 FWD testing: elliptical FRP

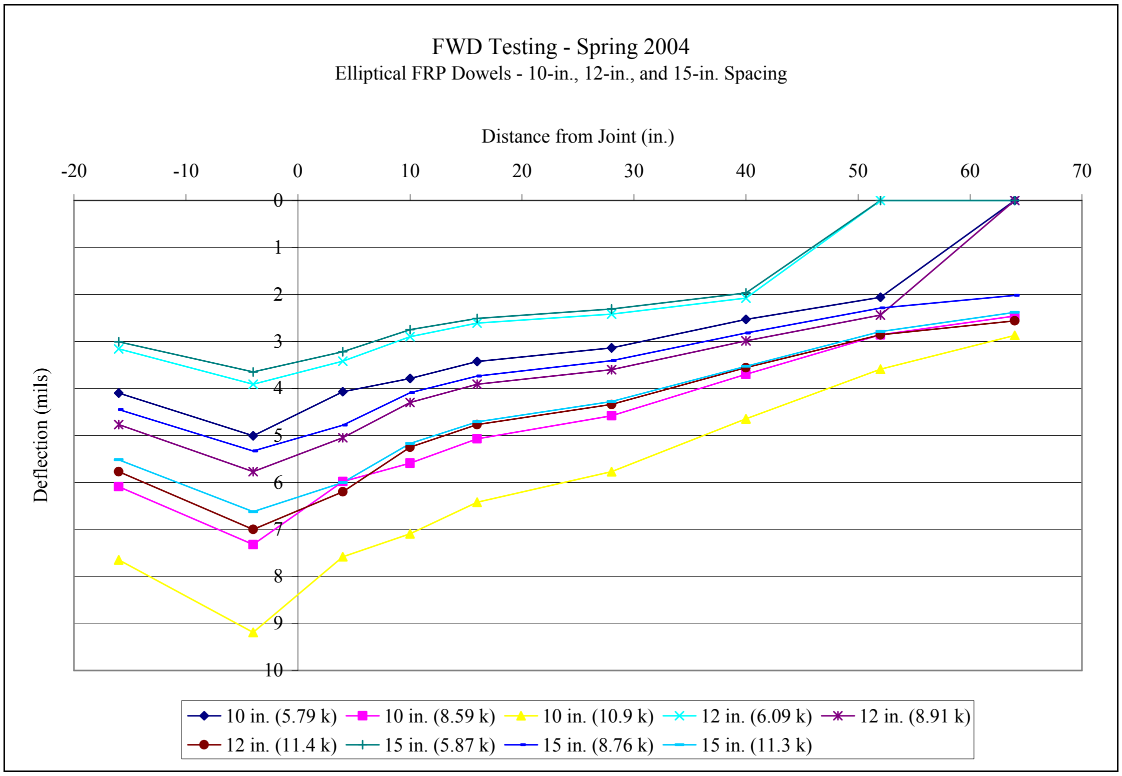

Figure A.3. Spring 2004 FWD testing: elliptical FRP

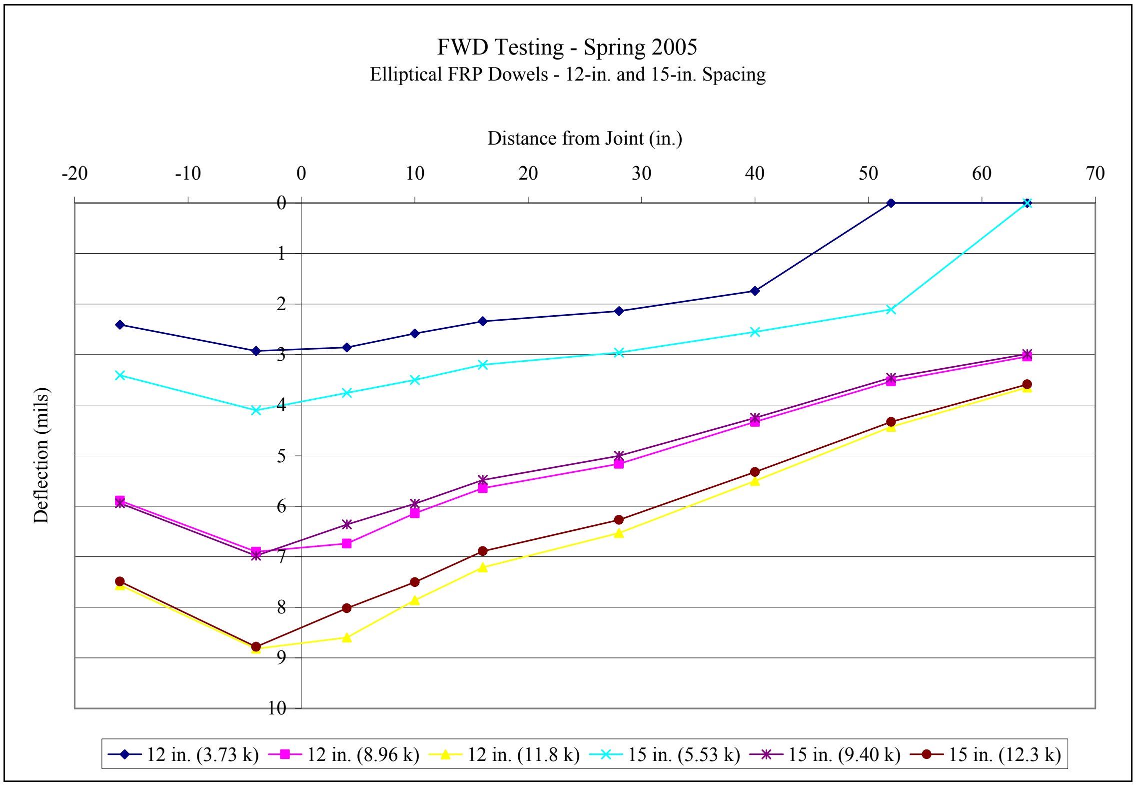

Figure A.4. Spring 2005 FWD testing: elliptical FRP

APPENDIX B. FAULTING DATA FOR FRP

In Table B.1, all tests were taken in the northbound (south) lane; tests were taken in the wheelpath four feet from the pavement edge in the driving lane and two feet from the pavement edge in the passing lane; the Georgia faultmeter was used for measurements; temperatures are measured in degrees Fahrenheit; and all dowels are manufactured by Hughes Brothers.

Table B.1. Elliptical FRP dowels: faulting field measurements

				Faulting Measurements (mm)											
				4/5/2003			10/25/2003			4/10/2004			4/23/2005		
Test Sect.	Station (Metric)	Bar Size	Spacing (inches)	Driving	Passing	Temp.	Driving	Passing	Temp.	Driving	Passing	Temp.	Driving	Passing	Temp.
EOP	1486+56 .225														
3	1371+09	1.33" x 2.25"	10	-0.6	0.0	35	-1.1	0.1	28.9	-0.1	-1.0	33	0.7	0.1	36
	1371+15	1.33" x 2.25"	10	-0.2	0.0	35	-0.2	-0.3	28.9	-0.7	-0.7	33	0.7	-0.6	36
	1371+21	1.33" x 2.25"	10	-0.5	-0.7	35	-0.3	0.2	28.9	-1.0	-1.5	33	0.3	1.2	36
	1371+27	1.33" x 2.25"	10	0.4	-0.3	35	-0.5	-0.3	28.9	0.0	-1.7	33	0.3	-0.1	36
	1371+33	1.33" x 2.25"	10	-0.3	0.5	35	-1.4	0.0	28.9	-0.2	-0.7	33	0.9	-0.1	36
	1371+39	1.33" x 2.25"	10	-0.5	-1.0	35	0.2	0.2	28.9	-0.8	-0.6	33	0.2	0.0	36
	1371+45	1.33" x 2.25"	10	-0.6	-0.3	35	-1.0	-0.1	28.9	-0.7	-0.2	33	0.1	0.5	36
	1371+51	1.33" x 2.25"	10	-1.3	-0.5	35	-1.4	0.0	28.9	-0.8	-0.7	33	0.1	0.5	36
	1371+57	1.33" x 2.25"	10	-0.8	0.5	35	-1.2	-0.4	28.9	-0.2	-0.3	33	1.0	-0.4	36
	1371+63	1.33" x 2.25"	10	-0.5	-0.8	35	-0.8	0.1	28.9	0.6	-1.6	33	1.0	0.0	36
2	1371+69	1.33" x 2.25"	12	-1.5	-0.3	35	-0.4	0.5	28.9	N/A	N/A	33	1.1	1.7	36
	1371+75	1.33" x 2.25"	12	-0.3	-0.2	35	0.1	0.5	28.9	-0.1	0.0	33	0.8	-0.7	36
	1371+81	1.33" x 2.25"	12	-0.8	0.0	35	-1.4	1.0	28.9	-0.1	-0.2	33	0.9	0.7	36
	1371+87	1.33" x 2.25"	12	-0.2	-0.5	35	-0.7	0.2	28.9	-1.0	-0.7	33	0.1	-0.3	36
	1371+93	1.33" x 2.25"	12	-1.0	-0.4	35	0.1	0.4	28.9	-0.1	-1.5	33	0.3	0.6	36
	1371+99	1.33" x 2.25"	12	-0.2	0.2	35	0.1	0.2	28.9	-0.2	-1.4	33	0.4	0.7	36
	1372+05	1.33" x 2.25"	12	-0.6	-0.7	35	-1.2	0.0	28.9	-0.1	-1.2	33	0.1	0.4	36
	1372+11	1.33" x 2.25"	12	-0.8	-0.8	35	-0.3	-0.5	28.9	-0.3	-0.8	33	0.4	0.5	36
	1372+17	1.33" x 2.25"	12	-0.4	0.4	35	-0.4	-0.2	28.9	-0.7	-0.5	33	0.3	0.7	36
	1372+23	1.33" x 2.25"	12	0.0	0.0	35	-1.2	0.2	28.9	-0.8	-1.5	33	0.3	-0.1	36
1	1372+29	1.33" x 2.25"	15	-0.3	-0.3	35	-1.3	0.3	28.9	-1.0	-1.4	33	0.2	-0.4	36
	1372+35	1.33" x 2.25"	15	-0.3	-0.3	35	-1.0	-0.3	28.9	-0.3	-1.2	33	0.6	-0.3	36
	1372+41	1.33" x 2.25"	15	0.4	-0.7	35	-0.9	0.3	28.9	-0.1	-0.8	33	0.0	0.1	36
	1372+47	1.33" x 2.25"	15	-0.5	0.1	35	-0.7	1.0	28.9	-0.7	-1.4	33	0.2	0.5	36
	1372+53	1.33" x 2.25"	15	0.5	-0.6	35	-0.5	0.2	28.9	0.3	-1.4	33	1.2	-0.4	36
	1372+59	1.33" x 2.25"	15	-0.3	0.0	35	-1.4	-0.4	28.9	-0.9	-0.7	33	0.4	-0.4	36
	1372+65	1.33" x 2.25"	15	-0.8	-0.7	35	-1.2	0.9	28.9	-0.4	-1.2	33	0.3	0.7	36
	1372+71	1.33" x 2.25"	15	-0.3	0.5	35	-1.2	-0.3	28.9	-0.1	-0.7	33	0.3	0.5	36
	1372+77	1.33" x 2.25"	15	-0.2	-0.2	35	-0.5	1.1	28.9	-0.6	-1.4	33	-0.5	-0.5	36
	1372+83	1.33" x 2.25"	15	-0.6	-0.3	35	-1.2	0.3	28.9	-1.4	-1.4	33	0.8	-0.8	36
BOP	1360+00														

Table B.2. FRP elliptical dowels: faulting averages

Test Date	Faulting Averages (mm)								
	10-in. spacing			12-in. spacing			15-in. spacing		
	Driving	Passing	Average	Driving	Passing	Average	Driving	Passing	Average
Spring 2003	-0.5	-0.3	-0.4	-0.6	-0.2	-0.4	-0.2	-0.3	-0.2
Fall 2003	-0.8	-0.1	-0.4	-0.5	0.2	-0.2	-1.0	0.3	-0.3
Spring 2004	-0.4	-0.9	-0.6	-0.4	-0.9	-0.6	-0.5	-1.2	-0.8
Spring 2005	0.5	0.1	0.3	0.5	0.4	0.4	0.4	-0.1	0.1

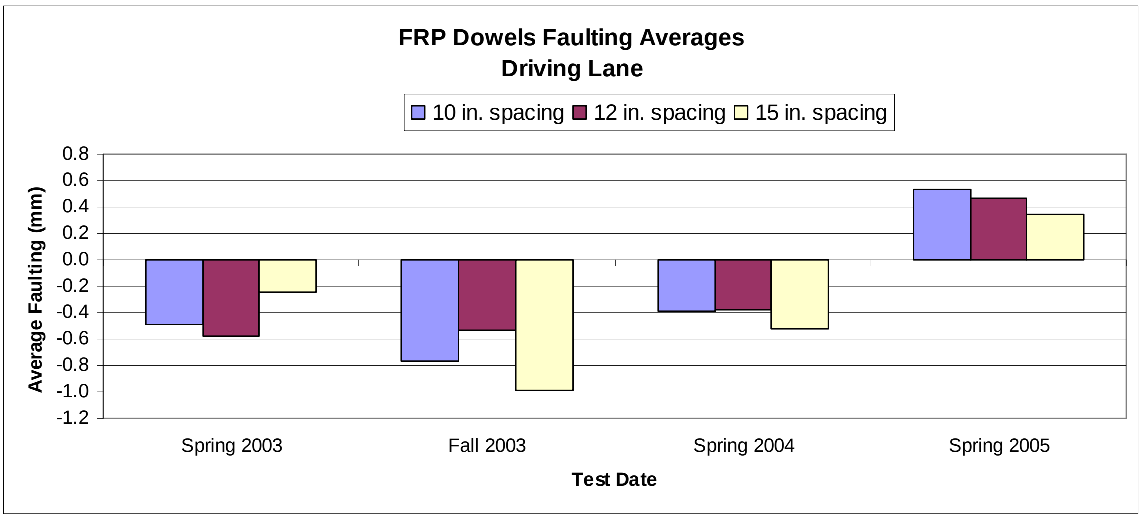

Figure B.1. Faulting: FRP dowels, driving lane

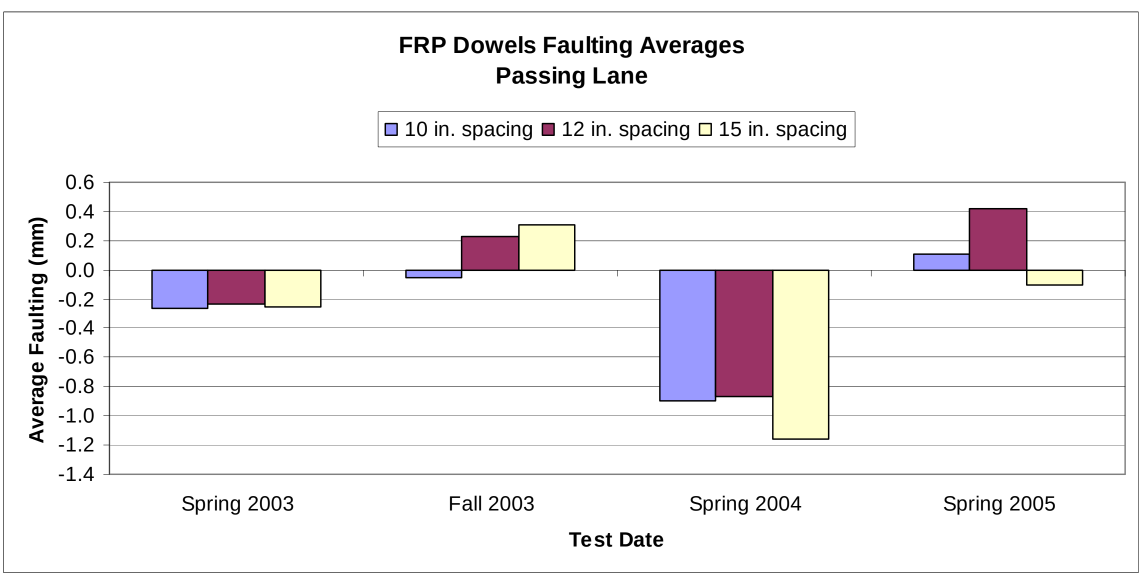

Figure B.2. Faulting: FRP dowels, passing lane

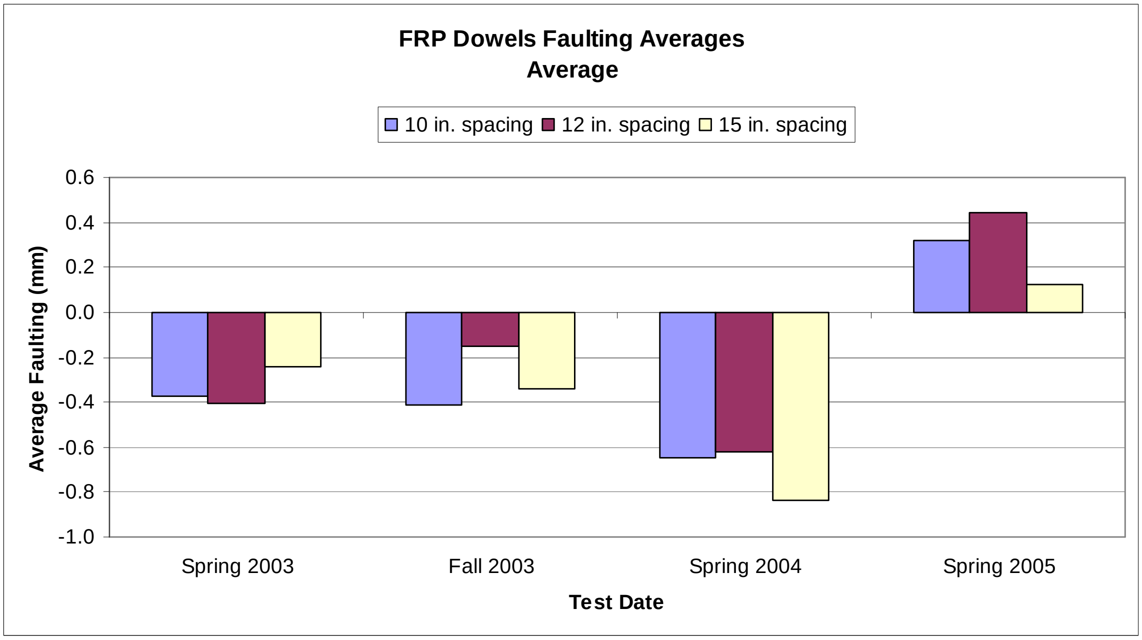

Figure B.3. Faulting: FRP dowels, averages

APPENDIX C. JOINT OPENING DATA FOR FRP

In Table C.1, note that a negative (-) value for "Change in Joint Opening" indicates joint expansion. A positive (+) value for "Change in Joint Opening" indicates joint contraction.

Table C.1. FRP elliptical dowels: joint opening field measurements

					Joint Opening Measurements (mm)				Change in Joint Opening (mm)		
Test Sect.	**Station (Metric)**	**Bar Shape**	**Bar Size**	**Spacing (inches)**	**8/28/2002** (35° F)	**9/21/2002** (35° F)	**10/1/2002** (35° F)	**4/23/2005** (34.5° F)	**9/21/2002** (35° F)	**10/1/2002** (35° F)	**4/23/2005** (34.5° F)
EOP	1486+56.225										
	1371+09	Elliptical	1.33" x 2.25"	10	264	264	264	266	0.3	0.3	2.4
	1371+15	Elliptical	1.33" x 2.25"	10	246	246	246	247	-0.2	-0.1	1.1
	1371+21	Elliptical	1.33" x 2.25"	10	249	249	250	250	-0.2	0.6	0.9
	1371+27	Elliptical	1.33" x 2.25"	10	249	248	248	249	-0.3	-0.2	0.3
3	1371+33	Elliptical	1.33" x 2.25"	10	250	250	251	251	0.1	0.6	1.0
	1371+39	Elliptical	1.33" x 2.25"	10	257	257	257	257	0.0	0.0	0.1
	1371+45	Elliptical	1.33" x 2.25"	10	252	252	252	253	-0.2	0.0	0.7
	1371+51	Elliptical	1.33" x 2.25"	10	253	253	253	253	-0.3	-0.2	-0.3
	1371+57	Elliptical	1.33" x 2.25"	10	252	252	253	253	-0.2	0.2	0.7
	1371+63	Elliptical	1.33" x 2.25"	10	249	249	250	250	0.1	0.8	1.1
	1371+69	Elliptical	1.33" x 2.25"	12	268	268	268	269	0.0	-0.1	0.9
	1371+75	Elliptical	1.33" x 2.25"	12	260	260	260	261	-0.2	0.0	1.1
	1371+81	Elliptical	1.33" x 2.25"	12	249	249	249	250	-0.2	-0.3	0.8
	1371+87	Elliptical	1.33" x 2.25"	12	245	245	245	246	0.1	0.1	0.7
2	1371+93	Elliptical	1.33" x 2.25"	12	256	257	256	257	0.3	0.2	0.8
	1371+99	Elliptical	1.33" x 2.25"	12	258	257	257	258	-0.2	-0.1	0.5
	1372+05	Elliptical	1.33" x 2.25"	12	255	255	255	256	-0.8	-0.5	0.5
	1372+11	Elliptical	1.33" x 2.25"	12	272	272	272	272	0.0	-0.2	-0.2
	1372+17	Elliptical	1.33" x 2.25"	12	256	256	257	256	0.1	0.6	-0.1
	1372+23	Elliptical	1.33" x 2.25"	12	271	272	271	272	1.5	0.7	1.2
	1372+29	Elliptical	1.33" x 2.25"	15	255	255	255	No nails	0.6	0.1	
	1372+35	Elliptical	1.33" x 2.25"	15	263	262	262	263	-0.4	-0.6	0.2
	1372+41	Elliptical	1.33" x 2.25"	15	258	258	258	No nails	0.4	-0.4	
1	1372+47	Elliptical	1.33" x 2.25"	15	248	248	248	249	0.0	0.1	1.2
	1372+53	Elliptical	1.33" x 2.25"	15	262	263	262	263	0.1	0.1	0.6
	1372+59	Elliptical	1.33" x 2.25"	15	263	263	262	264	0.3	-0.6	1.5
	1372+65	Elliptical	1.33" x 2.25"	15	260	260	260	261	0.1	0.3	1.5
	1372+71	Elliptical	1.33" x 2.25"	15	262	262	262	263	-0.2	0.1	1.3
	1372+77	Elliptical	1.33" x 2.25"	15	290	291	291	291	0.3	0.3	0.7
	1372+83	Elliptical	1.33" x 2.25"	15	275	275	275	277	0.1	0.2	1.9
BOP	1360+00										

Also note that for the data in Table C.1, all tests were taken in the northbound (south) lane; measurments were made between nails installed 12 inches from the edge of pavement; temperatures are measured in degrees Fahrenheit; and all dowels are manufactured by Hughes Brothers.

Table C.2. FRP elliptical dowels: change in joint opening averages

		Change in Joint Opening Averages (mm)	
Bar Type	**Spacing (inches)**	**Fall 2002**	**Spring 2005**
FRP-Elliptical	10	0.20	0.80
FRP-Elliptical	12	0.05	0.62
FRP-Elliptical	15	-0.05	1.10

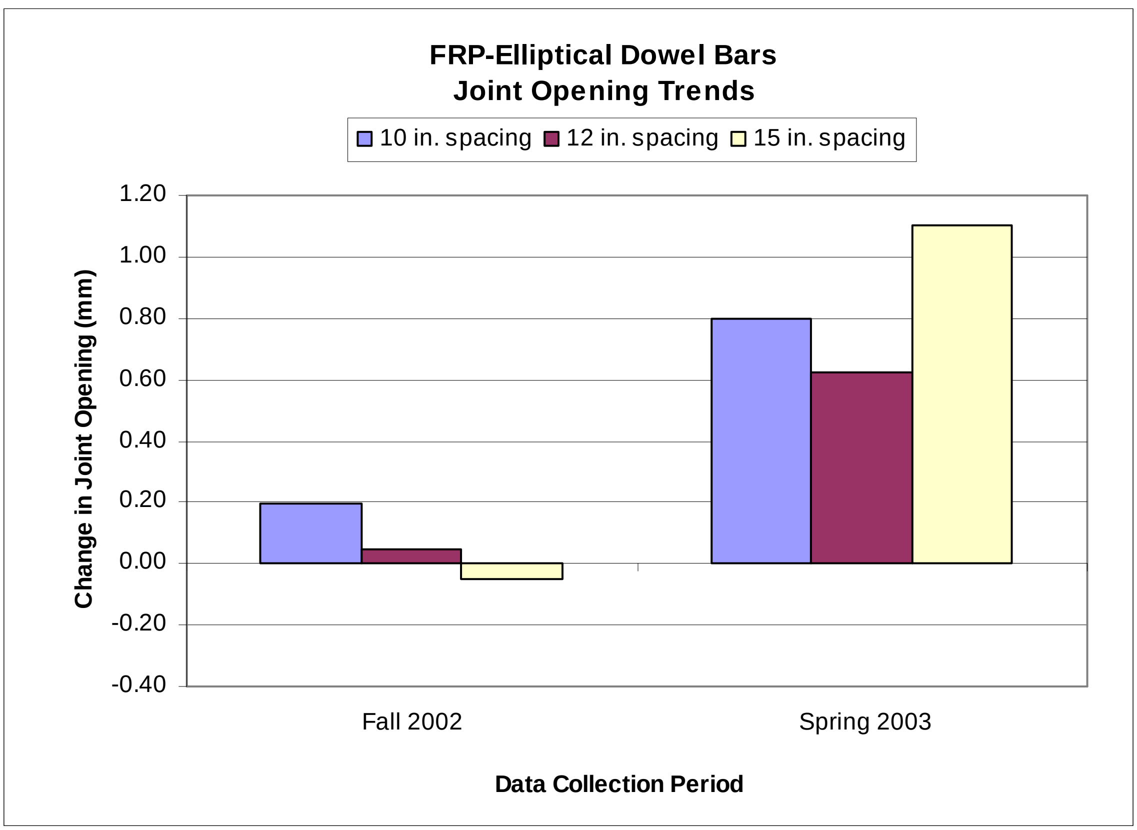

Figure C.1. Joint Opening - FRP Dowels

APPENDIX D. FALLING WEIGHT DEFLECTOMETER DATA FOR STEEL

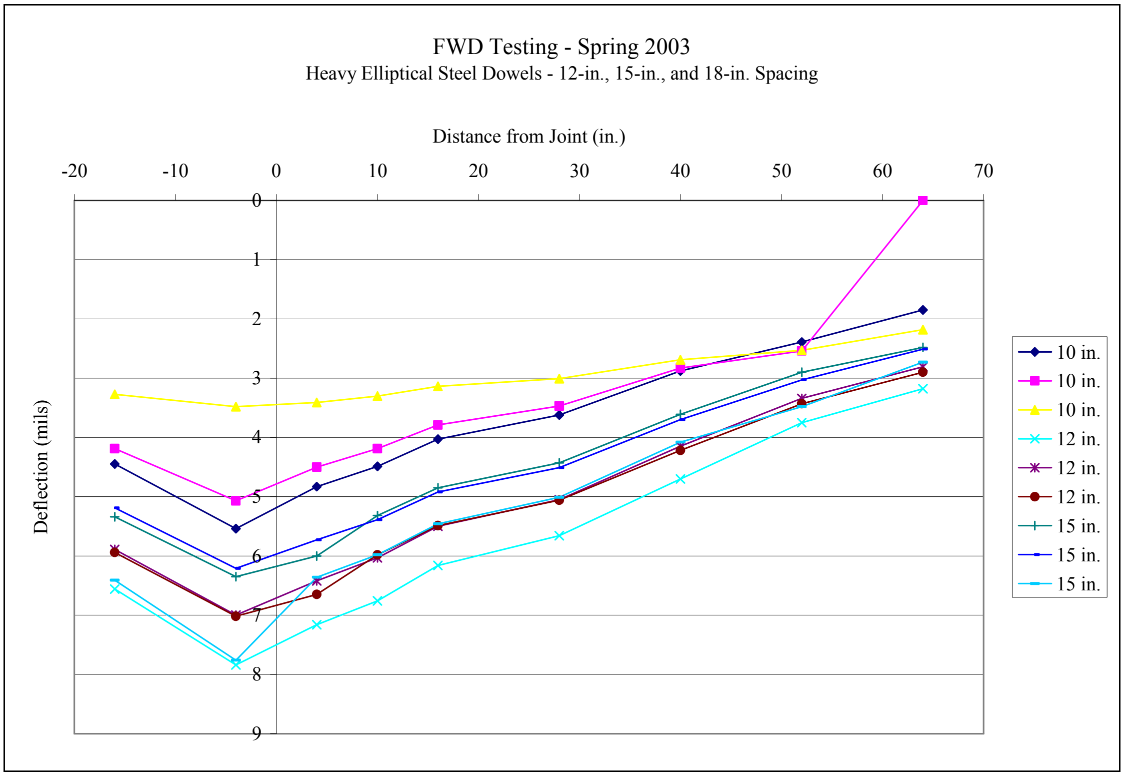

Figure D.1. Spring 2003 FWD testing: heavy elliptical steel

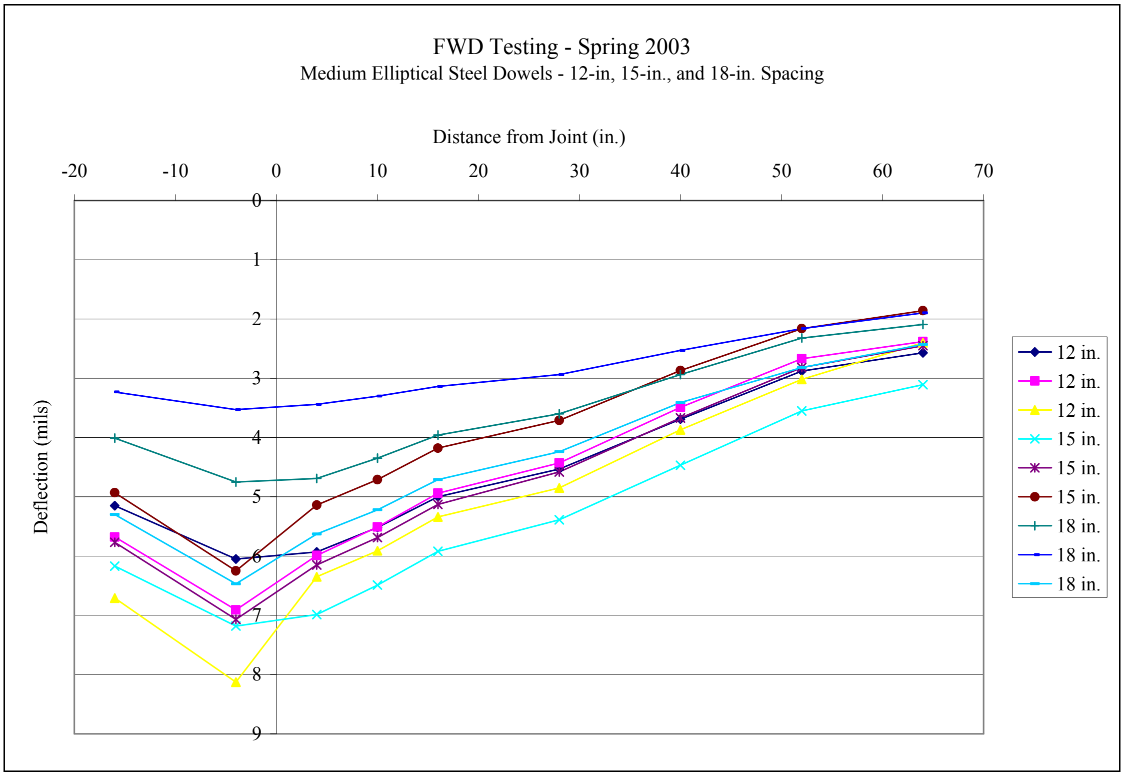

Figure D.2. Spring 2003 FWD testing: medium elliptical steel

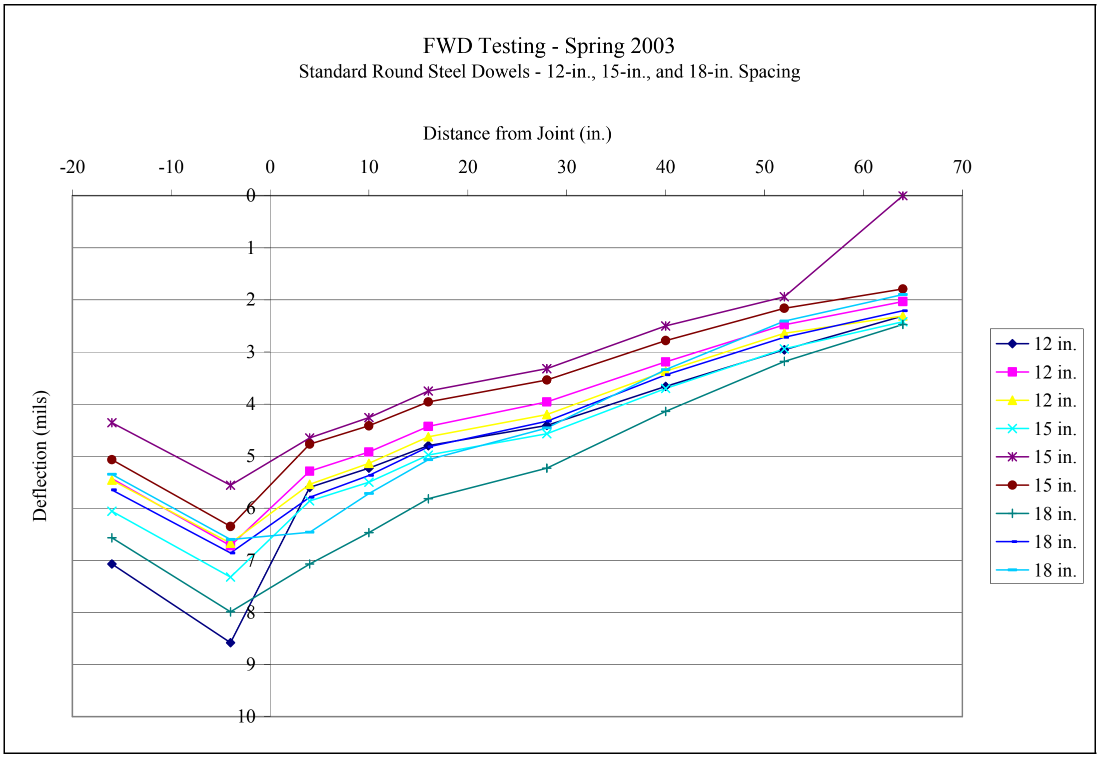

Figure D.3. Spring 2003 FWD testing: standard round steel

Figures D.4 to D.6 illustrate the average modulus of dowel support, k_0, for the heavy elliptical, medium elliptical, and standard round steel dowels at various dowel spacings.

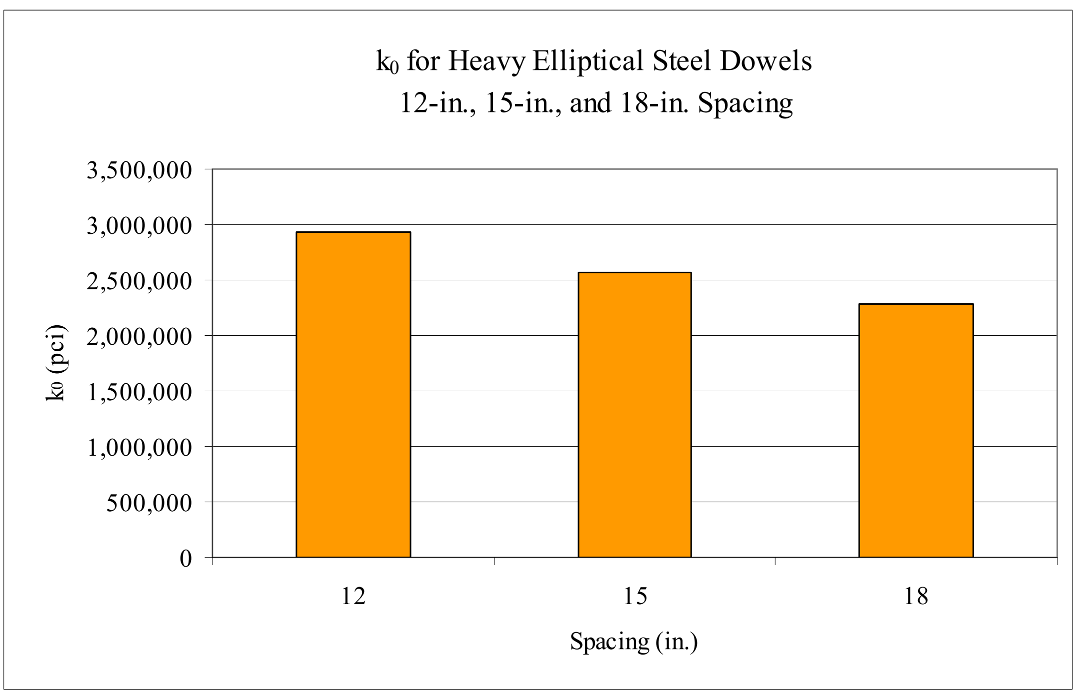

Figure D.4. Average k_0 for heavy elliptical steel dowels

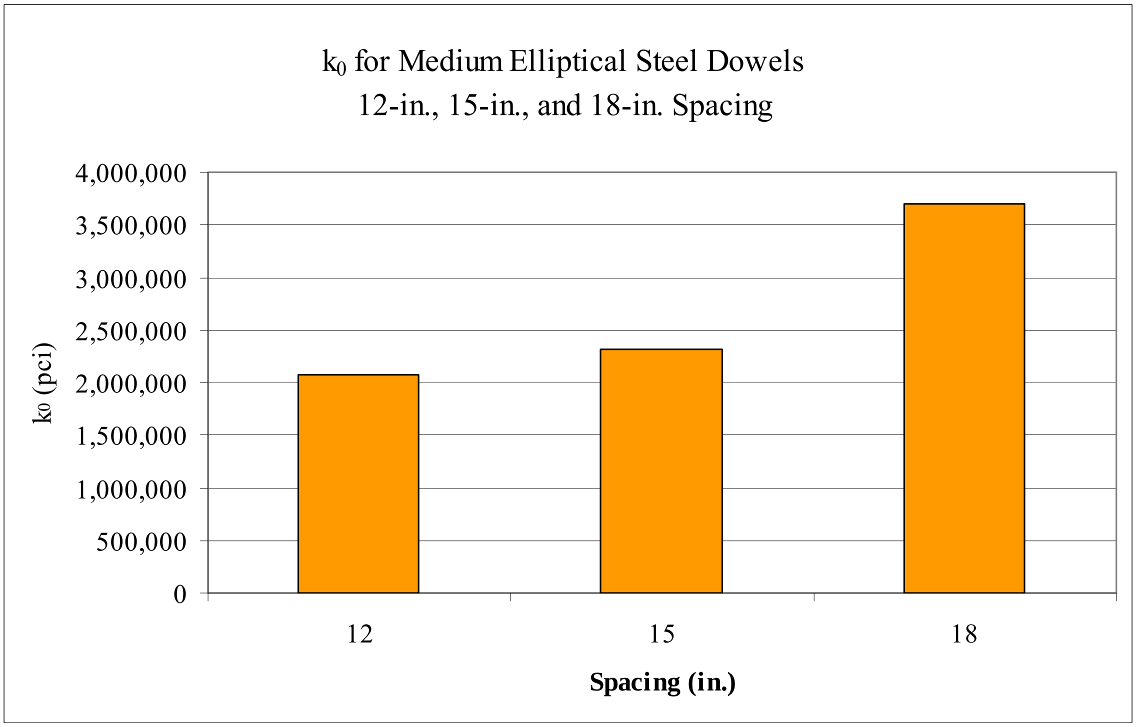

Figure D.5. Average k_0 for medium elliptical steel dowels

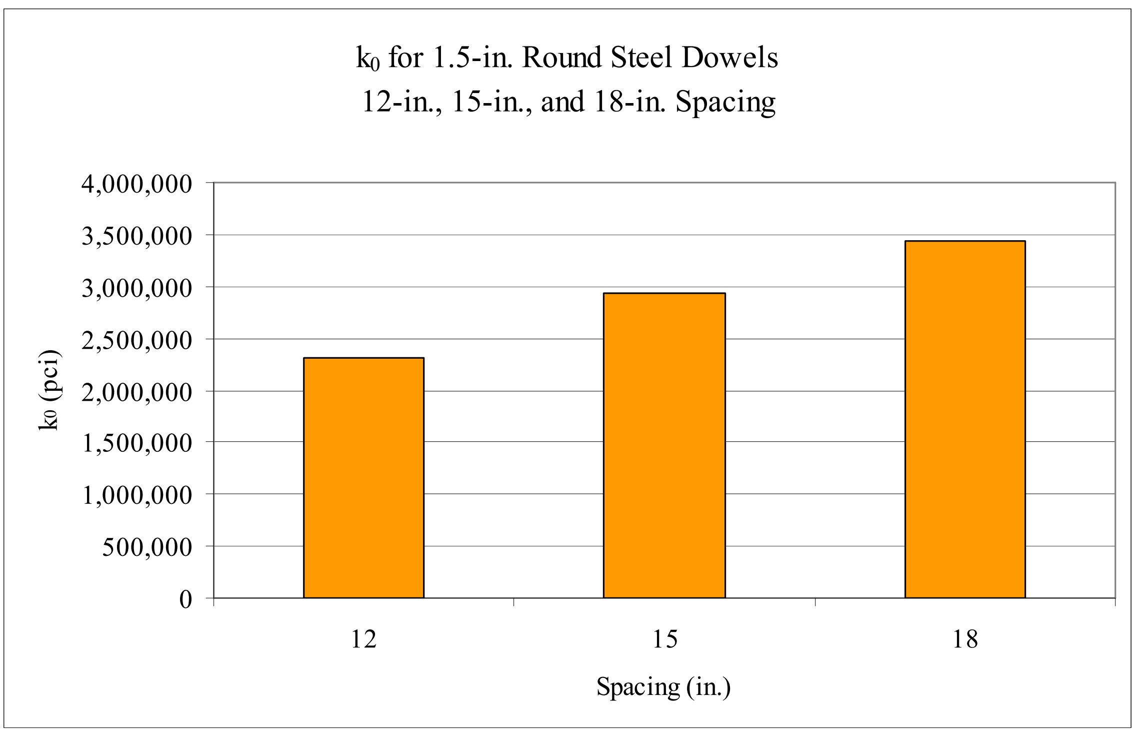

Figure D.6. Average k_0 for standard round steel dowels

APPENDIX E. STRAIN GAGE RESULTS FOR STEEL

Figures E.1 to E.3 show the estimated deflected shape from strain gage data for heavy elliptical steel dowels (major axis is 1.969 inches and minor axis is 1.338 inches) for 12- , 15- , and 18-inch spacing.

