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CHAPTER ONE

Introduction
1. INTRODUCTION

The following guideline is intended for National Park Service employees, joint agencies, and architectural and engineering (A/E) contractors for use in the preparation of NPS preliminary design (final submittal), construction and as-constructed drawings. To produce archivable drawings, maintain uniformity of work and to facilitate review of both A/E submittals and NPS-generated products, these requirements should be met for all drawings. Drawings that do not meet these guidelines are unacceptable. If some special condition makes it impractical or impossible to conform to these requirements, the problem should be referred to the Project Manager, Denver Service Center, for resolution. In the case of park or System Support Office-produced projects, refer to the official responsible for the project.

Director’s Order 10A sets forth the basic requirements. This document, Reference Manual 10A, includes specific information and graphic examples of drawing requirements. Specific size requirements are noted within the document although illustrations shown are for graphic representation only and may not be shown at actual size.

A CADD User’s guide is available from the Denver Service Center to assist in the preparation of acceptable computer generated drawings, or can be accessed from the following web site: http://165.83.23.11/dsc/cadd.
CHAPTER TWO

Drawing Format
2. DRAWING FORMAT

MATERIALS AND SUPPLIES AVAILABLE FROM NPS

The following material prepared by the Denver Service Center may be obtained upon request from the A/E managers:

- Cover sheets for parks
- Standard drawing sheets
- Standard details

STANDARD SHEETS

Standard 22"x34" NPS drawing sheets (Exhibit 2-A) are used for preliminary design, construction, and as-constructed drawings. Reduced-size samples of standard drawing sheets, showing overall sheet size and trim lines are shown in Exhibit 2-A. The exhibit also shows the location of the approval and revision blocks when required. Any sheet sizes other than 22"x34" require written approval prior to use.

Cover Sheet Standard cover sheets with vicinity and park maps should be used for all NPS projects.

All cover sheets should contain:

- A vicinity map
- A park map showing the project site location
- Basic data (source of information and date of cover sheet base preparation)
- A bar scale including a metric scale
- Required approval and revision blocks
- A solicitation number on drawings prepared for bid
- A construction contract number on as-constructed drawings
- If applicable, information regarding the A/E firm, subcontractors, and contract number.

A/E logos are not permitted. The format for presenting A/E firm and subcontractor information is shown on Page 2 of Exhibit 2B. If a set of drawings is prepared in part by the DSC and in part by an A/E, then the A/E information block should be placed only on those drawings for which they are responsible (see Page 3 of Exhibit 2B). If the state in which a project is located requires a professional stamp(s), then the A/E should also submit one stamped set of nonreproducible record drawings to the DSC and each sheet should be stamped. The stamp should be placed to the left side of the A/E firm information block.

An index to the sheets in the set is added to the cover sheet if possible; otherwise, the index is placed on a separate second sheet.

Second Sheets. These sheets are to be used for all subsequent drawings with the exception of those listed below.

Plan and Profile Sheets. These are preprinted with the second sheet title block. For manual drafting, the grid should be red ink; orange ink is unacceptable.

Survey Sheets. These sheets have been designed to be used on all NPS survey projects.

April 2001
PLAN/PROFILE SHEET

OVERALL DIMENSIONS OF PLAN AND PROFILE SHEET SAME AS COVER SHEET

A/E FIRM INFORMATION (WHEN REQUIRED)
RE: EXHIBIT 2-B, 3 OF 3

April 2001

DRAFTING GUIDELINE
Reference Manual 10A
Drawing Format
Standard Sheets

Chapter 2
Page 4
Exhibit 2-A
(3 of 4)
TITLE BLOCKS

Title blocks on cover sheets include the project title, specific location within the park, park name, region, county, and state (see Page 1 of Exhibit 2-B). If the park is in more than one county, show only the county in which the particular project is located. Title blocks on second sheets contain the title of the sheet (sheet contents) and park name. If location within the park is specified, it should follow the same standard size for location within park as shown on Page 1 of Exhibit 2-B. The samples in Exhibit 2-B show how to prepare the title blocks for cover and second sheets.

SOLICITATION OR CONSTRUCTION CONTRACT NUMBERS

Page 1 of Exhibit 2-B shows the proper size and placement of solicitation or construction contract numbers, which appear above the title block on drawings prepared for bid (solicitation number) or on as-constructed drawings (construction contract number).
COVER SHEET TITLE BLOCK

.240 LETTERING HEIGHT/#3 PEN

PROJ. NO. STLI142
1443IB160092123

.200 LETTERING HEIGHT/#3 PEN

CONSTRUCTION DRAWINGS
UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
DENVER SERVICE CENTER

.140 LETTERING HEIGHT/#1 PEN

THIS LINE SHOULD IDENTIFY THE
NPS OFFICE RESPONSIBLE FOR
THE PREPARATION OF THE SET
OF DRAWINGS

THIS SPACE DESCRIBES THE SET OF
DRAWINGS (PRELIMINARY DESIGN,
CONSTRUCTION, OR AS-CONSTRUCTED)