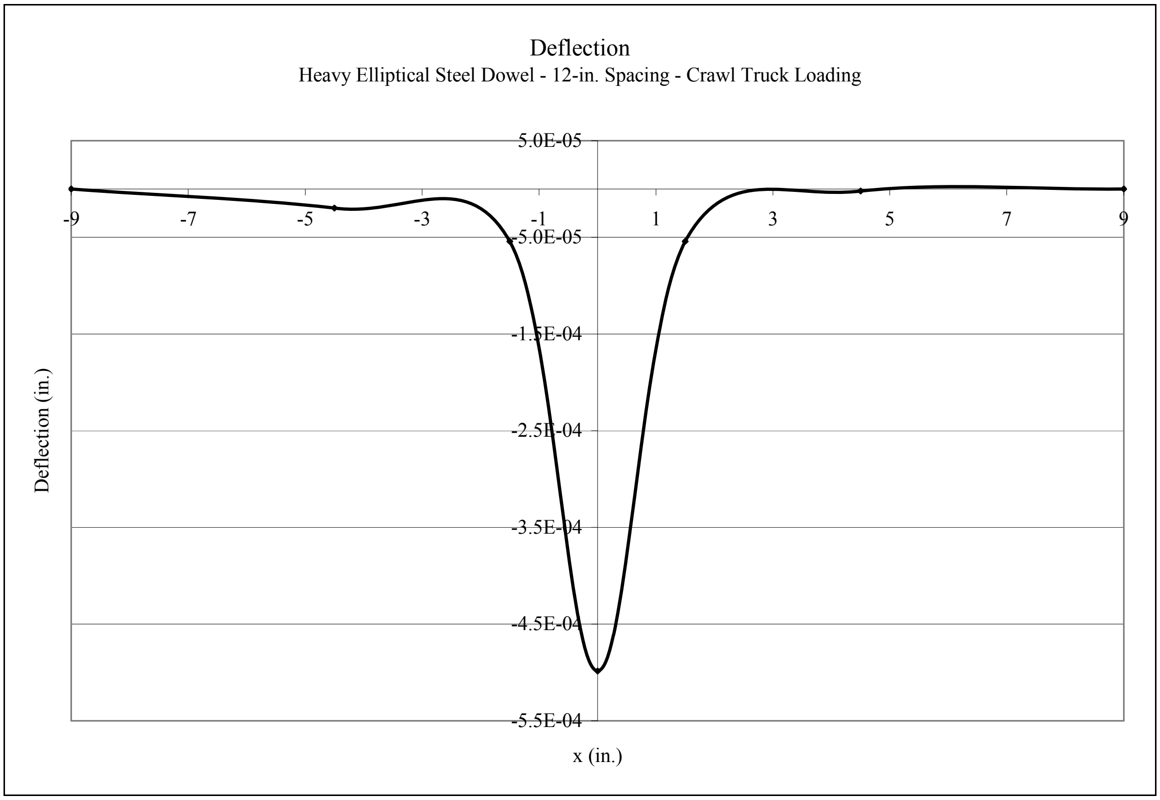

Figure E.1. Deflection of heavy elliptical steel dowel, 12-in. spacing

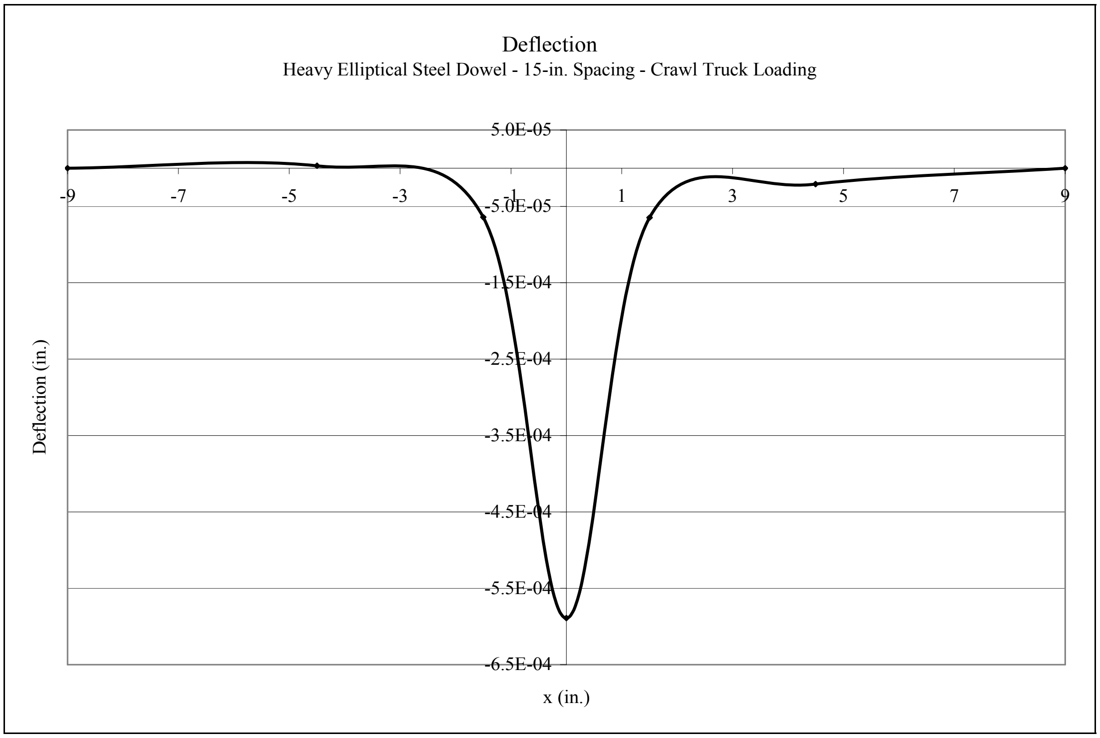

Figure E.2. Deflection of heavy elliptical steel dowel, 15-in. spacing

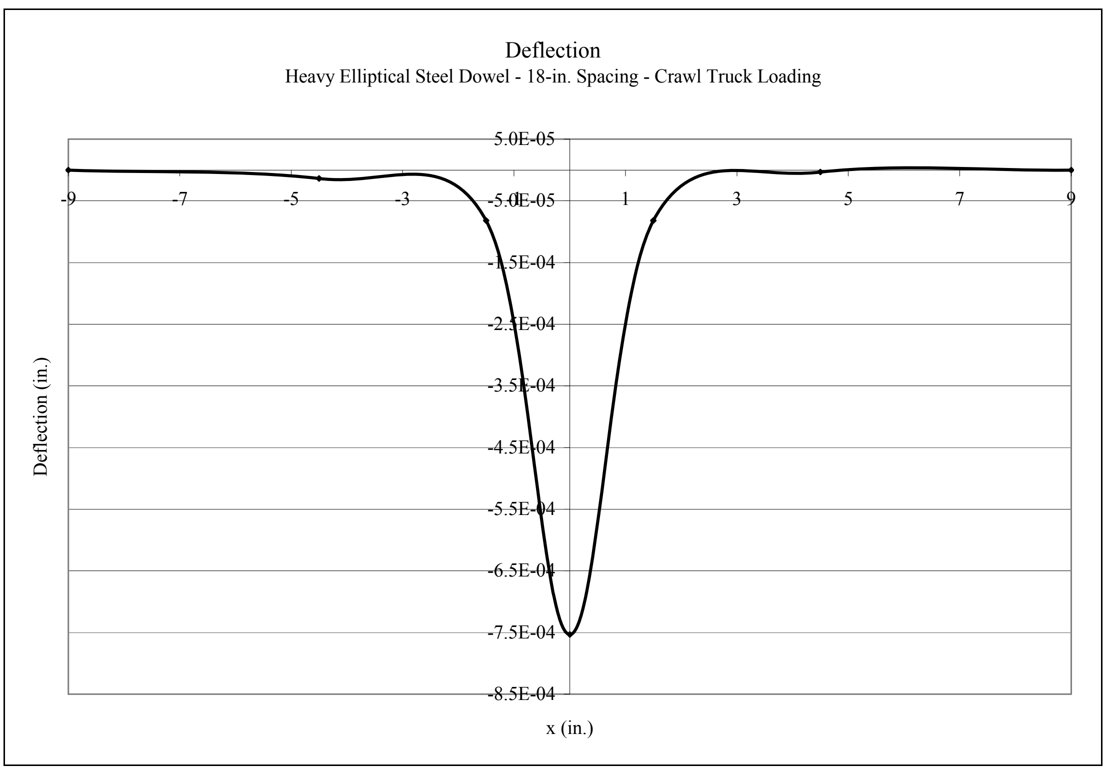

Figure E.3. Deflection of heavy elliptical steel dowel, 18-in. spacing

APPENDIX F. FAULTING DATA FOR STEEL

Table F.1. Steel dowels, faulting field measurments

Notes:

1. All tests were taken in the northbound (south) lane.
2. Tests were taken in the wheelpath: 4 ft from the edge of pavement in the driving lane and 2 ft from the ede of pavement in the passing lane.
3. Georgia Faultmeter was used for all measurements.
4. Temperatures are measured in Degrees Fahrenheit.

					Faulting Measurements (mm)																
Test Sect. Station Ref.	Station (Metric)	Bar Shape	Bar Size	Spacing (inches)	9/21/2002 Driving	9/21/2002 Passing	4/5/2003 Driving	4/5/2003 Passing	4/5/2003 Temp.	10/25/2003 Driving	10/25/2003 Passing	10/25/2003 Temp.	4/10/2004 Driving	4/10/2004 Passing	4/10/2004 Temp.	8/27/2004 Driving	8/27/2004 Passing	8/27/2004 Temp.	4/23/2005 Driving	4/23/2005 Passing	4/23/2005 Temp.
EOP	1360+00																				
	1345+89	Elliptical	Medium	18	-0.4	-0.3	0.0	0.0	32	0.2	0.9	27.1	0.1	-1.3	33	0.7	-0.9	68	0.8	0.3	40
	1345+83	Elliptical	Medium	18	0.5	1.1	-0.5	-0.5	32	-1.4	1.1	27.1	-1.1	-1.3	33	-0.6	-0.8	68	0.5	0.7	40
	1345+77	Elliptical	Medium	18	-0.2	0.4	0.0	0.4	32	-1.5	1.0	27.1	-1.0	-1.2	33	0	-0.3	68	0.0	1.5	40
	1345+71	Elliptical	Medium	18	-0.3	0.1	-0.3	0.0	32	-1.4	0.9	27.1	-1.2	-2.0	33	-0.5	-0.8	68	-0.5	1.0	40
128	1345+65	Elliptical	Medium	18	-1.3	0.3	0.0	-0.3	32	-1.4	0.3	27.1	-0.3	-1.3	33	0.5	0.1	68	0.4	0.7	40
1346+20	1345+59	Elliptical	Medium	18	-1	-0.8	0.2	-1.2	32	0.2	1.0	27.1	-0.1	-1.5	33	0.6	-0.4	68	0.6	1.0	40
	1345+53	Elliptical	Medium	18	-1	0.2	-0.3	-0.4	32	-1.6	-0.2	27.1	-0.6	-0.6	33	0.5	-0.8	68	0.5	0.0	40
	1384+47	Elliptical	Medium	18	-0.2	-0.3	-0.7	-0.2	32	-0.1	1.0	27.1	0.0	-1.8	33	-0.3	-0.7	68	-0.3	0.4	40
	1345+41	Elliptical	Medium	18	-0.8	-1	-0.5	-0.3	32	-0.1	1.0	27.1	-1.1	-1.3	33	0.5	-0.3	68	-0.3	0.4	40
	1345+35	Elliptical	Medium	18	0	-0.3	-0.5	-0.3	32	-1.2	0.2	27.1	-0.2	-1.5	33	0.6	0.2	68	0.2	0.6	40
	1344+40	Elliptical	Medium	18	0.1	0.5	0.6	0.5	32	-1.4	-0.5	27.1	-0.1	-0.6	33	0.1	-0.5	68	0.6	0.8	40
	1344+34	Elliptical	Medium	18	0.2	0	-0.3	-0.1	32	-0.9	0.1	27.1	-1.0	-0.5	33	0.7	-1	68	0.6	0.1	40
	1344+28	Elliptical	Medium	18	-0.9	-0.2	-0.5	-1.4	32	-0.6	-0.1	27.1	-0.1	-0.9	33	0.2	-0.7	68	0.1	0.2	40
	1344+22	Elliptical	Medium	18	0.5	0.3	0.4	0.3	32	-0.2	0.0	27.1	-0.5	0.0	33	0	-0.9	68	0.1	0.4	40
126	1344+16	Elliptical	Medium	18	-0.5	-0.4	0.0	-0.7	32	-1.1	0.5	27.1	-0.4	-0.6	33	0.5	0.3	68	-0.2	1.3	40
1344+70	1344+10	Elliptical	Medium	18	-0.7	0	-0.2	-0.1	32	-0.9	0.9	27.1	-1.0	-0.6	33	0.7	-0.6	68	0.5	0.7	40
	1344+04	Elliptical	Medium	18	-0.5	-0.4	0.3	-0.2	32	0.5	-0.1	27.1	-0.8	-0.1	33	0.7	-0.9	68	0.6	0.1	40
	1343+98	Elliptical	Medium	18	-1	-0.3	0.0	-0.3	32	-1.2	0.9	27.1	-1.0	-0.6	33	0.2	-1	68	0.5	0.1	40
	1343+92	Elliptical	Medium	18	-0.9	0.3	-0.5	-0.3	32	-0.8	0.2	27.1	0.3	-1.5	33	0.5	-0.5	68	0.4	0.9	40
	1343+86	Elliptical	Medium	18	-0.2	0.1	-0.4	-0.7	32	-0.9	0.1	27.1	-0.5	-1.4	33	-0.6	0.8	68	0.5	0.2	40
	1339+90	Elliptical	Medium	18	-1.9	-1	0.2	-1.3	44	1.0	0.2	25.5	-0.8	-0.5	33	0	-0.5	69	2.8	0.5	40
	1339+84	Elliptical	Medium	18	0.5	-0.8	-0.4	-1.9	44	-0.2	0.9	25.5	-1.1	-0.7	33	0.7	0	69	1.2	0.1	40
	1339+78	Elliptical	Medium	18	-0.3	0	-0.5	0.3	44	-1.0	0.7	25.5	-0.1	-0.5	33	-0.8	0.9	69	-0.2	1.6	40
	1339+72	Elliptical	Medium	18	0.5	-0.3	-0.6	-0.1	44	-1.4	0.4	25.5	-0.1	-1.8	33	-0.8	0	69	-0.1	0.5	40
124	1339+66	Elliptical	Medium	18	-0.8	-0.5	0.0	0.0	44	-0.9	0.9	25.5	-0.6	-1.4	33	-0.3	1.2	69	0.7	0.0	40
1340+20	1339+60	Elliptical	Medium	18	-0.1	0	0.2	-0.4	44	-0.6	0.0	25.5	-0.2	-1.5	33	-0.9	0	69	-0.3	1.0	40
	1339+54	Elliptical	Medium	18	0	-0.6	-0.1	-0.4	44	-1.0	0.2	25.5	-1.0	-1.3	33	-0.6	0	69	0.5	1.2	40
	1339+48	Elliptical	Medium	18	0.5	0	-0.5	-0.3	44	-1.4	0.0	25.5	-0.3	-1.5	33	-0.7	0.5	69	-0.4	0.1	40
	1339+42	Elliptical	Medium	18	0.3	-0.6	-0.3	0.9	44	-0.7	0.9	25.5	0.6	-0.8	33	-0.4	1	69	-0.3	0.5	40
	1339+36	Elliptical	Medium	18	0.4	0.2	-0.2	-0.5	44	-0.4	0.2	25.5	-0.7	-0.6	33	0	0.6	69	0.5	0.2	40
	1333+36	Elliptical	Medium	15	-0.4	-0.6	-1.0	0.1	44	0.2	0.5	25.5	-1.1	0.3	33	0.7	0.7	69	-0.3	0.7	40
	1333+30	Elliptical	Medium	15	-0.3	-0.6	-0.4	0.2	44	0.3	0.5	25.5	-2.2	0.0	33	1	0.7	69	1.7	0.3	40
	1333+24	Elliptical	Medium	15	-0.4	-0.5	-0.3	0.7	44	-1.4	-0.5	25.5	-1.5	-0.2	33	0.3	-1.5	69	0.4	0.4	40
	1333+18	Elliptical	Medium	15	0.6	0	-0.8	0.0	44	-0.6	-0.4	25.5	0.3	-1.5	33	-0.9	0	69	0.0	1.5	40
122	1333+12	Elliptical	Medium	15	0	0.6	-0.3	-1.3	44	-1.3	-0.1	25.5	0.3	-1.8	33	-0.6	0.7	69	0.7	1.0	40
1333+70	1333+06	Elliptical	Medium	15	-0.6	-0.3	-0.1	-1.0	44	-1.4	1.0	25.5	-0.1	-1.3	33	-0.7	0.7	69	1.2	0.6	40
	1333+00	Elliptical	Medium	15	0	0.5	0.2	-0.8	44	-1.2	-0.4	25.5	-0.1	-1.6	33	-0.1	0	69	0.7	0.6	40
	1332+94	Elliptical	Medium	15	-0.7	-0.3	-0.7	-0.5	44	0.4	-0.2	25.5	-0.6	-0.1	33	1	0.9	69	0.5	-0.1	40
	1332+88	Elliptical	Medium	15	-1	-0.8	-0.3	0.0	44	-1.2	-0.1	25.5	-0.4	-1.1	33	0.1	0.2	69	-0.6	-0.6	40
	1332+82	Elliptical	Medium	15	-0.7	0.7	0.3	0.1	44	-1.5	0.2	25.5	-0.1	-1.8	33	-0.2	-0.2	69	0.5	0.1	40
	1331+84	Elliptical	Medium	15	-1	0.2	0.0	-0.2	38	-0.4	0.3	26.8	-0.3	-0.5	33	0.1	0.5	70	1.2	0.8	40
	1331+78	Elliptical	Medium	15	-0.3	0.2	0.2	-0.6	38	-1.0	0.9	26.8	-0.4	-1.0	33	0.2	1.4	70	0.5	0.1	40
	1331+72	Elliptical	Medium	15	-1.3	0.6	-0.9	-1.1	38	-0.9	0.3	26.8	-0.7	-1.3	33	-0.9	0.6	70	0.7	0.0	40
	1331+66	Elliptical	Medium	15	-0.4	0.1	-0.5	-0.6	38	-1.1	0.0	26.8	0.4	-1.1	33	0.3	0.7	70	0.5	1.3	40
120	1331+60	Elliptical	Medium	15	-0.4	-0.2	-1.1	-0.6	38	0.1	0.2	26.8	-0.3	-1.3	33	0.8	-0.1	70	1.2	0.1	40
1332+20	1331+54	Elliptical	Medium	15	-0.5	-0.5	-1.5	-0.3	38	-1.0	0.1	26.8	0.2	-0.7	33	0.5	1.1	70	0.5	0.6	40
	1331+48	Elliptical	Medium	15	-0.2	0	-0.3	-0.5	38	0.3	1.0	26.8	0.2	-0.1	33	0.3	0.6	70	1.2	0.9	40
	1331+42	Elliptical	Medium	15	-0.5	-0.5	-0.3	-0.8	38	0.1	1.5	26.8	-0.5	0.0	33	0.1	1.2	70	0.6	2.1	40
	1331+36	Elliptical	Medium	15	-0.1	-0.3	0.5	-0.8	38	-0.1	0.3	26.8	-0.9	-1.5	33	0.8	0.7	70	0.4	1.3	40
	1331+30	Elliptical	Medium	15	-1.2	0.1	0.1	-0.2	38	-1.0	0.9	26.8	0.0	-0.1	33	0.4	0.7	70	0.6	0.1	40
	1327+88	Round	Standard	12	-0.7	-0.5	-0.2	0.7	38	-0.5	0.0	26.8	-0.9	-1.3	33	0	-0.8	70	-0.5	0.0	40
	1327+82	Round	Standard	12	0.5	-0.3	-0.2	0.1	38	-0.9	0.4	26.8	-0.1	0.0	33	0.7	0.2	70	1.2	1.0	40
	1327+76	Round	Standard	12	0.5	-1	0.2	0.2	38	-0.6	0.0	26.8	-0.2	-1.0	33	0	1	70	-0.3	1.0	40
	1327+70	Round	Standard	12	0.6	-0.2	-1.2	-0.2	38	-1.2	0.8	26.8	0.5	-1.3	33	0.2	0.8	70	-0.5	1.0	40
118	1327+64	Round	Standard	12	-0.5	0	-0.1	0.0	38	-0.2	-0.1	26.8	-0.1	-0.5	33	0.7	-0.5	70	0.5	0.2	40
1328+20	1327+58	Round	Standard	12	-1.1	0	-0.2	-1.0	38	-1.4	0.0	26.8	-0.1	-0.7	33	-0.3	-0.6	70	-0.3	0.3	40
	1327+52	Round	Standard	12	-0.3	-0.7	-0.5	-0.5	38	-0.1	0.8	26.8	-0.8	-0.6	33	0.7	-1	70	1.0	1.5	40
	1327+46	Round	Standard	12	0.3	-0.2	0.0	0.1	38	-1.2	1.6	26.8	-0.5	-1.3	33	1	0.6	70	0.4	1.0	40
	1327+40	Round	Standard	12	-0.8	0	-0.1	0.5	38	-0.9	0.1	26.8	1.2	-1.6	33	0.5	0.6	70	-0.3	0.7	40
	1327+34	Round	Standard	12	-1.4	-0.6	-0.6	-0.1	38	-0.3	0.9	26.8	0.0	0.1	33	1	-0.8	70	0.5	-0.5	40

	1320+89	Elliptical	Medium	15	-0.3	0	-0.3	-0.2	41	-0.3	-0.3	26.8	-0.2	0.0	36	0.4	-0.4	70	0.6	1.4	40
	1320+83	Elliptical	Medium	15	0.2	0	0.3	0.2	41	-0.6	0.2	26.8	-1.1	-0.7	36	0.2	0.2	70	-0.6	0.1	40
	1320+77	Elliptical	Medium	15	-0.2	0.2	-0.2	0.0	41	-1.2	0.1	26.8	-1.1	-0.8	36	0.2	0.6	70	0.6	1.0	40
	1320+71	Elliptical	Medium	15	-0.5	-0.2	-0.7	-0.7	41	-0.8	1.6	26.8	-0.7	-1.3	36	0.4	-0.4	70	-0.2	0.2	40
116	1320+65	Elliptical	Medium	15	-0.8	-0.3	0.2	-0.8	41	-0.5	1.2	26.8	-0.5	-1.3	36	1.4	-0.1	70	-0.3	1.3	40
1321+20	1320+59	Elliptical	Medium	15	-1.4	0	0.5	0.0	41	-1.4	0.2	26.8	-0.8	-1.5	36	1	-0.2	70	-0.5	0.1	40
	1320+53	Elliptical	Medium	15	0.1	0.6	0.0	-0.2	41	-0.5	0.0	26.8	-0.3	-1.6	36	0.2	-0.5	70	0.1	0.1	40
	1320+47	Elliptical	Medium	15	-0.3	-0.3	0.1	0.1	41	-0.1	-0.1	26.8	-0.3	0.0	36	-0.3	-0.1	70	-0.3	0.2	40
	1320+41	Elliptical	Medium	15	0	1.1	-0.5	0.4	41	-1.2	0.5	26.8	-0.1	-1.5	36	0.4	-0.1	70	-0.2	1.1	40
	1320+35	Elliptical	Medium	15	0.4	-0.7	-0.8	-0.8	41	-1.4	0.3	26.8	-0.8	-0.7	36	0.3	0.3	70	1.2	0.1	40
	1319+38	Elliptical	Medium	12	0.4	-0.8	0.0	-0.3	41	-1.3	0.0	26.8	-0.8	-0.5	36	1.1	-0.3	70	0.5	0.1	40
	1319+32	Elliptical	Medium	12	0	-0.5	0.0	-0.9	41	0.1	-0.1	26.8	-0.5	-0.5	36	1	-0.5	70	1.1	1.0	40
	1319+26	Elliptical	Medium	12	0.1	-0.1	-0.5	0.2	41	-0.1	0.9	26.8	0.5	-1.8	36	0.5	0.3	70	1.2	0.8	40
	1319+20	Elliptical	Medium	12	0.5	-1	-0.2	-1.0	41	0.1	0.2	26.8	-0.3	-0.5	36	0.7	0.2	70	0.6	0.2	40
114	1319+14	Elliptical	Medium	12	-0.5	0.3	0.0	-0.2	41	-0.6	0.3	26.8	-1.1	-1.6	36	-0.3	-0.8	70	0.5	1.0	40
1319+70	1319+08	Elliptical	Medium	12	0	1	0.2	-0.2	41	-1.4	0.8	26.8	0.4	-0.7	36	0.5	-0.8	70	0.1	1.0	40
	1319+02	Elliptical	Medium	12	-0.6	-0.8	0.1	-0.3	41	0.0	1.6	26.8	0.4	0.0	36	1.3	0.3	70	1.2	0.1	40
	1318+96	Elliptical	Medium	12	-0.5	-0.2	-1.2	-1.4	41	0.3	0.5	26.8	-0.3	-0.6	36	1.5	-0.6	70	0.2	1.4	40
	1318+90	Elliptical	Medium	12	1	-1	0.5	-0.3	41	0.1	-0.2	26.8	-1.0	-0.1	36	1	-0.8	70	0.6	1.0	40
	1318+84	Elliptical	Medium	12	-0.4	-1.3	-0.7	-0.4	41	1.7	0.1	26.8	-0.5	-0.7	36	1	-0.8	70	1.2	0.3	40
	1317+78	Elliptical	Medium	12	-0.8	0.2	-0.5	-0.5	40	-0.5	1.6	28	-0.4	-2.0	37	0.3	1.1	69	-0.3	1.0	40
	1317+71	Elliptical	Medium	12	-0.5	-0.3	-0.5	-0.5	40	-0.5	0.2	28	-0.8	-0.6	37	0.4	0.7	69	0.5	0.1	40
	1317+65	Elliptical	Medium	12	-0.5	-0.5	-0.3	0.0	40	-1.4	0.4	28	-1.0	-1.7	37	0.6	-0.3	69	-0.3	0.2	40
	1317+59	Elliptical	Medium	12	-0.9	0.2	-0.8	-0.5	40	-0.1	0.3	28	-0.4	0.0	37	-0.6	1	69	0.6	0.7	40
112	1317+53	Elliptical	Medium	12	0.1	-0.1	0.1	-0.4	40	0.8	0.2	28	-0.5	-0.3	37	1	-0.3	69	0.9	0.1	40
1318+20	1317+47	Elliptical	Medium	12	-0.9	-1.1	-0.3	-1.0	40	0.3	0.9	28	0.4	-2.0	37	-0.4	1.1	69	1.2	0.9	40
	1317+41	Elliptical	Medium	12	-0.5	-0.3	-1.0	-1.6	40	-0.1	1.2	28	1.0	-0.7	37	0.4	1	69	0.4	1.4	40
	1317+35	Elliptical	Medium	12	0	0.2	-0.8	-0.9	40	-0.8	0.9	28	0.3	-0.9	37	0.2	0.8	69	0.5	0.5	40
	1317+29	Elliptical	Medium	12	-0.7	-0.6	-0.3	-0.3	40	-0.9	0.7	28	-0.1	-1.3	37	-0.8	0.2	69	0.6	1.4	40
	1317+23	Elliptical	Medium	12	-1.1	-1.5	-0.4	-1.0	40	-0.1	1.0	28	0.4	-0.4	37	1.1	1	69	1.1	1.2	40
	1301+85	Round	Standard	12	-0.8	-0.4	0.6	-0.7	40	-1.3	-0.4	28	-0.6	-0.7	37	0.3	1.4	69	0.5	0.6	40
	1301+79	Round	Standard	12	-0.1	-0.4	-0.5	-0.9	40	0.1	0.2	28	-0.8	-0.7	37	0.7	0.7	69	0.5	0.8	40
	1301+73	Round	Standard	12	-0.1	0.2	-0.2	-1.0	40	-1.0	0.2	28	-0.8	-0.2	37	-0.9	-0.2	69	0.7	0.4	40
	1301+67	Round	Standard	12	0	0.5	-0.3	-0.3	40	0.1	0.3	28	-0.3	0.5	37	-0.6	0.7	69	0.6	0.1	40
110	1301+61	Round	Standard	12	-0.4	-0.2	-0.3	-0.7	40	-0.9	0.7	28	0.5	-0.5	37	0.7	1.3	69	0.8	1.4	40
1302+20	1301+55	Round	Standard	12	0	-0.4	0.2	0.4	40	-1.0	0.2	28	-0.9	-1.7	37	-0.7	0	69	0.1	0.9	40
	1301+49	Round	Standard	12	-0.7	-0.5	-0.6	-0.3	40	-1.1	0.9	28	-1.1	-0.5	37	0.9	-0.5	69	1.2	0.1	40
	1301+43	Round	Standard	12	-0.5	-0.3	-0.4	-1.1	40	-0.1	-0.3	28	-1.0	0.0	37	-0.3	0.7	69	0.5	0.3	40
	1301+37	Round	Standard	12	-0.5	0	0.3	-1.0	40	-1.4	1.0	28	-0.3	0.0	37	0.6	1.5	69	-0.4	0.1	40
	1301+31	Round	Standard	12	-0.8	-0.1	-0.5	-0.3	40	-0.1	-0.5	28	-0.4	0.0	37	1.1	0.2	69	0.7	1.0	40
	1280+87	Elliptical	Medium	12	0.4	-0.8	-0.4	-0.7	43	-0.9	-0.4	30.9	0.5	-0.7	37	0.3	-0.4	70	0.5	0.6	43
	1280+81	Elliptical	Medium	12	0	-0.6	-0.5	0.0	43	-1.4	-0.3	30.9	-1.0	-0.7	37	0.6	0.3	70	0.6	0.8	43
	1280+75	Elliptical	Medium	12	-0.3	-0.5	-0.9	-0.3	43	-0.5	-0.3	30.9	0.2	-0.4	37	1	0.2	70	0.4	0.8	43
	1280+69	Elliptical	Medium	12	0.5	-0.6	-0.1	-0.2	43	-0.5	0.2	30.9	0.0	-0.7	37	-0.1	-0.4	70	-0.3	0.1	43
108	1280+63	Elliptical	Medium	12	0.3	-0.5	-0.3	-0.6	43	-0.8	0.4	30.9	-0.4	-0.6	37	0.8	0.7	70	0.7	0.6	43
1281+20	1280+57	Elliptical	Medium	12	-0.5	-0.5	0.1	-0.8	43	-1.4	0.2	30.9	-1.0	-1.3	37	-0.9	0.6	70	0.2	0.2	43
	1280+51	Elliptical	Medium	12	-1	-1.3	-0.3	-0.5	43	-0.8	0.0	30.9	-1.0	-1.3	37	0.7	0.6	70	1.2	0.3	43
	1280+45	Elliptical	Medium	12	-0.2	-0.7	-0.8	-0.5	43	-0.6	0.2	30.9	-0.4	-0.5	37	-0.3	-0.2	70	1.2	0.8	43
	1280+39	Elliptical	Medium	12	-0.4	-0.1	0.0	-0.5	43	-1.3	-0.3	30.9	-0.8	-0.7	37	0.3	0.4	70	0.6	1.6	43
	1280+33	Elliptical	Medium	12	-1	-0.7	-1.0	-1.5	43	0.1	0.4	30.9	-1.1	-0.7	37	-0.2	0.7	70	0.0	0.6	43
	1279+38	Round	Standard	18	-0.1	-0.5	0.0	-0.5	43	0.2	0.0	30.9	-0.5	-0.5	37	0.4	-0.3	70	1.2	0.0	43
	1279+32	Round	Standard	18	0.1	-1.4	0.8	-0.2	43	-0.8	0.9	30.9	-1.0	-0.5	37	0.8	1.1	70	0.6	1.4	43
	1279+26	Round	Standard	18	0.5	0.4	-0.8	0.0	43	-0.1	0.0	30.9	-0.9	-0.4	37	-0.4	0.7	70	0.6	0.6	43
	1279+20	Round	Standard	18	-0.8	-0.6	-0.1	-0.2	43	0.2	-0.1	30.9	-0.5	0.0	37	0.8	0.3	70	1.2	1.0	43
106	1279+14	Round	Standard	18	0	-0.1	0.0	-0.8	43	-1.5	0.3	30.9	-1.1	-1.5	37	-0.4	1	70	1.0	-0.1	43
1279+70	1279+08	Round	Standard	18	-1.5	-0.7	0.0	-0.6	43	0.1	0.2	30.9	0.2	-0.7	37	0.6	0.7	70	1.1	1.4	43
	1279+02	Round	Standard	18	-0.5	-0.5	0.1	0.5	43	0.0	0.0	30.9	-0.1	-0.5	37	0.3	0.2	70	0.6	0.2	43
	1278+96	Round	Standard	18	0.7	-0.8	-1.1	-0.3	43	-0.3	0.5	30.9	-0.6	-0.7	37	0.1	-0.1	70	0.5	1.4	43
	1278+90	Round	Standard	18	0.1	-0.7	-0.8	0.1	43	0.6	1.0	30.9	-1.0	-0.5	37	0.6	0.3	70	0.9	0.7	43
	1278+84	Round	Standard	18	0.3	-0.9	-0.8	-1.0	43	0.2	1.2	30.9	-0.5	0.0	37	0.7	-0.3	70	1.1	0.2	43
	1277+89	Round	Standard	18	0.1	-0.1	-0.2	-1.2	41	-1.2	1.0	33	-1.0	-0.8	38	-0.4	0.7	70	-0.3	1.5	43
	1277+83	Round	Standard	18	-0.1	-0.5	0.1	-1.0	41	-0.1	0.9	33	-1.0	-0.7	38	0.6	0.6	70	1.1	1.6	43
	1277+77	Round	Standard	18	-0.2	-1.3	-0.5	0.0	41	-0.1	0.4	33	-0.5	-0.5	38	1.1	0.1	70	0.6	0.7	43
	1277+71	Round	Standard	18	0	-0.3	0.2	-0.1	41	-0.8	-0.1	33	-0.4	-1.3	38	-0.8	0.5	70	0.5	1.0	43
104	1277+65	Round	Standard	18	-1	0.2	0.5	-0.3	41	-1.4	0.2	33	-1.3	0.2	38	-0.3	0	70	1.5	1.3	43
1278+20	1277+59	Round	Standard	18	0.3	0.2	0.1	0.0	41	0.7	1.0	33	-1.8	-1.0	38	0.2	0.7	70	0.2	1.4	43
	1277+53	Round	Standard	18	-1.2	-0.7	-0.6	-0.8	41	-0.8	1.6	33	0.2	-1.2	38	0.3	1.7	70	0.5	1.9	43
	1277+47	Round	Standard	18	-0.3	-0.1	-0.5	0.0	41	-1.4	0.4	33	-0.3	-1.4	38	0.2	0	70	1.1	0.9	43
	1277+41	Round	Standard	18	-0.2	0	0.0	0.2	41	-1.3	-0.3	33	-0.7	-1.8	38	-0.1	-0.1	70	-0.6	1.0	43
	1277+35	Round	Standard	18	0	-0.5	-0.5	-0.7	41	0.0	0.1	33	-1.0	0.3	38	1	0.6	70	1.2	1.0	43