.130 LETTERING HEIGHT/#0 PEN

WATER STORAGE SYSTEM
LOCATION WITHIN PARK
LIBERTY ISLAND

.175 LETTERING HEIGHT/#2 PEN

TITLE OF DRAWING
STATUE OF LIBERTY NATIONAL MONUMENT

LOCATION OF REVISION LETTER WHEN INDIVIDUAL
SHEET IS REVISED. (SEE DIRECTOR'S ORDER #10B

41,019

DRAWING NO.
356

NG. NO.
142

SHEET
1

OF
7

LOCATION OF REVISION LETTER WHEN SET
IS REVISED. SEE DIRECTOR'S ORDER #10B

THIS TYPE OF SCALE USED ON COVER SHEETS ONLY

SCALE OF MILES
1 0 1 2 3 4
1 0 1 2 3 4

SCALE OF KILOMETERS

April 2001

Chapter 2
Page 7
Exhibit 2-8
(1 of 3)
### A/E INFORMATION ON COVER SHEET

**IDENTIFY WHICH FIRM IS THE PRIME**

**WIDTH =**

\[
1\frac{3}{8}^\prime \times \# \text{ OF INFORMATION COLUMNS}
\]

<table>
<thead>
<tr>
<th>A/E FIRM</th>
<th>A/E CONTRACT NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRIME/ARCH:</td>
<td>CIVIL: MECHANICAL:</td>
</tr>
<tr>
<td>NAME</td>
<td>NAME</td>
</tr>
<tr>
<td>CITY, STATE</td>
<td>CITY, STATE</td>
</tr>
<tr>
<td>LANDSCAPE:</td>
<td>STRUCTURAL: ELECTRICAL:</td>
</tr>
<tr>
<td>NAME</td>
<td>NAME</td>
</tr>
<tr>
<td>CITY, STATE</td>
<td>CITY, STATE</td>
</tr>
</tbody>
</table>

**NUMBER OF SUBCONTRACTORS VARIES PER PROJECT**

<table>
<thead>
<tr>
<th>Mark</th>
<th>Sheet</th>
<th>REVISION</th>
<th>Date</th>
<th>Initial</th>
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</tbody>
</table>
SECOND SHEET TITLE BLOCK

A/E FIRM INFORMATION (WHEN REQUIRED)

.240 LETTERING HEIGHT/#3 PEN

.625 LETTERING HEIGHT

.500 LETTERING WIDTH

#5 PEN

WHEN SCALE IS SHOWN, USE BAR SCALE ON SECOND SHEETS. IF NOT TO SCALE, SHOW "NO SCALE" IN THIS LOCATION.

SCALE OF FEET

4 0 4 8

A/E FIRM

PRIME:
NAME
SUBCONTRACTOR
NAME

SUB SHEET NO.

DESIGNED:
SMITH

FARKASH

TECH. REVIEW:

DATE:
1/92

SIGNATURE REQUIRED FOR TECH REVIEW

.130 LETTERING HEIGHT/#0 PEN

.175 LETTERING HEIGHT/#2 PEN

E1

STATUE OF LIBERTY NATIONAL MONUMENT

TITLE OF SHEET

ELECTRICAL LEGEND AND ABBREVIATIONS

DRAWING NO.

356

41,019

PKG. NO.
142

SHEET
2

OF
7

APRIL 2001
APPROVAL AND REVISION BLOCKS

Approval and revision blocks are preprinted on the cover sheet or first sheet, as required (see Exhibit 2-C).

Approval Block. Use on all preliminary design and construction drawing sets. All preliminary design and construction drawings prepared by parks, System Support Offices, or the Denver Service Center require approval signatures.

Revision Block. Required for changes to construction drawings which have been issued for bid and therefore are official contract documents. Include:

- An identifying mark (a triangle with a number or letter, used to key the information in the revision block to the part of the drawing it pertains to)
- The sheet number(s) of the sheets with that change or addition
- A brief description of the revision
- The date of the revision
- The initials of the person responsible for the revision.

A completed block is shown in Appendix E.

The information in the revision block is keyed to the drawings by encircling the affected part of each drawing and placing a revision mark on or within the circle (See page 3 of Chapter 3 under "use of ink or pencil"). When major revisions are made to a sheet, a note "General Revision" above the title block is acceptable.
APPROVAL BLOCKS
(SAMPLE)

PRELIMINARY

RECOMMENDED: ___________________________  Date
Project Manager

APPROVED: _______________________________  Date
Superintendent

PRELIMINARY

RECOMMENDED: ___________________________  Date
Project Manager

RECOMMENDED: ___________________________  Date
Superintendent

APPROVED: _______________________________  Date
Regional Director

April 2001
APPROVAL BLOCKS
(SAMPLE)

CONSTRUCTION

QUALITY DESIGN CERTIFICATION

☐ Prepared in Accordance with Design Development (Title I) _______________________
☐ OR Drawing No.
☐ Variance from Design Development (Title I) Approved by Superintendent on _______ Date
☐ OR
☐ Construction Drawing Not Preceded by Design Development (Title I)

Project Manager __________________________ Date __________

REVISION BLOCK

<table>
<thead>
<tr>
<th>Mark</th>
<th>Sheet</th>
<th>REVISION</th>
<th>Date</th>
<th>Initial</th>
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</thead>
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<td></td>
</tr>
</tbody>
</table>
DRAWINGS REISSUED FOR BID

REISSUED BID PACKAGES: Drawings and specifications that did not make it through a successful first bid and are rebid are identified as a reissued bid package.

DRAWINGS: Whether or not changes are made to the drawings, a revision letter is added to the drawing number to show that the drawings are being reissued. On the cover sheet, an R is added to the old project number (JELA-133A-R) and a new solicitation number replaces the old one. If no changes are made to the drawings, the words "Reissued for bid, no changes to the drawings" and the date are added to the Revision Block. If changes are made to the drawings, the words "Reissued for bid," the sheet numbers of the revised drawings, and the date are added to the Revision Block.

SPECIFICATIONS: The project number and solicitation number are also changed on the Project Manual.

REVISION LETTER:

See Drawing and Map Numbers Guideline, Director’s Order 10B.

DRAWINGS FOR CONTRACT MODIFICATIONS

Drawings prepared to accompany a construction contract modification shall follow Director’s Order 10A. The contracting officer’s representative (COR) is responsible for submitting the drawings or sketches, as appropriate, for inclusion in the contract modification package. In most cases, the drawings or sketches will actually be prepared by the project designer. The drawings or sketches will be furnished to TIC (by whomever initially prepares these documents) for filming or filing, as appropriate, immediately after preparation to avoid loss. In the event changes are made to the design during the modification negotiation process, or if the modification is not executed, the COR is responsible for advising TIC of the changes. The COR is also responsible for incorporating the changes into the as-built drawings.

When sketches are used rather than standard drawing sheets, the sketches must include the project number, drawing number, project title, person responsible for drawing, and the date prepared.
NORTH ARROWS

When possible the drawings should be laid out so north is toward the top or left of the sheet. The orientation of north should be maintained throughout a set of drawings, if possible. When a north arrow is required, it is normally placed in the lower right-hand corner above the title block (see Page 3 of Exhibit 2-B). Recommended style for north arrows appears in Exhibit 2-D. When more than one north arrow is used on the same sheet, each arrow should be placed near the title of the specific view it orients (see "Specific View Titles," below).

SCALES

All scales should be graphic scales (see Exhibit 2-E). If a single scale applies to an entire sheet, place scale above the title block. If an entire drawing sheet is not to scale, the term "NO SCALE" should appear above the title block. If more than one scale is used on a sheet, place scales below the title of each section or detail. If a specific section or detail is not drawn to scale, the term "NO SCALE" should appear below the title of that section or detail. If more than one scale is used on a sheet, but one or more of them is used repetitively, group all scales above the title block, and reference each section or detail to the corresponding scale (see Page 4 of Exhibit 2-E).

Scales of associated drawings should be the same for all disciplines.

SPECIFIC VIEW TITLES

Instructions for drawing section or detail symbols are provided in Exhibit 2-F.
RECOMMENDED NORTH ARROWS

WHEN NORTH ARROW APPLIES TO ENTIRE DRAWING AND IS SHOWN ABOVE TITLE BLOCK, USE A $\frac{3}{4}$ CIRCLE.

WHEN NORTH ARROW APPLIES ONLY TO PORTIONS OF A DRAWING, IT SHOULD BE SHOWN IN VICINITY OF SPECIFIC PLAN TITLE, USING A $\frac{1}{2}$ CIRCLE.