	1276+65	Round	Standard	12	-0.6	-0.1	0.3	-0.5	41	0.5	1.0	33	-0.8	-0.1	38	0.8	0	70	1.2	1.1	43
	1276+59	Round	Standard	12	-0.2	-0.8	0.0	-1.5	41	-0.1	0.5	33	-1.0	-0.1	38	1	0.3	70	0.9	1.2	43
	1276+53	Round	Standard	12	1.2	0	0.2	-0.1	41	0.4	0.3	33	0.0	-1.3	38	0.5	-0.3	70	0.7	0.6	43
	1276+47	Round	Standard	12	0.2	-0.1	-0.1	-0.4	41	-0.8	0.3	33	0.0	-0.7	38	-0.8	-0.5	70	0.4	0.9	43
103	1276+41	Round	Standard	12	-0.5	-0.3	-0.6	-0.5	41	-0.1	0.3	33	-0.1	-0.6	38	0.9	-0.4	70	0.5	0.8	43
1277+00	1276+35	Round	Standard	12	-0.1	-0.4	-0.5	0.0	41	-1.1	0.1	33	-0.8	-1.8	38	0.1	0.7	70	0.8	0.3	43
	1276+29	Round	Standard	12	-0.3	-0.3	-0.9	-1.2	41	-0.8	1.0	33	-0.5	-1.4	38	-0.8	-0.5	70	-0.4	0.7	43
	1276+23	Round	Standard	12	1	0	0.2	-0.3	41	-0.1	0.1	33	-0.8	-0.9	38	-0.6	0.2	70	-0.2	0.1	43
	1276+17	Round	Standard	12	-1.2	-0.9	-0.8	-0.8	41	-0.3	0.1	33	-0.5	-0.5	38	0.2	1.3	70	-0.3	1.6	43
	1276+11	Round	Standard	12	-0.5	-0.9	-0.6	-0.8	41	0.4	1.0	33	-0.4	-0.5	38	0.6	1.2	70	1.1	0.5	43
	1267+37	Round	Standard	12	-0.3	-0.5	0.1	-1.2	42	-0.1	1.5	33.3	0.2	-0.5	45	1	-0.9	71	0.7	0.1	50
	1267+31	Round	Standard	12	-0.1	-1.4	-0.5	-0.6	42	-0.1	0.2	33.3	0.0	-0.7	45	0.5	-0.9	71	0.5	0.6	50
	1267+25	Round	Standard	12	-0.6	-0.6	-0.5	-1.5	42	-0.4	-0.2	33.3	-1.0	-1.8	45	0.2	0.1	71	-0.3	0.9	50
	1267+19	Round	Standard	12	0.6	-0.1	0.5	-0.8	42	-0.8	-0.1	33.3	0.0	-1.7	45	0.7	-0.1	71	1.1	0.1	50
101	1267+13	Round	Standard	12	-1.3	0.6	-0.5	-0.9	42	-0.4	1.0	33.3	-0.8	-1.8	45	0.5	-0.9	71	-0.4	1.4	50
1267+70	1267+07	Round	Standard	12	-0.8	-0.1	-0.6	-0.1	42	-0.8	-0.2	33.3	-1.0	-0.5	45	0.7	-0.9	71	-0.5	0.2	50
	1267+01	Round	Standard	12	0.9	0	-0.8	0.2	42	-0.7	0.9	33.3	-1.0	-0.8	45	0.7	-1	71	-0.2	0.0	50
	1266+95	Round	Standard	12	-0.8	-0.8	-0.2	-0.9	42	0.3	1.5	33.3	-1.0	-0.2	45	0.7	0.8	71	1.1	1.0	50
	1266+89	Round	Standard	12	-0.6	-0.5	-0.5	-0.8	42	-0.2	0.5	33.3	-0.1	-0.7	45	0.3	0.7	71	0.5	0.8	50
	1266+83	Round	Standard	12	-0.7	-1.2	-1.0	-0.4	42	0.1	0.9	33.3	-0.8	0.0	45	1	-0.6	71	0.6	1.0	50
	1266+16	Round	Standard	12	-0.2	-0.8	0.0	0.0	42	-1.4	-0.5	33.3	-0.2	-0.8	45	0	-0.6	71	1.0	1.0	50
	1266+10	Round	Standard	12	0.8	0	-0.8	0.7	42	-1.1	-0.5	33.3	-0.8	-1.4	45	0.1	-0.7	71	-0.3	0.3	50
	1266+04	Round	Standard	12	-1.5	-0.3	-0.2	-1.7	42	-1.3	1.2	33.3	0.6	-0.7	45	0.7	0.8	71	0.2	1.2	50
	1265+98	Round	Standard	12	-0.3	-0.3	-1.0	-0.8	42	-0.1	0.8	33.3	-0.4	0.0	45	1.2	-0.3	71	1.2	1.1	50
100	1265+92	Round	Standard	12	-0.5	0.6	-0.7	-0.1	42	-0.1	-0.3	33.3	-1.0	-0.7	45	0.6	-0.8	71	0.1	0.8	50
1266+50	1265+86	Round	Standard	12	0	-0.4	-0.1	-0.7	42	-0.3	0.7	33.3	0.1	-0.7	45	1	-0.6	71	0.5	0.1	50
	1265+80	Round	Standard	12	0.6	0.4	0.1	-0.1	42	-0.1	0.7	33.3	-0.1	-1.0	45	-0.3	-0.3	71	-0.1	1.7	50
	1265+74	Round	Standard	12	-0.3	-0.8	-0.8	-0.5	42	-0.3	0.0	33.3	-1.0	-1.5	45	0.1	-0.8	71	0.2	0.4	50
	1265+68	Round	Standard	12	0	-0.3	-0.8	0.0	42	-1.0	0.7	33.3	-0.6	-0.7	45	1.3	-0.3	71	0.7	0.2	50
	1265+62	Round	Standard	12	-0.3	0.3	0.6	-0.8	42	-1.2	-0.1	33.3	-0.6	-0.7	45	0.6	-0.3	71	0.5	0.6	50
	1264+90	Elliptical	Medium	12	-0.5	-0.3	-2.0	-0.6	50	-0.5	0.7	34.3	-1.0	-0.5	43	0.6	-0.8	71	0.6	0.3	55
	1264+84	Elliptical	Medium	12	0.5	-0.2	0.4	-0.5	50	-1.0	0.0	34.3	0.2	-0.5	43	1	0.1	71	0.2	0.1	55
	1264+78	Elliptical	Medium	12	0.7	0.5	0.3	-0.3	50	0.1	0.0	34.3	0.8	-0.3	43	1	0.2	71	0.9	0.3	55
	1264+72	Elliptical	Medium	12	-0.6	-0.5	-0.8	-1.1	50	0.1	1.5	34.3	-1.0	0.0	43	1.3	-0.8	71	1.2	1.6	55
98	1264+66	Elliptical	Medium	12	-1.1	-0.7	-0.2	-0.8	50	-1.1	1.6	34.3	0.4	-0.4	43	0.7	0.1	71	0.5	1.5	55
1265+20	1264+60	Elliptical	Medium	12	-0.4	-0.8	-1.0	-0.3	50	0.0	0.4	34.3	0.1	-0.1	43	1.5	-0.8	71	0.6	0.6	55
	1264+54	Elliptical	Medium	12	0.3	0.2	0.0	-0.2	50	0.3	0.0	34.3	-0.3	-0.4	43	1.4	-0.5	71	0.9	0.1	55
	1264+48	Elliptical	Medium	12	0.1	0.5	-0.4	-0.5	50	-1.1	0.2	34.3	-0.4	-0.5	43	0.6	0.1	71	0.5	0.6	55
	1264+42	Elliptical	Medium	12	0.2	-0.5	-0.8	-0.5	50	-0.5	0.3	34.3	-0.8	-0.6	43	0.5	-0.3	71	0.5	0.9	55
	1264+36	Elliptical	Medium	12	-1.2	0.4	-0.4	-0.9	50	0.2	1.0	34.3	0.3	-0.8	43	0.5	0	71	0.0	0.3	55
	1263+69	Round	Standard	18	0.5	0.2	-0.7	0.0	50	-1.4	0.8	34.3	-0.8	-1.3	43	1	-0.9	71	0.5	1.2	55
	1263+63	Round	Standard	18	0	0	-0.3	-0.7	50	-0.5	0.3	34.3	-1.3	-1.5	43	0.7	-0.9	71	-0.3	1.0	55
	1263+57	Round	Standard	18	0.5	-0.8	-0.5	-1.1	50	0.2	0.9	34.3	-1.0	0.0	43	1.2	0.2	71	-0.1	0.1	55
	1263+51	Round	Standard	18	0.1	-0.8	-0.3	-0.7	50	-1.4	0.0	34.3	0.0	-1.0	43	0.6	-0.8	71	-0.2	1.4	55
97	1263+45	Round	Standard	18	-0.2	-1	-0.2	-0.5	50	0.3	1.0	34.3	0.5	0.0	43	1.2	0.1	71	-0.7	0.1	55
1264+10	1263+39	Round	Standard	18	0.4	-1	-0.4	-0.8	50	-0.7	-0.1	34.3	-0.8	-1.8	43	0.5	-0.5	71	-0.8	0.7	55
	1263+33	Round	Standard	18	0.2	0.2	-0.1	-0.9	50	-0.1	0.9	34.3	-1.0	-0.7	43	0.7	-0.8	71	-0.1	0.1	55
	1263+27	Round	Standard	18	0	-0.5	-0.9	-0.5	50	-0.3	0.0	34.3	-1.0	-0.8	43	0.7	0.1	71	-0.4	0.8	55
	1263+21	Round	Standard	18	-0.8	-0.1	-0.3	-0.4	50	-1.2	0.4	34.3	-0.9	-0.8	43	0.2	-0.3	71	0.5	1.8	55
	1263+15	Round	Standard	18	0.5	0	-1.0	-0.5	50	-1.4	0.2	34.3	-1.0	-0.1	43	1	0.1	71	0.5	0.1	55
	1262+44	Round	Standard	15	-0.3	0.2	-0.2	-0.4	41	-1.0	0.3	31.9	0.3	-1.3	42	0.5	-0.8	70	0.5	0.8	48
	1262+38	Round	Standard	15	-0.3	-0.2	-1.9	-1.0	41	-0.5	0.9	31.9	-0.7	-0.6	42	0.2	0.2	70	1.2	0.9	48
	1262+32	Round	Standard	15	-0.8	0.2	0.2	-0.8	41	-0.6	-0.1	31.9	0.4	-1.7	42	-0.5	-0.3	70	-0.3	0.1	48
	1262+26	Round	Standard	15	0.1	-0.6	0.1	-0.6	41	-0.9	1.0	31.9	-0.7	-1.3	42	0	0.7	70	-0.3	1.4	48
95	1262+20	Round	Standard	15	-0.8	-1	-0.7	-0.6	41	-0.8	0.5	31.9	-1.0	-1.7	42	-0.3	-0.9	70	0.5	0.1	48
1262+80	1262+14	Round	Standard	15	0	0.5	-0.6	-0.3	41	-1.2	-0.4	31.9	-0.7	-1.1	42	-0.5	-0.8	70	-0.4	1.2	48
	1262+08	Round	Standard	15	-1.3	-1.5	-1.1	-1.5	41	0.1	1.4	31.9	0.6	0.0	42	1.1	0.4	70	-0.3	2.1	48
	1262+02	Round	Standard	15	-1	-0.2	-1.0	-0.5	41	-0.4	0.8	31.9	-0.8	-1.1	42	-0.3	-0.1	70	-0.1	2.0	48
	1261+96	Round	Standard	15	-0.8	-0.2	-0.3	-1.7	41	-0.3	2.0	31.9	0.4	-1.8	42	0	1.1	70	0.6	1.7	48
	1261+90	Round	Standard	15	-0.5	0	-0.5	-0.4	41	-1.1	0.4	31.9	0.1	-0.6	42	0.5	-0.2	70	-0.5	0.9	48
	1261+19	Elliptical	Medium	12	0.2	0	-1.1	-0.6	41	-0.8	1.0	31.9	-0.8	-0.7	42	0.7	0.3	70	0.4	0.1	48
	1261+13	Elliptical	Medium	12	-0.7	-0.1	0.4	-0.8	41	0.0	1.4	31.9	0.1	-0.7	42	1	0.8	70	0.5	0.8	48
	1261+07	Elliptical	Medium	12	-0.8	-0.4	-0.4	-0.9	41	-1.1	1.4	31.9	0.1	-1.5	42	-0.2	0.5	70	0.0	0.8	48
	1261+01	Elliptical	Medium	12	-0.8	-0.3	0.5	0.1	41	-1.2	1.3	31.9	0.7	-0.7	42	0.6	0.8	70	0.7	1.7	48
93	1260+95	Elliptical	Medium	12	-0.1	0.7	-0.3	-0.3	41	-1.0	0.0	31.9	0.0	-1.8	42	0.2	-0.2	70	-0.4	0.1	48
1261+50	1260+89	Elliptical	Medium	12	-0.6	-0.4	-0.2	-0.5	41	-1.2	1.0	31.9	-1.3	0.0	42	4.5	-0.3	70	1.0	1.4	48
	1260+83	Elliptical	Medium	12	-0.2	0.3	-0.5	0.0	41	-1.4	0.4	31.9	-1.0	-1.6	42	0.3	-0.8	70	0.5	0.1	48
	1260+77	Elliptical	Medium	12	-0.9	-1	-0.7	0.1	41	-0.9	0.1	31.9	-0.9	-0.6	42	0.7	1.8	70	0.5	0.7	48
	1260+71	Elliptical	Medium	12	-0.7	-0.3	-0.8	0.4	41	-1.1	0.3	31.9	0.6	-1.3	42	0.2	0.8	70	-0.3	2.0	48
	1260+65	Elliptical	Medium	12	-0.3	-0.2	0.0	-1.4	41	-1.4	1.6	31.9	0.3	-1.2	42	0.7	1.2	70	-0.3	1.8	48

	1256+87	Round	Standard	12	-0.7	-0.5	-0.6	0.2	43	-0.9	1.1	33.6	0.8	-1.4	43	0.5	0.5	70	-0.3	1.7	50
	1256+81	Round	Standard	12	1	-0.5	-1.2	-0.5	43	-0.9	1.5	33.6	-0.4	-0.5	43	1	0.3	70	-0.6	0.6	50
	1256+75	Round	Standard	12	-0.3	-0.5	-0.6	-0.2	43	-0.2	1.6	33.6	-0.8	-0.6	43	0.6	0.3	70	0.5	0.5	50
	1256+69	Round	Standard	12	-1.1	-0.8	-0.4	0.0	43	-1.0	0.4	33.6	0.0	-1.8	43	-0.3	0.6	70	-0.1	0.8	50
91	1256+63	Round	Standard	12	0.1	0.1	-0.9	-1.6	43	-1.2	-0.1	33.6	-0.3	-1.5	43	-0.3	0.5	70	-0.4	0.2	50
1260+20	1256+57	Round	Standard	12	0.1	-0.4	-0.2	-1.3	43	-1.6	0.4	33.6	-0.1	-1.7	43	1.5	-0.7	70	0.5	1.3	50
	1256+51	Round	Standard	12	0.3	-0.1	0.2	-0.8	43	-1.3	-0.1	33.6	0.0	-0.5	43	-0.5	0.2	70	-0.1	0.6	50
	1256+45	Round	Standard	12	-0.5	-0.2	0.2	-0.5	43	-0.5	-0.3	33.6	-0.8	-0.3	43	0.7	-0.8	70	0.5	1.7	50
	1256+39	Round	Standard	12	-0.6	0.6	-0.2	-0.1	43	-1.4	0.3	33.6	-1.0	-1.9	43	0	0.5	70	-0.4	1.0	50
	1259+33	Round	Standard	12	0	-1	-0.3	0.2	43	-0.6	0.2	33.6	-0.3	-0.7	43	1.3	-0.8	70	-0.1	0.1	50
	1256+88	Elliptical	Medium	12	0.2	-0.3	-0.5	-0.5	43	-0.2	1.5	33.6	0.5	-0.6	43	1	0.8	70	0.5	0.7	50
	1256+82	Elliptical	Medium	12	-0.8	0.1	-0.5	-0.5	43	-0.1	0.1	33.6	-1.0	-1.2	43	0.6	-0.9	70	0.2	0.1	50
	1256+76	Elliptical	Medium	12	0.5	-0.3	-0.4	0.7	43	-1.4	1.5	33.6	0.1	-0.6	43	1.5	-1	70	0.5	0.1	50
	1256+70	Elliptical	Medium	12	0.1	0.1	0.2	1.0	43	-1.4	-0.2	33.6	-0.8	-1.8	43	0.2	0.3	70	0.7	0.1	50
89	1256+64	Elliptical	Medium	12	-0.3	0.2	0.1	-1.3	43	-1.0	0.3	33.6	0.0	-0.7	43	0.7	-0.8	70	0.8	0.4	50
1257+20	1256+58	Elliptical	Medium	12	-0.3	-1.1	-0.4	0.4	43	0.1	0.2	33.6	-0.4	-1.3	43	0.5	0.3	70	0.5	1.2	50
	1256+52	Elliptical	Medium	12	-0.4	0	-0.2	-0.2	43	-0.4	0.3	33.6	-0.7	-1.5	43	1	-0.5	70	-0.3	0.1	50
	1256+48	Elliptical	Medium	12	-0.2	0.4	0.4	-0.4	43	-0.8	-0.1	33.6	0.6	-1.7	43	0.6	0.8	70	0.0	1.7	50
	1256+42	Elliptical	Medium	12	0	0.2	0.1	-0.5	43	-1.4	1.0	33.6	1.2	-0.6	43	0.2	-0.3	70	-0.2	1.0	50
	1256+36	Elliptical	Medium	12	-0.2	0.2	-0.6	-0.5	43	-0.3	0.2	33.6	-0.6	-0.3	43	-0.1	-0.4	70	-0.5	0.3	50
	1255+34	Elliptical	Medium	12	-0.5	-0.1	-0.3	-0.6	43	-1.0	1.0	34.4	0.3	-0.5	43	0.5	-0.8	71	0.7	1.2	55
	1255+28	Elliptical	Medium	12	-1.3	-0.1	-0.5	-0.3	43	-1.2	0.3	34.4	-1.0	-1.4	43	0.7	-0.3	71	0.6	0.2	55
	1255+22	Elliptical	Medium	12	0.2	-1.7	-1.0	-0.3	43	-0.8	0.2	34.4	-0.5	-1.4	43	0	-0.7	71	0.0	0.6	55
	1255+16	Elliptical	Medium	12	0.1	0.2	-0.7	-0.3	43	0.1	0.2	34.4	-0.5	-1.2	43	0.7	-0.8	71	-0.1	-0.1	55
87	1255+10	Elliptical	Medium	12	-0.3	-0.4	-0.5	-0.3	43	0.3	0.1	34.4	-1.0	-1.3	43	1	-0.9	71	1.0	-0.3	55
1255+70	1255+04	Elliptical	Medium	12	-0.9	-0.3	-0.9	-0.6	43	-0.2	-0.3	34.4	-0.6	-0.6	43	0.5	-0.8	71	-0.7	-1.7	55
	1254+98	Elliptical	Medium	12	0.4	0.2	0.0	-0.8	43	-1.2	0.4	34.4	-0.1	-0.7	43	0.2	-0.9	71	-0.1	-1.0	55
	1254+92	Elliptical	Medium	12	0.2	-0.8	-1.0	0.5	43	-0.3	-0.4	34.4	-0.4	-0.7	43	0.7	-0.7	71	0.6	-0.6	55
	1254+86	Elliptical	Medium	12	0.9	0	-0.8	0.1	43	-0.3	0.4	34.4	-0.1	-0.7	43	-0.3	0.1	71	0.5	0.3	55
	1254+80	Elliptical	Medium	12	0.2	-0.9	0.2	1.2	43	-0.8	0.0	34.4	-1.0	-0.8	43	-0.5	0.1	71	0.6	0.6	55
	1252+84	Elliptical	Medium	12	0.3	-0.8	-0.2	-1.8	43	-0.7	1.0	34.4	-0.3	-1.5	43	1	0.2	71	-0.5	0.4	55
	1252+78	Elliptical	Medium	12	0.3	-1.5	-1.0	-0.5	43	0.1	1.4	34.4	-0.4	0.0	43	1	-0.2	71	1.1	0.8	55
	1252+72	Elliptical	Medium	12	-0.3	-0.7	-0.4	-0.8	43	0.1	-1.4	34.4	-1.0	-0.2	43	1.4	-0.8	71	1.0	0.2	55
	1252+66	Elliptical	Medium	12	-0.8	-1.2	-1.0	-0.3	43	-0.6	-0.3	34.4	-1.0	-0.7	43	0.7	1.1	71	0.6	0.7	55
85	1252+60	Elliptical	Medium	12	0.3	0.2	-0.5	0.2	43	-0.9	-0.2	34.4	-0.8	-0.6	43	0.4	-0.3	71	0.8	1.1	55
1254+20	1252+54	Elliptical	Medium	12	-0.9	-1	0.2	-1.0	43	-1.4	0.5	34.4	0.1	-1.4	43	0.5	0.5	71	0.6	0.3	55
	1253+48	Elliptical	Medium	12	-0.2	-0.4	-0.3	-0.2	43	0.1	-0.2	34.4	0.0	-0.1	43	1	-0.8	71	0.5	1.4	55
	1253+42	Elliptical	Medium	12	0.1	0.4	-0.3	-0.8	43	-0.2	-0.8	34.4	-0.6	-0.6	43	1	0	71	0.7	0.0	55
	1253+36	Elliptical	Medium	12	1.3	-0.3	-0.9	-0.8	43	-1.3	-1.0	34.4	-0.4	-1.3	43	0.8	-0.6	71	0.4	-0.1	55
	1253+30	Elliptical	Medium	12	1.2	0.8	0.0	-0.9	43	-0.5	1.0	34.4	0.0	-0.2	43	0.5	-0.8	71	0.5	0.2	55
	1252+34	Elliptical	Heavy	18	-0.3	-1.1	-0.3	-0.8	45	-1.1	1.2	35.9	0.4	-1.5	46	0.5	0.8	72	-0.4	1.4	52
	1252+28	Elliptical	Heavy	18	0.3	0.4	-1.4	-1.0	45	-1.4	-0.1	35.9	0.3	-0.8	46	0.7	0	72	-0.3	0.5	52
	1252+22	Elliptical	Heavy	18	-1	0	-0.8	-0.6	45	-0.2	0.0	35.9	-0.9	-1.3	46	1.2	-0.2	72	0.8	-0.8	52
	1252+16	Elliptical	Heavy	18	0.4	-0.3	0.0	0.0	45	-0.3	0.3	35.9	-0.9	-0.7	46	0.7	-0.6	72	0.7	0.8	52
83	1252+10	Elliptical	Heavy	18	-0.5	-0.4	-1.0	-0.5	45	-0.8	0.4	35.9	0.0	0.0	46	0.4	-0.9	72	0.7	0.3	52
1252+70	1252+04	Elliptical	Heavy	18	-0.7	-0.7	-0.2	-0.2	45	0.0	0.5	35.9	-0.8	-0.1	46	0	-0.8	72	0.6	-0.1	52
	1251+98	Elliptical	Heavy	18	0.1	-1.1	0.0	0.0	45	0.1	1.4	35.9	0.3	0.2	46	1.7	0.2	72	1.5	1.0	52
	1251+92	Elliptical	Heavy	18	0	0.2	-1.0	-1.0	45	-0.6	0.2	35.9	-0.1	-0.1	46	1.3	-0.9	72	0.8	0.6	52
	1251+86	Elliptical	Heavy	18	-1.1	-0.3	-0.5	-0.8	45	-1.0	1.1	35.9	0.6	-1.2	46	0.5	0.9	72	-0.5	1.4	52
	1251+80	Elliptical	Heavy	18	0.2	-0.3	0.2	0.1	45	-0.8	0.9	35.9	0.5	-0.8	46	0.2	-0.8	72	1.0	1.4	52
	1250+84	Elliptical	Medium	12	-0.9	-0.7	-0.5	-0.6	45	-1.4	0.3	35.9	-0.3	-0.7	46	0.5	-0.1	72	-0.4	0.6	52
	1250+78	Elliptical	Medium	12	-0.8	-0.6	-0.3	0.0	45	0.3	0.9	35.9	0.1	0.0	46	1	0	72	1.2	1.2	52
	1250+72	Elliptical	Medium	12	0.5	-0.8	1.8	-0.4	45	-0.5	-0.5	35.9	-0.3	0.0	46	1.2	0.3	72	1.2	-0.1	52
	1250+66	Elliptical	Medium	12	0.8	-0.8	-0.5	-1.0	45	-0.4	-0.1	35.9	-0.8	-1.4	46	-0.3	-0.8	72	-0.4	-0.1	52
81	1250+60	Elliptical	Medium	12	0.2	-0.6	-1.2	-1.4	45	-0.2	0.2	35.9	-0.6	0.0	46	1	1	72	0.8	1.8	52
1251+20	1250+54	Elliptical	Medium	12	0.5	-0.8	-0.8	-0.8	45	0.1	0.2	35.9	-0.8	-0.5	46	1	-0.6	72	0.7	-0.1	52
	1250+48	Elliptical	Medium	12	0.7	-0.4	-0.3	-1.2	45	-1.3	0.9	35.9	-0.3	-0.7	46	0.2	0.1	72	1.2	0.4	52
	1250+42	Elliptical	Medium	12	0.2	0.1	-0.2	-0.8	45	-0.8	0.3	35.9	-0.3	-0.8	46	0.7	0.2	72	0.9	1.4	52
	1250+36	Elliptical	Medium	12	-1.2	0	-0.8	-1.0	45	-0.1	-0.1	35.9	-0.3	-0.7	46	0.7	0.5	72	1.2	1.9	52
	1250+30	Elliptical	Medium	12	-0.5	0.3	-0.5	-1.0	45	0.0	1.2	35.9	-0.1	-0.7	46	0.8	0.8	72	0.6	-0.1	52
	1249+34	Round	Standard	15	0.5	0.4	0.1	-1.0	43	-1.4	0.0	37.1	-0.6	-1.0	45	-0.3	-0.2	72	-0.3	0.7	56
	1249+28	Round	Standard	15	-0.5	0.7	-0.2	-0.7	43	-0.8	1.0	37.1	-0.9	-0.2	45	0.5	0.3	72	0.7	0.6	56
	1249+22	Round	Standard	15	0.3	-0.3	0.1	-1.0	43	0.5	1.6	37.1	-0.4	-1.3	45	1	0.2	72	1.1	-0.1	56
	1249+16	Round	Standard	15	0.7	-0.8	-0.4	-1.3	43	-1.4	1.0	37.1	-0.9	-1.6	45	0.5	-0.8	72	0.5	0.5	56
79	1249+10	Round	Standard	15	-1	-0.4	0.1	-1.3	43	-0.8	1.5	37.1	-0.4	-0.5	45	0.2	-0.8	72	0.5	-0.2	56
1249+70	1249+04	Round	Standard	15	-0.8	0	-1.0	-1.1	43	-1.4	0.9	37.1	-0.3	-1.6	45	-0.1	0.7	72	-0.4	1.6	56
	1248+98	Round	Standard	15	-0.1	-0.1	0.7	0.1	43	-1.5	0.5	37.1	-1.0	-1.3	45	-0.2	-0.1	72	0.6	-0.1	56
	1248+92	Round	Standard	15	-0.3	-0.9	-0.8	-0.4	43	-0.1	1.0	37.1	-0.2	-0.5	45	0.7	-0.8	72	1.1	-0.1	56
	1248+86	Round	Standard	15	-0.8	-1	0.3	-1.2	43	-0.2	2.3	37.1	1.0	0.0	45	0.2	0.3	72	0.3	1.4	56
	1248+80	Round	Standard	15	-0.3	-0.9	-0.7	0.2	43	-1.1	1.0	37.1	0.4	-1.5	45	0.3	0.3	72	0.7	1.9	56

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	1247+35	Round	Standard	15	-1	0.8	-1.0	-0.1	43	-1.0	1.4	37.1	-0.4	-0.6	45	1.5	0.1	72	0.6	1.4	56
	1247+29	Round	Standard	15	-1.1	-0.3	-0.2	-1.5	43	0.4	0.9	37.1	0.0	-0.2	45	1.4	-0.3	72	0.7	0.5	56
	1247+23	Round	Standard	15	-0.3	0	-0.6	-0.8	43	-0.2	1.0	37.1	0.4	-1.4	45	0.5	0.8	72	0.6	1.2	56
	1247+17	Round	Standard	15	-1	-0.3	-0.2	-0.7	43	-1.4	1.5	37.1	0.6	-0.5	45	1.4	0.8	72	1.0	1.4	56
77	1247+11	Round	Standard	15	-1.5	-0.7	-0.7	0.6	43	-0.6	1.4	37.1	0.2	-1.3	45	0.7	0.5	72	0.5	0.7	56
1247+70	1247+05	Round	Standard	15	-0.8	-0.5	-0.6	-0.6	43	0.3	0.9	37.1	0.4	-1.7	45	0	0.5	72	-0.2	0.0	56
	1246+99	Round	Standard	15	-0.5	-0.6	-0.7	-0.1	43	-0.8	0.2	37.1	-0.3	-1.6	45	0.7	0.4	72	-0.3	-0.1	56
	1246+93	Round	Standard	15	0.2	-0.8	-1.1	-0.3	43	-1.0	0.2	37.1	-1.0	-0.5	45	0.2	-0.3	72	0.5	-0.1	56
	1246+87	Round	Standard	15	-0.7	-0.3	-0.5	-0.4	43	-0.8	1.0	37.1	0.6	-1.5	45	-0.4	-0.3	72	0.0	1.3	56
	1246+81	Round	Standard	15	-0.4	-0.7	-1.3	-0.8	43	0.1	0.7	37.1	0.6	0.0	45	1	0	72	0.5	-0.1	56
	1245+36	Elliptical	Heavy	18	-1	-0.4	0.8	-0.5	48	-0.9	-0.5	36.2	0.1	-0.5	52	0.5	0.3	73	0.4	0.3	55
	1245+30	Elliptical	Heavy	18	-0.8	-0.5	-0.1	0.3	48	0.3	2.1	36.2	0.6	-0.6	52	1	0.4	73	1.1	1.4	55
	1245+24	Elliptical	Heavy	18	-1.7	-0.7	-0.4	-0.3	48	-0.8	0.9	36.2	1.0	-0.5	52	0.7	0.7	73	0.5	1.2	55
	1245+18	Elliptical	Heavy	18	0.3	-0.4	-1.8	-1.2	48	-0.8	0.0	36.2	-1.0	-0.6	52	0.7	-0.3	73	0.5	1.3	55
75	1245+12	Elliptical	Heavy	18	0.4	0.4	-2.1	-0.6	48	0.1	0.9	36.2	-0.9	-0.5	52	0.8	-0.8	73	1.0	0.6	55
1245+70	1245+06	Elliptical	Heavy	18	-0.4	-0.8	-0.3	-0.8	48	0.7	0.2	36.2	-0.6	-0.7	52	0.7	-0.6	73	0.5	-0.1	55
	1245+00	Elliptical	Heavy	18	-0.1	0	-0.3	0.0	48	-0.6	0.6	36.2	-0.3	-0.8	52	0.6	0.1	73	0.5	-0.2	55
	1244+94	Elliptical	Heavy	18	1	-0.7	-0.6	0.0	48	-0.1	0.0	36.2	-1.0	0.0	52	1.4	-0.8	73	1.0	-0.2	55
	1244+88	Elliptical	Heavy	18	-0.2	0	-0.5	0.0	48	-0.6	0.0	36.2	-0.5	-0.5	52	0.7	-0.3	73	0.0	0.2	55
	1244+82	Elliptical	Heavy	18	3	-0.2	-1.0	-1.0	48	0.8	1.6	36.2	-0.5	-0.7	52	0.6	0.3	73	1.7	0.7	55
	1243+87	Round	Standard	12	0.2	-0.3	-0.5	-0.9	48	0.3	0.0	36.2	-1.0	-0.7	52	0.9	-0.9	73	1.2	0.5	55
	1243+81	Round	Standard	12	-0.8	-0.3	-0.3	0.1	48	-0.4	-0.1	36.2	-0.8	-1.1	52	0.5	0.3	73	0.5	0.1	55
	1243+75	Round	Standard	12	-0.3	-0.8	-0.4	-0.9	48	-1.4	0.2	36.2	-0.8	-1.1	52	0.7	-0.1	73	0.0	0.8	55
	1243+69	Round	Standard	12	-0.3	-1.5	0.1	-1.2	48	0.1	1.2	36.2	1.1	0.0	52	1.1	1	73	0.6	1.4	55
73	1243+63	Round	Standard	12	-0.1	-0.2	-0.5	-0.5	48	-1.2	0.3	36.2	-0.3	-0.7	52	0.7	-0.3	73	0.0	1.2	55
1244+20	1243+57	Round	Standard	12	-0.4	-1.7	-0.2	-1.0	48	0.2	0.4	36.2	-0.2	-0.1	52	1	-0.4	73	0.5	0.6	55
	1243+51	Round	Standard	12	0.6	-0.5	-0.5	-0.1	48	0.1	0.0	36.2	-1.0	0.0	52	0.7	-0.8	73	1.1	0.5	55
	1243+45	Round	Standard	12	0.4	-1.2	0.3	-0.9	48	-0.8	0.1	36.2	-0.6	-0.2	52	0.7	-0.8	73	0.7	0.6	55
	1243+39	Round	Standard	12	-0.3	-0.9	-0.6	-0.9	48	-1.2	0.3	36.2	-0.1	-1.4	52	0.7	-0.3	73	0.5	0.4	55
	1243+33	Round	Standard	12	-0.8	-0.8	-0.5	-0.8	48	-1.1	1.0	36.2	0.4	-1.3	52	0.1	0.2	73	-0.2	0.6	55
	1242+39	Round	Standard	12	0.6	-0.9	-0.2	0.1	43	0.3	1.0	39.4	0.0	-0.5	48	0.5	-0.8	71	0.0	-0.1	53
	1242+33	Round	Standard	12	-0.4	-1.1	-1.1	-0.9	43	0.2	-0.3	39.4	-0.6	-0.2	48	1.1	-0.3	71	0.2	0.8	53
	1242+27	Round	Standard	12	0.7	-1.5	-1.6	-1.4	43	0.7	0.7	39.4	-0.4	0.5	48	1.7	-0.5	71	0.9	1.3	53
	1242+21	Round	Standard	12	-0.4	0.2	-0.4	-1.8	43	-0.5	1.5	39.4	0.6	-0.7	48	1	1	71	-0.8	0.6	53
71	1242+15	Round	Standard	12	-1.3	-0.8	-0.3	-0.8	43	-0.2	0.3	39.4	-0.8	0.0	48	1.3	0.8	71	0.5	-0.1	53
1242+70	1242+09	Round	Standard	12	-1	0.3	-1.0	-0.8	43	-0.7	1.4	39.4	0.3	-1.8	48	-0.5	0.8	71	-0.2	1.3	53
	1242+03	Round	Standard	12	0.5	-0.5	-0.3	-0.8	43	-0.3	0.3	39.4	-1.0	-1.0	48	0.5	-0.8	71	-0.1	0.0	53
	1241+97	Round	Standard	12	-0.2	-1.1	-1.0	-0.8	43	-1.2	1.0	39.4	-0.6	-1.8	48	-0.2	-0.3	71	-0.8	1.0	53
	1241+91	Round	Standard	12	-0.7	-1.2	-0.4	-0.8	43	-0.6	1.0	39.4	0.3	-0.8	48	0.6	0.7	71	-0.5	0.4	53
	1241+85	Round	Standard	12	-0.1	-0.3	-0.4	-0.8	43	-0.4	0.9	39.4	-0.3	-1.0	48	-0.3	0.6	71	-0.8	0.1	53
	1240+89	Round	Standard	12	-0.3	-0.3	-0.5	-1.8	43	-1.2	-0.2	39.4	-1.0	-1.4	48	-0.2	0.4	71	-0.1	0.0	53
	1240+83	Round	Standard	12	-0.4	-2	0.0	-1.3	43	-0.8	1.7	39.4	-1.0	0.0	48	1	0.8	71	-1.0	-0.1	53
	1240+77	Round	Standard	12	0	-0.6	-0.3	-0.3	43	-1.0	1.4	39.4	0.6	-1.4	48	-0.3	1	71	-1.0	1.8	53
	1240+71	Round	Standard	12	0	-0.3	0.1	-0.3	43	-1.5	0.2	39.4	-0.6	-0.8	48	1.1	-0.8	71	-0.1	0.2	53
69	1240+65	Round	Standard	12	0	-0.6	-0.7	-0.4	43	-0.1	1.0	39.4	0.4	-0.8	48	0.8	0.6	71	0.5	-0.1	53
1241+20	1240+59	Round	Standard	12	-0.3	0	-0.5	-0.6	43	-1.4	1.5	39.4	-0.3	-1.5	48	0.3	0.3	71	-1.3	0.4	53
	1240+53	Round	Standard	12	-0.1	-0.5	-0.5	-0.5	43	-0.1	1.2	39.4	0.3	0.0	48	1.5	0.5	71	0.5	1.9	53
	1240+47	Round	Standard	12	-0.5	-0.5	-1.3	-1.2	43	0.2	-0.1	39.4	-1.0	-0.6	48	1	-0.1	71	0.0	0.6	53
	1240+41	Round	Standard	12	-0.4	0.5	-0.5	-1.3	43	-0.8	0.0	39.4	-0.7	-1.6	48	-0.5	-0.1	71	-1.0	1.0	53
	1240+35	Round	Standard	12	-0.1	-0.9	-1.0	-1.3	43	-0.6	0.2	39.4	-0.8	-0.5	48	1.1	-0.7	71	0.4	0.0	53
	1239+38	Elliptical	Heavy	18	-0.3	-0.1	N/A		43	-0.3	0.3	38.4	0.1	-1.8	48	1.2	1.7	71	-0.2	1.2	57
	1239+32	Elliptical	Heavy	18	-1.1	-0.8	N/A		43	-0.1	0.2	38.4	-0.8	-0.3	48	1.2	0.3	71	0.5	1.2	57
	1239+26	Elliptical	Heavy	18	-1.1	-0.5	N/A		43	0.3	0.8	38.4	-1.0	0.0	48	1.1	-0.3	71	0.5	0.7	57
	1239+20	Elliptical	Heavy	18	0.2	0.1	N/A		43	-1.2	1.0	38.4	-1.0	-0.2	48	1.4	-0.3	71	0.0	-0.2	57
67	1239+14	Elliptical	Heavy	18	-0.2	-1.5	N/A		43	-0.7	0.2	38.4	-0.1	-0.8	48	0.5	-0.5	71	-0.2	-0.1	57
1239+70	1239+08	Elliptical	Heavy	18	-0.6	0.4	N/A		43	-0.2	-0.1	38.4	-0.9	-0.3	48	-0.2	-0.4	71	0.5	0.5	57
	1239+02	Elliptical	Heavy	18	-0.5	0	N/A		43	0.2	1.6	38.4	0.5	0.0	48	1	-0.8	71	0.5	1.2	57
	1238+96	Elliptical	Heavy	18	-0.8	-0.5	N/A		43	-1.1	1.4	38.4	1.2	-0.3	48	1	0.8	71	0.0	1.4	57
	1238+90	Elliptical	Heavy	18	-1	-0.8	N/A		43	-1.4	0.8	38.4	0.3	-0.9	48	0.7	0.3	71	0.2	0.9	57
	1238+84	Elliptical	Heavy	18	0.7	0.3	N/A		43	0.3	1.2	38.4	-1.0	0.0	48	1.3	-0.5	71	0.0	-0.1	57
	1237+84	Elliptical	Heavy	18	-0.2	0	-0.7	-0.5	43	-0.5	-0.1	38.4	-0.5	-0.4	48	1.2	-0.7	71	0.4	1.0	57
	1237+78	Elliptical	Heavy	18	0.3	0.2	-0.4	-0.3	43	-0.1	-0.4	38.4	-0.1	-1.3	48	1.4	0.1	71	0.0	-0.4	57
	1237+72	Elliptical	Heavy	18	0.5	-1.6	-0.4	-0.1	43	0.3	1.2	38.4	0.5	-0.5	48	1.5	1	71	0.0	0.0	57
	1237+66	Elliptical	Heavy	18	0.5	0.1	-0.1	-0.5	43	-0.2	0.2	38.4	0.0	0.0	48	1.4	0.1	71	0.2	0.1	57
65	1237+60	Elliptical	Heavy	18	-0.9	-0.5	-0.6	-0.1	43	-1.1	1.5	38.4	0.2	-1.3	48	0.3	0.8	71	-0.1	0.7	57
1238+20	1237+54	Elliptical	Heavy	18	-0.3	0.2	-0.1	-0.6	43	0.1	1.0	38.4	0.3	0.4	48	1.7	-0.2	71	0.2	1.0	57
	1237+48	Elliptical	Heavy	18	-0.3	0.1	-0.6	-0.3	43	0.3	0.4	38.4	-0.4	0.0	48	1.3	-0.8	71	0.8	0.1	57
	1237+42	Elliptical	Heavy	18	-1	-0.5	-0.3	-0.3	43	-0.2	-0.2	38.4	-1.0	-0.5	48	0.7	0.8	71	0.2	0.3	57
	1237+36	Elliptical	Heavy	18	-1.8	0.4	-1.3	-0.9	43	-1.1	1.2	38.4	0.7	-1.4	48	0.5	0.9	71	-1.0	1.4	57
	1237+30	Elliptical	Heavy	18	-0.4	0.3	-0.9	0.0	43	-0.1	0.5	38.4	-0.3	-0.5	48	1.2	-0.3	71	0.3	0.6	57

	1233+37	Elliptical	Heavy	15	-1	-1.3	-0.5	-0.3	39	-0.8	-0.2	39.3	-0.5	-0.7	48	-0.8	1	70	-0.6	1.5	50
	1233+31	Elliptical	Heavy	15	-0.8	0.8	0.4	-0.6	39	-0.8	0.2	39.3	-0.1	-0.5	48	0.3	0.6	70	0.5	-0.1	50
	1233+25	Elliptical	Heavy	15	-0.3	-0.4	0.0	0.2	39	-0.9	0.2	39.3	-0.6	-0.8	48	-0.3	0.5	70	-0.2	0.6	50
	1233+19	Elliptical	Heavy	15	-0.3	-0.5	-0.1	0.0	39	0.2	0.3	39.3	-0.8	-0.2	48	0.4	0	70	-0.8	0.0	50
63	1233+13	Elliptical	Heavy	15	-0.7	0	-0.7	-1.2	39	-0.8	1.6	39.3	0.6	-1.7	48	-0.7	1	70	-0.7	-0.1	50
1233+70	1233+07	Elliptical	Heavy	15	0	0	-0.5	-0.6	39	-0.2	-0.2	39.3	0.8	-1.8	48	-0.8	1	70	-0.1	1.0	50
	1233+01	Elliptical	Heavy	15	-0.8	-0.4	-0.7	-0.9	39	-1.3	1.0	39.3	0.2	-0.7	48	0.1	1.3	70	-0.3	1.2	50
	1232+95	Elliptical	Heavy	15	0.4	0.2	-0.3	-0.3	39	-0.5	0.2	39.3	-0.9	-0.7	48	0.2	0	70	-0.5	0.8	50
	1232+89	Elliptical	Heavy	15	0	-1	-0.3	-0.5	39	-1.4	0.5	39.3	-1.0	-1.8	48	0.1	0	70	-0.2	0.3	50
	1232+83	Elliptical	Heavy	15	-1.5	-0.3	0.5	2.5	39	-1.2	0.9	39.3	-0.6	-1.3	48	-0.3	1.7	70	-0.1	1.3	50
	1231+87	Elliptical	Heavy	15	-0.4	-0.2	-0.1	0.4	39	-0.2	-0.1	39.3	-0.1	-0.7	48	0.4	0.5	70	-0.9	0.0	50
	1231+81	Elliptical	Heavy	15	-0.1	-0.2	-0.5	-0.9	39	-1.4	1.0	39.3	-0.7	0.0	48	0.2	1.5	70	-0.1	1.2	50
	1231+75	Elliptical	Heavy	15	-0.8	-0.1	0.3	-0.8	39	-1.0	1.1	39.3	-0.4	-1.5	48	-0.5	1	70	-0.2	1.2	50
	1231+69	Elliptical	Heavy	15	-1.1	-0.7	-1.1	-0.8	39	0.4	1.5	39.3	0.5	-0.8	48	0.4	1	70	0.0	0.0	50
61	1231+63	Elliptical	Heavy	15	-0.8	0.1	-0.3	-0.8	39	-0.8	0.7	39.3	-0.9	-1.4	48	0.8	1	70	-1.2	0.0	50
1232+20	1231+57	Elliptical	Heavy	15	-0.5	0.6	0.2	0.2	39	-1.4	0.2	39.3	-0.7	-1.3	48	-0.5	0.2	70	-1.4	0.8	50
	1231+51	Elliptical	Heavy	15	0.9	0	-0.9	-0.9	39	-1.2	0.5	39.3	-1.0	-0.5	48	0.1	0.9	70	-0.8	0.8	50
	1231+45	Elliptical	Heavy	15	0.9	-0.3	-0.2	-0.4	39	-0.3	0.9	39.3	-0.3	-1.8	48	0.5	-0.2	70	-0.2	0.7	50
	1231+39	Elliptical	Heavy	15	0.5	0	-0.8	-0.9	39	-0.8	0.2	39.3	0.1	-0.5	48	0.3	0.7	70	0.0	0.6	50
	1231+33	Elliptical	Heavy	15	0.5	-0.8	-0.6	-0.4	39	-1.2	0.2	39.3	0.3	-1.7	48	-0.8	0.4	70	-0.9	0.0	50
	1230+36	Elliptical	Heavy	15	-0.2	-0.4	0.3	0.3	43	-0.8	1.0	44.4	-0.3	-0.7	48	0.4	1	70	0.0	0.6	47
	1230+30	Elliptical	Heavy	15	0.8	-0.5	-0.3	0.2	43	0.1	0.8	44.4	-1.0	-0.4	48	0.3	0.8	70	-0.5	0.9	47
	1230+24	Elliptical	Heavy	15	0.7	-0.5	-0.3	-1.0	43	-0.1	1.0	44.4	-0.2	-1.4	48	0.3	1	70	-0.8	0.1	47
	1230+18	Elliptical	Heavy	15	0.1	-0.2	-0.4	-1.0	43	-0.2	0.7	44.4	0.2	-0.8	48	-0.2	1.1	70	-0.8	-0.1	47
59	1230+12	Elliptical	Heavy	15	-0.3	1.3	-0.9	-1.0	43	-0.2	0.5	44.4	-1.0	-1.3	48	-0.4	1	70	-0.9	0.3	47
1230+70	1230+06	Elliptical	Heavy	15	0.5	0	-0.8	-0.1	43	-0.1	0.0	44.4	0.7	-1.8	48	-0.8	1.4	70	-1.2	-0.1	47
	1230+00	Elliptical	Heavy	15	-0.4	-0.1	0.2	-1.1	43	-3.0	0.3	44.4	0.4	-1.2	48	-0.8	1.6	70	-0.2	-0.1	47
	1229+94	Elliptical	Heavy	15	-0.1	-0.2	-0.2	-0.3	43	0.2	0.7	44.4	-0.6	-0.7	48	-0.4	1.3	70	-0.2	0.7	47
	1229+88	Elliptical	Heavy	15	-0.7	0.2	-1.9	-0.8	43	-0.1	-0.1	44.4	-0.8	-0.7	48	-0.8	0.5	70	0.5	-0.1	47
	1229+82	Elliptical	Heavy	15	-0.7	0.4	-0.1	-0.2	43	-1.4	0.5	44.4	-0.3	-1.2	48	0.2	0.7	70	-0.2	1.0	47
	1228+85	Elliptical	Heavy	18	-0.1	-0.2	-0.7	-0.3	43	0.0	-0.3	44.4	-0.7	-0.6	48	-0.8	1	70	0.2	1.7	47
	1228+79	Elliptical	Heavy	18	0	0	-0.3	-0.8	43	-0.3	1.0	44.4	0.2	-1.3	48	-0.9	1	70	-1.0	0.4	47
	1228+73	Elliptical	Heavy	18	-0.3	0.2	-0.4	-0.4	43	-0.4	-0.1	44.4	-0.1	-1.1	48	0.8	1.4	70	-1.0	1.3	47
	1228+67	Elliptical	Heavy	18	-0.3	0.8	-0.1	-0.8	43	-0.4	0.7	44.4	-0.8	-0.5	48	1	-0.8	70	-0.8	-0.1	47
57	1225+61	Elliptical	Heavy	18	-0.3	0.8	-0.3	-0.6	43	-0.4	-0.2	44.4	0.4	-0.8	48	-0.4	-1.6	70	-0.5	1.2	47
1229+20	1228+55	Elliptical	Heavy	18	0.2	0.1	-0.3	-0.5	43	-0.1	-0.1	44.4	0.0	-1.4	48	-0.8	1.2	70	-0.1	1.0	47
	1228+49	Elliptical	Heavy	18	0.2	-0.3	-0.9	-0.5	43	-0.8	1.0	44.4	0.2	-0.9	48	-1.9	1	70	-0.4	-0.4	47
	1228+43	Elliptical	Heavy	18	-0.3	0.2	-0.9	-1.0	43	-0.8	0.9	44.4	0.4	-1.6	48	-0.8	1.6	70	0.5	0.5	47
	1228+37	Elliptical	Heavy	18	-0.3	-0.5	-0.3	0.5	43	0.0	0.3	44.4	-0.1	-0.7	48	-0.6	1.2	70	-0.9	0.5	47
	1228+31	Elliptical	Heavy	18	0	0	-0.5	-0.9	43	-1.0	0.4	44.4	-0.5	-0.9	48	-0.3	0.8	70	0.0	0.2	47
	1227+35	Elliptical	Heavy	12	-0.1	-0.3	-0.8	-1.5	40	-0.6	0.8	44.4	1.2	-0.1	55	0.1	1.4	72	-0.8	1.4	55
	1227+29	Elliptical	Heavy	12	-0.4	-0.5	-0.1	0.6	40	-0.8	0.2	44.4	-0.6	-1.2	55	-0.9	1.5	72	-0.8	1.5	55
	1227+23	Elliptical	Heavy	12	-0.4	-0.7	-0.8	-1.0	40	-1.2	0.5	44.4	-0.1	-1.1	55	-0.1	0	72	-0.1	-0.1	55
	1227+17	Elliptical	Heavy	12	-0.3	-0.8	-0.2	-0.8	40	-1.4	0.1	44.4	0.2	-1.3	55	0.1	0.9	72	-0.9	0.3	55
55	1227+11	Elliptical	Heavy	12	-0.3	-1	0.3	-0.9	40	-0.1	0.9	44.4	-0.8	-1.0	55	-0.8	0.2	72	-1.3	0.9	55
1227+70	1227+05	Elliptical	Heavy	12	-0.3	-1	-0.7	-1.0	40	0.0	0.4	44.4	0.2	-1.3	55	-0.3	1	72	-0.8	1.2	55
	1226+99	Elliptical	Heavy	12	-0.5	0.2	0.2	-1.5	40	-1.3	1.5	44.4	0.6	-1.3	55	-0.3	1.2	72	0.0	1.4	55
	1226+93	Elliptical	Heavy	12	0.1	0.2	-0.6	-0.8	40	-0.7	0.0	44.4	-0.9	-1.9	55	0.2	1.3	72	-1.3	1.0	55
	1226+87	Elliptical	Heavy	12	-0.1	-0.3	-1.0	-0.6	40	0.3	0.9	44.4	-1.0	-0.6	55	-0.8	0.6	72	-0.1	1.7	55
	1226+81	Elliptical	Heavy	12	-0.4	-0.4	0.1	-0.8	40	-1.3	1.7	44.4	0.6	-1.8	55	-0.1	1	72	-0.2	1.4	55
	1225+85	Elliptical	Heavy	18	-0.8	-0.5	-0.5	-0.8	40	-0.8	0.9	44.4	0.1	-0.9	55	-0.6	0.2	72	0.0	0.0	55
	1225+79	Elliptical	Heavy	18	-0.5	0	-0.6	-0.7	40	-0.6	1.1	44.4	0.4	-0.7	55	-0.8	1	72	-0.1	-0.1	55
	1225+73	Elliptical	Heavy	18	-0.5	0.2	-0.3	-1.1	40	-0.5	1.4	44.4	0.3	-1.3	55	0.1	1.5	72	-0.1	1.4	55
	1225+67	Elliptical	Heavy	18	-0.9	-0.9	-0.3	-0.9	40	-0.2	1.6	44.4	0.9	-0.6	55	0.1	1.3	72	-0.1	1.7	55
53	1225+61	Elliptical	Heavy	18	0.1	-0.6	-1.0	-0.8	40	-0.1	-0.2	44.4	-1.0	-0.5	55	0.3	0.9	72	0.5	0.3	55
1226+20	1225+55	Elliptical	Heavy	18	0.2	-0.4	-0.5	0.2	40	-0.2	0.2	44.4	-0.5	-1.8	55	0.3	0	72	-0.2	0.6	55
	1225+49	Elliptical	Heavy	18	0.2	-0.1	-1.0	0.4	40	-0.3	-0.3	44.4	-0.5	-1.4	55	0.3	0.2	72	-0.9	0.2	55
	1225+43	Elliptical	Heavy	18	-0.5	-0.5	-1.1	0.1	40	-0.1	0.9	44.4	0.8	-0.6	55	0.3	1.2	72	0.5	0.3	55
	1225+37	Elliptical	Heavy	18	-0.1	-0.2	-1.3	-0.5	40	-0.8	-0.2	44.4	0.4	-0.7	55	0.4	0.5	72	0.1	0.4	55
	1225+31	Elliptical	Heavy	18	-0.9	-0.1	-0.4	0.2	40	-0.2	0.4	44.4	-0.8	0.0	55	0	0.6	72	-0.1	1.0	55
	1224+25	Elliptical	Heavy	12	-0.2	0	0.1	-0.5	43	-0.2	0.2	45.5	-0.6	-0.5	54	-0.4	1	73	-0.3	1.0	56
	1224+19	Elliptical	Heavy	12	0.5	0.5	-1.0	-2.0	43	0.3	1.4	45.5	0.6	-1.5	54	-0.3	1.2	73	-0.8	1.0	56
	1224+13	Elliptical	Heavy	12	-1	-0.2	-0.3	-0.4	43	0.1	0.5	45.5	0.1	-0.7	54	-0.8	1.3	73	-0.6	0.9	56
	1224+07	Elliptical	Heavy	12	-0.2	0	-1.3	-0.4	43	-0.1	1.4	45.5	-1.0	0.5	54	0.8	1	73	-0.2	0.3	56
51	1224+01	Elliptical	Heavy	12	-0.2	-0.5	0.4	-0.7	43	0.3	0.9	45.5	0.2	-1.3	54	-0.6	1.1	73	-0.9	0.7	56
1224+70	1223+95	Elliptical	Heavy	12	-0.3	-1.1	-2.0	-0.1	43	-1.3	0.3	45.5	0.4	-1.7	54	-0.8	1	73	-0.9	0.9	56
	1223+89	Elliptical	Heavy	12	-0.8	-1.1	-0.7	-0.5	43	-0.8	1.0	45.5	-0.3	-1.2	54	-0.4	1.7	73	-0.8	0.6	56
	1223+83	Elliptical	Heavy	12	-0.8	1.2	-1.0	-0.7	43	-0.8	1.2	45.5	0.3	-0.5	54	-0.8	1	73	0.0	1.5	56
	1223+77	Elliptical	Heavy	12	-0.3	-0.5	-0.7	-0.8	43	-0.2	0.4	45.5	-0.1	-1.0	54	-0.8	1.4	73	-0.8	1.0	56
	1223+71	Elliptical	Heavy	12	-1	-0.3	0.0	-1.2	43	-1.0	0.5	45.5	1.0	-1.3	54	-0.1	1	73	-1.0	-0.1	56

	1222+85	Elliptical	Heavy	15	-0.4	-0.3	-0.6	-0.3	43	-1.0	1.1	45.5	0.3	-1.8	54	-0.8	1.3	73	-0.7	0.8	56
	1222+79	Elliptical	Heavy	15	-0.1	0.5	-0.8	-0.7	43	-0.9	0.9	45.5	-0.1	-1.3	54	-0.1	1	73	-0.9	0.1	56
	1222+73	Elliptical	Heavy	15	-0.1	0.5	-0.3	-1.0	43	-0.9	0.9	45.5	0.6	-1.5	54	-0.3	1.2	73	-1.0	1.4	56
	1222+67	Elliptical	Heavy	15	0.5	0.9	-0.2	-0.2	43	-1.4	-0.2	45.5	-0.8	-1.3	54	-0.8	1.3	73	-1.3	-0.1	56
49	1222+61	Elliptical	Heavy	15	0.5	0.2	-0.3	-0.4	43	-0.3	0.2	45.5	-0.3	-1.3	54	-0.1	0	73	-0.8	-0.1	56
1223+20	1222+55	Elliptical	Heavy	15	0.4	0.2	-0.5	-0.5	43	-0.7	0.3	45.5	0.3	-1.3	54	-0.8	0.8	73	-0.3	0.3	56
	1222+49	Elliptical	Heavy	15	0.5	0.5	-0.2	-0.5	43	-0.6	0.1	45.5	-0.8	-1.1	54	-0.2	0.7	73	-0.6	0.5	56
	1222+43	Elliptical	Heavy	15	-0.4	0.4	-0.5	0.5	43	-1.2	0.1	45.5	-1.0	-1.4	54	-0.6	0.9	73	-0.8	0.0	56
	1222+37	Elliptical	Heavy	15	0.2	0.5	-1.0	-0.5	43	-0.1	0.1	45.5	-0.8	-1.3	54	-0.8	1	73	-0.1	-0.1	56
	1222+31	Elliptical	Heavy	15	0.5	0.2	-0.4	-0.2	43	-0.8	-0.1	45.5	0.0	-1.8	54	0	0.5	73	-1.0	-0.1	56
	1219+84	Elliptical	Medium	12			-0.5	-0.5	42	-0.8	-0.1	48	0.1	-0.7	57	1.3	0.4	72	-0.1	1.5	57
	1219+78	Elliptical	Medium	12			0.4	0.0	42	-0.5	0.2	48	-1.0	-1.3	57	-0.2	-0.3	72	-0.8	0.8	57
	1219+72	Elliptical	Medium	12			-1.3	-0.5	42	0.2	0.1	48	-0.2	-0.4	57	1.2	-0.8	72	-0.7	0.6	57
	1219+66	Elliptical	Medium	12			-1.7	-2.2	42	-1.4	2.0	48	0.8	-1.4	57	0.4	1.1	72	-1.3	1.4	57
47	1219+60	Elliptical	Medium	12	No Data		-0.5	-1.7	42	-1.3	1.4	48	-0.4	-0.5	57	0.9	0.8	72	-0.7	1.2	57
1220+20	1219+54	Elliptical	Medium	12	Landslide		-1.0	-0.8	42	-1.4	1.6	48	0.3	-1.2	57	0	0.6	72	-2.0	1.1	57
	1219+48	Elliptical	Medium	12			0.0	-0.5	42	-0.6	1.2	48	0.8	-1.5	57	0.1	-0.7	72	-0.8	-0.1	57
	1219+42	Elliptical	Medium	12			-0.7	-0.7	42	-0.1	1.0	48	-1.0	-1.6	57	1	-0.6	72	-0.1	-0.1	57
	1219+36	Elliptical	Medium	12			-0.2	-0.1	42	-0.8	1.7	48	-1.3	-1.0	57	0.4	-0.8	72	-0.6	1.0	57
	1219+30	Elliptical	Medium	12			-0.6	-0.3	42	-0.1	0.9	48	0.4	-2.0	57	1	-0.5	72	-0.8	1.2	57
	1218+34	Elliptical	Medium	18			-0.5	-0.3	42	-1.2	0.2	48	-1.0	-0.8	57	1	-1	72	-1.0	1.7	57
	1218+28	Elliptical	Medium	18			-0.5	-0.8	42	-1.3	0.2	48	-0.1	0.0	57	1.5	0	72	-0.1	0.1	57
	1218+22	Elliptical	Medium	18			0.7	-1.2	42	-1.4	0.9	48	-0.3	-1.3	57	1	-0.3	72	-0.6	0.9	57
	1218+16	Elliptical	Medium	18			-0.3	-1.7	42	-0.6	0.8	48	0.6	-1.3	57	-0.3	0.3	72	-0.7	1.4	57
45	1218+10	Elliptical	Medium	18	No Data		1.2	-0.8	42	-0.8	0.3	48	-0.3	0.0	57	0	0.8	72	-0.1	1.3	57
1218+70	1218+04	Elliptical	Medium	18	Landslide		-1.3	-1.1	42	0.3	0.2	48	-1.0	-0.7	57	0.2	-0.6	72	-1.3	1.0	57
	1217+98	Elliptical	Medium	18			0.2	0.0	42	-0.5	0.3	48	-0.8	-1.3	57	1.3	-1.6	72	0.2	-0.7	57
	1217+92	Elliptical	Medium	18			-1.0	0.1	42	-1.7	0.3	48	-0.4	-1.6	57	-0.3	0.1	72	-0.8	-0.1	57
	1217+86	Elliptical	Medium	18			0.3	-1.3	42	0.1	2.1	48	0.8	-0.7	57	1.3	1	72	-0.5	1.8	57
	1217+80	Elliptical	Medium	18			-0.6	-0.6	42	0.1	0.9	48	0.0	-0.3	57	1.2	-0.3	72	0.1	0.0	57
	1216+85	Elliptical	Medium	18			-0.7	-1.2	39	-0.7	0.4	47.6	0.5	-0.5	61	0.2	-0.5	72	-0.8	-0.1	56
	1216+79	Elliptical	Medium	18			-0.6	-0.8	39	-1.3	1.0	47.6	0.5	-0.5	61	0.9	0.4	72	-1.0	1.2	56
	1216+73	Elliptical	Medium	18			-0.4	-0.9	39	-1.2	0.1	47.6	0.2	-2.0	61	0.5	-0.4	72	-1.5	0.0	56
	1216+67	Elliptical	Medium	18			-0.1	-1.3	39	0.8	0.4	47.6	-0.1	-0.6	61	0.9	-0.7	72	-0.1	1.2	56
43	1216+61	Elliptical	Medium	18	No Data		0.6	-1.1	39	-1.2	1.6	47.6	0.4	-1.8	61	-0.8	-0.8	72	-1.4	1.2	56
1217+20	1216+55	Elliptical	Medium	18	Landslide		0.0	-0.3	39	0.0	-0.1	47.6	0.4	-0.6	61	1.1	0.8	72	0.4	-0.1	56
	1216+49	Elliptical	Medium	18			0.6	-0.3	39	0.1	1.2	47.6	-0.3	-0.2	61	0.8	0.8	72	0.3	1.2	56
	1216+43	Elliptical	Medium	18			-1.0	-0.5	39	-1.2	-0.1	47.6	0.0	-0.9	61	1.7	-0.1	72	0.1	0.3	56
	1216+37	Elliptical	Medium	18			-0.2	-1.9	39	-0.8	1.6	47.6	-0.3	-1.4	61	0.3	-0.5	72	-0.7	0.5	56
	1216+31	Elliptical	Medium	18			-0.7	-0.9	39	-1.4	0.9	47.6	0.3	-1.3	61	-0.3	0.3	72	-1.1	0.7	56
	1215+40	Elliptical	Medium	18	0.2	-1.1	-0.6	-0.3	39	-0.4	0.0	47.6	-0.4	-1.2	61	0.8	-0.9	72	-0.1	0.7	56
	1215+34	Elliptical	Medium	18	0	0.4	-1.2	-1.0	39	-1.4	-1.7	47.6	0.0	-0.8	61	-0.2	0.2	72	-1.3	1.4	56
	1215+28	Elliptical	Medium	18	0	0	-0.8	-1.0	39	-1.3	0.0	47.6	0.0	-1.3	61	1.1	0.8	72	-0.1	0.8	56
	1215+22	Elliptical	Medium	18	0.5	0	-0.5	-0.1	39	-0.7	0.0	47.6	-0.3	-1.7	61	0.8	-0.8	72	0.0	-0.1	56
41	1215+16	Elliptical	Medium	18	-0.8	0.5	-0.7	-0.7	39	-0.1	0.3	47.6	0.5	-0.5	61	0.7	-0.8	72	0.0	1.4	56
1215+70	1215+10	Elliptical	Medium	18	0.2	-0.4	-1.2	-0.1	39	0.1	0.0	47.6	-0.9	0.0	61	1	-0.5	72	-0.1	0.1	56
	1215+04	Elliptical	Medium	18	0.3	-0.4	-0.3	-0.5	39	-0.4	0.3	47.6	-1.0	-1.4	61	0.2	-0.8	72	-0.1	0.5	56
	1214+98	Elliptical	Medium	18	0.4	0.1	-0.5	0.2	39	0.2	0.0	47.6	-1.0	-1.5	61	0.2	-0.7	72	-1.0	-0.1	56
	1214+92	Elliptical	Medium	18	0.2	0.7	-0.5	-0.4	39	-0.1	-0.3	47.6	-0.9	-0.7	61	0.2	-0.8	72	-0.5	0.0	56
	1214+86	Elliptical	Medium	18	0	-0.3	-0.3	-0.7	39	-1.2	-0.2	47.6	-0.3	-1.5	61	0.6	-0.3	72	-0.6	0.6	56
	1213+89	Elliptical	Medium	15	-1.3	0	-0.6	1.8	42	-1.3	1.2	46	0.7	-0.9	51	1.6	0.8	86	-0.1	1.9	57
	1213+83	Elliptical	Medium	15	-0.2	-0.3	-0.3	-1.0	42	-0.1	1.7	46	-0.3	-1.7	51	1	-0.4	86	-1.0	0.6	57
	1213+77	Elliptical	Medium	15	-0.9	-0.2	-0.7	-1.4	42	-1.3	0.9	46	1.1	-1.2	51	0.6	-0.5	86	-1.0	1.6	57
	1213+71	Elliptical	Medium	15	1.2	-0.4	-0.9	0.0	42	0.1	-0.5	46	-0.8	-0.7	51	1.2	-0.8	86	-0.1	0.2	57
39	1213+65	Elliptical	Medium	15	-0.8	0.1	-0.3	-0.5	42	-0.8	0.0	46	-0.9	-0.5	51	0.9	-0.6	86	-0.5	-0.1	57
1214+20	1213+59	Elliptical	Medium	15	-0.4	-0.4	-0.5	0.0	42	-1.3	0.0	46	-0.8	-0.8	51	0.9	0.5	86	0.1	1.4	57
	1213+53	Elliptical	Medium	15	-0.2	0.3	-0.5	-0.1	42	-0.5	1.5	46	-0.8	-0.6	51	1.2	0.1	86	-0.1	1.0	57
	1213+47	Elliptical	Medium	15	0.2	-0.4	-0.1	-0.1	42	-1.4	-0.1	46	-1.0	-0.7	51	0.4	-0.9	86	-0.8	0.1	57
	1213+41	Elliptical	Medium	15	0.7	0.2	0.5	-0.5	42	-0.3	0.0	46	0.4	-0.7	51	1	0.3	86	-0.6	-0.2	57
	1213+35	Elliptical	Medium	15	-0.3	0.5	-1.0	-0.8	42	-1.1	0.2	46	0.3	-1.1	51	0.5	-0.2	86	0.6	0.0	57
	1211+39	Elliptical	Heavy	15	-0.4	-0.3	-0.3	-0.4	42	-0.3	0.9	46	-0.4	-0.7	51	-0.1	0.9	86	0.1	-0.1	57
	1211+33	Elliptical	Heavy	15	-0.9	1	0.2	-1.1	42	-1.0	-0.3	46	-1.0	-0.8	51	0.8	0.3	86	-0.6	-0.1	57
	1211+27	Elliptical	Heavy	15	-0.5	0.8	-0.1	-1.0	42	-0.1	1.4	46	-0.5	-1.7	51	-0.3	0.8	86	-0.1	1.2	57
	1211+21	Elliptical	Heavy	15	-0.2	1.1	-0.9	-1.4	42	-0.8	1.2	46	-1.0	-0.9	51	0.6	1.2	86	-0.1	0.8	57
37	1211+15	Elliptical	Heavy	15	-0.8	-0.3	-0.4	-1.0	42	-1.1	0.7	46	0.1	-1.3	51	0.9	0.8	86	-0.2	0.6	57
1211+70	1211+09	Elliptical	Heavy	15	-0.5	1.1	0.0	-0.4	42	-0.2	0.4	46	0.3	-0.8	51	0	1.4	86	-0.5	1.5	57
	1211+03	Elliptical	Heavy	15	0.2	0.7	-0.8	-0.7	42	-0.6	0.7	46	0.8	-0.7	51	0.3	1	86	-1.3	0.4	57
	1210+97	Elliptical	Heavy	15	-0.5	0	-0.3	-0.3	42	-0.4	0.0	46	0.1	-1.5	51	-0.9	0.3	86	-1.0	1.0	57
	1210+91	Elliptical	Heavy	15	-0.5	0.2	-0.3	-1.1	42	-1.3	0.9	46	0.7	-1.5	51	0	1.3	86	-0.5	1.9	57
	1210+85	Elliptical	Heavy	15	-0.5	-0.3	-1.8	-1.1	42	-1.3	0.0	46	1.0	-0.7	51	0.3	1	86	0.0	0.4	57

	1209+86	Elliptical	Medium	15	-0.6	-0.7	-0.4	0.1	39	0.3	0.7	48.7	0.0	-1.5	60	0.9	-0.3	84	0.0	0.6	55
	1209+80	Elliptical	Medium	15	1.2	1	-0.2	-0.3	39	-0.8	0.9	48.7	0.0	-0.7	60	0	-0.2	84	-0.7	0.6	55
	1209+74	Elliptical	Medium	15	-1	-0.2	-0.2	-1.2	39	-0.3	-0.1	48.7	-0.6	-1.5	60	0.1	0	84	0.9	0.9	55
	1209+68	Elliptical	Medium	15	-0.6	0.6	2.6	-1.4	39	-1.3	1.2	48.7	0.3	-0.5	60	1	0.8	84	0.9	1.4	55
35	1209+62	Elliptical	Medium	15	-0.6	0.6	-0.7	-0.6	39	-1.4	1.5	48.7	0.5	-1.7	60	1	-0.3	84	-0.2	1.4	55
1210+20	1209+56	Elliptical	Medium	15	0.1	-0.1	-1.3	-0.2	39	-0.1	0.3	48.7	0.6	-0.5	60	1.1	0.2	84	1.1	-1.0	55
	1209+50	Elliptical	Medium	15	-0.1	-0.3	-0.4	1.1	39	-0.2	0.8	48.7	0.6	-1.7	60	0	0.8	84	0.0	0.0	55
	1209+44	Elliptical	Medium	15	-0.6	-0.1	-0.5	0.5	39	0.3	0.2	48.7	-1.0	-1.3	60	0.5	0.9	84	-0.1	-0.8	55
	1209+38	Elliptical	Medium	15	-0.4	0.3	-0.4	0.3	39	-0.3	1.0	48.7	0.8	-1.5	60	0.8	0.3	84	0.0	-1.6	55
	1209+32	Elliptical	Medium	15	-0.5	1.1	0.4	0.3	39	-1.3	0.2	48.7	-1.0	-0.7	60	1	-0.4	84	0.2	-1.3	55
	1206+85	Elliptical	Medium	15	0.1	0.5	0.1	-1.7	39	-1.0	1.5	48.7	1.0	-0.7	60	0.9	0.9	84	0.3	-0.1	55
	1206+79	Elliptical	Medium	15	-0.8	0.2	-0.9	-0.5	39	-1.3	0.9	48.7	0.7	-1.8	60	0.6	0.8	84	0.0	0.0	55
	1206+73	Elliptical	Medium	15	-0.8	0	-0.3	-0.9	39	-0.5	1.0	48.7	-0.8	-1.5	60	0.6	0.2	84	0.0	-1.7	55
	1206+67	Elliptical	Medium	15	0.5	-0.4	-0.3	-0.3	39	-1.1	-0.4	48.7	-0.6	0.0	60	0.8	-0.6	84	0.3	-0.1	55
33	1206+61	Elliptical	Medium	15	-0.5	0.3	0.0	-1.5	39	-0.6	1.6	48.7	-0.3	-1.1	60	0.3	0.9	84	0.1	-1.0	55
1207+20	1206+55	Elliptical	Medium	15	0.5	-0.5	-0.6	-0.8	39	-0.8	0.3	48.7	-0.8	-1.6	60	0.4	-1	84	-0.1	-1.7	55
	1206+49	Elliptical	Medium	15	-1.4	-0.5	-0.6	-0.5	39	-0.9	1.0	48.7	0.8	0.0	60	1.1	-0.9	84	0.9	-1.7	55
	1206+43	Elliptical	Medium	15	-0.2	-0.7	-1.4	-0.8	39	-0.5	0.2	48.7	0.1	-1.3	60	0.9	-0.2	84	0.2	-0.9	55
	1206+37	Elliptical	Medium	15	0.5	0.1	-0.8	0.1	39	-0.1	-0.3	48.7	0.8	-1.8	60	0.9	-0.3	84	1.5	-0.8	55
	1206+31	Elliptical	Medium	15	-0.5	-0.1	-0.2	-0.9	39	-1.3	1.1	48.7	-0.2	-0.4	60	1.6	-0.2	84	1.5	-1.1	55
	1205+39	Elliptical	Heavy	15	0.3	1.1	-0.7	-1.5	38	-0.4	1.5	57.4	0.8	-1.0	54	0.9	0	85	0.5	0.6	53
	1205+33	Elliptical	Heavy	15	0.3	-0.2	-0.8	-2.0	38	-0.8	0.5	57.4	-0.8	-1.3	54	0.5	0.9	85	0.3	-1.1	53
	1205+27	Elliptical	Heavy	15	-0.4	0	-0.8	-1.0	38	0.1	0.2	57.4	-0.8	-0.8	54	0.9	-0.8	85	1.5	-1.0	53
	1205+21	Elliptical	Heavy	15	-0.5	-0.5	-0.3	-0.8	38	-0.3	-0.3	57.4	-1.0	-0.3	54	1.1	0.6	85	1.2	-1.2	53
31	1205+15	Elliptical	Heavy	15	-0.5	-0.5	-0.7	-0.5	38	-0.9	0.1	57.4	-1.0	-0.6	54	1.2	-0.3	85	-2.3	-1.3	53
1205+70	1205+09	Elliptical	Heavy	15	-0.5	-0.8	-0.4	-0.7	38	0.2	0.2	57.4	0.5	0.0	54	1.5	0.4	85	1.6	-0.7	53
	1205+03	Elliptical	Heavy	15	-0.4	-0.2	-0.4	-0.9	38	-1.4	1.2	57.4	0.8	-0.1	54	1.7	0.3	85	0.9	-1.7	53
	1204+97	Elliptical	Heavy	15	-0.6	-0.1	-0.8	-0.2	38	-1.3	0.0	57.4	0.3	-1.5	54	1.5	0.9	85	0.2	-0.7	53
	1204+91	Elliptical	Heavy	15	0	-0.3	-0.1	-1.1	38	-0.5	0.8	57.4	0.3	-0.7	54	1.3	0.3	85	1.1	-0.7	53
	1204+85	Elliptical	Heavy	15	0.5	0.1	-1.0	-0.6	38	-0.8	0.2	57.4	-0.8	-1.7	54	0	-0.6	85	0.2	-1.2	53
	1202+39	Elliptical	Medium	12	-0.2	0.7	-0.2	-1.3	38	-1.3	1.5	57.4	1.2	-1.3	54	0.2	0.7	85	-0.3	0.3	53
	1202+33	Elliptical	Medium	12	-0.6	-0.2	0.0	-0.5	38	-0.3	1.6	57.4	0.5	0.0	54	1.5	0.8	85	0.9	0.0	53
	1202+27	Elliptical	Medium	12	0.6	-0.4	-1.3	0.2	38	-0.7	-0.2	57.4	-0.7	-1.8	54	1.7	1	85	0.8	-1.8	53
	1202+21	Elliptical	Medium	12	0	-0.4	-0.3	-1.1	38	-1.4	1.0	57.4	-0.3	-0.7	54	0.2	-0.6	85	0.9	-0.3	53
29	1202+15	Elliptical	Medium	12	-0.3	-0.4	-1.3	-1.3	38	0.7	1.1	57.4	0.5	0.0	54	1.6	0.8	85	1.1	-0.2	53
1202+70	1202+09	Elliptical	Medium	12	-1	-1.1	-0.3	-2.0	38	0.1	1.2	57.4	0.8	-0.9	54	1.3	0.8	85	0.5	-0.5	53
	1202+03	Elliptical	Medium	12	-0.5	0.6	-0.5	-1.5	38	-0.8	0.2	57.4	0.1	-0.8	54	0.9	0.7	85	0.2	-0.3	53
	1201+97	Elliptical	Medium	12	0	0.6	-0.7	0.2	38	-1.2	0.2	57.4	-1.0	-1.4	54	-0.2	0.9	85	0.5	-0.1	53
	1201+91	Elliptical	Medium	12	-0.8	0	-0.7	-1.9	38	-1.2	1.2	57.4	0.2	-0.6	54	0.2	0.2	85	0.2	-1.3	53
	1201+85	Elliptical	Medium	12	-0.5	-1.3	-1.3	0.2	38	-0.6	1.0	57.4	0.0	-1.3	54	0.8	-0.3	85	0.2	-1.7	53
	1199+26	Elliptical	Heavy	12	-0.8	-0.6	-1.0	-0.5	38	0.3	1.7	52.3	-0.8	-0.5	52	1.2	0.8	90	1.2	-1.6	53
	1199+20	Elliptical	Heavy	12	0.2	-0.5	0.2	-0.4	38	-1.2	0.0	52.3	-0.6	0.0	52	1.1	-0.3	90	0.9	-0.8	53
	1199+14	Elliptical	Heavy	12	-1.3	0.1	-0.3	-0.6	38	-0.4	1.8	52.3	-0.8	-1.7	52	0.8	0.1	90	0.3	-0.1	53
	1199+08	Elliptical	Heavy	12	-1	0	0.7	-0.4	38	-0.6	0.2	52.3	1.2	-1.9	52	0.3	-0.3	90	0.4	-1.1	53
27	1199+02	Elliptical	Heavy	12	0	0	-0.4	-0.8	38	0.0	1.0	52.3	-1.4	-0.6	52	1.5	-0.8	90	1.2	-0.6	53
1199+70	1198+96	Elliptical	Heavy	12	-1.3	0.4	0.0	0.4	38	-1.3	0.2	52.3	-1.0	-1.6	52	0.1	-0.8	90	0.0	-1.2	53
	1198+90	Elliptical	Heavy	12	-0.4	0.2	-0.2	-1.1	38	0.1	1.6	52.3	0.3	-0.8	52	1	1	90	1.0	-1.2	53
	1198+84	Elliptical	Heavy	12	0	0.3	0.1	-0.7	38	-0.1	1.5	52.3	0.2	-0.5	52	0.5	0.8	90	1.5	-1.4	53
	1198+78	Elliptical	Heavy	12	-0.8	0.2	-0.7	-1.2	38	-0.7	1.8	52.3	0.6	-1.5	52	0.1	0.9	90	0.7	-0.3	53
	1198+72	Elliptical	Heavy	12	-0.7	-0.3	-0.4	-1.1	38	0.1	1.5	52.3	1.1	-0.7	52	-0.2	0.8	90	0.3	0.0	53
	1197+87	Elliptical	Heavy	12	-0.2	0.2	-0.3	-1.3	38	-0.4	1.4	52.3	0.1	-1.6	52	1	0.5	90	-0.2	-0.6	53
	1197+81	Elliptical	Heavy	12	-0.2	0.8	-0.5	-0.3	38	-1.3	1.1	52.3	-1.0	-1.8	52	0.7	-0.7	90	0.0	-1.8	53
	1197+75	Elliptical	Heavy	12	0	0.2	-0.8	-0.9	38	0.3	1	52.3	0.5	-1.6	52	1	0.1	90	0.9	-0.3	53
	1197+69	Elliptical	Heavy	12	0.6	0.4	-0.1	-0.4	38	-0.9	1.7	52.3	-0.9	-0.7	52	0.9	-0.4	90	0.2	-1.6	53
25	1197+63	Elliptical	Heavy	12	0.2	0.5	-0.8	-0.5	38	-1.2	1.7	52.3	0.0	0.0	52	1.7	1	90	-0.3	-1.7	53
1198+20	1197+57	Elliptical	Heavy	12	0.2	0.7	-0.7	-0.3	38	0.3	0	52.3	-1.0	-1.5	52	1.2	-0.3	90	0.3	-1.0	53
	1197+51	Elliptical	Heavy	12	-0.5	0.1	-0.6	-1.5	38	-0.1	1.1	52.3	0.6	-0.7	52	1.2	0.2	90	1.1	0.0	53
	1197+45	Elliptical	Heavy	12	-0.3	-0.3	-1	-0.6	38	-1.2	1.4	52.3	-1.0	-1.5	52	-0.2	0.9	90	0.1	-1.0	53
	1197+39	Elliptical	Heavy	12	-0.5	-0.5	-0.7	-1.1	38	-0.5	1.1	52.3	-0.6	-1.2	52	0.1	0.7	90	0.2	-1.5	53
	1197+33	Elliptical	Heavy	12	0.2	0.5	-0.7	-1	38	-1.8	0.5	52.3	-0.8	-0.5	52	0	-0.2	90	0.0	-1.8	53
	1195+34	Elliptical	Medium	12	0.3	0.8	0.3	-0.7	38	-0.5	1.0	61.3	0.5	-0.5	54	0.9	0.3	91	1.4	-1.6	56
	1195+28	Elliptical	Medium	12	-0.6	-0.3	-0.7	-0.7	38	-0.3	0.1	61.3	-0.3	-1.5	54	0.1	-0.3	91	0.1	-1.5	56
	1195+22	Elliptical	Medium	12	0.1	-0.3	-0.5	0.2	38	-0.6	0.4	61.3	-0.8	-1.5	54	0.8	0.6	91	0.0	-1.8	56
	1195+16	Elliptical	Medium	12	-0.3	-0.3	-0.3	-0.5	38	0.3	0.4	61.3	-0.1	0.0	54	1.5	-0.7	91	0.9	-1.0	56
23	1195+10	Elliptical	Medium	12	0.2	-1	-0.4	-1.0	38	0.2	1.7	61.3	-0.8	-0.3	54	1.5	-0.8	91	1.0	-1.8	56
1195+70	1195+04	Elliptical	Medium	12	0.2	0.2	-0.2	0.7	38	-1.0	0.3	61.3	-0.6	-0.5	54	1.2	-1	91	1.5	-1.7	56
	1194+98	Elliptical	Medium	12	-1	-0.8	-0.4	-1.0	38	-0.6	1.1	61.3	-1.0	-1.7	54	1.4	0.6	91	0.2	0.0	56
	1194+92	Elliptical	Medium	12	-1.4	0.1	-0.2	-1.2	38	0.5	1.0	61.3	-1.0	0.0	54	1.2	-0.9	91	1.5	-0.9	56
	1194+86	Elliptical	Medium	12	-0.5	-0.8	-0.5	0.0	38	-0.6	1.1	61.3	0.3	-1.5	54	1	0.8	91	0.9	0.3	56
	1194+80	Elliptical	Medium	12	-0.4	-0.3	-1.3	-0.3	38	-1.2	0.4	61.3	-0.2	-0.5	54	1.2	-0.8	91	1.2	-0.7	56
												61.3									