BUILDING NORTH — THE NORTHERLY DIRECTION OF THE BUILDING DISTINGUISHED FROM THE GEOGRAPHIC NORTH.
COVER SHEET GRAPHIC SCALE

THIS SCALE IS USED ONLY ON COVER SHEETS

SCALE OF MILES

SCALE OF KILOMETERS

.130 LETTERING HEIGHT/\#0 PEN

.100 LETTERING HEIGHT/\#00 PEN

STANDARD GRAPHIC SCALE

1” WHERE POSSIBLE

SCALE OF FEET

.130 LETTERING HEIGHT/\#0 PEN

SCALE OF FEET

DO NOT SHOW TEXT SCALES (\(\frac{1}{4}” = 1’-0”\)). TEXT SCALES ARE NOT ACCURATE AS DRAWINGS ARE OFTEN REDUCED AND DISTORTED.
### STANDARD SCALES

#### COMMON ARCHITECTURAL & ENGINEERING SCALES

<table>
<thead>
<tr>
<th>Scale</th>
<th>Representation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\frac{1}{8}$&quot; = 1’−0”</td>
<td>8 0 8 16</td>
<td>SCALE OF FEET</td>
</tr>
<tr>
<td>$\frac{1}{4}$&quot; = 1’−0”</td>
<td>4 0 4 8</td>
<td>SCALE OF FEET</td>
</tr>
<tr>
<td>$\frac{1}{2}$&quot; = 1’−0”</td>
<td>2 0 2 4</td>
<td>SCALE OF FEET</td>
</tr>
<tr>
<td>$\frac{3}{4}$&quot; = 1’−0”</td>
<td>1 0 1 2 3</td>
<td>SCALE OF FEET</td>
</tr>
<tr>
<td>1” = 1’−0”</td>
<td>1 0 1 2</td>
<td>SCALE OF FEET</td>
</tr>
<tr>
<td>$1\frac{1}{2}$” = 1’−0”</td>
<td>12 6 0 12</td>
<td>SCALE OF INCHES</td>
</tr>
<tr>
<td>3” = 1’−0”</td>
<td>6 3 0 6</td>
<td>SCALE OF INCHES</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scale</th>
<th>Representation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1” = 10’</td>
<td>10 0 10 20</td>
<td>SCALE OF FEET</td>
</tr>
<tr>
<td>1” = 20’</td>
<td>20 0 20 40</td>
<td>SCALE OF FEET</td>
</tr>
<tr>
<td>1” = 40’</td>
<td>40 0 40 80</td>
<td>SCALE OF FEET</td>
</tr>
<tr>
<td>1” = 50’</td>
<td>50 0 50 100</td>
<td>SCALE OF FEET</td>
</tr>
</tbody>
</table>
PROFILE SCALES

Profiles are usually drawn with different horizontal and vertical scales. This is done to exaggerate the vertical dimensions so the profile can be easily drawn and read.

A few common scale combinations:

1” = 20’ Horiz.  1” = 40’ Horiz.  1” = 20’ Horiz.  1” = 100’ Horiz.

2’ Vert.  10’ Vert.  5’ Vert.  20’ Vert.

These should always be shown with a graphic scale as in this example:

![Graphic Scale Example]

Scale of Feet

April 2001
GROUPING MULTIPLE SCALES

MULTIPLE SCALES WILL BE LOCATED ABOVE THE TITLE BLOCK (IF POSSIBLE) AND WILL BE SHOWN AS FOLLOWS:

SCALE (C) 4 0 4 8 SCALE OF FEET

SCALE (B) 2 0 2 4 SCALE OF FEET

SCALE (A) 1 0 1 2 SCALE OF FEET

REFERENCE TO SCALES

WHEN USING MULTIPLE SCALES ON A DRAWING, THE SCALE SHOULD BE REFERENCED BELOW TITLE OF SECTION OR DETAIL AS SHOWN BELOW:

COLUMN BASE DETAIL

.130 LETTERING HEIGHT/#0 PEN

1/4 CIRCLE
SECTION OR DETAIL IDENTIFICATION SYMBOLS

SECTION IDENTIFICATION LETTER

SECTION TAKEN FROM THIS SHEET

SECTION SHOWN ON THIS SHEET

3 PART BUBBLE

2 PART BUBBLE

IDENTIFICATION LETTER AND SHEET NUMBERS SHOULD ALWAYS BE DRAFTED HORIZONTALLY, AS SHOWN BELOW:

NOTE
CIRCLES ARE $\frac{5}{8}$"; DETAIL OR SECTION LETTER CALLOUTS ARE .175 LETTERING HEIGHT/#2 PEN; SHEET NUMBER REFERENCES ARE .110 LETTERING HEIGHT/#0 PEN

April 2001
SECTION OR DETAIL IDENTIFICATION SYMBOLS

DETAIL REFERENCES SHOULD BE SHOWN AS FOLLOWS:

2 PART BUBBLE

3 PART BUBBLE

WHEN ENCLOSING AN AREA INDICATING AN ENLARGED DETAIL, THE OUTLINE SHOULD BE SHOWN AS A DASHED LINE.