	1193+84	Elliptical	Heavy	12	0.5	-1	0.2	-1.0	38	-0.1	0.6	61.3	-1.0	-1.4	54	1.3	-0.3	91	0.9	-0.6	56
	1193+78	Elliptical	Heavy	12	-0.5	-0.3	-0.6	-1.1	38	-0.6	1.7	61.3	0.7	-1.5	54	0.1	0.3	91	1.2	-0.4	56
	1193+72	Elliptical	Heavy	12	-0.3	-1.3	-0.7	-0.7	38	-0.3	1.0	61.3	0.3	-1.5	54	1	0.8	91	1.4	-1.2	56
	1193+66	Elliptical	Heavy	12	-1.5	-0.3	-0.4	-0.5	38	-1.1	1.4	61.3	0.4	-1.8	54	0.7	0.6	91	0.1	-0.2	56
21	1193+60	Elliptical	Heavy	12	-1.2	-0.5	-0.8	-0.3	38	0.3	1.0	61.3	-0.3	-1.5	54	0	-0.6	91	0.3	-1.2	56
1194+20	1193+54	Elliptical	Heavy	12	0	0.4	-1.0	-0.8	38	-1.0	1.0	61.3	-0.8	-1.5	54	0.1	0.8	91	0.0	-1.3	56
	1193+48	Elliptical	Heavy	12	-0.6	-0.9	-0.3	-1.0	38	-0.2	1.3	61.3	-0.9	-0.5	54	0.2	-0.6	91	0.5	-0.2	56
	1193+42	Elliptical	Heavy	12	-0.5	-0.2	0.2	-0.1	38	-1.1	1.0	61.3	-0.3	-1.4	54	-0.3	-0.3	91	0.8	-1.7	56
	1193+36	Elliptical	Heavy	12	-0.6	0	-0.9	0.2	38	-1.2	0.2	61.3	-0.8	-0.7	54	1.2	0.1	91	1.0	-0.8	56
	1193+30	Elliptical	Heavy	12	0.2	0.1	-0.8	-0.7	38	-0.5	0.9	61.3	0.3	-1.5	54	1.2	0	91	0.0	-1.9	56
	1192+35	Elliptical	Medium	12	-1.2	-1.4	-0.5	-1.0	37	-0.2	1.2	58.5	0.5	-1.8	52	1.3	0.5	92	1.5	-0.6	59
	1192+29	Elliptical	Medium	12	0.6	-0.8	-0.9	0.1	37	-0.8	0.0	58.5	-1.0	-1.4	52	0.6	-0.5	92	0.2	-1.4	59
	1192+23	Elliptical	Medium	12	-0.7	-0.3	-0.9	-0.3	37	-0.9	0.4	58.5	-0.9	-0.5	52	0	-0.6	92	0.0	-1.2	59
	1192+17	Elliptical	Medium	12	0.7	-0.7	-0.3	0.3	37	-1.2	-0.3	58.5	0.8	-1.2	52	0.6	-0.9	92	0.8	-0.8	59
19	1192+11	Elliptical	Medium	12	-0.8	-0.5	-0.8	-0.3	37	-1.1	1.0	58.5	0.1	-1.7	52	-0.3	1.1	92	0.2	-0.2	59
1192+70	1192+05	Elliptical	Medium	12	-0.9	-1.6	0.1	-0.6	37	-1.3	2.1	58.5	0.5	-1.1	52	0.3	0.7	92	0.9	-0.1	59
	1191+99	Elliptical	Medium	12	-0.9	-0.9	-0.7	-1.4	37	-0.7	1.2	58.5	1.0	-0.2	52	1.3	0.7	92	1.4	-0.3	59
	1191+93	Elliptical	Medium	12	0	-0.8	0.1	-1.5	37	0.3	0.0	58.5	0.5	0.0	52	1.2	0	92	1.4	-1.2	59
	1191+87	Elliptical	Medium	12	-0.7	-0.2	-0.5	-0.5	37	-0.6	0.5	58.5	-0.6	-1.2	52	0.5	-0.2	92	0.2	-1.6	59
	1191+81	Elliptical	Medium	12	-0.4	-0.6	-1.3	0.1	37	-0.1	0.0	58.5	-0.9	-0.7	52	0.6	-0.5	92	0.6	-0.3	59
												58.5									
	1190+84	Round	Standard	18	-1	0	-0.1	-0.8	37	-1.3	1.6	58.5	-0.6	-1.5	52	0	-0.5	92	0.2	-0.4	59
	1190+78	Round	Standard	18	-0.3	-1.3	-0.5	-0.8	37	-1.4	1.5	58.5	-0.2	-0.2	52	1.1	0.5	92	0.9	-0.7	59
	1190+72	Round	Standard	18	-0.6	-0.3	-0.1	-0.6	37	0.1	1.5	58.5	-0.2	0.3	52	2.1	0.1	92	0.8	0.0	59
	1190+66	Round	Standard	18	-0.4	-0.7	-1.2	-1.0	37	-1.3	1.8	58.5	-1.3	-0.6	52	1.4	0.9	92	0.9	-1.1	59
17	1190+60	Round	Standard	18	-0.2	-1	-0.4	-0.4	37	-1.2	0.2	58.5	-0.4	-1.5	52	0.3	-0.6	92	0.0	-1.7	59
1191+20	1190+54	Round	Standard	18	-0.5	-0.5	-0.2	-1.0	37	0.5	1.0	58.5	-0.3	-0.5	52	0.8	0	92	0.0	-0.9	59
	1190+48	Round	Standard	18	-1.7	-0.5	-0.9	-0.9	37	-0.2	0.3	58.5	0.2	-1.5	52	-0.2	-0.9	92	0.9	-0.8	59
	1190+42	Round	Standard	18	-1	-1.2	0.1	-0.3	37	-0.8	1.1	58.5	-0.6	-1.1	52	0.1	-0.8	92	0.3	-1.0	59
	1190+36	Round	Standard	18	-1.4	0.3	-1.2	-0.2	37	-0.4	0.4	58.5	-0.4	-1.6	52	1.2	-0.8	92	0.2	-1.3	59
	1190+30	Round	Standard	18	-0.4	-0.4	0.0	-0.1	37	0.3	0.0	58.5	-1.0	-1.7	52	1.1	-0.6	92	0.0	-1.3	59
	1189+39	Round	Standard	18	0.3	-0.5	-0.5	-0.8	37	-0.8	1.6	55.7	0.7	-1.5	54	1	1	92	0.0	-0.2	62
	1189+33	Round	Standard	18	-1.3	-0.8	-1.1	-0.8	37	-1.2	0.5	55.7	-0.4	-1.4	54	0.9	-0.9	92	0.2	-1.3	62
	1189+27	Round	Standard	18	-1.4	-0.9	-0.5	-1.2	37	-1.2	1.7	55.7	-0.6	-0.7	54	1.5	0.8	92	0.0	-1.7	62
	1189+21	Round	Standard	18	2	-0.5	-0.1	0.0	37	-1.3	-1.0	55.7	0.1	-1.4	54	0.2	-1.7	92	-1.1	-1.0	62
15	1189+15	Round	Standard	18	-0.5	-1.3	-0.8	-0.4	37	0.7	0.3	55.7	-1.0	-0.5	54	1.5	-0.2	92	0.0	-1.6	62
1189+70	1189+09	Round	Standard	18	-0.8	-1	-0.6	-0.5	37	0.5	1.1	55.7	-0.3	0.0	54	1.5	0	92	1.6	-0.1	62
	1189+03	Round	Standard	18	-0.9	-0.6	-0.8	-0.6	37	0.2	0.0	55.7	-0.7	-0.1	54	1.4	0.1	92	1.1	-1.0	62
	1188+97	Round	Standard	18	-1.8	-0.3	-0.8	-1.7	37	-1.0	1.0	55.7	0.4	-1.7	54	1.3	0.9	92	1.0	-0.3	62
	1188+91	Round	Standard	18	-0.9	-0.5	0.1	-0.8	37	-0.1	0.5	55.7	1.0	-0.5	54	1	0	92	1.0	-1.8	62
	1188+85	Round	Standard	18	0.2	0.4	-0.1	0.2	37	-1.1	0.4	55.7	-0.7	-1.0	54	0	-0.8	92	0.0	-1.4	62
	1187+86	Round	Standard	18	-0.5	-0.2	0.2	-0.9	37	-0.5	1.1	55.7	1.2	-1.4	54	0	0.8	92	0.9	-0.6	62
	1187+80	Round	Standard	18	-0.8	-0.2	-0.9	-1.8	37	-0.3	2.1	55.7	0.6	-1.6	54	0.9	0.5	92	0.8	-0.4	62
	1187+74	Round	Standard	18	-1	-0.3	0.0	-0.8	37	-1.9	1.3	55.7	0.2	-1.9	54	0	0.8	92	-0.9	-0.2	62
	1187+68	Round	Standard	18	-0.8	-0.4	-0.4	-0.7	37	0.1	1.3	55.7	0.8	-0.7	54	1.5	0.6	92	1.0	-0.2	62
13	1187+62	Round	Standard	18	0.1	0.1	0.0	-0.4	37	-1.2	1.7	55.7	-1.0	-1.3	54	1	0.4	92	0.2	-0.7	62
1188+20	1187+56	Round	Standard	18	-0.2	-1.4	0.2	-1.3	37	0.3	1.1	55.7	-0.3	0.0	54	1.2	-0.8	92	1.5	-1.4	62
	1187+50	Round	Standard	18	0.3	0.2	-0.6	-0.3	37	-1.3	1.0	55.7	-1.0	-0.7	54	-0.1	-0.6	92	0.9	-1.7	62
	1187+44	Round	Standard	18	-1	-0.5	-1.2	-1.1	37	0.6	1.7	55.7	0.8	-0.4	54	1.7	0.2	92	1.5	-0.5	62
	1187+38	Round	Standard	18	-1.4	0	-1.3	-0.8	37	-1.2	1.0	55.7	0.3	-1.2	54	-0.3	0.8	92	0.0	-0.7	62
	1187+31	Round	Standard	18	-0.8	-0.8	0.2	-1.1	37	-1.0	1.7	55.7	0.1	-0.7	54	0.4	0.7	92	1.5	-1.0	62
	1184+38	Round	Standard	15	0.1	-0.5	-0.5	-0.7	36	0.1	0.4	54	-0.8	-1.5	57	1.7	-0.5	95	0.9	-1.5	61
	1184+32	Round	Standard	15	-0.3	0.1	-1.0	-0.7	36	-0.8	-0.2	54	-0.3	-0.3	57	0.8	1	95	0.2	-0.2	61
	1184+26	Round	Standard	15	-0.5	-1	-0.7	-1.0	36	-0.2	0.9	54	-1.0	-1.3	57	0.9	0	95	0.3	-0.6	61
	1184+20	Round	Standard	15	1	-1	-0.5	0.2	36	-1.1	1.8	54	-1.0	-1.3	57	1.3	-0.8	95	1.0	-1.9	61
11	1184+14	Round	Standard	15	-0.3	-0.9	0.5	-1.6	36	-0.8	2.7	54	0.4	-1.7	57	1	1	95	1.5	-0.3	61
1184+70	1184+08	Round	Standard	15	-0.5	-0.7	-0.5	0.0	36	0.1	0.0	54	-0.7	-1.4	57	1	-0.1	95	-0.2	-0.7	61
	1184+02	Round	Standard	15	-1.3	-0.8	-0.7	-1.0	36	-1.3	1.0	54	0.4	-1.3	57	0.8	0.8	95	0.3	-0.8	61
	1183+96	Round	Standard	15	0	-0.8	-0.7	-1.0	36	-0.2	1.4	54	0.3	-1.0	57	1.5	0.4	95	0.9	-0.3	61
	1183+90	Round	Standard	15	-1.9	0.5	0.6	-1.0	36	-0.8	1.4	54	0.8	-1.7	57	1	0.4	95	0.9	-0.2	61
	1183+84	Round	Standard	15	-1.8	0.5	-0.9	-0.5	36	-1.2	1.1	54	0.9	-1.7	57	-0.3	0.8	95	0.0	-0.1	61
	1182+84	Round	Standard	15	2	-1	-1.2	-0.8	36	0.3	-0.1	54	-0.5	-0.5	57	1.3	-0.7	95	1.5	-0.8	61
	1182+78	Round	Standard	15	0.1	-1	0.1	-1.5	36	0.1	1.7	54	1.0	-0.6	57	1.6	1	95	1.0	-0.1	61
	1182+72	Round	Standard	15	-0.9	-0.2	-0.8	0.2	36	-1.2	0.4	54	-1.0	-1.4	57	0.1	-0.5	95	0.2	-1.5	61
	1182+66	Round	Standard	15	-0.2	-0.8	-0.4	-0.2	36	0.3	1.5	54	-0.7	-0.7	57	1.1	0.9	95	1.0	-0.8	61
10	1182+60	Round	Standard	15	-1	0.2	-1.2	-0.4	36	-0.8	1.5	54	1.1	-1.5	57	-0.3	0.8	95	0.0	0.0	61
1183+20	1182+54	Round	Standard	15	-0.1	0.2	0.5	-1.5	36	-0.2	1.0	54	0.5	-0.5	57	1.1	0.8	95	1.5	0.0	61
	1182+48	Round	Standard	15	0.2	-1.4	-0.3	-0.8	36	-0.2	0.0	54	-1.0	-0.7	57	1.2	-0.2	95	-0.1	-1.0	61
	1182+42	Round	Standard	15	-0.4	0.3	0.7	-1.0	36	-1.3	1.3	54	0.2	-1.2	57	0.2	0.5	95	-0.2	-1.0	61
	1182+36	Round	Standard	15	-0.5	-0.3	0.0	-0.4	36	-0.3	1.4	54	0.4	-0.7	57	0.6	0.8	95	0.9	-1.2	61
	1182+30	Round	Standard	15	0	-0.6	0.8	-1.3	36	-0.2	0.4	54	-0.5	-0.5	57	-0.3	0.8	95	0.9	-1.7	61

8 1181+70	1181+39	Round	Standard	15	1	0	0.1	-0.3	36	-0.4	1.1	59.1	-0.3	-1.7	59	0.3	-0.8	98	0.0	-1.8	63
	1181+33	Round	Standard	15	1.3	-0.7	-0.5	-0.4	36	-1.2	1.0	59.1	0.7	-1.6	59	-0.1	-0.8	98	0.0	-1.0	63
	1181+27	Round	Standard	15	-0.5	-0.6	-0.7	-0.7	36	-1.2	1.5	59.1	1.0	-0.5	59	0.8	0.3	98	1.0	0.1	63
	1181+21	Round	Standard	15	0.6	0.2	-0.8	-0.7	36	0.3	0.4	59.1	-1.0	0.0	59	1.7	-0.6	98	0.9	-1.3	63
	1181+15	Round	Standard	15	0.5	-0.3	-0.3	-0.9	36	-0.7	1.3	59.1	-1.0	-0.7	59	-0.2	0.2	98	0.0	-1.1	63
	1181+09	Round	Standard	15	0.3	-1.3	-0.8	-1.0	36	0.3	1.2	59.1	0.5	-1.3	59	1	0	98	0.9	-0.3	63
	1181+03	Round	Standard	15	-1	0.1	1.5	-0.7	36	-1.3	1.2	59.1	0.3	-1.4	59	-0.2	0.6	98	0.0	-0.6	63
	1180+97	Round	Standard	15	-0.2	-1	-0.3	-1.1	36	-0.1	1.7	59.1	0.5	-1.3	59	1.2	0.7	98	0.7	0.1	63
	1180+91	Round	Standard	15	0	-0.8	0.0	-1.0	36	0.8	0.5	59.1	-0.8	0.5	59	1.2	0.8	98	1.4	-1.3	63
	1180+85	Round	Standard	15	-0.7	-0.3	-1.0	-1.3	36	0.5	1.6	59.1	-0.1	0.6	59	1.2	0.5	98	0.8	-0.8	63
6 1180+20	1179+87	Round	Standard	12	-4	-0.7	-1.0	-0.8	36	-1.0	1.0	59.1	0.8	-1.9	59	0.3	-0.3	98	0.0	0.0	63
	1179+81	Round	Standard	12	-1	-0.4	0.2	-0.5	36	-1.2	2.3	59.1	-1.0	-1.5	59	0.2	0	98	1.0	-1.7	63
	1179+75	Round	Standard	12	-0.5	-0.9	-0.3	-0.3	36	-0.1	0.0	59.1	0.2	-0.7	59	0.6	0.2	98	0.8	0.0	63
	1179+69	Round	Standard	12	-0.8	-0.7	0.0	-0.5	36	0.5	0.1	59.1	0.5	-0.8	59	1.5	0.3	98	0.9	-1.3	63
	1179+63	Round	Standard	12	-0.3	-1	0.0	-0.8	36	-0.1	1.7	59.1	0.4	-1.7	59	1.6	0.8	98	0.9	-0.7	63
	1179+57	Round	Standard	12	-0.8	-0.4	-1.5	-1.3	36	-0.3	0.1	59.1	0.0	-0.1	59	1.3	-0.7	98	0.9	-1.3	63
	1179+51	Round	Standard	12	-0.4	-0.3	0.0	-1.8	36	-0.7	0.0	59.1	-0.8	-1.4	59	0	-0.6	98	-0.1	-0.6	63
	1179+45	Round	Standard	12	-1	-1.1	-0.5	-1.8	36	0.3	1.7	59.1	0.6	-0.3	59	1.2	0.8	98	1.5	0.2	63
	1179+39	Round	Standard	12	-0.2	-0.5	-0.2	0.9	36	-1.2	1.8	59.1	0.3	-1.7	59	1	0.8	98	-0.1	-1.9	63
	1179+33	Round	Standard	12	0	-0.4	-0.2	-1.0	36	-0.1	-0.1	59.1	0.4	-1.3	59	1.1	-0.8	98	0.9	-1.6	63
4 1178+70	1178+25	Round	Standard	12	0.6	-1.5	-0.3	0.5	36	-1.0	0.5	51.5	-0.1	-1.3	61	0.2	-0.2	93	0.3	-1.1	68
	1178+19	Round	Standard	12	-0.8	-1	-0.7	-1.7	36	-0.7	1.2	51.5	0.0	-1.4	61	1	0.8	93	0.9	-0.3	68
	1178+13	Round	Standard	12	0.3	-0.7	-0.7	-0.1	36	-0.3	0.5	51.5	-1.0	0.0	61	1	-0.6	93	1.0	-0.8	68
	1178+07	Round	Standard	12	0.6	0.2	0.9	-0.8	36	-0.3	1.1	51.5	0.4	-0.1	61	0.7	0.3	93	0.0	-1.9	68
	1178+01	Round	Standard	12	0.2	-0.5	0.5	-0.6	36	-0.2	0.2	51.5	-1.0	-1.8	61	0.2	0.6	93	0.1	-1.6	68
	1177+95	Round	Standard	12	-1	-1	-0.5	-0.4	36	-0.1	0.0	51.5	0.7	-0.2	61	0.7	0.8	93	1.0	-1.3	68
	1177+89	Round	Standard	12	-0.5	-0.9	-2.0	-0.8	36	0.5	1.5	51.5	0.1	-0.7	61	1.2	0.6	93	0.9	0.0	68
	1177+83	Round	Standard	12	-2	-0.7	-1.0	-1.5	36	-0.6	1.5	51.5	-1.0	-0.7	61	1.2	0.6	93	0.2	0.1	68
	1177+87	Round	Standard	12	-0.5	0.4	-0.9	0.0	36	-0.7	1.1	51.5	-0.8	-0.8	61	1.2	-0.3	93	1.0	-1.8	68
	1177+81	Round	Standard	12	-1	-0.7	-0.9	-0.9	36	-1.1	1.3	51.5	0.4	-1.3	61	0.2	0.8	93	0.8	-0.2	68
2 1177+20	1176+84	Round	Standard	12	-0.9	-1.6	-0.8	-1.0	36	0.1	1.3	51.5	-0.4	-0.3	61	2.2	0.3	93	2.0	-1.3	68
	1176+78	Round	Standard	12	-1.1	-1	-0.6	-0.8	36	-0.2	0.3	51.5	0.3	0.0	61	1.6	0	93	0.9	-1.0	68
	1176+72	Round	Standard	12	-0.5	-0.4	-0.9	-0.1	36	-1.3	0.8	51.5	-0.3	-1.8	61	-0.3	-0.3	93	0.8	-1.7	68
	1176+66	Round	Standard	12	-1	-0.8	-1.4	-1.1	36	-1.2	1.2	51.5	0.2	-1.9	61	1.6	0.9	93	0.6	0.1	68
	1176+60	Round	Standard	12	-1.2	-0.8	-0.1	-1.0	36	0.3	1.2	51.5	0.0	-0.5	61	1.5	0.3	93	1.5	-0.4	68
	1176+54	Round	Standard	12	-0.1	-0.3	-0.7	-0.5	36	-1.0	1.1	51.5	-0.4	-0.5	61	0.3	0.8	93	-0.3	-0.7	68
	1176+48	Round	Standard	12	-1	-0.3	0.1	-0.5	36	0.5	1.0	51.5	-1.0	-0.6	61	1	0.7	93	1.0	-1.9	68
	1176+42	Round	Standard	12	-0.4	-1.3	-0.5	-0.2	36	0.8	-0.2	51.5	-0.9	0.0	61	1.2	-0.8	93	1.2	-0.8	68
	1176+36	Round	Standard	12	-0.5	-0.5	-0.6	-0.8	36	0.4	1.0	51.5	-0.8	-0.7	61	1.6	-0.2	93	1.1	-0.5	68
	1176+30	Round	Standard	12	-0.7	-0.6	-1.0	-0.7	36	0.3	1.4	51.5	0.3	-0.8	61	1.3	1	93	1.0	0.2	68
BOP	1175+44																				

Table F.2. Steel dowels, faulting section averages

Section No.	Ref. Station	Bar Type	Bar Size	Spacing (inches)	Faulting Section Averages (mm) 9/21/2002 Driving	9/21/2002 Passing	4/5/2003 Driving	4/5/2003 Passing	10/25/2003 Driving	10/25/2003 Passing	4/10/2004 Driving	4/10/2004 Passing	8/27/2004 Driving	8/27/2004 Passing	4/23/2005 Driving	4/23/2005 Passing
118	1328+20	Round	Standard	12	-0.29	-0.35	-0.29	-0.02	-0.73	0.45	-0.10	-0.82	0.45	-0.05	0.17	0.62
110	1302+20	Round	Standard	12	-0.39	-0.16	-0.17	-0.59	-0.67	0.23	-0.57	-0.38	0.18	0.58	0.52	0.57
103	1277+00	Round	Standard	12	-0.10	-0.38	-0.28	-0.61	-0.20	0.47	-0.49	-0.79	0.19	0.20	0.47	0.78
101	1267+70	Round	Standard	12	-0.37	-0.46	-0.40	-0.70	-0.31	0.60	-0.55	-0.87	0.63	-0.37	0.31	0.61
100	1266+50	Round	Standard	12	-0.17	-0.16	-0.37	-0.40	-0.69	0.27	-0.40	-0.82	0.53	-0.39	0.40	0.74
91	1260+20	Round	Standard	12	-0.17	-0.33	-0.40	-0.46	-0.96	0.50	-0.29	-1.09	0.45	0.06	-0.05	0.85
73	1244+20	Round	Standard	12	-0.18	-0.82	-0.31	-0.71	-0.54	0.34	-0.33	-0.66	0.71	-0.21	0.49	0.67
71	1242+70	Round	Standard	12	-0.23	-0.69	-0.67	-0.88	-0.27	0.78	-0.25	-0.73	0.57	0.12	-0.16	0.53
69	1241+20	Round	Standard	12	-0.21	-0.52	-0.52	-0.90	-0.73	0.69	-0.41	-0.86	0.58	0.19	-0.31	0.57
6	1180+20	Round	Standard	12	-0.90	-0.64	-0.35	-0.79	-0.39	0.86	0.14	-1.14	0.88	0.05	0.67	-0.89
4	1178+70	Round	Standard	12	-0.41	-0.64	-0.56	-0.63	-0.45	0.89	-0.23	-0.83	0.76	0.34	0.62	-0.89
2	1177+20	Round	Standard	12	-0.74	-0.76	-0.65	-0.67	-0.13	0.91	-0.30	-0.71	1.20	0.27	0.98	-0.80
95	1262+80	Round	Standard	15	-0.57	-0.28	-0.60	-0.78	-0.67	0.68	-0.21	-1.12	0.07	-0.07	0.09	1.12
79	1249+70	Round	Standard	15	-0.23	-0.33	-0.18	-0.77	-0.82	1.08	-0.33	-0.95	0.28	-0.09	0.48	0.62
77	1247+70	Round	Standard	15	-0.71	-0.34	-0.69	-0.47	-0.50	0.92	0.11	-0.93	0.70	0.22	0.39	0.62
11	1184+70	Round	Standard	15	-0.55	-0.46	-0.44	-0.73	-0.62	1.05	-0.10	-1.32	0.97	0.30	0.58	-0.66
10	1183+20	Round	Standard	15	-0.08	-0.46	-0.18	-0.77	-0.35	0.91	-0.05	-0.83	0.66	0.42	0.67	-0.81
8	1181+70	Round	Standard	15	0.13	-0.47	-0.28	-0.81	-0.30	1.15	-0.02	-0.74	0.69	0.09	0.57	-0.80
106	1279+70	Round	Standard	18	-0.12	-0.58	-0.27	-0.30	-0.14	0.40	-0.60	-0.53	0.35	0.36	0.88	0.68
104	1278+20	Round	Standard	18	-0.26	-0.31	-0.14	-0.39	-0.64	0.52	-0.78	-0.82	0.18	0.48	0.58	1.23
97	1264+10	Round	Standard	18	0.12	-0.38	-0.47	-0.61	-0.65	0.44	-0.73	-0.80	0.78	-0.37	-0.11	0.73
17	1191+20	Round	Standard	18	-0.75	-0.56	-0.45	-0.61	-0.57	0.94	-0.48	-0.99	0.79	-0.27	0.42	-0.92
15	1189+70	Round	Standard	18	-0.51	-0.60	-0.52	-0.66	-0.53	0.61	-0.15	-0.88	1.03	-0.08	0.38	-1.04
13	1188+20	Round	Standard	18	-0.61	-0.35	-0.38	-0.92	-0.64	1.40	0.17	-0.99	0.63	0.34	0.74	-0.74
114	1319+70	Elliptical	Medium	12	0.00	-0.44	-0.18	-0.48	-0.11	0.41	-0.32	-0.70	0.83	-0.38	0.72	0.69
112	1318+20	Elliptical	Medium	12	-0.58	-0.38	-0.48	-0.67	-0.33	0.74	-0.23	-0.89	0.22	0.63	0.52	0.75
108	1281+20	Elliptical	Medium	12	-0.22	-0.63	-0.44	-0.60	-0.81	0.01	-0.50	-0.76	0.22	0.25	0.51	0.64
98	1265+20	Elliptical	Medium	12	-0.20	-0.14	-0.49	-0.57	-0.35	0.57	-0.17	-0.41	0.91	-0.27	0.59	0.63
93	1261+50	Elliptical	Medium	12	-0.49	-0.17	-0.31	-0.39	-1.01	0.85	-0.22	-1.01	0.87	0.49	0.26	0.95
89	1257+20	Elliptical	Medium	12	-0.14	-0.05	-0.18	-0.18	-0.69	0.48	-0.11	-1.03	0.62	-0.17	0.22	0.57
87	1255+70	Elliptical	Medium	12	-0.10	-0.39	-0.55	-0.14	-0.54	0.19	-0.49	-0.93	0.35	-0.57	0.31	-0.08
85	1254+20	Elliptical	Medium	12	0.13	-0.45	-0.44	-0.69	-0.53	0.00	-0.44	-0.66	0.83	-0.17	0.57	0.50
81	1251+20	Elliptical	Medium	12	-0.05	-0.43	-0.33	-0.82	-0.43	0.33	-0.37	-0.55	0.68	0.14	0.70	0.69
47	1220+20	Elliptical	Medium	12			-0.61	-0.73	-0.68	1.00	-0.15	-1.16	0.61	-0.08	-0.79	0.86
29	1202+70	Elliptical	Medium	12	-0.33	-0.19	-0.66	-0.90	-0.67	0.88	0.13	-0.88	0.82	0.50	0.50	-0.59
23	1195+70	Elliptical	Medium	12	-0.34	-0.27	-0.42	-0.45	-0.38	0.75	-0.40	-0.80	1.08	-0.22	0.87	-1.07
19	1192+70	Elliptical	Medium	12	-0.43	-0.78	-0.57	-0.51	-0.66	0.61	0.00	-0.98	0.61	0.03	0.72	-0.77
122	1333+70	Elliptical	Medium	15	-0.35	-0.13	-0.34	-0.25	-0.77	0.05	-0.55	-0.91	0.06	0.22	0.48	0.45
120	1332+20	Elliptical	Medium	15	-0.59	-0.03	-0.38	-0.57	-0.50	0.55	-0.23	-0.76	0.26	0.74	0.74	0.73
116	1321+20	Elliptical	Medium	15	-0.28	0.04	-0.14	-0.20	-0.80	0.37	-0.59	-0.94	0.42	-0.07	0.04	0.56
39	1214+20	Elliptical	Medium	15	-0.20	-0.06	-0.44	-0.26	-0.80	0.49	-0.21	-0.89	0.93	-0.17	-0.35	0.65
35	1210+20	Elliptical	Medium	15	-0.31	0.22	-0.11	-0.14	-0.51	0.67	0.02	-1.16	0.64	0.18	0.21	0.02
33	1207+20	Elliptical	Medium	15	-0.26	-0.11	-0.50	-0.78	-0.81	0.69	0.07	-1.02	0.81	-0.04	0.47	-0.91
128	1346+20	Elliptical	Medium	18	-0.47	-0.06	-0.26	-0.28	-0.83	0.72	-0.55	-1.38	0.20	-0.47	0.19	0.66
126	1344+70	Elliptical	Medium	18	-0.39	-0.01	-0.06	-0.30	-0.75	0.20	-0.51	-0.68	0.30	-0.50	0.37	0.48
124	1340+20	Elliptical	Medium	18	-0.09	-0.36	-0.22	-0.37	-0.66	0.44	-0.43	-1.06	-0.38	0.37	0.44	0.57
45	1218+70	Elliptical	Medium	18			-0.18	-0.77	-0.70	0.62	-0.25	-0.80	0.69	-0.16	-0.48	0.74
43	1217+20	Elliptical	Medium	18			-0.25	-0.92	-0.69	0.70	0.16	-0.98	0.53	-0.07	-0.58	0.61
41	1215+70	Elliptical	Medium	18	0.10	-0.05	-0.66	-0.46	-0.53	-0.16	-0.43	-1.06	0.54	-0.46	-0.38	0.53
55	1227+70	Elliptical	Heavy	12	-0.27	-0.46	-0.36	-0.83	-0.71	0.70	-0.06	-1.16	-0.29	0.91	-0.63	1.07
51	1224+70	Elliptical	Heavy	12	-0.43	-0.20	-0.65	-0.73	-0.37	0.78	0.06	-0.92	-0.42	1.17	-0.63	0.78
27	1199+70	Elliptical	Heavy	12	-0.61	-0.02	-0.20	-0.64	-0.38	1.13	-0.12	-0.98	0.64	0.22	0.75	-0.83
25	1198+20	Elliptical	Heavy	12	-0.05	0.26	-0.62	-0.79	-0.68	1.10	-0.41	-1.11	0.76	0.18	0.23	-1.13
21	1194+20	Elliptical	Heavy	12	-0.45	-0.40	-0.51	-0.60	-0.58	1.01	-0.24	-1.33	0.55	0.08	0.62	-0.95
63	1233+70	Elliptical	Heavy	15	-0.50	-0.29	-0.22	-0.17	-0.77	0.45	-0.29	-1.02	-0.18	0.71	-0.30	0.65
61	1232+20	Elliptical	Heavy	15	-0.09	-0.16	-0.40	-0.53	-0.79	0.62	-0.32	-1.02	0.09	0.70	-0.57	0.53
59	1230+70	Elliptical	Heavy	15	-0.03	0.00	-0.44	-0.50	-0.56	0.54	-0.29	-1.02	-0.22	1.04	-0.43	0.32
49	1223+20	Elliptical	Heavy	15	0.16	0.36	-0.48	-0.38	-0.79	0.34	-0.26	-1.41	-0.45	0.87	-0.75	0.27
37	1211+70	Elliptical	Heavy	15	-0.46	0.40	-0.47	-0.85	-0.71	0.59	0.01	-1.06	0.16	0.90	-0.42	0.76
31	1205+70	Elliptical	Heavy	15	-0.18	-0.14	-0.60	-0.93	-0.61	0.44	-0.17	-0.80	1.06	0.17	0.52	-0.90
83	1252+70	Elliptical	Heavy	18	-0.26	-0.36	-0.50	-0.48	-0.61	0.59	-0.06	-0.63	0.72	-0.23	0.49	0.65
75	1245+70	Elliptical	Heavy	18	0.05	-0.33	-0.63	-0.41	-0.19	0.58	-0.31	-0.54	0.77	-0.10	0.72	0.52
67	1239+70	Elliptical	Heavy	18	-0.47	-0.34			-0.42	0.74	-0.27	-0.46	0.92	0.03	0.18	0.67
65	1238+20	Elliptical	Heavy	18	-0.36	-0.13	-0.54	-0.36	-0.26	0.53	-0.06	-0.55	1.12	0.17	0.10	0.48
57	1229+20	Elliptical	Heavy	18	-0.12	0.11	-0.46	-0.66	-0.42	0.36	-0.10	-0.98	-0.47	0.68	-0.40	0.63
53	1226+20	Elliptical	Heavy	18	-0.37	-0.31	-0.70	-0.39	-0.38	0.58	0.01	-0.85	0.04	0.74	-0.04	0.58

Table F.3. Steel dowels, standard round faulting averages

Test Date	Faulting Averages (mm)								
	12 in. spacing			15 in. spacing			18 in. spacing		
	Driving	Passing	Average	Driving	Passing	Average	Driving	Passing	Average
Fall 2002	-0.35	-0.49	-0.42	-0.34	-0.39	-0.36	-0.36	-0.46	-0.41
Spring 2003	-0.41	-0.61	-0.51	-0.40	-0.72	-0.56	-0.37	-0.58	-0.48
Fall 2003	-0.51	0.58	0.04	-0.54	0.97	0.21	-0.53	0.72	0.09
Spring 2004	-0.32	-0.81	-0.56	-0.10	-0.98	-0.54	-0.43	-0.84	-0.63
Fall 2004	0.59	0.07	0.33	0.56	0.15	0.35	0.63	0.08	0.35
Spring 2005	0.34	0.28	0.31	0.46	0.02	0.24	0.48	-0.01	0.24

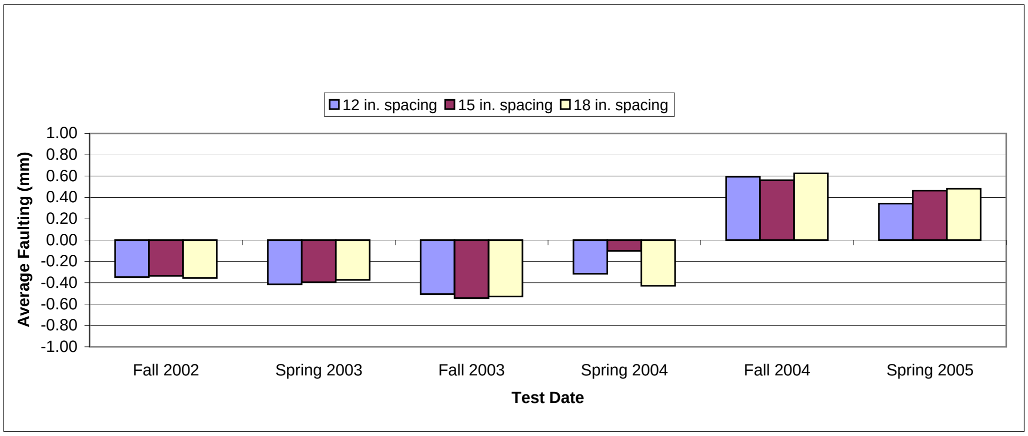

Figure F.1. Faulting averages, standard round steel dowels, driving lane

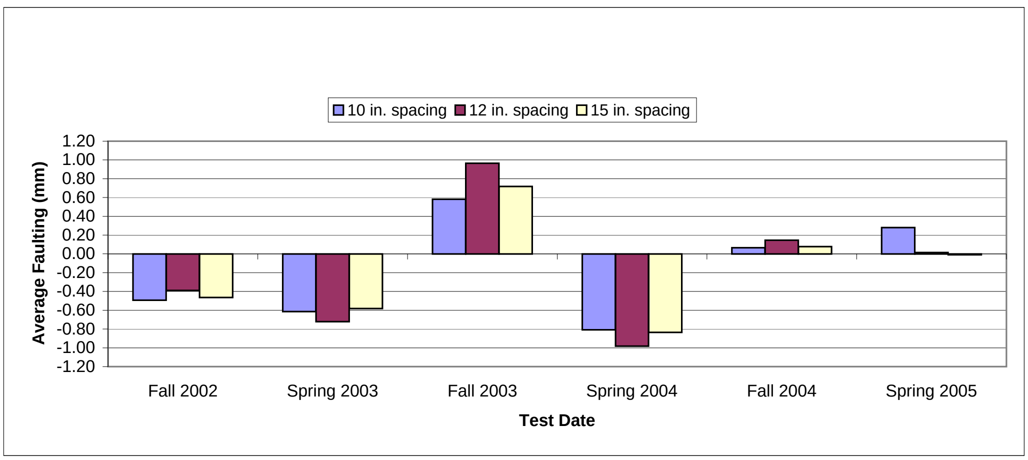

Figure F.2. Faulting averages, standard round steel dowels, passing lane

Figure F.3. Faulting averages, standard round steel dowels, average

Table F.4. Steel dowels, medium elliptical faulting averages

Test Date	Faulting Averages (mm)								
	12 in. spacing			15 in. spacing			18 in. spacing		
	Driving	Passing	Average	Driving	Passing	Average	Driving	Passing	Average
Fall 2002	-0.23	-0.36	-0.29	-0.33	-0.01	-0.17	-0.21	-0.12	-0.17
Spring 2003	-0.44	-0.55	-0.49	-0.32	-0.37	-0.34	-0.27	-0.52	-0.39
Fall 2003	-0.55	0.52	-0.01	-0.70	0.47	-0.11	-0.69	0.42	-0.14
Spring 2004	-0.25	-0.83	-0.54	-0.25	-0.95	-0.60	-0.34	-0.99	-0.66
Fall 2004	0.67	0.01	0.34	0.52	0.14	0.33	0.31	-0.22	0.05
Spring 2005	0.44	0.29	0.36	0.27	0.25	0.26	-0.07	0.60	0.26

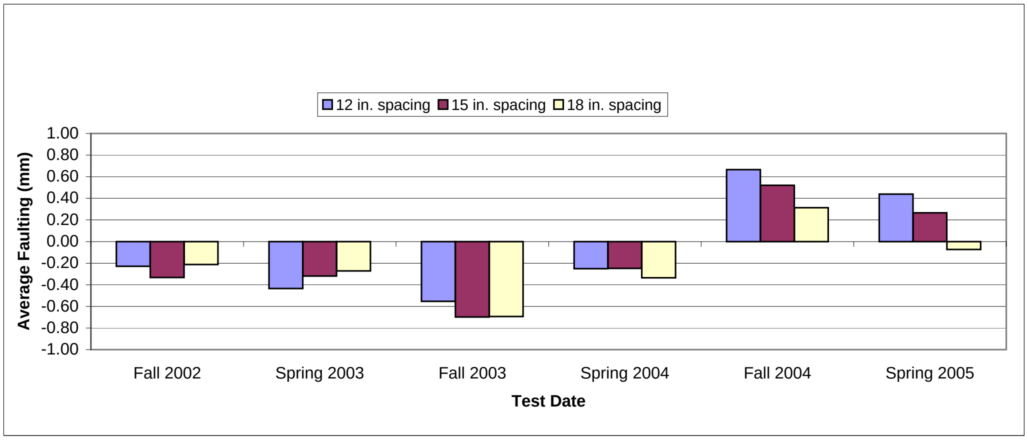

Figure F.4. Faulting averages, medium elliptical steel dowels, driving lane

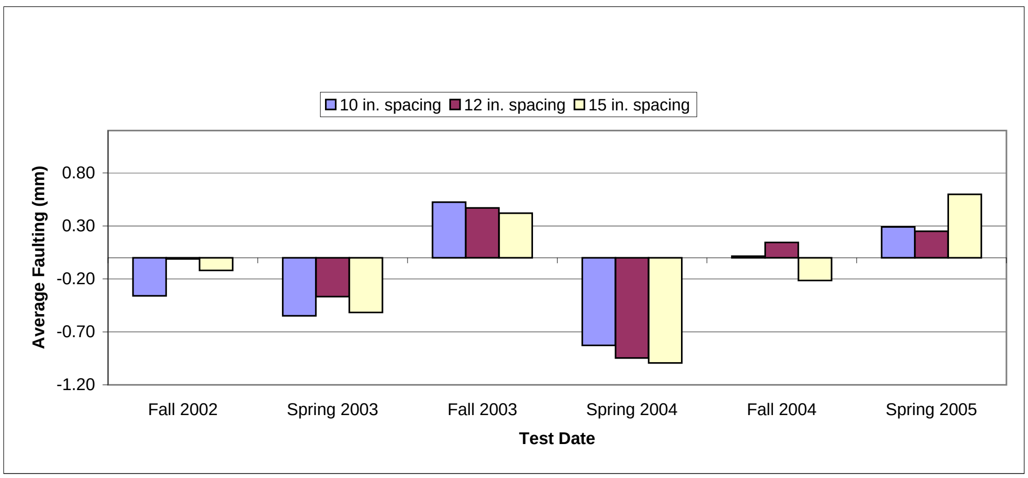

Figure F.5. Faulting averages, medium elliptical steel dowels, passing lane

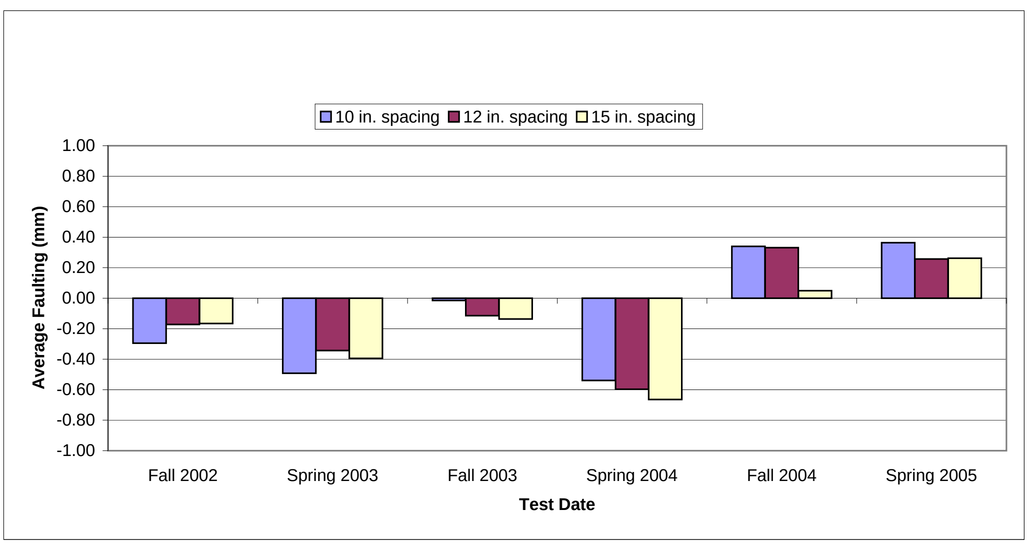

Figure F.6. Faulting averages, medium elliptical steel dowels, average

Table F.5. Steel dowels, heavy elliptical faulting averages

Test Date	Faulting Averages (mm)								
	12 in. spacing			15 in. spacing			18 in. spacing		
	Driving	Passing	Average	Driving	Passing	Average	Driving	Passing	Average
Fall 2002	-0.36	-0.16	-0.26	-0.18	0.03	-0.08	-0.26	-0.23	-0.24
Spring 2003	-0.47	-0.72	-0.59	-0.44	-0.56	-0.50	-0.57	-0.46	-0.51
Fall 2003	-0.54	0.94	0.20	-0.71	0.50	-0.10	-0.38	0.56	0.09
Spring 2004	-0.15	-1.10	-0.63	-0.22	-1.06	-0.64	-0.13	-0.67	-0.40
Fall 2004	0.25	0.51	0.38	0.08	0.73	0.40	0.52	0.22	0.37
Spring 2005	0.07	-0.21	-0.07	-0.33	0.27	-0.03	0.18	0.59	0.38

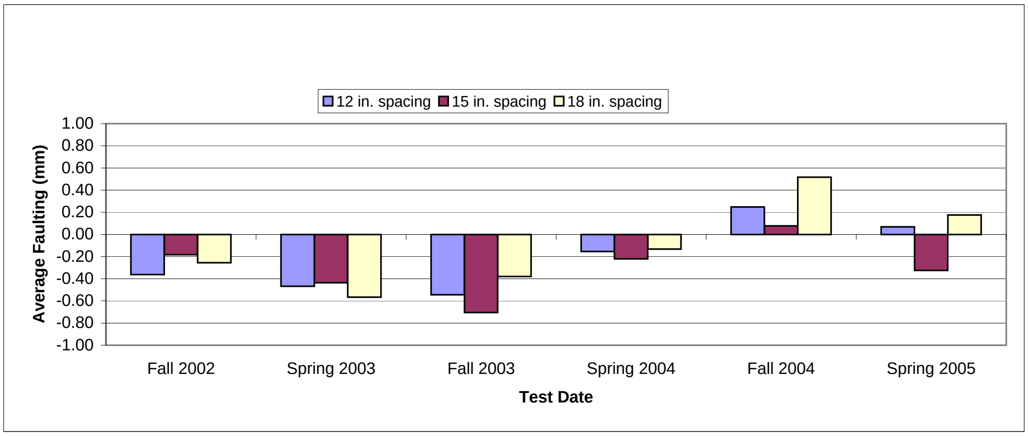

Figure F.7. Faulting averages, heavy elliptical steel dowels, driving lane

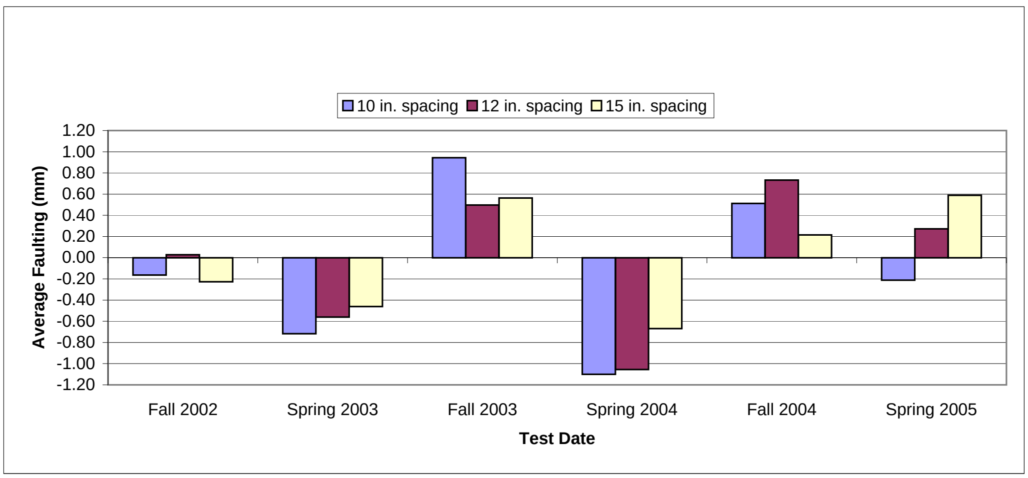

Figure F.8. Faulting averages, heavy elliptical steel dowels, passing lane

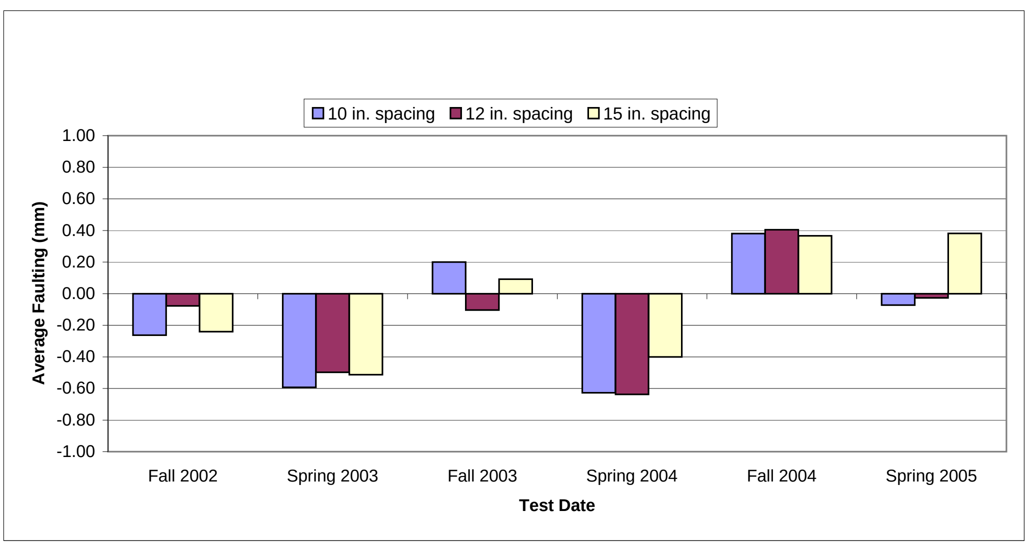

Figure F.9. Faulting averages, heavy elliptical steel dowels, average

APPENDIX G. JOINT OPENING DATA FOR STEEL

Table G.1. Steel dowels, joint opening field measurments

Notes:j1. All tests were taken in the northbound (south) lane.
2. Measurments were made between nails installed 12 inches from the edge of pavement.
3. Temperatures are measured in Degrees Fahrenheit.

					Joint Opening Measurments (mm)														Change in Joint Opening (mm)					
					8/28/2002		9/21/2002		4/5/2003		10/25/2003		4/10/2004		8/27/2004		4/23/2005							
Test Sect. Station Ref.	Station (Metric)	Bar Shape	Bar Size	Spacing (inches)	Dist.	Temp.	Dist.	Temp.	Dist.	Temp.	Dist.	Temp.	Dist.	Temp.	Dist.	Temp.	Dist.	Temp.	9/21/2002	4/5/2003	10/25/2003	4/10/2004	8/27/2004	4/23/2005
EOP	1360+00																							
	1280+87	Elliptical	Medium	12	254	94	255	77	252	29	256	38	255	37	253	70	250	43	1.0	-1.9	1.9	0.7	-1.5	-4.3
	1280+81	Elliptical	Medium	12	252	94	253	77	250	29	253	38	253	37	251	70	251	43	1.0	-1.4	1.1	1.3	-1.2	-0.7
	1280+75	Elliptical	Medium	12	254	94	255	77	253	29	256	38	255	37	253	70	253	43	1.5	-0.9	2.7	1.3	-0.7	-0.7
	1280+69	Elliptical	Medium	12	259	94	259	77	258	29	261	38	260	37	259	70	259	43	0.0	-1.1	1.8	0.9	-0.3	-0.1
108	1280+63	Elliptical	Medium	12	260	94	261	77	258	29	261	38	260	37	259	70	258	43	1.0	-1.6	0.8	0.2	-1.2	-1.8
1281+20	1280+57	Elliptical	Medium	12	250	94	251	77	249	29	258	38	250	37	249	70	250	43	0.8	-1.5	7.7	-0.2	-0.9	-0.2
	1280+51	Elliptical	Medium	12	267	94	269	77	267	29	270	38	268	37	267	70	267	43	1.3	-0.3	2.4	0.5	-0.7	-0.5
	1280+45	Elliptical	Medium	12	251	94	253	77	249	29	253	38	252	37	250	70	251	43	2.0	-1.7	2.0	1.3	-0.3	0.3
	1280+39	Elliptical	Medium	12	247	94	249	77	245	29	249	38	247	37	246	70	241	43	1.5	-1.7	1.7	-0.1	-1.3	-6.1
	1280+33	Elliptical	Medium	12	248	94	248	77	245	29	249	38	247	37	246	70	246	43	0.0	-2.4	1.3	-0.7	-1.9	-1.7
	1279+38	Round	Standard	18	260	103	261	73	258	28	262	38	260	37	259	70	259	43	1.0	-1.4	2.0	0.2	-1.3	-0.8
	1279+32	Round	Standard	18	248	103	249	73	247	28	250	38	249	37	248	70	247	43	0.8	-1.1	1.8	1.1	0.0	-0.9
	1279+26	Round	Standard	18	252	103	252	73	250	28	253	38	252	37	250	70	251	43	0.5	-1.6	1.1	0.3	-1.9	-0.7
	1279+20	Round	Standard	18	276	103	268	73	265	28	268	38	267	37	265	70	267	43	-7.9	-10.5	-7.7	-8.6	-10.8	-8.6
106	1279+14	Round	Standard	18	253	103	253	73	251	28	254	38	253	37	251	70	253	43	-0.3	-2.7	0.5	-0.5	-2.8	-0.5
1279+70	1279+08	Round	Standard	18	266	103	267	73	264	28	268	38	266	37	264	70	266	43	1.3	-2.0	1.8	0.1	-1.6	0.1
	1279+02	Round	Standard	18	252	103	253	73	251	28	254	38	252	37	251	70	251	43	1.0	-1.5	1.9	0.0	-1.4	-1.0
	1278+96	Round	Standard	18	254	103	254	73	252	28	254	38	254	37	252	70	253	43	-0.3	-2.5	0.3	0.0	-2.5	-1.0
	1278+90	Round	Standard	18	253	103	254	73	254	28	255	38	254	37	252	70	252	43	1.0	0.4	1.5	0.8	-1.0	-1.2
	1278+84	Round	Standard	18	244	103	245	73	242	28	246	38	244	37	242	70	243	43	1.3	-1.5	2.1	0.4	-1.4	-0.6
	1277+89	Round	Standard	18	238	103	240	72	238	29	240	36	239	38	238	70	238	44	1.3	-0.3	1.6	0.7	0.1	-0.3
	1277+83	Round	Standard	18	251	103	252	72	251	29	253	36	253	38	252	70	252	44	1.3	0.1	2.1	1.8	0.8	0.8
	1277+77	Round	Standard	18	251	103	251	72	250	29	252	36	252	38	249	70	249	44	0.5	-1.2	0.9	1.0	-1.7	-2.0
	1277+71	Round	Standard	18	246	103	246	72	245	29	247	36	247	38	246	70	245	44	0.5	-1.0	1.2	1.1	0.4	-0.9
104	1277+65	Round	Standard	18	241	103	242	72	241	29	245	36	243	38	241	70	242	44	1.3	-0.1	4.2	2.0	-0.3	1.0
1278+20	1277+59	Round	Standard	18	238	103	237	72	235	29	237	36	237	38	236	70	235	44	-0.8	-2.6	-0.9	-0.7	-1.8	-2.7
	1277+53	Round	Standard	18	243	103	244	72	243	29	244	36	244	38	243	70	242	44	0.5	-0.7	0.9	0.7	-0.3	-1.3
	1277+47	Round	Standard	18	242	103	243	72	241	29	243	36	243	38	241	70	241	44	1.5	-0.4	1.5	1.4	-0.6	-0.6
	1277+41	Round	Standard	18	250	103	253	72	250	29	251	36	250	38	247	70	249	44	3.3	-0.3	0.7	-0.2	-2.7	-1.2
	1277+35	Round	Standard	18	246	103	247	72	246	29	247	36	246	38	247	70	246	44	1.3	0.3	1.4	0.4	1.1	0.4
	1276+65	Round	Standard	12	252	104	251	70	248	29	250	36	250	38	249	70	249	44	-1.3	-3.8	-1.8	-2.2	-3.0	-3.2
	1276+59	Round	Standard	12	238	104	240	70	238	29	240	36	239	38	238	70	241	44	2.0	0.2	1.7	0.7	0.1	2.7
	1276+53	Round	Standard	12	242	104	244	70	241	29	244	36	242	38	142	70	242	44	1.8	-0.4	2.3	0.2	-99.8	0.2
	1276+47	Round	Standard	12	253	104	253	70	252	29	254	36	253	38	252	70	253	44	0.3	-0.9	0.9	-0.2	-1.5	-0.2
103	1276+41	Round	Standard	12	244	104	246	70	243	29	245	36	245	38	243	70	245	44	2.0	-0.1	1.8	1.4	-0.2	1.4
1277+00	1276+35	Round	Standard	12	261	104	263	70	261	29	263	36	263	38	261	70	262	44	1.8	0.1	2.1	1.9	-0.1	0.9
	1276+29	Round	Standard	12	242	104	243	70	241	29	244	36	242	38	242	70	241	44	1.5	-0.3	1.9	0.2	-0.2	-0.8
	1276+23	Round	Standard	12	245	104	247	70	245	29	247	36	247	38	244	70	245	44	1.5	-0.5	1.8	1.9	-0.7	-0.1
	1276+17	Round	Standard	12	240	104	240	70	239	29	241	36	240	38	240	70	241	44	0.0	-1.0	1.0	0.5	0.4	1.5
	1276+11	Round	Standard	12	247	104	247	70	244	29	246	36	246	38	244	70	245	44	0.3	-2.3	-0.7	-0.6	-2.4	-1.6
	1267+37	Round	Standard	12	251	93	255	67	249	29	252	43	251	45	249	69	250	50	3.3	-2.1	0.7	-0.2	-1.9	-1.2
	1267+31	Round	Standard	12	257	93	260	67	256	29	258	43	257	45	255	69	255	50	3.0	-1.0	1.2	0.0	-2.2	-2.0
	1267+25	Round	Standard	12	262	93	263	67	259	29	264	43	263	45	260	69	261	50	0.5	-3.0	1.5	0.9	-2.1	-1.1
	1267+19	Round	Standard	12	250	93	247	67	248	29	253	43	251	45	249	69	249	50	-3.6	-1.8	2.9	0.8	-0.8	-1.2
101	1267+13	Round	Standard	12	256	93	255	67	252	29	256	43	254	45	253	69	253	50	-0.8	-4.2	0.1	-2.0	-3.5	-3.0
1267+70	1267+07	Round	Standard	12	247	93	248	67	246	29	249	43	247	45	246	69	246	50	0.5	-1.3	1.4	-0.1	-1.5	-1.1
	1267+01	Round	Standard	12	250	93	251	67	246	29	251	43	249	45	248	69	248	50	1.0	-4.5	0.7	-1.4	-2.8	-2.4
	1266+95	Round	Standard	12	256	93	257	67	254	29	258	43	256	45	255	69	256	50	0.8	-2.6	1.8	-0.3	-1.4	-0.3
	1266+89	Round	Standard	12	248	93	249	67	245	29	249	43	248	45	246	69	246	50	1.0	-2.9	1.2	-0.2	-2.5	-2.2
	1266+83	Round	Standard	12	248	93	249	67	246	29	249	43	247	45	245	69	246	50	0.8	-1.8	1.5	-0.9	-2.5	-1.9
	1266+16	Round	Standard	12	267	94	269	67	266	26	269	43	267	45	265	69	266	50	1.3	-1.0	1.8	-0.5	-2.0	-1.5
	1266+10	Round	Standard	12	265	94	266	67	262	26	266	43	265	45	263	69	264	50	1.0	-2.8	1.5	0.3	-1.5	-0.7
	1266+04	Round	Standard	12	275	94	279	67	275	26	278	43	277	45	277	69	276	50	4.3	-0.3	3.3	1.9	1.8	0.9
	1265+98	Round	Standard	12	260	94	261	67	257	26	262	43	260	45	258	69	258	50	1.3	-2.4	2.3	0.4	-1.4	-1.6
100	1265+92	Round	Standard	12	263	94	262	67	261	26	264	43	262	45	261	69	262	50	-0.5	-1.6	0.7	-0.9	-1.6	-0.9
1266+50	1265+86	Round	Standard	12	273	94	274	67	270	26	274	43	272	45	272	69	272	50	1.0	-2.3	1.6	-0.5	-1.0	-0.5
	1265+80	Round	Standard	12	273	94	274	67	269	26	273	43	272	45	269	69	270	50	1.5	-3.4	0.2	-0.5	-3.1	-2.5
	1265+74	Round	Standard	12	261	94	262	67	259	26	262	43	261	45	259	69	259	50	1.0	-2.6	1.3	-0.1	-2.4	-2.1
	1265+68	Round	Standard	12	257	94	261	67	258	26	262	43	260	45	258	69	258	50	4.6	1.1	5.0	3.2	1.2	1.2
	1265+62	Round	Standard	12	259	94	259	67	256	26	261	43	258	45	258	69	257	50	0.3	-2.7	2.2	-1.1	-1.3	-2.1

	1264+90	Elliptical	Medium	12	261	93	261	67	257	26	262	41	260	43	259	69	258	52	-0.3	-3.8	1.1	-1.1	-1.8	-3.1
	1264+84	Elliptical	Medium	12	273	93	274	67	271	26	275	41	272	43	271	69	271	52	1.0	-2.6	1.6	-1.3	-2.2	-2.3
	1264+78	Elliptical	Medium	12	266	93	269	67	265	26	269	41	267	43	266	69	266	52	3.0	-1.1	3.4	1.3	0.2	0.3
	1264+72	Elliptical	Medium	12	270	93	272	67	266	26	270	41	268	43	268	69	268	52	1.5	-4.2	0.3	-2.0	-2.4	-2.0
98	1264+66	Elliptical	Medium	12	275	93	277	67	273	26	277	41	275	43	274	69	275	52	1.3	-2.0	1.6	-0.3	-1.7	-0.3
1265+20	1264+60	Elliptical	Medium	12	264	93	265	67	263	26	266	41	265	43	263	69	264	52	1.0	-1.0	2.5	1.1	-1.1	0.1
	1264+54	Elliptical	Medium	12	273	93	272	67	270	26	273	41	272	43	271	69	271	52	-0.8	-3.2	0.5	-0.8	-2.0	-1.8
	1264+48	Elliptical	Medium	12	274	93	275	67	273	26	276	41	274	43	272	69	272	52	0.8	-1.2	2.0	-0.1	-1.8	-2.1
	1264+42	Elliptical	Medium	12	269	93	269	67	266	26	271	41	270	43	269	69	269	52	0.3	-3.5	1.8	0.8	-0.4	-0.2
	1264+36	Elliptical	Medium	12	268	93	269	67	266	26	269	41	269	43	267	69	257	52	0.8	-2.6	1.1	0.8	-0.8	-11.2
	1263+69	Round	Standard	18	275	95	277	66	272	27	277	41	275	43	275	69	273	52	1.5	-2.7	1.9	-0.1	-0.2	-2.1
	1263+63	Round	Standard	18	269	95	269	66	265	27	270	41	269	43	266	69	267	52	0.5	-4.0	1.5	0.0	-2.7	-2.0
	1263+57	Round	Standard	18	274	95	275	66	272	27	275	41	273	43	272	69	273	52	0.8	-2.0	1.0	-1.3	-1.8	-1.3
	1263+51	Round	Standard	18	265	95	268	66	261	27	266	41	265	43	263	69	264	52	3.3	-3.8	1.5	0.1	-1.9	-0.9
97	1263+45	Round	Standard	18	255	95	256	66	252	27	256	41	255	43	253	69	253	52	1.0	-2.2	1.5	0.5	-1.2	-1.5
1264+10	1263+39	Round	Standard	18	263	95	263	66	260	27	264	41	263	43	261	69	261	52	0.0	-3.0	0.9	-0.1	-2.4	-2.1
	1263+33	Round	Standard	18	271	95	273	66	268	27	272	41	271	43	269	69	270	52	1.5	-2.9	1.3	0.0	-1.8	-1.0
	1263+27	Round	Standard	18	257	95	257	66	255	27	258	41	256	43	252	69	256	52	0.3	-1.6	1.1	-0.5	-4.2	-0.5
	1263+21	Round	Standard	18	275	95	276	66	273	27	277	41	275	43	274	69	274	52	0.8	-2.2	2.3	-0.1	-0.6	-1.1
	1263+15	Round	Standard	18	276	95	276	66	273	27	277	41	275	43	274	69	275	52	0.0	-2.9	1.2	-0.6	-2.0	-0.6
	1262+44	Round	Standard	15	274	94	274	66	271	28	274	34	270	42	272	71	272	45	0.8	-2.7	0.8	-3.6	-1.6	-1.6
	1262+38	Round	Standard	15	260	94	260	66	257	28	260	34	258	42	257	71	258	45	0.3	-3.0	0.7	-1.6	-2.5	-1.6
	1262+32	Round	Standard	15	271	94	270	66	269	28	273	34	271	42	269	71	269	45	-0.8	-1.4	1.9	0.2	-1.6	-1.8
	1262+26	Round	Standard	15	250	94	250	66	240	28	252	34	250	42	249	71	249	45	0.3	-9.6	1.7	0.1	-1.1	-0.9
95	1262+20	Round	Standard	15	259	94	258	66	258	28	261	34	259	42	257	71	257	45	-0.8	-0.4	1.8	0.2	-2.2	-1.8
1262+80	1262+14	Round	Standard	15	274	94	274	66	272	28	276	34	273	42	273	71	273	45	0.5	-1.3	2.2	-0.8	-1.3	-0.8
	1262+08	Round	Standard	15	264	94	264	66	263	28	266	34	265	42	262	71	262	45	0.8	-1.1	2.5	1.3	-1.3	-1.7
	1262+02	Round	Standard	15	272	94	272	66	269	28	273	34	271	42	270	71	271	45	-0.3	-2.7	1.6	-0.8	-2.0	-0.8
	1261+96	Round	Standard	15	269	94	271	66	269	28	271	34	270	42	268	71	268	45	1.3	-0.7	1.4	0.5	-1.2	-1.5
	1261+90	Round	Standard	15	282	94	282	66	280	28	284	34	282	42	281	71	282	45	0.0	-2.9	1.5	-0.4	-1.6	-0.4
	1261+19	Elliptical	Medium	12	272	97	273	61	269	29	274	34	272	42	278	71	269	45	0.8	-2.9	1.2	-0.3	5.9	-3.3
	1261+13	Elliptical	Medium	12	286	97	287	61	283	29	288	34	286	42	285	71	285	45	1.0	-2.4	2.2	0.3	-0.3	-0.8
	1261+07	Elliptical	Medium	12	266	97	267	61	264	29	267	34	266	42	266	71	265	45	0.8	-1.8	1.1	-0.2	-0.4	-1.2
	1261+01	Elliptical	Medium	12	272	97	271	61	269	29	273	34	271	42	270	71	270	45	-0.5	-2.3	1.3	-0.8	-2.1	-1.8
93	1260+95	Elliptical	Medium	12	265	97	263	61	261	29	266	34	262	42	263	71	263	45	-1.5	-3.6	0.8	-2.9	-2.2	-1.9
1261+50	1260+89	Elliptical	Medium	12	264	97	266	61	262	29	267	34	264	42	263	71	265	45	1.8	-2.3	2.9	-0.4	-1.5	0.6
	1260+83	Elliptical	Medium	12	266	97	267	61	265	29	269	34	266	42	266	71	267	45	1.0	-1.8	2.2	-0.4	-0.1	0.6
	1260+77	Elliptical	Medium	12	267	97	266	61	265	29	269	34	267	42	265	71	265	45	-1.5	-3.0	1.4	-0.5	-2.2	-2.5
	1260+71	Elliptical	Medium	12	277	97	278	61	275	29	279	34	276	42	275	71	277	45	1.0	-2.6	1.7	-1.1	-1.8	-0.1
	1260+65	Elliptical	Medium	12	265	97	265	61	262	29	266	34	265	42	263	71	264	45	0.5	-2.7	1.3	0.1	-1.5	-0.9
	1256+87	Round	Standard	12	264	92	264	58	261	30	265	38	265	43	262	71	263	44	0.5	-2.7	1.4	1.1	-1.7	-0.9
	1256+81	Round	Standard	12	266	92	266	58	264	30	267	38	265	43	264	71	264	44	0.0	-2.2	1.0	-0.9	-1.7	-1.9
	1256+75	Round	Standard	12	273	92	273	58	271	30	274	38	274	43	270	71	270	44	0.0	-2.1	0.6	0.9	-3.1	-3.1
	1256+69	Round	Standard	12	277	92	277	58	274	30	277	38	276	43	275	71	275	44	0.5	-2.3	0.9	-0.6	-1.7	-1.6
91	1256+63	Round	Standard	12	277	92	279	58	274	30	280	38	278	43	276	71	277	44	1.5	-2.9	2.2	0.6	-1.9	-0.4
1260+20	1256+57	Round	Standard	12	275	92	276	58	273	30	277	38	276	43	273	71	272	44	0.8	-2.5	1.8	0.7	-2.2	-3.3
	1256+51	Round	Standard	12	261	92	261	58	259	30	262	38	261	43	259	71	260	44	0.3	-1.5	1.4	0.1	-1.5	-0.9
	1256+45	Round	Standard	12	292	92	292	58	290	30	292	38	291	43	290	71	291	44	0.0	-1.7	0.4	-0.6	-1.9	-0.6
	1256+39	Round	Standard	12	274	92	274	58	272	30	275	38	274	43	273	71	273	44	0.0	-1.9	0.9	-0.3	-1.0	-1.3
	1259+33	Round	Standard	12	281	92	255	58	279	30	282	38	281	43	279	71	279	44	-25.7	-1.7	1.8	0.3	-2.0	-1.7
	1256+88	Elliptical	Medium	12	240	84	240	68	239	29	241	38	240	43	238	71	240	44	0.0	-1.3	0.7	0.0	-2.0	0.0
	1256+82	Elliptical	Medium	12	250	84	250	68	247	29	250	38	249	43	249	71	248	44	-0.3	-3.0	-0.1	-1.4	-1.3	-2.4
	1256+76	Elliptical	Medium	12	237	84	237	68	236	29	237	38	239	43	236	71	236	44	0.3	-1.0	0.3	2.0	-1.1	-1.0
	1256+70	Elliptical	Medium	12	245	84	244	68	242	29	245	38	241	43	243	71	245	44	-0.8	-3.0	0.1	-3.6	-2.1	0.4
89	1256+64	Elliptical	Medium	12	237	84	237	68	236	29	238	38	237	43	236	71	237	44	-0.3	-2.0	0.5	-0.5	-1.7	-0.5
1257+20	1256+58	Elliptical	Medium	12	248	84	249	68	246	29	248	38	248	43	244	71	245	44	1.3	-2.0	0.4	0.3	-3.7	-2.7
	1256+52	Elliptical	Medium	12	242	84	245	68	241	29	243	38	243	43	241	71	239	44	3.6	-0.6	1.3	1.4	-0.8	-2.6
	1256+48	Elliptical	Medium	12	250	84	250	68	249	29	250	38	249	43	247	71	249	44	0.8	-0.3	0.5	-0.7	-2.9	-0.7
	1256+42	Elliptical	Medium	12	245	84	245	68	244	29	245	38	244	43	243	71	244	44	0.3	-1.1	0.1	-0.9	-1.8	-0.9
	1256+36	Elliptical	Medium	12	267	84	268	68	266	29	268	38	266	43	266	71	265	44	0.8	-0.6	0.8	-1.0	-1.0	-2.0
	1255+34	Elliptical	Medium	12	240	85	239	69	248	32	239	38	239	43	238	72	240	52	-0.5	8.7	-0.5	-0.8	-1.8	0.2
	1255+28	Elliptical	Medium	12	235	85	238	69	234	32	235	38	235	43	235	72	235	52	2.8	-1.0	0.5	0.1	-0.1	0.1
	1255+22	Elliptical	Medium	12	236	85	237	69	235	32	237	38	236	43	234	72	234	52	0.8	-0.7	0.9	0.0	-2.1	-2.0
	1255+16	Elliptical	Medium	12	246	85	248	69	246	32	247	38	247	43	246	72	247	52	1.5	-0.7	0.7	0.6	-0.5	0.6
87	1255+10	Elliptical	Medium	12	228	85	229	69	226	32	228	38	227	43	227	72	226	52	1.0	-1.8	-0.1	-1.1	-1.4	-2.1
1255+70	1255+04	Elliptical	Medium	12	239	85	239	69	238	32	240	38	239	43	237	72	238	52	0.5	-1.0	1.1	0.2	-2.2	-0.8
	1254+98	Elliptical	Medium	12	238	85	239	69	237	32	238	38	239	43	234	72	238	52	1.5	-0.3	0.5	1.3	-3.3	0.3
	1254+92	Elliptical	Medium	12	233	85	236	69	233	32	235	38	236	43	232	72	234	52	2.3	-0.1	1.2	2.6	-1.3	0.6
	1254+86	Elliptical	Medium	12	246	85	248	69	246	32	248	38	243	43	245	72	244	52	2.3	-0.4	2.2	-3.1	-1.0	-2.1
	1254+80	Elliptical	Medium	12	230	85	233	69	230	32	232	38	232	43	229	72	232	52	3.0	-0.1	1.4	1.6	-1.7	1.6
	1252+84	Elliptical	Medium	12	215	84	217	68	214	33	216	38	216	43	212	72	213	52	1.5	-1.3	0.9	0.6	-3.3	-2.4
	1252+78	Elliptical	Medium	12	234	84	236	68	233	33	235	38	236	43	233	72	234	52	2.8	-0.2	1.3	2.3	-0.9	0.3
	1252+72	Elliptical	Medium	12	237	84	238	68	235	33	237	38	235	43	234	72	235	52	1.5	-2.1	0.1	-1.7	-2.9	-1.7
	1252+66	Elliptical	Medium	12	238	84	239	68	237	33	238	38	237	43	237	72	237	52	0.5	-1.3	0.1	-1.0	-1.5	-1.0
85	1252+60	Elliptical	Medium	12	236	84	239	68	235	33	238	38	237	43	235	72	236	52	2.8	-1.5	1.7	0.5	-1.3	-0.5
1254+20	1252+54	Elliptical	Medium	12	237	84	238	68	235	33	238	38	237	43	237	72	235	52	0.8	-1.8	0.8	0.0	0.2	-2.0
	1253+48	Elliptical	Medium	12	237	84	239	68	237	33	239	38	239	43	238	72	235	52	1.0	-0.4	1.6	1.5	0.8	-2.5
	1253+42	Elliptical	Medium	12	245	84	247	68	244	33	245	38	244	43	243	72	245	52	2.0	-1.3	-0.2	-1.1	-2.3	-0.1
	1253+36	Elliptical	Medium	12	242	84	243	68	239	33	242	38	242	43	240	72	240	52	1.5	-2.2	0.4	0.4	-1.5	-1.6
	1253+30	Elliptical	Medium	12	256	84	256	68	252	33	255	38	255	43	253	72	253	52	0.0	-3.4	-0.4	-0.5	-2.3	-2.5