DETAIL OR SECTION REFERENCES LOCATED IN ANY NOTE FORM SHALL BE SHOWN AS FOLLOWS:

CONCRETE WALK. SEE DETAIL 3/L7. MATCH LINES AND GRADES OF EXISTING CURB.
TYPICAL TITLES

TYPICAL TITLE FOR A SECTION (DESIGNATED WITH A LETTER):

```
A
C1
C2
5" CIRCLE
.175 LETTERING HEIGHT/#2 PEN
SECTION
SCALE A
3 PART BUBBLE
```

```
A
C2
SECTION
SCALE A
2 PART BUBBLE
```

TYPICAL TITLES FOR A DETAIL (DESIGNATED WITH A NUMBER):

```
2
C1
C2
DETAIL
NO SCALE
3 PART BUBBLE
```

```
2
C2
DETAIL
NO SCALE
2 PART BUBBLE
```

WHEN A SECTION OR DETAIL IS TAKEN FROM MORE THAN ONE SHEET AND A 3-PART BUBBLE IS USED:

```
2
C1
C3
C2
C9
DETAIL
NO SCALE
```

TYPICAL TITLE WITHOUT BUBBLE:

```
CONCRETE VALVE BOX
1 0 1 2
SCALE OF FEET
```

April 2001
BUILDING LINES

BUILDING LINES THAT ARE ASSOCIATED WITH THE CENTER LINE OF AN OBJECT SHOULD BE SHOWN AS A CENTER LINE. IF A BUILDING LINE IS NOT REPRESENTING A CENTER LINE, IT SHOULD BE SHOWN AS A PHANTOM LINE.

ALL BUILDING LINE REFERENCES SHOULD BE READ HORIZONTALLY.

MAJOR LINES SHOULD BE NUMBERED WITH LETTERS OF THE ALPHABET OR WHOLE NUMBERS. MINOR LINES APPEAR BETWEEN MAJOR LINES. A MINOR LINE SHOULD BE NUMBERED ACCORDING TO HOW FAR IT IS FROM THE PRECEDEING MAJOR LINE. THE NUMBERING OF MINOR LINES SHOULD REPRESENT THE NUMBER OF TENTHS OF THE DISTANCE BETWEEN MAJOR LINES.

MINOR LINE CALLOUTS, OR CALLOUTS WITH MORE THAN ONE NUMBER SHALL BE .140 LETTERING HEIGHT/#1 PEN.
3. DRAFTING PRACTICES

All NPS drawings are microfilmed and therefore must be capable of being reproduced as clear and legible half-size prints. This is particularly important for construction drawings being issued to prospective bidders as nominal half-size prints.

Consistent line density and clear, legible lettering are essential. Originals and photographic duplicates that cannot be reproduced as clear and legible half-size prints are unacceptable.

All NPS drafting practices apply to both manual and computer-aided drafting.

GENERAL

These drafting practices are to be followed:

- Maintain even line weight.
- Avoid line congestion.
- Match line weight when making additions or changes.
- Keep drawings clean and uncreased.
- Keep erasures at a minimum, with no ghosting.
- Maintain dark, clear, sharp, uniform lines to ensure good reproduction and microfilm.
- Differentiate outlines and section lines by varying the width of lines, not by changing densities; the density of the line should be constant.
- Use line work techniques for distinctive symbols and crosshatching.
- Do not use pencil for shading or toning.
- Ensure open spacing of lines and lettering.
- Clean out all graphics behind text to ensure good legible drawings.

ACTUAL ELEVATION VS. REFERENCE BUILDING ELEVATION

If a reference building elevation is set that is different from the actual elevation, it should be noted on the plan sheets.

ABBREVIATIONS

Words written in full are preferred. However, abbreviations may be used if necessary to conserve space and ensure neatness and readability. All abbreviations should be described in a legend and used consistently throughout a discipline. See Appendix C for NPS recommendations. Edit suggested abbreviations as needed.
ADHESIVE-BACKED MATERIALS

No adhesive-backed material or rub on transfers of any kind will be accepted on any final original. Adhesive backed strips applied to original drawings in order to file them in hanging drawing files (such as EASI FILE) are not acceptable.

COLORS USED IN THE REVIEW AND UPDATING OF DRAWINGS

Additions, changes, and corrections must be marked on check prints and as-constructed prints using the following color code:

- RED—indicates additions
- GREEN—indicates deletions
- BLUE—indicates general notation or specific instruction to draftsman
- YELLOW—indicates okay as shown (use when necessary)

DIMENSION FORMAT

All dimensions 1'-0" and over should be called out in feet and inches. If a measurement other than feet and inches is accepted industry-wide to describe a product or spacing, the common measure should be used. For example:

48" pipe (not 4'-0" pipe)
16" o.c. (not 1'-4" o.c.)

Both slash marks and arrows are acceptable as line terminators as long as they are consistent within a discipline.

Survey and site work layout dimensions should be feet and decimals.

ENLARGED DETAIL:

If a detail of a certain item is to be enlarged, it should be shown with the same orientation as the item from which it was taken. It should not be turned 90 degrees or shown in reverse direction.

LAYOUT LINES

Layout lines and guidelines used in preparing originals must be invisible on reproduced drawings and microfilm.