	1252+34	Elliptical	Heavy	18	254	82	254	67	251	34	255	40	253	46	251	72	251	44	0.3	-2.3	1.5	-0.7	-2.8	-2.7
	1252+28	Elliptical	Heavy	18	240	82	240	67	236	34	239	40	239	46	238	72	238	44	-0.5	-4.4	-0.9	-1.0	-2.2	-2.0
	1252+22	Elliptical	Heavy	18	258	82	258	67	255	34	260	40	258	46	255	72	255	44	0.3	-3.1	1.5	-0.1	-2.9	-3.1
	1252+16	Elliptical	Heavy	18	244	82	243	67	241	34	245	40	243	46	241	72	241	44	-0.5	-2.6	1.4	-0.6	-2.9	-2.6
83 1252+70	1252+10	Elliptical	Heavy	18	239	82	240	67	237	34	241	40	240	46	238	72	237	44	0.8	-2.6	1.8	0.7	-1.6	-2.3
	1252+04	Elliptical	Heavy	18	240	82	239	67	236	34	241	40	239	46	237	72	237	44	-0.8	-3.4	1.1	-0.5	-2.6	-2.5
	1251+98	Elliptical	Heavy	18	240	82	239	67	234	34	240	40	238	46	234	72	235	44	-0.8	-5.6	0.4	-1.5	-5.4	-4.5
	1251+92	Elliptical	Heavy	18	237	82	236	67	233	34	239	40	236	46	235	72	234	44	-1.0	-3.7	1.8	-0.7	-2.2	-2.7
	1251+86	Elliptical	Heavy	18	243	82	243	67	240	34	244	40	242	46	240	72	241	44	0.0	-2.8	0.5	-1.1	-2.9	-2.1
	1251+80	Elliptical	Heavy	18	245	82	245	67	241	34	246	40	245	46	243	72	243	44	0.3	-3.9	1.2	-0.1	-1.7	-2.1
	1250+84	Elliptical	Medium	12	249	84	249	69	246	34	250	40	249	46	245	72	209	44	0.0	-2.3	1.8	0.3	-3.4	-39.7
	1250+78	Elliptical	Medium	12	242	84	242	69	240	34	244	40	243	46	240	72	204	44	0.3	-1.6	2.0	0.9	-2.5	-38.1
	1250+72	Elliptical	Medium	12	235	84	235	69	230	34	236	40	234	46	231	72	195	44	0.0	-4.8	1.6	-0.7	-3.3	-39.7
	1250+66	Elliptical	Medium	12	244	84	243	69	240	34	243	40	242	46	239	72	203	44	-1.3	-4.1	-0.4	-1.8	-4.7	-40.8
81 1251+20	1250+60	Elliptical	Medium	12	234	84	237	69	234	34	236	40	234	46	232	72	196	44	2.3	-0.4	1.1	-0.4	-2.0	-38.4
	1250+54	Elliptical	Medium	12	236	84	242	69	237	34	240	40	236	46	237	72	201	44	5.1	0.5	3.3	-0.5	0.7	-35.5
	1250+48	Elliptical	Medium	12	253	84	254	69	250	34	256	40	255	46	250	72	213	44	0.8	-3.5	2.4	1.5	-3.7	-40.5
	1250+42	Elliptical	Medium	12	235	84	236	69	234	34	238	40	235	46	232	72	197	44	0.8	-1.9	2.1	-0.5	-3.7	-38.5
	1250+36	Elliptical	Medium	12	245	84	246	69	243	34	247	40	245	46	243	72	205	44	0.5	-2.1	1.9	-0.1	-1.9	-40.1
	1250+30	Elliptical	Medium	12	244	84	243	69	240	34	245	40	243	46	241	72	203	44	-1.0	-3.3	1.3	-0.6	-3.0	-40.6
	1249+34	Round	Standard	15	266	80	267	71	262	35	297	42	265	45	264	72	227	50	0.8	-4.0	31.4	-0.9	-2.0	-38.9
	1249+28	Round	Standard	15	278	80	278	71	276	35	279	42	277	45	276	72	238	50	0.8	-2.0	1.6	-0.6	-2.0	-39.6
	1249+22	Round	Standard	15	262	80	263	71	260	35	263	42	262	45	260	72	223	50	0.5	-1.8	1.2	-0.1	-2.3	-39.1
	1249+16	Round	Standard	15	257	80	258	71	254	35	259	42	258	45	255	72	219	50	1.0	-2.4	2.2	1.2	-1.6	-37.8
79 1249+70	1249+10	Round	Standard	15	273	80	274	71	271	35	275	42	274	45	271	72	235	50	0.8	-2.3	1.6	0.9	-2.0	-38.1
	1249+04	Round	Standard	15	270	80	272	71	269	35	272	42	270	45	268	72	232	50	1.8	-1.7	1.7	-0.3	-2.3	-38.3
	1248+98	Round	Standard	15	265	80	265	71	262	35	267	42	265	45	263	72	227	50	0.3	-2.9	1.4	-0.2	-2.2	-38.2
	1248+92	Round	Standard	15	271	80	272	71	269	35	273	42	271	45	269	72	232	50	1.0	-2.1	2.5	0.2	-1.6	-38.8
	1248+86	Round	Standard	15	273	80	273	71	270	35	274	42	273	45	271	72	234	50	0.0	-3.0	1.0	0.5	-1.9	-38.5
	1248+80	Round	Standard	15	266	80	267	71	264	35	268	42	266	45	265	72	228	50	0.8	-1.9	1.6	-0.2	-1.4	-38.2
	1247+35	Round	Standard	15	276	79	277	64	274	34	277	42	276	45	274	72	237	50	0.8	-2.1	1.5	0.2	-1.6	-38.8
	1247+29	Round	Standard	15	261	79	262	64	258	34	263	42	261	45	260	72	222	50	1.5	-3.0	2.5	0.1	-0.6	-38.9
	1247+23	Round	Standard	15	272	79	274	64	270	34	274	42	272	45	271	72	234	50	1.3	-2.7	1.9	-0.3	-1.1	-38.3
	1247+17	Round	Standard	15	269	79	269	64	266	34	271	42	268	45	267	72	230	50	0.3	-2.9	1.4	-1.2	-2.1	-39.2
77 1247+70	1247+11	Round	Standard	15	262	79	264	64	261	34	264	42	264	45	262	72	235	50	1.8	-1.6	1.8	1.6	-0.8	-27.4
	1247+05	Round	Standard	15	274	79	275	64	272	34	276	42	275	45	274	72	237	50	0.8	-1.6	2.4	0.9	0.0	-37.1
	1246+99	Round	Standard	15	269	79	271	64	267	34	271	42	269	45	268	72	231	50	1.8	-1.7	2.0	0.3	-0.8	-37.7
	1246+93	Round	Standard	15	260	79	259	64	255	34	259	42	256	45	255	72	220	50	-1.0	-4.7	-1.3	-4.1	-5.0	-40.1
	1246+87	Round	Standard	15	271	79	272	64	268	34	272	42	271	45	268	72	232	50	1.0	-2.7	1.2	0.0	-2.8	-39.0
	1246+81	Round	Standard	15	273	79	273	64	270	34	274	42	271	45	271	72	233	50	0.5	-3.1	1.5	-1.8	-2.2	-39.8
	1245+36	Elliptical	Heavy	18	247	69	247	69	246	34	248	48	248	52	244	71	208	43	0.3	-0.8	1.4	1.4	-2.2	-38.6
	1245+30	Elliptical	Heavy	18	251	69	253	69	249	34	253	48	251	52	249	71	211	43	1.8	-1.5	2.4	0.0	-1.6	-40.0
	1245+24	Elliptical	Heavy	18	237	69	238	69	234	34	239	48	237	52	235	71	198	43	0.8	-3.2	1.1	-0.5	-2.7	-39.5
	1245+18	Elliptical	Heavy	18	247	69	246	69	241	34	247	48	245	52	241	71	204	43	-0.8	-5.5	-0.2	-1.9	-6.0	-42.9
75 1245+70	1245+12	Elliptical	Heavy	18	231	69	232	69	228	34	233	48	230	52	228	71	191	43	0.3	-3.8	1.3	-1.4	-3.6	-40.4
	1245+06	Elliptical	Heavy	18	250	69	250	69	247	34	251	48	250	52	247	71	210	43	0.5	-2.9	1.0	0.1	-2.8	-39.9
	1245+00	Elliptical	Heavy	18	253	69	255	69	252	34	254	48	252	52	251	71	215	43	1.3	-1.0	1.1	-1.2	-2.2	-38.2
	1244+94	Elliptical	Heavy	18	255	69	256	69	253	34	257	48	254	52	253	71	216	43	0.8	-2.0	1.5	-1.0	-2.2	-39.0
	1244+88	Elliptical	Heavy	18	242	69	243	69	239	34	244	48	242	52	239	71	202	43	0.5	-3.3	1.8	-0.1	-2.9	-40.1
	1244+82	Elliptical	Heavy	18	242	69	241	69	237	34	241	48	239	52	238	71	200	43	-0.3	-4.2	-0.1	-2.6	-3.2	-41.6
	1243+87	Round	Standard	12	233	69	234	65	230	33	234	48	233	52	230	71	194	43	1.0	-2.5	1.5	0.3	-2.5	-38.7
	1243+81	Round	Standard	12	256	69	257	65	255	33	257	48	255	52	253	71	216	43	1.3	-1.2	1.3	-1.0	-3.2	-40.0
	1243+75	Round	Standard	12	246	69	245	65	242	33	245	48	246	52	244	71	206	43	-0.8	-3.7	-0.8	-0.1	-2.2	-40.1
	1243+69	Round	Standard	12	237	69	237	65	232	33	238	48	236	52	232	71	196	43	0.0	-5.3	0.4	-1.2	-5.1	-41.2
73 1244+20	1243+63	Round	Standard	12	229	69	238	65	234	33	238	48	237	52	233	71	197	43	8.9	5.4	9.3	8.1	3.9	-31.9
	1243+57	Round	Standard	12	249	69	230	65	227	33	230	48	227	52	227	71	190	43	-19.1	-21.7	-18.4	-21.7	-21.5	-58.7
	1243+51	Round	Standard	12	246	69	249	65	246	33	249	48	247	52	246	71	210	43	3.0	-0.1	2.9	0.6	-0.3	-36.4
	1243+45	Round	Standard	12	250	69	247	65	243	33	248	48	247	52	243	71	206	43	-2.8	-7.2	-2.3	-2.9	-7.0	-43.9
	1243+39	Round	Standard	12	249	69	251	65	249	33	251	48	249	52	247	71	211	43	2.3	0.2	2.8	0.3	-1.3	-37.7
	1243+33	Round	Standard	12			250	65	245	33	251	48	249	52	247	71	211	43						
	1242+39	Round	Standard	12	241	71	240	67	238	32	241	48	240	48	237	71	199	44	-0.3	-2.7	0.7	-0.5	-3.9	-41.5
	1242+33	Round	Standard	12	250	71	251	67	247	32	252	48	248	48	247	71	209	44	0.8	-3.5	1.4	-2.2	-3.3	-41.2
	1242+27	Round	Standard	12	247	71	248	67	244	32	249	48	246	48	245	71	209	44	1.5	-2.8	1.8	-0.9	-2.0	-37.9
	1242+21	Round	Standard	12	240	71	241	67	236	32	242	48	237	48	237	71	200	44	1.0	-3.6	1.6	-3.0	-2.9	-40.0
71 1242+70	1242+15	Round	Standard	12	249	71	250	67	247	32	250	48	249	48	247	71	211	44	0.3	-2.1	1.0	-0.4	-2.8	-38.4
	1242+09	Round	Standard	12	239	71	239	67	236	32	240	48	238	48	236	71	199	44	0.5	-2.5	1.4	-0.5	-2.3	-39.5
	1242+03	Round	Standard	12	260	71	260	67	258	32	261	48	257	48	256	71	220	44	-0.5	-2.0	0.8	-3.4	-4.8	-40.4
	1241+97	Round	Standard	12	243	71	244	67	241	32	244	48	242	48	239	71	205	44	0.8	-2.5	0.3	-1.3	-4.6	-38.3
	1241+91	Round	Standard	12	241	71	242	67	239	32	243	48	239	48	239	71	201	44	0.5	-2.4	1.3	-2.3	-2.2	-40.3
	1241+85	Round	Standard	12	250	71	251	67	248	32	252	48	246	48	249	71	211	44	0.8	-1.8	1.9	-3.9	-1.2	-38.9
	1240+89	Round	Standard	12	249	70	249	65	246	34	249	48	247	48	246	71	210	44	-0.5	-2.8	0.2	-2.2	-3.0	-39.2
	1240+83	Round	Standard	12	246	70	247	65	243	34	248	48	245	48	243	71	206	44	0.5	-3.3	1.5	-1.1	-3.3	-40.1
	1240+77	Round	Standard	12	241	70	242	65	239	34	243	48	239	48	237	71	201	44	1.0	-1.9	1.4	-2.3	-4.2	-40.3
	1240+71	Round	Standard	12	237	70	238	65	237	34	239	48	235	48	235	71	199	44	0.3	-0.3	1.1	-2.5	-2.3	-38.5
69 1241+20	1240+65	Round	Standard	12	246	70	247	65	244	34	247	48	244	48	242	71	206	44	1.0	-1.9	0.8	-1.9	-3.8	-39.9
	1240+59	Round	Standard	12	238	70	238	65	235	34	239	48	238	48	235	71	200	44	0.5	-2.7	0.9	0.3	-2.6	-37.7
	1240+53	Round	Standard	12	248	70	247	65	241	34	246	48	244	48	240	71	205	44	-0.8	-6.7	-1.5	-3.9	-7.8	-42.9
	1240+47	Round	Standard	12	233	70	234	65	232	34	235	48	230	48	231	71	195	44	0.8	-1.9	1.4	-3.4	-2.6	-38.4
	1240+41	Round	Standard	12	239	70	240	65	238	34	241	48	237	48	234	71	202	44	1.3	-0.5	1.8	-1.8	-4.6	-36.8
	1240+35	Round	Standard	12	249	70	249	65	245	34	250	48	246	48	245	71	208	44	0.0	-4.6	0.3	-3.4	-4.7	-41.4

67 1239+70	1239+38	Elliptical	Heavy	18	239	61	239	66	238	31	239	52	237	48	237	71	201	45	-0.3	-1.5	0.3	-2.0	-2.0	-38.0
	1239+32	Elliptical	Heavy	18	226	61	226	66	225	31	226	52	226	48	224	71	188	45	-0.3	-1.2	0.6	0.2	-1.4	-37.8
	1239+26	Elliptical	Heavy	18	218	61	218	66	217	31	218	52	217	48	216	71	180	45	0.0	-1.6	0.0	-1.2	-1.7	-38.2
	1239+20	Elliptical	Heavy	18	248	61	249	66	244	31	247	52	246	48	244	71	209	45	0.8	-3.8	-0.7	-2.2	-4.6	-39.2
	1239+14	Elliptical	Heavy	18	237	61	237	66	236	31	238	52	235	48	234	71	299	45	0.3	-0.8	1.4	-2.0	-2.8	62.0
	1239+08	Elliptical	Heavy	18	212	61	212	66	209	31	213	52	211	48	210	71	175	45	0.0	-2.6	1.1	-1.1	-2.0	-37.1
	1239+02	Elliptical	Heavy	18	227	61	226	66	225	31	226	52	224	48	224	71	188	45	-0.3	-1.6	-0.4	-2.6	-2.8	-38.6
	1238+96	Elliptical	Heavy	18	231	61	231	66	230	31	233	52	230	48	225	71	194	45	0.5	-1.0	1.9	-0.9	-5.9	-36.9
	1238+90	Elliptical	Heavy	18	245	61	245	66	244	31	246	52	244	48	243	71	207	45	0.5	-1.0	1.1	-0.9	-1.9	-37.9
	1238+84	Elliptical	Heavy	18	249	61	248	66	247	31	249	52	246	48	247	71	211	45	-1.0	-1.7	-0.1	-2.7	-1.6	-37.7
65 1238+20	1237+84	Elliptical	Heavy	18	276	58	277	65	273	34	277	52	273	48	274	71	237	45	1.0	-2.5	1.6	-2.8	-1.7	-38.8
	1237+78	Elliptical	Heavy	18	263	58	264	65	261	34	265	52	260	48	260	71	224	45	1.3	-1.2	1.9	-2.6	-2.4	-38.6
	1237+72	Elliptical	Heavy	18	274	58	275	65	274	34	276	52	274	48	274	71	236	45	0.8	-0.3	1.7	-0.3	-0.2	-38.3
	1237+66	Elliptical	Heavy	18	280	58	280	65	277	34	280	52	277	48	276	71	240	45	0.0	-3.5	-0.3	-3.2	-4.1	-40.2
	1237+60	Elliptical	Heavy	18	265	58	265	65	262	34	266	52	263	48	262	71	225	45	0.0	-2.6	0.9	-1.7	-2.8	-39.7
	1237+54	Elliptical	Heavy	18	268	58	269	65	266	34	270	52	267	48	266	71	230	45	0.8	-2.7	1.4	-1.2	-1.9	-38.2
	1237+48	Elliptical	Heavy	18	286	58	286	65	283	34	287	52	284	48	284	71	245	45	0.3	-2.6	1.5	-1.8	-1.8	-40.8
	1237+42	Elliptical	Heavy	18	286	58	285	65	284	34	287	52	285	48	284	71	246	45	-0.3	-1.3	1.0	-0.8	-2.1	-39.8
	1237+36	Elliptical	Heavy	18	281	58	281	65	279	34	282	52	280	48	278	71	241	45	0.3	-2.0	0.8	-1.2	-3.0	-40.2
	1237+30	Elliptical	Heavy	18	274	58	273	65	271	34	274	52	271	48	271	71	233	45	-0.8	-2.8	-0.3	-3.1	-3.0	-41.1
63 1233+70	1233+37	Elliptical	Heavy	15	264	60	266	65	255	34	265	51	262	48	262	72	225	43	1.8	-8.4	0.9	-1.9	-2.0	-38.9
	1233+31	Elliptical	Heavy	15	279	60	278	65	276	34	278	51	277	48	276	72	239	43	-1.0	-2.9	-0.4	-1.9	-3.2	-39.9
	1233+25	Elliptical	Heavy	15	282	60	281	65	280	34	283	51	279	48	280	72	242	43	-1.3	-1.6	1.5	-2.9	-2.2	-39.9
	1233+19	Elliptical	Heavy	15	264	60	263	65	261	34	265	51	262	48	262	72	224	43	-1.3	-2.9	0.1	-2.4	-2.9	-40.4
	1233+13	Elliptical	Heavy	15	276	60	275	65	272	34	277	51	274	48	275	72	237	43	-0.8	-3.5	1.8	-1.6	-0.8	-38.6
	1233+07	Elliptical	Heavy	15	287	60	286	65	284	34	287	51	283	48	283	72	246	43	-1.3	-3.1	-0.1	-4.3	-4.4	-41.3
	1233+01	Elliptical	Heavy	15	276	60	276	65	273	34	277	51	270	48	275	72	237	43	-0.8	-3.0	0.4	-6.4	-1.5	-39.4
	1232+95	Elliptical	Heavy	15	272	60	272	65	270	34	272	51	270	48	271	72	232	43	0.5	-1.6	0.5	-1.5	-0.9	-39.5
	1232+89	Elliptical	Heavy	15	269	60	268	65	268	34	271	51	267	48	266	72	230	43	-1.8	-1.9	1.1	-2.5	-3.5	-39.5
	1232+83	Elliptical	Heavy	15	259	60	257	65	265	34	259	51	255	48	256	72	219	43	-2.5	6.0	0.1	-4.1	-2.8	-40.1
61 1232+20	1231+87	Elliptical	Heavy	15	283	60	282	65	280	34	282	51	279	48	280	72	243	43	-1.0	-3.0	-0.5	-3.7	-3.0	-39.7
	1231+81	Elliptical	Heavy	15	280	60	277	65	276	34	280	51	278	48	278	72	240	43	-2.3	-3.2	0.2	-1.7	-1.9	-39.7
	1231+75	Elliptical	Heavy	15	270	60	271	65	269	34	271	51	269	48	269	72	231	43	0.8	-1.7	0.4	-1.3	-1.5	-39.3
	1231+69	Elliptical	Heavy	15	264	60	264	65	262	34	265	51	262	48	261	72	225	43	-0.8	-2.1	0.2	-2.4	-3.1	-39.4
	1231+63	Elliptical	Heavy	15	277	60	276	65	275	34	278	51	275	48	275	72	238	43	-1.0	-2.2	0.7	-2.1	-2.4	-39.1
	1231+57	Elliptical	Heavy	15	248	60	249	65	247	34	250	51	247	48	245	72	211	43	0.8	-1.0	1.8	-0.9	-3.0	-36.9
	1231+51	Elliptical	Heavy	15	238	60	239	65	237	34	239	51	233	48	236	72	201	43	0.5	-1.0	0.4	-5.3	-1.8	-37.3
	1231+45	Elliptical	Heavy	15	251	60	253	65	249	34	252	51	248	48	250	72	213	43	1.5	-2.0	0.5	-3.5	-1.2	-38.5
	1231+39	Elliptical	Heavy	15	251	60	251	65	247	34	251	51	249	48	250	72	212	43	-0.3	-4.4	-0.2	-2.5	-1.7	-39.5
	1231+33	Elliptical	Heavy	15	248	60	247	65	246	34	248	51	245	48	246	72	209	43	-0.5	-1.8	0.1	-2.7	-1.8	-38.7
59 1230+70	1230+36	Elliptical	Heavy	15	243	65	242	65	241	36	244	53	241	48	242	70	204	46	-0.3	-1.6	1.1	-1.6	-0.8	-38.6
	1230+30	Elliptical	Heavy	15	250	65	248	65	247	36	249	53	247	48	248	70	211	46	-1.5	-3.3	-0.5	-2.9	-2.4	-38.9
	1230+24	Elliptical	Heavy	15	245	65	245	65	244	36	246	53	243	48	244	70	206	46	0.3	-1.6	1.2	-2.1	-1.5	-39.1
	1230+18	Elliptical	Heavy	15	244	65	245	65	240	36	244	53	243	48	243	70	206	46	0.8	-4.2	-0.2	-1.3	-1.5	-38.3
	1230+12	Elliptical	Heavy	15	247	65	247	65	245	36	247	53	243	48	246	70	210	46	0.8	-1.3	0.8	-3.6	-0.6	-36.6
	1230+06	Elliptical	Heavy	15	229	65	229	65	229	36	229	53	225	48	226	70	190	46	-0.3	-0.2	-0.7	-4.4	-3.0	-39.4
	1230+00	Elliptical	Heavy	15	241	65	241	65	238	36	241	53	236	48	238	70	202	46	-0.3	-2.7	-0.2	-4.8	-2.4	-38.8
	1229+94	Elliptical	Heavy	15	236	65	234	65	237	36	236	53	234	48	232	70	197	46	-1.5	1.5	-0.3	-2.0	-4.0	-39.0
	1229+88	Elliptical	Heavy	15	257	65	256	65	255	36	258	53	255	48	256	70	220	46	-0.3	-1.2	1.0	-1.5	-1.0	-36.5
	1229+82	Elliptical	Heavy	15	242	65	243	65	240	36	242	53	244	48	240	70	204	46	1.0	-1.5	0.3	2.2	-1.5	-37.8
57 1229+20	1228+85	Elliptical	Heavy	18	237	70	239	66	236	34	238	53	237	48	237	70	200	46	1.0	-1.0	0.0	-0.5	-0.3	-37.5
	1228+79	Elliptical	Heavy	18	233	70	232	66	232	34	233	53	230	48	231	70	195	46	-0.5	-1.1	-0.3	-2.9	-1.8	-37.9
	1228+73	Elliptical	Heavy	18	257	70	256	66	253	34	257	53	253	48	256	70	219	46	-1.0	-4.0	-0.3	-4.0	-0.8	-38.0
	1228+67	Elliptical	Heavy	18	233	70	235	66	234	34	234	53	233	48	231	70	196	46	2.5	0.8	1.7	0.3	-1.5	-36.7
	1225+61	Elliptical	Heavy	18	259	70	N/A		255	34	256	53	253	48	254	70	219	46		-3.9	-2.1	-5.6	-4.4	-39.6
	1228+55	Elliptical	Heavy	18	228	70	N/A		227	34	228	53	226	48	226	70	190	46		-0.6	0.9	-1.6	-1.5	-37.6
	1228+49	Elliptical	Heavy	18	241	70	242	66	240	34	242	53	239	48	238	70	204	46	1.0	-1.0	0.9	-1.8	-2.4	-36.8
	1228+43	Elliptical	Heavy	18	241	70	241	66	239	34	240	53	238	48	238	70	202	46	0.5	-1.7	-1.1	-2.8	-3.0	-38.8
	1228+37	Elliptical	Heavy	18	256	70	258	66	254	34	256	53	253	48	253	70	217	46	2.8	-1.7	0.2	-2.5	-2.1	-38.5
	1228+31	Elliptical	Heavy	18	240	70	241	66	238	34	240	53	238	48	238	70	202	46	1.0	-1.9	0.3	-2.0	-1.8	-38.0
55 1227+70	1227+35	Elliptical	Heavy	12	241	65	240	65	239	40	242	53	240	55	239	72	203	56	-1.3	-2.7	0.3	-1.3	-1.9	-38.3
	1227+29	Elliptical	Heavy	12	251	65	250	65	250	40	251	53	249	55	249	72	212	56	-1.0	-0.4	0.5	-1.7	-2.1	-38.7
	1227+23	Elliptical	Heavy	12	239	65	241	65	240	40	240	53	238	55	239	72	203	56	1.5	0.8	1.0	-1.0	-0.2	-36.0
	1227+17	Elliptical	Heavy	12	256	65	254	65	253	40	255	53	253	55	252	72	216	56	-1.8	-2.7	-0.7	-2.5	-3.4	-39.5
	1227+11	Elliptical	Heavy	12	241	65	241	65	239	40	241	53	242	55	241	72	203	56	0.0	-1.8	0.6	1.5	0.0	-37.5
	1227+05	Elliptical	Heavy	12	252	65	252	65	250	40	253	53	251	55	251	72	216	56	0.5	-1.3	1.1	-0.7	-0.7	-35.7
	1226+99	Elliptical	Heavy	12	243	65	242	65	237	40	242	53	241	55	240	72	204	56	-0.8	-6.1	-1.2	-1.8	-2.7	-38.8
	1226+93	Elliptical	Heavy	12	244	65	244	65	244	40	244	53	241	55	243	72	206	56	-0.3	0.2	0.5	-2.8	-0.4	-37.8
	1226+87	Elliptical	Heavy	12	242	65	244	65	240	40	242	53	240	55	241	72	204	56	1.8	-1.7	-0.2	-2.1	-0.9	-38.1
	1226+81	Elliptical	Heavy	12	258	65	259	65	257	40	258	53	256	55	256	72	220	56	1.3	-0.6	0.1	-1.6	-1.7	-37.6
53 1226+20	1225+85	Elliptical	Heavy	18	233	68	233	65	231	41	233	53	230	55	232	72	194	56	0.0	-2.5	0.0	-3.4	-1.1	-39.4
	1225+79	Elliptical	Heavy	18	247	68	248	65	246	41	249	53	226	55	247	72	210	56	1.0	-0.6	1.7	-20.9	0.0	-36.9
	1225+73	Elliptical	Heavy	18	247	68	247	65	245	41	247	53	244	55	245	72	208	56	0.0	-1.8	-0.5	-3.1	-2.1	-39.1
	1225+67	Elliptical	Heavy	18	232	68	233	65	232	41	233	53	232	55	234	72	195	56	0.8	-0.5	0.5	-0.4	1.7	-37.4
	1225+61	Elliptical	Heavy	18	258	68	257	65	254	41	257	53	256	55	254	72	219	56	-0.8	-3.7	-0.9	-1.6	-3.3	-38.6
	1225+55	Elliptical	Heavy	18	235	68	235	65	234	41	235	53	232	55	231	72	196	56	0.0	-1.6	-0.2	-3.2	-4.4	-39.2
	1225+49	Elliptical	Heavy	18	220	68	220	65	217	41	219	53	218	55	219	72	182	56	0.8	-2.3	-0.8	-1.7	-0.5	-37.7
	1225+43	Elliptical	Heavy	18	239	68	239	65	236	41	239	53	235	55	238	72	200	56	0.0	-2.8	0.4	-3.5	-0.9	-38.5
	1225+37	Elliptical	Heavy	18	255	68	255	65	256	41	256	53	253	55	253	72	218	56	0.3	1.1	1.8	-1.5	-1.8	-36.5
	1225+31	Elliptical	Heavy	18	244	68	244	65	244	41	245	53	223	55	241	72	207	56	0.0	-0.6	1.2	-21.1	-2.6	-37.1

	1224+25	Elliptical	Heavy	12	242	68	242	65	240	41	242	56	239	54	241	74	204	50	0.3	-1.6	0.2	-2.8	-0.3	-37.8
	1224+19	Elliptical	Heavy	12	236	68	236	65	235	41	236	56	234	54	236	74	197	50	0.5	-1.1	0.5	-2.0	-0.2	-39.0
	1224+13	Elliptical	Heavy	12	241	68	241	65	240	41	241	56	239	54	236	74	203	50	-0.5	-1.4	-0.4	-2.0	-5.2	-38.0
	1224+07	Elliptical	Heavy	12	246	68	247	65	246	41	247	56	245	54	244	74	209	50	1.0	-0.8	0.2	-1.4	-2.1	-37.4
51	1224+01	Elliptical	Heavy	12	247	68	247	65	245	41	247	56	246	54	244	74	209	50	0.5	-1.8	-0.2	-0.9	-2.5	-37.9
1224+70	1223+95	Elliptical	Heavy	12	246	68	246	65	244	41	245	56	244	54	245	74	207	50	0.3	-1.7	-0.4	-1.6	-0.9	-38.6
	1223+89	Elliptical	Heavy	12	260	68	259	65	258	41	259	56	258	54	258	74	223	50	-1.3	-2.2	-0.7	-1.8	-1.6	-36.8
	1223+83	Elliptical	Heavy	12	252	68	253	65	247	41	251	56	248	54	248	74	212	50	1.5	-5.0	-1.3	-4.0	-4.2	-40.0
	1223+77	Elliptical	Heavy	12	236	68	236	65	232	41	235	56	234	54	234	74	199	50	0.0	-4.6	-0.8	-2.2	-1.9	-37.2
	1223+71	Elliptical	Heavy	12	257	68	259	65	256	41	257	56	255	54	257	74	220	50	2.0	-0.7	-0.1	-1.8	-0.1	-36.8
	1222+85	Elliptical	Heavy	15	254	72	255	65	252	43	255	56	251	54	253	74	215	50	0.5	-2.5	0.3	-3.3	-1.2	-39.3
	1222+79	Elliptical	Heavy	15	251	72	251	65	251	43	252	56	251	54	251	74	214	50	0.3	-0.4	1.2	-0.2	-0.1	-37.2
	1222+73	Elliptical	Heavy	15	239	72	239	65	238	43	239	56	233	54	237	74	200	50	0.3	-1.4	-0.5	-6.0	-2.1	-39.0
	1222+67	Elliptical	Heavy	15	228	72	229	65	228	43	229	56	227	54	228	74	191	50	0.8	-0.3	0.6	-1.1	-0.1	-37.1
49	1222+61	Elliptical	Heavy	15	241	72	243	65	240	43	242	56	241	54	241	74	204	50	2.0	-1.3	1.4	0.0	0.1	-37.0
1223+20	1222+55	Elliptical	Heavy	15	246	72	248	65	245	43	247	56	244	54	246	74	209	50	1.8	-1.1	0.7	-2.4	0.0	-37.4
	1222+49	Elliptical	Heavy	15	245	72	246	65	243	43	245	56	243	54	243	74	207	50	0.8	-1.8	-0.5	-2.1	-1.7	-38.1
	1222+43	Elliptical	Heavy	15	236	72	236	65	236	43	237	56	235	54	234	74	199	50	-0.3	-0.3	0.4	-1.5	-2.4	-37.5
	1222+37	Elliptical	Heavy	15	213	72	214	65	213	43	214	56	213	54	213	74	178	50	1.3	0.1	0.4	-0.1	-0.5	-35.1
	1222+31	Elliptical	Heavy	15	253	72	252	65	249	43	253	56	252	54	247	74	216	50	-1.8	-5.0	-0.2	-1.5	-6.8	-37.5
		Elliptical	Medium	12																				
		Elliptical	Medium	12																				
		Elliptical	Medium	12																				
		Elliptical	Medium	12																				
47		Elliptical	Medium	12																				
1220+20		Elliptical	Medium	12																				
		Elliptical	Medium	12																				
		Elliptical	Medium	12																				
		Elliptical	Medium	12																				
		Elliptical	Medium	12																				
		Elliptical	Medium	18																				
		Elliptical	Medium	18																				
		Elliptical	Medium	18																				
		Elliptical	Medium	18																				
45		Elliptical	Medium	18																				
1218+70		Elliptical	Medium	18																				
		Elliptical	Medium	18																				
		Elliptical	Medium	18																				
		Elliptical	Medium	18																				
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		Elliptical	Medium	18																				
		Elliptical	Medium	18																				
		Elliptical	Medium	18																				
43		Elliptical	Medium	18																				
1217+20		Elliptical	Medium	18																				
		Elliptical	Medium	18																				
		Elliptical	Medium	18																				
		Elliptical	Medium	18																				
		Elliptical	Medium	18																				
	1215+40	Elliptical	Medium	18	268	73	267	64	265	35	267	53	268	61	267	74	264	49	-0.5	-2.3	-0.5	0.3	-1.1	-3.7
	1215+34	Elliptical	Medium	18	278	73	277	64	276	35	277	53	277	61	276	74	275	49	-1.0	-2.1	-0.2	-0.6	-2.1	-2.6
	1215+28	Elliptical	Medium	18	265	73	264	64	262	35	265	53	262	61	263	74	262	49	-0.3	-3.0	-0.1	-2.7	-2.2	-2.7
	1215+22	Elliptical	Medium	18	274	73	274	64	269	35	273	53	271	61	272	74	271	49	0.8	-4.3	-0.5	-2.6	-1.7	-2.6
41	1215+16	Elliptical	Medium	18	267	73	266	64	264	35	266	53	265	61	263	74	264	49	-0.5	-2.3	-0.6	-1.7	-3.9	-2.7
1215+70	1215+10	Elliptical	Medium	18	271	73	272	64	269	35	270	53	270	61	270	74	269	49	0.3	-2.4	-0.9	-1.3	-1.4	-2.3
	1215+04	Elliptical	Medium	18	274	73	275	64	272	35	274	53	272	61	271	74	271	49	0.5	-1.7	-0.5	-2.1	-2.6	-3.1
	1214+98	Elliptical	Medium	18	281	73	280	64	279	35	279	53	278	61	277	74	277	49	-1.0	-2.3	-1.6	-2.9	-3.6	-3.9
	1214+92	Elliptical	Medium	18	272	73	272	64	270	35	272	53	268	61	269	74	268	49	0.5	-1.5	0.2	-3.8	-3.3	-3.8
	1214+86	Elliptical	Medium	18	262	73	262	64	258	35	262	53	261	61	260	74	259	49	-0.3	-3.9	-0.2	-1.1	-2.4	-3.1
	1213+89	Elliptical	Medium	15	254	73	256	66	251	38	254	50	252	51	251	73	250	59	1.5	-3.3	-0.1	-2.3	-3.4	-4.3
	1213+83	Elliptical	Medium	15	273	73	274	66	272	38	275	50	273	51	272	73	272	59	1.3	-0.7	1.5	-0.1	-1.3	-1.1
	1213+77	Elliptical	Medium	15	275	73	275	66	274	38	275	50	274	51	274	73	272	59	-0.3	-1.4	0.2	-1.1	-1.1	-3.1
	1213+71	Elliptical	Medium	15	268	73	268	66	264	38	267	50	267	51	265	73	265	59	-0.3	-3.6	-0.5	-1.0	-2.9	-3.0
39	1213+65	Elliptical	Medium	15	274	73	275	66	271	38	272	50	271	51	271	73	270	59	0.5	-2.7	-1.8	-3.1	-2.6	-4.1
1214+20	1213+59	Elliptical	Medium	15	256	73	256	66	254	38	255	50	254	51	253	73	253	59	0.0	-2.3	-1.1	-2.0	-3.1	-3.0
	1213+53	Elliptical	Medium	15	278	73	277	66	275	38	277	50	275	51	274	73	275	59	-1.0	-3.1	-0.7	-3.1	-4.1	-3.1
	1213+47	Elliptical	Medium	15	275	73	275	66	276	38	274	50	274	51	273	73	271	59	0.3	0.4	-0.6	-1.1	-1.9	-4.1
	1213+41	Elliptical	Medium	15	272	73	271	66	269	38	271	50	269	51	268	73	269	59	-0.5	-2.4	-0.2	-2.5	-3.4	-2.5
	1213+35	Elliptical	Medium	15	269	73	268	66	267	38	268	50	267	51	267	73	271	59	-0.8	-1.8	-0.5	-1.7	-2.1	2.3
	1211+39	Elliptical	Heavy	15	276	77	276	66	275	38	277	50	276	51	276	73	274	59	0.0	-1.8	0.7	-0.4	-0.8	-2.4
	1211+33	Elliptical	Heavy	15	285	77	285	66	283	38	285	50	283	51	283	73	282	59	0.0	-2.8	-0.5	-2.5	-2.6	-3.5
	1211+27	Elliptical	Heavy	15	265	77	266	66	262	38	266	50	264	51	263	73	262	59	0.8	-3.2	0.5	-1.4	-2.4	-3.4
	1211+21	Elliptical	Heavy	15	275	77	276	66	273	38	275	50	273	51	272	73	272	59	0.5	-2.6	-0.1	-2.3	-2.9	-3.3
37	1211+15	Elliptical	Heavy	15	261	77	261	66	258	38	261	50	259	51	260	73	259	59	0.8	-2.6	0.2	-1.6	-0.7	-1.6
1211+70	1211+09	Elliptical	Heavy	15	275	77	274	66	271	38	274	50	271	51	272	73	270	59	-0.5	-3.8	-1.2	-3.8	-3.3	-4.8
	1211+03	Elliptical	Heavy	15	263	77	262	66	260	38	263	50	261	51	261	73	260	59	-0.3	-2.7	-0.1	-1.6	-1.3	-2.6
	1210+97	Elliptical	Heavy	15	269	77	269	66	268	38	269	50	267	51	268	73	267	59	0.0	-1.0	0.2	-2.2	-1.6	-2.2
	1210+91	Elliptical	Heavy	15	275	77	274	66	273	38	274	50	274	51	271	73	272	59	-1.0	-1.8	-1.1	-1.1	-4.2	-3.1
	1210+85	Elliptical	Heavy	15	264	77	263	66	262	38	264	50	263	51	260	73	262	59	-1.0	-2.1	-0.4	-1.4	-4.0	-2.4