NEW WORK AND EXISTING CONDITIONS

New work should be easily distinguishable from other information shown on the drawings. Show new work at 100% (unscreened) and show existing conditions, including text, screened at 50%. Background information shown for orientation or clarification may be screened at 50%.

Survey drawings should be shown at 100% (unscreened) to be screened later if incorporated into design drawings.

April 2001
DRAWINGS VS. SPECIFICATIONS

Limit text within the drawings to the required notation, avoiding duplication of information within the drawings and the written specifications.

LETTERING - SIZES AND PEN Weights

The following pen and lettering sizes are recommended for full sized drawings so that text will be easily readable after drawings are reduced to half-size. No line weight should be less than .012" in thickness (or #00 pen). When possible use .014" in thickness (or #0 pen).

Use only one type of lettering style, vertical and all uppercase.

Maintain a minimum lettering height of:

* Mechanical - .100; when possible, use .130
* Freehand - 1/8"

For each numeral in a fraction, maintain a minimum lettering height of:

* Mechanical - .100
* Freehand - 1/8"

* Refers to Leroy® and computer aided drafting.

SYMBOLS

Preferred symbols and line symbols with abbreviations for the most common drawing elements are in Appendix C. All symbols used should appear in a legend and should be used consistently throughout a discipline. Edit suggested symbols as needed.

USE OF COLORED INK OR PENCIL

The use of colored inks or pencils on final original drawings is prohibited.

USE OF INK OR PENCIL

Waterproof ink is recommended for all drafting surfaces. If drafting pencils are used on polyester materials, plastic lead pencils should be used. Felt-tip pens/markers should not be used.

A combination of ink and pencil should not be used on the same drawing sheet.

Soft black pencils should be used on the backs of drawings to identify revisions made after the drawings are issued for bid.

The use of grease pencils is unacceptable.
LINE SYMBOLS, LINE WEIGHTS
AND LETTERING ORIENTATION

LINE SYMBOLS

MATCH LINE
CENTER LINE
PHANTOM LINE
BUILDING LINE
INVISIBLE OR HIDDEN CONSTRUCTION
BREAK LINE
PARTIAL BREAK/(CUT AWAY)

LINE WEIGHTS

LIGHT *
#00 (.012)
#0 (.014)
#1 (.020)
#2 (.024)
#3 (.031)
#5 (.051)

* MINIMUM LINE WEIGHT ACCEPTED BY NPS

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DISCIPLINE SPECIFIC GUIDELINES

Site Work Drawings (Landscape Architecture, Civil, and Survey)

Slope designation of a utility line or a grade line of a road should be expressed as a percent of slope and the direction of the slope should be designated by a + or - sign with an arrow. A positive slope is uphill in the direction of increasing station.

Slope designation of earthwork may be shown as run:rise (for example, 3:1, 4:1).

In special instances, slopes may be designated as inches of rise or fall per foot of run. For clarity, the direction of the slope should be designated with an arrow (for example, 1/4 inch per foot →).

Architectural Drawings

1. On the first sheet of the architectural drawings, provide Building Code Data, including:
   - Name and date of the major building code(s) to which the design conforms
   - Occupancy Group
   - Construction Type
   - Square footage of each building

Structural Drawings

1. **General Notes**: should contain, as a minimum:
   - Design loads
   - Name and date of model building code and/or design specifications to which the design conforms
   - Soil bearing capacity or other foundation design values
   - Structural materials description (for example, ASTM number, allowable stresses, etc).

2. **Showing Elevations on Drawings**:

   **Plan Sheets**: Elevations should be shown on plan sheets (e.g. top of beam, top of footing, top of wall), as well as sections and details.

   **Decimal versus Feet and Inches**: The method of expressing elevations should match the architectural drawings or other drawings to which the structural drawings pertain. For instance, if the building elevations on the architectural sheets are in feet and inches, the building elevations on the related structural drawings should be in feet and inches also. Elevations shown should be consistent throughout the set of drawings.

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3. Sections and Details:

**Showing Architectural Features:** Sections and details may show architectural features in order to enhance the information being conveyed. These architectural features should not be shown in detail but rather outlined using a phantom line.

**Poche’ (material symbols):** All structural materials shown in section should be poche’d. When two structural steel members are shown back to back, reverse and stagger the hatching in order to increase clarity.

**Use of O.C.:** It is normally not necessary to use O.C. to annotate "on center" when using "@" symbol. It is appropriate to state O.C. in cases when panelized or modular materials are being applied to framing.

4. Dimensions for Spacing of Structural Members:

**Dimensions 2 feet or less:** Indicated in inches.

**Dimensions greater than 2 feet:** Indicated in feet and inches.

5. Nominal Versus Actual Size Wood:

**Nominal Size:** Nominal size lumber and timber should be indicated **without** tick marks (e.g. 2x6, 10x10).

**Actual Size:** Actual size lumber and timber, including glued laminated timber, should be indicated **with** tick marks (e.g. 8"x8", 1 3/4", 7 3/4").