35 1210+20	1209+86	Elliptical	Medium	15	272	79	273	65	269	40	272	54	271	60	270	70	268	51	1.0	-3.3	-0.5	-1.3	-2.8	-4.3
	1209+80	Elliptical	Medium	15	279	79	280	65	277	40	278	54	278	60	277	70	275	51	0.5	-2.5	-1.8	-1.4	-2.6	-4.4
	1209+74	Elliptical	Medium	15	267	79	267	65	265	40	267	54	266	60	263	70	263	51	-0.3	-2.3	-0.6	-1.2	-4.3	-4.2
	1209+68	Elliptical	Medium	15	268	79	269	65	266	40	268	54	266	60	267	70	265	51	1.8	-1.7	-0.1	-1.7	-1.0	-2.7
	1209+62	Elliptical	Medium	15	273	79	272	65	270	40	273	54	273	60	269	70	270	51	-0.5	-3.0	0.3	0.2	-3.3	-2.8
	1209+56	Elliptical	Medium	15	268	79	268	65	265	40	267	54	265	60	265	70	264	51	-0.5	-3.4	-1.0	-3.2	-3.2	-4.2
	1209+50	Elliptical	Medium	15	280	79	278	65	278	40	279	54	278	60	277	70	276	51	-2.0	-1.9	-1.3	-2.2	-3.3	-4.2
	1209+44	Elliptical	Medium	15	264	79	263	65	263	40	264	54	263	60	262	70	261	51	-1.0	-1.6	-0.7	-1.2	-2.6	-3.2
	1209+38	Elliptical	Medium	15	257	79	255	65	254	40	255	54	254	60	253	70	253	51	-1.5	-2.7	-1.4	-2.5	-3.8	-3.5
	1209+32	Elliptical	Medium	15	276	79	275	65	273	40	275	54	273	60	273	70	273	51	-1.8	-3.7	-1.0	-3.4	-3.2	-3.4
33 1207+20	1206+85	Elliptical	Medium	15	264	80	264	64	262	39	264	54	262	60	262	70	261	51	0.0	-1.7	-0.2	-1.9	-2.4	-2.9
	1206+79	Elliptical	Medium	15	281	80	280	64	278	39	281	54	278	60	279	70	277	51	-1.0	-2.8	-0.6	-3.2	-2.7	-4.2
	1206+73	Elliptical	Medium	15	280	80	279	64	278	39	279	54	273	60	278	70	278	51	-1.0	-2.4	-0.6	-6.9	-2.1	-1.9
	1206+67	Elliptical	Medium	15	274	80	273	64	271	39	279	54	269	60	269	70	269	51	-1.0	-2.6	5.7	-4.6	-4.4	-4.6
	1206+61	Elliptical	Medium	15	251	80	251	64	250	39	272	54	251	60	250	70	249	51	-0.3	-1.2	20.9	-0.2	-1.7	-2.2
	1206+55	Elliptical	Medium	15	266	80	267	64	263	39	252	54	264	60	263	70	264	51	0.5	-3.1	-14.4	-2.2	-3.1	-2.2
	1206+49	Elliptical	Medium	15	268	80	267	64	266	39	266	54	267	60	263	70	265	51	-0.8	-2.0	-1.7	-0.7	-4.8	-2.7
	1206+43	Elliptical	Medium	15	261	80	260	64	258	39	267	54	260	60	257	70	258	51	-0.5	-2.7	5.7	-0.9	-3.9	-2.9
	1206+37	Elliptical	Medium	15	262	80	263	64	260	39	260	54	261	60	258	70	259	51	0.5	-2.2	-1.7	-1.1	-3.7	-3.1
	1206+31	Elliptical	Medium	15	275	80	275	64	274	39	261	54	274	60	273	70	272	51	-0.5	-1.5	-14.5	-1.3	-1.9	-3.3
31 1205+70	1205+39	Elliptical	Heavy	15	271	85	271	65	270	40	270	58	270	54	268	71	267	50	-0.3	-1.0	-0.5	-0.8	-3.0	-3.8
	1205+33	Elliptical	Heavy	15	277	85	277	65	276	40	277	58	277	54	274	71	275	50	-0.3	-1.1	0.1	0.1	-2.8	-1.9
	1205+27	Elliptical	Heavy	15	274	85	274	65	271	40	274	58	274	54	272	71	272	50	-0.8	-3.0	0.0	-0.3	-2.3	-2.3
	1205+21	Elliptical	Heavy	15	263	85	262	65	260	40	261	58	261	54	258	71	259	50	-0.8	-3.1	-2.1	-2.1	-4.8	-4.1
	1205+15	Elliptical	Heavy	15	269	85	269	65	266	40	268	58	267	54	265	71	266	50	0.0	-2.3	-0.8	-1.7	-3.8	-2.7
	1205+09	Elliptical	Heavy	15	278	85	278	65	276	40	278	58	277	54	277	71	276	50	-0.5	-2.3	-0.4	-1.4	-1.4	-2.4
	1205+03	Elliptical	Heavy	15	266	85	267	65	264	40	266	58	264	54	264	71	263	50	0.5	-2.6	-0.7	-2.2	-2.4	-3.2
	1204+97	Elliptical	Heavy	15	269	85	269	65	268	40	269	58	268	54	267	71	267	50	0.0	-1.5	-0.4	-1.5	-2.0	-2.5
	1204+91	Elliptical	Heavy	15	274	85	272	65	271	40	272	58	271	54	269	71	270	50	-1.8	-3.0	-1.3	-2.6	-4.5	-3.6
	1204+85	Elliptical	Heavy	15	260	85	261	65	258	40	260	58	258	54	256	71	257	50	1.0	-2.6	-0.8	-2.4	-3.9	-3.4
29 1202+70	1202+39	Elliptical	Medium	12	284	79	283	65	282	41	284	58	282	54	281	71	281	50	-0.8	-2.0	-0.2	-2.0	-3.0	-3.0
	1202+33	Elliptical	Medium	12	278	79	277	65	276	41	279	58	276	54	277	71	275	50	-1.0	-2.4	0.4	-2.4	-1.4	-3.4
	1202+27	Elliptical	Medium	12	271	79	271	65	269	41	270	58	270	54	268	71	269	50	0.0	-2.0	-0.6	-0.8	-2.8	-1.8
	1202+21	Elliptical	Medium	12	273	79	273	65	270	41	272	58	272	54	270	71	270	50	0.5	-2.9	-0.6	-0.8	-2.7	-2.8
	1202+15	Elliptical	Medium	12	265	79	265	65	262	41	264	58	264	54	263	71	262	50	0.3	-2.7	-0.3	-0.7	-1.2	-2.7
	1202+09	Elliptical	Medium	12	267	79	267	65	264	41	267	58	266	54	264	71	265	50	0.3	-3.5	-0.5	-1.2	-2.8	-2.2
	1202+03	Elliptical	Medium	12	263	79	265	65	262	41	263	58	263	54	260	71	261	50	1.3	-1.8	-0.1	-0.4	-3.0	-2.4
	1201+97	Elliptical	Medium	12	266	79	267	65	264	41	265	58	265	54	266	71	264	50	0.5	-2.7	-1.0	-1.4	-0.9	-2.4
	1201+91	Elliptical	Medium	12	275	79	276	65	273	41	275	58	275	54	273	71	273	50	1.3	-2.0	-0.1	0.2	-1.5	-1.8
	1201+85	Elliptical	Medium	12	273	79	273	65	271	41	273	58	273	54	270	71	270	50	0.3	-1.3	0.4	0.5	-2.4	-2.5
27 1199+70	1199+26	Elliptical	Heavy	12	240	79	240	63	240	42	238	59	228	52	225	69	226	50	0.5	0.5	-1.4	-11.5	-14.6	-13.5
	1199+20	Elliptical	Heavy	12	235	79	236	63	236	42	234	59	251	52	248	69	249	50	1.0	1.0	-0.4	16.3	13.5	14.3
	1199+14	Elliptical	Heavy	12	228	79	227	63	227	42	227	59	242	52	241	69	241	50	-1.0	-1.0	-1.0	13.9	13.1	12.9
	1199+08	Elliptical	Heavy	12	252	79	253	63	253	42	250	59	229	52	227	69	227	50	1.0	1.0	-1.6	-22.7	-24.4	-24.7
	1199+02	Elliptical	Heavy	12	244	79	244	63	244	42	243	59	232	52	231	69	230	50	-0.3	-0.3	-1.0	-11.8	-13.3	-13.8
	1198+96	Elliptical	Heavy	12	235	79	232	63	232	42	230	59	240	52	235	69	239	50	-3.0	-3.0	-5.6	4.8	-0.5	3.8
	1198+90	Elliptical	Heavy	12	233	79	233	63	233	42	231	59	243	52	243	69	242	50	0.3	0.3	-1.4	10.1	10.0	9.1
	1198+84	Elliptical	Heavy	12	242	79	243	63	243	42	241	59	243	52	244	69	242	50	0.3	0.3	-1.6	0.7	1.9	-0.3
	1198+78	Elliptical	Heavy	12	244	79	244	63	244	42	243	59	NO NAILS	52	NO NAILS	69	NO NAILS	50	0.3	0.3	-1.0			
	1198+72	Elliptical	Heavy	12	245	79	245	63	245	42	244	59	NO NAILS	52	NO NAILS	69	NO NAILS	50	0.3	0.3	-1.0			
25 1198+20	1197+87	Elliptical	Heavy	12	248	77	249	61	246	41	247	59	247	52	245	69	245	50	0.5	-2.0	-1.3	-1.4	-3.2	-3.4
	1197+81	Elliptical	Heavy	12	241	77	240	61	239	41	241	59	239	52	237	69	238	50	-1.0	-2.1	-0.7	-2.3	-4.3	-3.3
	1197+75	Elliptical	Heavy	12	246	77	246	61	243	41	244	59	244	52	242	69	242	50	0.5	-2.1	-1.2	-1.6	-3.4	-3.6
	1197+69	Elliptical	Heavy	12	244	77	245	61	242	41	242	59	243	52	241	69	241	50	0.8	-2.0	-1.5	-0.8	-3.3	-2.8
	1197+63	Elliptical	Heavy	12	252	77	252	61	250	41	250	59	250	52	248	69	248	50	-0.3	-2.2	-1.7	-2.0	-3.6	-4.0
	1197+57	Elliptical	Heavy	12	245	77	245	61	243	41	244	59	244	52	242	69	242	50	0.0	-1.6	-0.2	-0.6	-2.7	-2.6
	1197+51	Elliptical	Heavy	12	244	77	244	61	242	41	243	59	241	52	240	69	240	50	0.0	-2.3	-1.3	-3.1	-4.1	-4.1
	1197+45	Elliptical	Heavy	12	252	77	251	61	250	41	250	59	248	52	249	69	249	50	-1.0	-3.0	-2.3	-4.5	-3.2	-3.5
	1197+39	Elliptical	Heavy	12	237	77	236	61	234	41	236	59	235	52	235	69	233	50	-1.0	-3.5	-1.5	-2.2	-2.6	-4.2
	1197+33	Elliptical	Heavy	12	235	77	235	61	233	41	234	59	232	52	233	69	232	50	0.3	-2.2	-0.8	-2.9	-2.1	-2.9
23 1195+70	1195+34	Elliptical	Medium	12	226	87	226	63	224	42	224	69	225	54	225	69	223	53	-0.3	-2.2	-2.7	-1.3	-1.3	-3.3
	1195+28	Elliptical	Medium	12	245	87	245	63	242	42	243	69	243	54	242	69	240	53	0.3	-2.6	-1.4	-1.6	-3.0	-4.6
	1195+22	Elliptical	Medium	12	238	87	239	63	236	42	238	69	237	54	234	69	236	53	0.8	-2.2	-0.1	-1.0	-3.9	-2.0
	1195+16	Elliptical	Medium	12	232	87	231	63	229	42	230	69	231	54	229	69	228	53	-1.0	-3.6	-1.8	-1.2	-3.3	-4.2
	1195+10	Elliptical	Medium	12	226	87	226	63	224	42	225	69	225	54	226	69	223	53	-0.3	-2.1	-1.1	-1.1	0.3	-3.1
	1195+04	Elliptical	Medium	12	241	87	242	63	238	42	239	69	240	54	238	69	238	53	1.0	-2.8	-1.7	-0.8	-2.7	-2.8
	1194+98	Elliptical	Medium	12	248	87	248	63	244	42	246	69	246	54	245	69	244	53	0.0	-3.6	-1.6	-1.7	-2.9	-3.7
	1194+92	Elliptical	Medium	12	243	87	242	63	240	42	242	69	241	54	240	69	240	53	-0.3	-2.2	-0.6	-1.6	-2.8	-2.6
	1194+86	Elliptical	Medium	12	219	87	219	63	216	42	218	69	216	54	217	69	216	53	0.0	-3.0	-1.4	-3.5	-2.9	-3.5
	1194+80	Elliptical	Medium	12	232	87	232	63	230	42	231	69	231	54	230	69	229	53	0.0	-1.5	-1.3	-0.9	-2.1	-2.9
21 1194+20	1193+84	Elliptical	Heavy	12	228	85	229	64	226	42	227	69	223	54	226	69	226	53	0.3	-2.3	-1.8	-5.3	-2.0	-2.3
	1193+78	Elliptical	Heavy	12	247	85	247	64	245	42	246	69	246	54	245	69	245	53	0.5	-1.7	-0.7	-0.9	-2.1	-1.9
	1193+72	Elliptical	Heavy	12	225	85	227	64	223	42	225	69	224	54	222	69	223	53	2.5	-1.7	0.6	-0.8	-2.3	-1.8
	1193+66	Elliptical	Heavy	12	245	85	245	64	244	42	244	69	245	54	242	69	242	53	0.0	-1.1	-1.1	-0.4	-3.5	-3.4
	1193+60	Elliptical	Heavy	12	246	85	246	64	244	42	246	69	245	54	244	69	244	53	-0.5	-2.8	-0.2	-1.4	-1.9	-2.4
	1193+54	Elliptical	Heavy	12	229	85	228	64	227	42	228	69	228	54	226	69	226	53	-0.8	-1.2	-0.2	-0.6	-2.8	-2.6
	1193+48	Elliptical	Heavy	12	234	85	234	64	231	42	233	69	232	54	230	69	231	53	-0.3	-3.1	-0.7	-1.9	-3.9	-2.9
	1193+42	Elliptical	Heavy	12	243	85	244	64	241	42	242	69	241	54	240	69	240	53	0.8	-2.3	-1.7	-2.3	-3.7	-3.3
	1193+36	Elliptical	Heavy	12	246	85	247	64	244	42	246	69	245	54	245	69	244	53	0.5	-1.7	-0.3	-1.1	-1.0	-2.1
	1193+30	Elliptical	Heavy	12	238	85	238	64	236	42	237	69	237	54	237	69	235	53	0.0	-1.5	-0.8	-0.7	-0.8	-2.7

	1192+35	Elliptical	Medium	12	242	89	242	66	239	42	241	66	241	52	240	70	239	56	0.3	-3.0	-1.5	-1.1	-2.4	-3.1
	1192+29	Elliptical	Medium	12	257	89	255	66	254	42	254	66	254	52	253	70	252	56	-1.3	-2.5	-3.0	-2.5	-3.9	-4.5
	1192+23	Elliptical	Medium	12	248	89	250	66	246	42	248	66	248	52	245	70	246	56	1.8	-1.9	0.2	0.1	-2.7	-1.9
	1192+17	Elliptical	Medium	12	242	89	242	66	241	42	241	66	241	52	236	70	239	56	0.3	-1.0	-0.4	-0.6	-5.6	-2.6
19 1192+70	1192+11	Elliptical	Medium	12	228	89	228	66	227	42	227	66	227	52	226	70	225	56	-0.3	-1.0	-1.4	-1.1	-2.4	-3.1
	1192+05	Elliptical	Medium	12	238	89	238	66	235	42	236	66	236	52	235	70	234	56	0.5	-2.4	-1.5	-1.7	-3.1	-3.7
	1191+99	Elliptical	Medium	12	246	89	246	66	243	42	246	66	246	52	245	70	244	56	0.0	-3.0	-0.8	-0.4	-1.3	-2.4
	1191+93	Elliptical	Medium	12	254	89	255	66	251	42	253	66	253	52	252	70	252	56	0.5	-3.3	-0.9	-1.0	-1.7	-2.0
	1191+87	Elliptical	Medium	12	237	89	237	66	235	42	237	66	237	52	236	70	234	56	0.3	-1.9	0.1	0.3	-0.8	-2.7
	1191+81	Elliptical	Medium	12	251	89	251	66	248	42	250	66	251	52	248	70	248	56	-0.8	-3.5	-1.3	-0.5	-3.5	-3.5
	1190+84	Round	Standard	18	236	77	235	64	232	43	233	66	234	52	231	70	231	56	-1.0	-4.0	-2.7	-1.7	-4.6	-4.7
	1190+78	Round	Standard	18	234	77	233	64	231	43	233	66	233	52	230	70	231	56	-0.8	-2.9	-1.3	-0.9	-3.4	-2.9
	1190+72	Round	Standard	18	245	77	245	64	243	43	245	66	244	52	242	70	243	56	-0.5	-2.5	-0.9	-1.4	-3.0	-2.4
	1190+66	Round	Standard	18	248	77	248	64	245	43	247	66	247	52	246	70	246	56	-0.5	-3.0	-0.9	-1.2	-2.6	-2.2
17 1191+20	1190+60	Round	Standard	18	248	77	248	64	246	43	247	66	248	52	246	70	245	56	-0.8	-2.0	-1.6	-0.4	-2.8	-3.4
	1190+54	Round	Standard	18	241	77	241	64	239	43	240	66	240	52	237	70	238	56	0.3	-1.3	-0.3	-0.5	-3.5	-2.5
	1190+48	Round	Standard	18	242	77	242	64	241	43	242	66	241	52	242	70	240	56	-0.5	-1.4	-0.2	-1.3	-0.5	-2.3
	1190+42	Round	Standard	18	238	77	237	64	235	43	238	66	237	52	235	70	234	56	-1.0	-3.0	-0.4	-1.0	-3.5	-4.0
	1190+36	Round	Standard	18	253	77	253	64	250	43	252	66	252	52	247	70	250	56	0.0	-2.6	-1.0	-1.0	-6.1	-3.0
	1190+30	Round	Standard	18	238	77	239	64	237	43	238	66	233	52	237	70	236	56	1.0	-1.7	-0.1	-5.3	-1.3	-2.3
	1189+39	Round	Standard	18	255	81	255	61	254	39	253	72	255	54	250	69	251	55	0.0	-0.6	-1.6	0.0	-4.5	-4.0
	1189+33	Round	Standard	18	248	81	248	61	246	39	248	72	249	54	246	69	245	55	0.0	-1.7	-0.1	1.3	-1.3	-2.7
	1189+27	Round	Standard	18	231	81	231	61	229	39	229	72	231	54	228	69	229	55	0.3	-2.0	-1.5	0.1	-2.8	-1.9
	1189+21	Round	Standard	18	221	81	221	61	219	39	221	72	222	54	220	69	219	55	-0.5	-2.2	-0.1	0.8	-1.0	-2.2
15 1189+70	1189+15	Round	Standard	18	239	81	239	61	237	39	239	72	239	54	236	69	237	55	0.3	-1.7	-0.4	0.0	-2.6	-2.0
	1189+09	Round	Standard	18	255	81	253	61	252	39	253	72	252	54	251	69	251	55	-1.0	-2.1	-1.5	-2.5	-3.9	-3.5
	1189+03	Round	Standard	18	226	81	224	61	224	39	224	72	225	54	221	69	222	55	-1.3	-1.9	-1.2	-0.6	-4.2	-3.6
	1188+97	Round	Standard	18	248	81	248	61	246	39	247	72	246	54	244	69	245	55	-0.5	-2.5	-1.6	-2.4	-4.1	-3.4
	1188+91	Round	Standard	18	237	81	237	61	235	39	237	72	237	54	235	69	235	55	-0.3	-2.2	0.0	-0.2	-2.4	-2.2
	1188+85	Round	Standard	18	248	81	249	61	246	39	247	72	247	54	246	69	245	55	0.3	-2.6	-1.1	-1.4	-2.9	-3.4
	1187+86	Round	Standard	18	235	92	233	64	233	40	234	72	235	54	233	69	232	55	-1.8	-1.8	-1.0	0.1	-2.0	-2.9
	1187+80	Round	Standard	18	247	92	247	64	245	40	246	72	246	54	246	69	244	55	0.5	-2.3	-0.8	-0.9	-1.2	-2.9
	1187+74	Round	Standard	18	243	92	244	64	242	40	243	72	244	54	241	69	242	55	0.8	-0.8	0.1	0.9	-1.7	-1.1
	1187+68	Round	Standard	18	258	92	258	64	253	40	256	72	257	54	255	69	254	55	0.0	-4.1	-1.5	-0.6	-2.5	-3.6
13 1188+20	1187+62	Round	Standard	18	256	92	257	64	254	40	256	72	256	54	254	69	254	55	0.5	-2.0	-0.4	0.0	-2.1	-2.0
	1187+56	Round	Standard	18	240	92	244	64	241	40	243	72	243	54	242	69	240	55	3.8	0.9	2.9	3.2	2.4	0.2
	1187+50	Round	Standard	18	231	92	231	64	229	40	230	72	230	54	227	69	228	55	0.3	-1.8	-0.7	-0.9	-3.9	-2.9
	1187+44	Round	Standard	18	252	92	253	64	252	40	252	72	252	54	249	69	250	55	0.8	-0.9	-0.5	-0.5	-3.5	-2.5
	1187+38	Round	Standard	18	252	92	253	64	251	40	252	72	251	54	249	69	250	55	0.3	-1.3	-0.5	-1.5	-3.9	-2.5
	1187+31	Round	Standard	18	245	92	247	64	243	40	245	72	245	54	242	69	242	55	2.3	-1.8	0.0	-0.1	-2.6	-3.1
	1184+38	Round	Standard	15	229	85	229	64	228	41	228	65	229	57	227	71	227	59	0.5	-0.8	-0.5	0.4	-1.1	-1.6
	1184+32	Round	Standard	15	241	85	242	64	238	41	240	65	240	57	239	71	238	59	1.0	-2.9	-1.3	-1.0	-2.4	-3.0
	1184+26	Round	Standard	15	231	85	232	64	230	41	231	65	232	57	229	71	229	59	0.8	-0.9	0.3	0.9	-2.2	-2.1
	1184+20	Round	Standard	15	240	85	240	64	238	41	239	65	239	57	239	71	238	59	0.0	-2.0	-1.1	-1.3	-1.3	-2.3
11 1184+70	1184+14	Round	Standard	15	251	85	250	64	248	41	250	65	249	57	249	71	248	59	-0.3	-2.8	-0.7	-1.7	-2.1	-2.7
	1184+08	Round	Standard	15	242	85	242	64	240	41	241	65	242	57	239	71	239	59	0.3	-2.0	-1.3	-0.1	-3.1	-3.1
	1184+02	Round	Standard	15	258	85	259	64	257	41	256	65	257	57	256	71	255	59	1.0	-0.9	-1.3	-0.8	-2.3	-2.8
	1183+96	Round	Standard	15	249	85	250	64	247	41	250	65	250	57	245	71	248	59	0.3	-2.0	0.2	0.6	-4.3	-1.4
	1183+90	Round	Standard	15	248	85	248	64	247	41	247	65	248	57	245	71	246	59	-0.5	-1.3	-0.9	-0.4	-3.1	-2.4
	1183+84	Round	Standard	15	242	85	241	64	240	41	241	65	241	57	239	71	239	59	-0.3	-1.5	-0.7	-0.6	-2.2	-2.6
	1182+84	Round	Standard	15	255	94	255	65	249	40	NO NAILS	65	NO NAILS	57	NO NAILS	71	NO NAILS	59	0.0	-5.4				
	1182+78	Round	Standard	15	245	94	246	65	243	40	244	65	245	57	248	71	243	59	0.5	-2.8	-1.8	-0.4	2.8	-2.4
	1182+72	Round	Standard	15	235	94	237	65	233	40	234	65	235	57	232	71	232	59	1.3	-2.7	-1.2	-0.5	-3.3	-3.5
	1182+66	Round	Standard	15	251	94	251	65	249	40	249	65	247	57	249	71	248	59	0.0	-1.9	-1.7	-4.2	-2.1	-3.2
10 1183+20	1182+60	Round	Standard	15	248	94	248	65	245	40	247	65	246	57	244	71	245	59	0.8	-3.1	-0.4	-1.7	-3.7	-2.7
	1182+54	Round	Standard	15	239	94	240	65	237	40	238	65	239	57	237	71	236	59	1.5	-1.3	-0.2	0.5	-1.9	-2.5
	1182+48	Round	Standard	15	252	94	251	65	249	40	250	65	250	57	249	71	249	59	-0.5	-2.8	-1.6	-2.0	-2.5	-3.0
	1182+42	Round	Standard	15	242	94	242	65	241	40	241	65	242	57	239	71	240	59	-0.5	-1.1	-0.6	-0.1	-2.7	-2.1
	1182+36	Round	Standard	15	256	94	255	65	255	40	256	65	255	57	253	71	254	59	-0.5	-1.2	-0.1	-0.8	-3.0	-1.8
	1182+30	Round	Standard	15	237	94	236	65	234	40	236	65	263	57	234	71	234	59	-0.5	-2.6	-0.8	26.3	-2.4	-2.7
	1181+39	Round	Standard	15	245	84	246	63	243	40	244	70	245	59	241	72	243	61	0.5	-2.0	-0.8	-0.1	-3.9	-2.1
	1181+33	Round	Standard	15	238	84	238	63	237	40	238	70	238	59	235	72	237	61	0.3	-1.0	0.2	0.0	-2.7	-1.0
	1181+27	Round	Standard	15	252	84	256	63	251	40	252	70	253	59	251	72	251	61	3.0	-1.6	-0.3	0.5	-1.8	-1.5
	1181+21	Round	Standard	15	251	84	252	63	250	40	251	70	251	59	251	72	248	61	1.3	-0.8	0.1	0.3	-0.1	-2.7
8 1181+70	1181+15	Round	Standard	15	241	84	243	63	239	40	241	70	242	59	238	72	239	61	1.8	-1.4	-0.1	1.2	-2.9	-1.8
	1181+09	Round	Standard	15	234	84	236	63	223	40	235	70	235	59	232	72	232	61	1.5	-11.0	0.5	0.8	-2.1	-2.2
	1181+03	Round	Standard	15	253	84	257	63	253	40	254	70	254	59	251	72	253	61	3.6	-0.2	0.2	0.5	-2.7	-0.5
	1180+97	Round	Standard	15	232	84	233	63	230	40	232	70	232	59	226	72	229	61	1.0	-2.5	-0.3	-0.2	-6.3	-3.2
	1180+91	Round	Standard	15	250	84	252	63	247	40	249	70	249	59	245	72	247	61	2.8	-2.7	-1.1	-0.7	-5.0	-2.7
	1180+85	Round	Standard	15	253	84	253	63	252	40	253	70	254	59	252	72	252	61	0.3	-0.8	-0.4	0.8	-1.6	-1.2
	1179+87	Round	Standard	12	256	81	255	63	255	40	255	70	255	59	254	72	255	61	-0.8	-1.0	-0.5	-0.8	-1.6	-0.8
	1179+81	Round	Standard	12	259	81	260	63	259	40	258	70	258	59	257	72	257	61	0.3	-0.4	-1.0	-1.3	-2.2	-2.3
	1179+75	Round	Standard	12	251	81	252	63	250	40	251	70	251	59	249	72	249	61	1.0	-0.7	-0.7	-0.2	-2.2	-2.2
	1179+69	Round	Standard	12	249	81	251	63	248	40	249	70	250	59	247	72	247	61	2.0	-1.6	-0.6	0.6	-2.3	-2.4
6 1180+20	1179+63	Round	Standard	12	261	81	261	63	259	40	260	70	260	59	257	72	259	61	0.3	-1.7	-0.9	-1.1	-3.6	-2.1
	1179+57	Round	Standard	12	246	81	247	63	245	40	247	70	247	59	244	72	246	61	1.0	-0.8	0.7	1.1	-2.1	0.1
	1179+51	Round	Standard	12	263	81	264	63	261	40	263	70	262	59	260	72	261	61	0.8	-1.7	-0.2	-0.9	-2.9	-1.9
	1179+45	Round	Standard	12	276	81	276	63	276	40	276	70	276	59	276	72	275	61	-0.3	0.0	-0.4	-0.4	-0.3	-1.4
	1179+39	Round	Standard	12	235	81	236	63	234	40	235	70	234	59	232	72	233	61	0.5	-0.9	-0.3	-1.2	-3.4	-2.2
	1179+33	Round	Standard	12	267	81	269	63	267	40	268	70	267	59	266	72	265	61	1.8	-0.9	0.3	-0.5	-1.1	-2.5

4 1178+70	1178+25	Round	Standard	12	264	88	264	63	262	40	263	65	263	61	262	72	261	60	0.5	-1.5	-0.7	-0.7	-1.9	-2.7
	1178+19	Round	Standard	12	269	88	268	63	268	40	268	65	270	61	268	72	266	60	-0.5	-1.2	-0.5	1.0	-1.2	-3.0
	1178+13	Round	Standard	12	268	88	267	63	266	40	268	65	267	61	266	72	264	60	-1.0	-2.1	-0.3	-1.0	-2.2	-4.0
	1178+07	Round	Standard	12	272	88	273	63	270	40	271	65	272	61	270	72	270	60	0.3	-1.8	-1.1	-0.3	-1.9	-2.3
	1178+01	Round	Standard	12	275	88	276	63	272	40	274	65	274	61	273	72	272	60	1.0	-3.1	-1.3	-0.8	-1.9	-2.8
	1177+95	Round	Standard	12	279	88	280	63	279	40	278	65	278	61	276	72	276	60	1.0	-0.4	-1.0	-0.9	-2.6	-2.9
	1177+89	Round	Standard	12	269	88	269	63	268	40	269	65	269	61	267	72	266	60	0.3	-1.5	-0.1	-0.2	-2.0	-3.2
	1177+83	Round	Standard	12	271	88	272	63	269	40	270	65	270	61	269	72	269	60	0.5	-2.6	-1.1	-1.3	-1.8	-2.3
	1177+87	Round	Standard	12	276	88	277	63	274	40	276	65	276	61	275	72	274	60	0.5	-2.3	-0.3	-0.4	-1.5	-2.4
	1177+81	Round	Standard	12	269	88	269	63	267	40	267	65	268	61	266	72	265	60	0.3	-1.8	-1.8	-1.0	-3.2	-4.0
2 1177+20	1176+84	Round	Standard	12	292	89	292	62	289	40	292	65	291	61	289	72	289	60	0.3	-2.8	0.1	-0.6	-3.0	-2.6
	1176+78	Round	Standard	12	252	89	250	62	248	40	249	65	249	61	248	72	247	60	-2.5	-4.2	-3.4	-3.5	-4.8	-5.5
	1176+72	Round	Standard	12	265	89	265	62	264	40	265	65	265	61	264	72	263	60	0.3	-1.1	0.0	0.3	-1.1	-1.7
	1176+66	Round	Standard	12	274	89	275	62	273	40	274	65	273	61	272	72	271	60	0.5	-0.9	-0.6	-1.3	-2.6	-3.3
	1176+60	Round	Standard	12	262	89	262	62	259	40	261	65	262	61	258	72	259	60	0.0	-2.8	-0.5	0.1	-3.4	-2.9
	1176+54	Round	Standard	12	284	89	284	62	281	40	283	65	283	61	282	72	281	60	0.5	-2.2	-0.5	-0.7	-2.0	-2.7
	1176+48	Round	Standard	12	274	89	273	62	271	40	272	65	271	61	271	72	270	60	-0.3	-2.4	-1.4	-2.6	-2.7	-3.6
	1176+42	Round	Standard	12	266	89	266	62	263	40	265	65	266	61	264	72	264	60	0.0	-3.0	-1.1	-0.4	-2.4	-2.4
	1176+36	Round	Standard	12	273	89	274	62	268	40	272	65	273	61	271	72	270	60	0.5	-5.7	-0.9	-0.3	-2.6	-3.3
	1176+30	Round	Standard	12	269	89	269	62	268	40	269	65	269	61	268	72	267	60	-0.3	-1.0	-0.6	-0.5	-2.0	-2.5
BOP	1175+44																							

Table G.2. Steel dowels, average change in joint opening

					Average Change in Joint Opening (mm)					
Section No.	Station	Bar Type	Bar Size	Spacing (inches)	9/21/2002	4/5/2003	10/25/2003	4/10/2004	8/27/2004	4/23/2005
118	1328+20	Round	Standard	12	NO NAILS	NO NAILS	NO NAILS	NO NAILS	NO NAILS	NO NAILS
110	1302+20	Round	Standard	12	NO NAILS	NO NAILS	NO NAILS	NO NAILS	NO NAILS	NO NAILS
103	1277+00	Round	Standard	12	1.0	-0.9	1.1	0.4	-10.7	0.1
101	1267+70	Round	Standard	12	0.7	-2.5	1.3	-0.4	-2.1	-1.7
100	1266+50	Round	Standard	12	1.6	-1.8	2.0	0.2	-1.1	-1.0
91	1260+20	Round	Standard	12	-2.2	-2.2	1.2	0.1	-1.9	-1.6
73	1244+20	Round	Standard	12	-0.7	-4.0	-0.4	-2.0	-4.4	-
71	1242+70	Round	Standard	12	0.5	-2.6	1.2	-1.8	-3.0	-
69	1241+20	Round	Standard	12	0.4	-2.7	0.8	-2.2	-3.9	-
6	1180+20	Round	Standard	12	0.7	-1.0	-0.4	-0.5	-2.2	-1.8
4	1178+70	Round	Standard	12	0.3	-1.8	-0.8	-0.5	-2.0	-2.9
2	1177+20	Round	Standard	12	-0.1	-2.6	-0.9	-0.9	-2.6	-3.0
95	1262+80	Round	Standard	15	0.2	-2.6	1.6	-0.5	-1.6	-1.3
79	1249+70	Round	Standard	15	0.8	-2.4	4.6	0.1	-1.9	-
77	1247+70	Round	Standard	15	0.9	-2.6	1.5	-0.4	-1.7	-
11	1184+70	Round	Standard	15	0.3	-1.7	-0.7	-0.4	-2.4	-2.4
10	1183+20	Round	Standard	15	0.2	-2.5	-0.9	1.9	-2.1	-2.6
8	1181+70	Round	Standard	15	1.6	-2.4	-0.2	0.3	-2.9	-1.9
106	1279+70	Round	Standard	18	-0.2	-2.4	0.5	-0.6	-2.5	-1.5
104	1278+20	Round	Standard	18	1.1	-0.6	1.4	0.8	-0.5	-0.7
97	1264+10	Round	Standard	18	1.0	-2.7	1.4	-0.2	-1.9	-1.3
17	1191+20	Round	Standard	18	-0.4	-2.4	-0.9	-1.5	-3.1	-3.0
15	1189+70	Round	Standard	18	-0.3	-1.9	-0.9	-0.5	-3.0	-2.9
13	1188+20	Round	Standard	18	0.7	-1.6	-0.2	0.0	-2.1	-2.3
114	1319+70	Elliptical	Medium	12	NO NAILS	NO NAILS	NO NAILS	NO NAILS	NO NAILS	NO NAILS
112	1318+20	Elliptical	Medium	12	NO NAILS	NO NAILS	NO NAILS	NO NAILS	NO NAILS	NO NAILS
108	1281+20	Elliptical	Medium	12	1.0	-1.5	2.3	0.5	-1.0	-1.6
98	1265+20	Elliptical	Medium	12	0.9	-2.5	1.6	-0.2	-1.4	-2.3
93	1261+50	Elliptical	Medium	12	0.3	-2.5	1.6	-0.6	-0.6	-1.1
89	1257+20	Elliptical	Medium	12	0.6	-1.5	0.5	-0.4	-1.8	-1.2
87	1255+70	Elliptical	Medium	12	1.5	0.3	0.8	0.1	-1.5	-0.4
85	1254+20	Elliptical	Medium	12	1.4	-1.5	0.6	0.1	-1.5	-1.4
81	1251+20	Elliptical	Medium	12	0.7	-2.4	1.7	-0.2	-2.7	-
47	1220+20	Elliptical	Medium	12						
29	1202+70	Elliptical	Medium	12	0.3	-2.3	-0.3	-0.9	-2.2	-2.5
23	1195+70	Elliptical	Medium	12	0.0	-2.6	-1.4	-1.5	-2.5	-3.3
19	1192+70	Elliptical	Medium	12	0.1	-2.4	-1.1	-0.8	-2.7	-2.9
122	1333+70	Elliptical	Medium	15	NO NAILS	NO NAILS	NO NAILS	NO NAILS	NO NAILS	NO NAILS
120	1332+20	Elliptical	Medium	15	NO NAILS	NO NAILS	NO NAILS	NO NAILS	NO NAILS	NO NAILS
116	1321+20	Elliptical	Medium	15	NO NAILS	NO NAILS	NO NAILS	NO NAILS	NO NAILS	NO NAILS
39	1214+20	Elliptical	Medium	15	0.1	-2.1	-0.4	-1.8	-2.6	-2.6
35	1210+20	Elliptical	Medium	15	-0.4	-2.6	-0.8	-1.8	-3.0	-3.7
33	1207+20	Elliptical	Medium	15	-0.4	-2.2	-0.1	-2.3	-3.1	-3.0
128	1346+20	Elliptical	Medium	18	NO NAILS	NO NAILS	NO NAILS	NO NAILS	NO NAILS	NO NAILS
126	1344+70	Elliptical	Medium	18	NO NAILS	NO NAILS	NO NAILS	NO NAILS	NO NAILS	NO NAILS
124	1340+20	Elliptical	Medium	18	NO NAILS	NO NAILS	NO NAILS	NO NAILS	NO NAILS	NO NAILS
45	1218+70	Elliptical	Medium	18						
43	1217+20	Elliptical	Medium	18						
41	1215+70	Elliptical	Medium	18	-0.2	-2.6	-0.5	-1.8	-2.4	-3.0
55	1227+70	Elliptical	Heavy	12	0.0	-1.6	0.2	-1.4	-1.4	-
51	1224+70	Elliptical	Heavy	12	0.4	-2.1	-0.3	-2.1	-1.9	-
27	1199+70	Elliptical	Heavy	12	-0.1	-0.1	-1.6	0.0	-1.8	-1.5
25	1198+20	Elliptical	Heavy	12	-0.1	-2.3	-1.2	-2.1	-3.3	-3.4
21	1194+20	Elliptical	Heavy	12	0.3	-1.9	-0.7	-1.6	-2.4	-2.6
63	1233+70	Elliptical	Heavy	15	-0.8	-2.3	0.6	-2.9	-2.4	-
61	1232+20	Elliptical	Heavy	15	-0.2	-2.3	0.4	-2.6	-2.1	-
59	1230+70	Elliptical	Heavy	15	-0.1	-1.6	0.2	-2.2	-1.9	-
49	1223+20	Elliptical	Heavy	15	0.6	-1.4	0.4	-1.8	-1.5	-
37	1211+70	Elliptical	Heavy	15	-0.1	-2.4	-0.2	-1.8	-2.4	-2.9
31	1205+70	Elliptical	Heavy	15	-0.3	-2.3	-0.7	-1.5	-3.1	-3.0
83	1252+70	Elliptical	Heavy	18	-0.2	-3.4	1.0	-0.6	-2.7	-2.7
75	1245+70	Elliptical	Heavy	18	0.5	-2.8	1.1	-0.7	-2.9	-
67	1239+70	Elliptical	Heavy	18	0.0	-1.7	0.5	-1.5	-2.7	-
65	1238+20	Elliptical	Heavy	18	0.3	-2.2	1.0	-1.9	-2.3	-
57	1229+20	Elliptical	Heavy	18	0.9	-1.6	0.0	-2.3	-2.0	-
53	1226+20	Elliptical	Heavy	18	0.2	-1.5	0.3	-6.0	-1.5	-

Table G.3. Steel dowels, change in joint opening, section averages

		Change in Joint Opening - Section Averages (mm)					
Bar Type	**Spacing (inches)**	**Fall 2002**	**Spring 2003**	**Fall 2003**	**Spring 2004**	**Fall 2004**	**Spring 2005**
Steel - Standard 1.5"ϕ	12	0.2	-2.2	0.5	-0.8	-3.4	-1.7
Steel - Standard 1.5"ϕ	15	0.7	-2.4	1.0	0.2	-2.1	-2.1
Steel - Standard 1.5"ϕ	18	0.3	-2.0	0.2	-0.3	-2.2	-2.0
Steel - Elliptical - Medium	12	0.7	-1.9	0.6	-0.4	-1.8	-1.8
Steel - Elliptical - Medium	15	-0.3	-2.3	-0.4	-2.0	-2.9	-3.1
Steel - Elliptical - Medium	18	-0.2	-2.6	-0.5	-1.8	-2.4	-3.0
Steel - Elliptical - Heavy	12	0.1	-1.6	-0.7	-1.4	-2.1	-2.5
Steel - Elliptical - Heavy	15	-0.2	-2.0	0.1	-2.1	-2.2	-3.0
Steel - Elliptical - Heavy	18	0.3	-2.2	0.7	-2.2	-2.4	-2.7

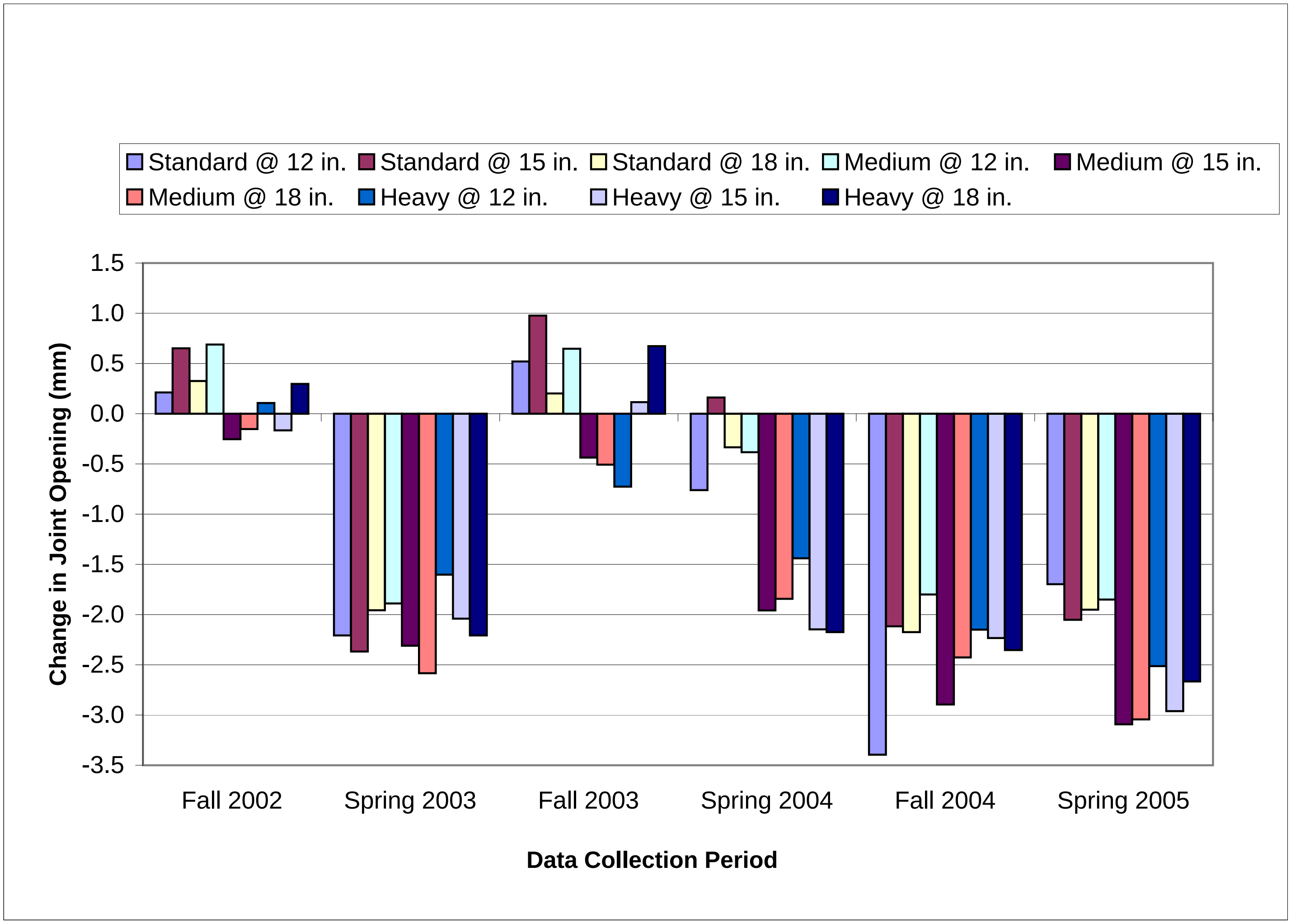

Figure G.1. Changes in joint opening averages, steel dowels