Note: For projects which contain both actual size and nominal size lumber, include a statement in the General Notes explaining this convention.
SHOWING MEMBERS IN FRAMING PLANS:

Single Members: Member should be shown as a solid line without span arrows.

Repetitive Members:

Pre-Manufactured Materials: Members should be shown as the first and last two members of the layout with member identification, distance between members, how many, and spacing.

'Off-the-shelf' Materials (e.g. lumber framing): Members should be shown as one in the middle of the layout with leaders to the edges, member identification and spacing.
### Structural Steel Shape Designations

<table>
<thead>
<tr>
<th>DESIGNATION</th>
<th>TYPE OF SHAPE</th>
<th>DESIGNATION</th>
<th>TYPE OF SHAPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PL $\frac{1}{2} \times 18$</td>
<td>PLATE</td>
<td>HP 14x73</td>
<td>HP SHAPE</td>
</tr>
<tr>
<td>L 6x6x$\frac{3}{4}$</td>
<td>EQUAL LEG ANGLE</td>
<td>C 12x20.7</td>
<td>AMERICAN STANDARD CHANNEL</td>
</tr>
<tr>
<td>L 6x4x$\frac{5}{8}$</td>
<td>UNEQUAL LEG ANGLE</td>
<td>MC 12x45</td>
<td>MISCELLANEOUS CHANNEL</td>
</tr>
<tr>
<td>BAR 1Φ</td>
<td>SQUARE BAR</td>
<td>MC 12x10.6</td>
<td></td>
</tr>
<tr>
<td>BAR $\frac{1}{4}$</td>
<td>ROUND BAR</td>
<td>W 24x76</td>
<td>W SHAPE</td>
</tr>
<tr>
<td>BAR $2\frac{1}{2}$</td>
<td>FLAT BAR</td>
<td>W 14x26</td>
<td></td>
</tr>
<tr>
<td>ST 12x50</td>
<td>STRUCTURAL TEE CUT FROM S SHAPE</td>
<td>M 8x18.5</td>
<td>M SHAPE</td>
</tr>
<tr>
<td>WT 12x38</td>
<td>STRUCTURAL TEE CUT FROM W SHAPE</td>
<td>M 10x9</td>
<td></td>
</tr>
<tr>
<td>WT 7x13</td>
<td></td>
<td>M 8x34.3</td>
<td></td>
</tr>
<tr>
<td>S 24x100</td>
<td>S SHAPE</td>
<td>MT 4x9.25</td>
<td>STRUCTURAL TEE CUT FROM M SHAPE</td>
</tr>
<tr>
<td>PIPE 4 STD.</td>
<td>PIPE</td>
<td>MT 5x4.5</td>
<td></td>
</tr>
<tr>
<td>PIPE 4X-STRONG</td>
<td>PIPE</td>
<td>MT 4x17.15</td>
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</tr>
<tr>
<td>PIPE 4XX-STRONG</td>
<td>PIPE</td>
<td>TS 4x4x.375</td>
<td>STRUCT. TUBING: SQ</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TS 5x3x.375</td>
<td>STRUCT. TUBING: REC.</td>
</tr>
</tbody>
</table>

**Standard Abbreviations Given in This Table Designate Rolled Steel Sections on Drawings That Identify the Section Group Without Reference to the Manufacturer.**

When the length of a rolled member is given, use feet and inches thus: W 24x76x6’–10”, or L 2x2x$\frac{1}{2}$x1’–11\(\frac{1}{2}\)” or 2–L 6x4x$\frac{1}{2}$x0’–8”, or PL $\frac{1}{2}$x10x0’–11\(\frac{1}{2}\)”.

For practically all other dimensions on structural steel (except depth of sections, pipe diameters, holes, etc.) use feet and inches when 1’–0” or over, and inches only when less than one foot: Thus 7\(\frac{1}{2}\)”.

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4. ARCHIVAL QUALITY

GENERAL

The National Park Service is responsible for the lifetime administration and maintenance of its buildings. Therefore, it is imperative that the material used for that documentation meets a minimum 100 year life expectancy.

The archival quality of drawings is important because various reproduction methods, such as diazo printing and wash-off photographic processes, do not produce acceptable archival products. The National Park Service will not accept as an archival product any drawing which has been prepared using a spray fixative or spray coating.

WET INK PLOTTERS AND INK JET PRINTERS

Drawing sheets produced using either wet ink plotters or ink jet printers are acceptable as long as the ink is waterproof, pigmented, is a permanent base ink, and is not diluted. Lettering and line density shall be 100% black. Drawings submitted using the wet ink process shall be printed or plotted on high quality vellum, Clearprint 1000H or approved equal, or on translucent drafting mylar with a matte face surface with a minimum thickness of .003 inch and a maximum thickness of .004 inch.

Screen patterns shall be 50% dot with no less than 85 dots per inch and no more than 120 dots per inch relative to line weights being used. Each dot shall be sharp, clear, and with a definite visual dot separation of each dot. In some cases computer generated screen patterns which use a combination of pen sizes and percentage of screen and which are produced on wet ink plotters or ink jet printers may be acceptable. Screen patterns shall be of consistent line and lettering quality vertically, horizontally, and diagonally.

USE OF PHOTOGRAPHIC REPRODUCTION

In some cases, photographic reproduction methods may be used as an effective tool in the preparation of a set of drawings. For instance, if several drawing sheets require the same base sheet information (a floor plan, for example), duplicates made by photographic techniques may be used. In all cases, the end product must meet the same archival standards as original tracings.

Photographic reproducibles shall be .004 inch thickness, polyester base matte film, and photographically developed, fixed and washed. Lettering and line work must be sharp and clear, not over or under exposed, and reversed reading. Finished product shall be free of chemical stains, dirt, wrinkles, and other visual defects that would affect the quality of reproduction. Photographic wash off or moistline eraser film will not be acceptable as a final product.

If photo art/tint screens are used on photographic mylar, the screens shall be 50% dot with no fewer than 100 dots per inch, and no more than 120 dots per inch for a standard 22"x34" sheet or with no fewer than 133 dots per inch and no more than 150 dots per inch for a half-size drawing.

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When an A/E wants to use "photo drawing techniques" (for example, photos of a site or building), they must supply a high quality, half-size, photographic mylar reproducible of the photo drawing sheet, in addition to supplying the full-size original to the National Park Service. When photographs are used as information on a photographic sheet, the photos shall be screened by using a magenta or gray halftone screen with 120 dots per inch, with either conventional square dots or elliptical dots, for both standard 22”x34” drawings and for half-size drawings. The half-size reproducible must be capable of producing clear, legible prints by using the diazo or xerographic printing process.

UNACCEPTABLE PRODUCTS

Design and construction drawings produced by using computerized methods, such as impact printer plotters, electrostatic, laser, or xerography, and submitted as final products, have presented many problems and concerns. Some of the problems associated with these methods are image transfer with the stacking of drawings, image smearing, rubbing off the image with routine handling, flaking and peeling during reproduction, poor clarity of lettering and detail, uneven density, hollowing out of lettering and line work, poor image anchorage to the sheet, and quality variation over time.

Some of the problems associated with the xerographic process are documented in American Society of Testing and Materials (ASTM) Specification D-3458, "Standard Specification for Copies from Office Copying Machines for Permanent Records," or National Technical Information Service (NTIS) Publication PB90-171836, "Archival Copies of Thermofax, Verifax, and Other Unstable Records." The NTIS publication also describes the use of the tape test of dry image anchorage of the copier. (Copies of this document may be attained through the NPS Technical Information Center, Denver Service Center).

Based on the problems associated with the technology described in this section, design and construction drawings produced or reproduced by using any of the unacceptable methods noted above will not be accepted as a final archival product or as an original drawing.
CHAPTER FIVE

Construction Drawings
5. CONSTRUCTION DRAWINGS

SHEET ORDER

Each discipline's drawings should be organized in a logical sequence which agrees with the drawings of other disciplines in the drawing set. Each discipline should begin with an overview and then become more detailed. Discipline specific notes, legends, code references, and abbreviations should be located on the first sheet of each discipline. A list of abbreviations and a legend may be combined with other disciplines into an overall listing, which is shown at the beginning of the overall set of drawings in the General section.

A typical drawing set should be in the following order:

<table>
<thead>
<tr>
<th>TYPE</th>
<th>SUBSHEET</th>
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<tr>
<td>*</td>
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<td>Index</td>
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<tr>
<td></td>
<td>General...........................................G</td>
</tr>
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<td>CivILC</td>
<td>Roads</td>
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<tr>
<td></td>
<td>Parking</td>
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<td></td>
<td>Site Utilities</td>
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<td>Plumbing/Piping</td>
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<td>Fire Protection</td>
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<td>***</td>
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<td></td>
<td>Intrusion Detection</td>
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<td></td>
<td>Lightning Protection</td>
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</tbody>
</table>

* The index should be placed on the cover sheet if possible.
** Plans of a structural set should be placed before the sections and details sheets (i.e. foundation, floor, and roof framing plans should precede any of the associated sections and details).
*** The following sequence should be used: legend and abbreviations, general notes, site plan, power plan, one line diagram, lighting plan, fire and intrusion plan, lightning protection, schedules, control wiring diagrams, and control cabinet layouts.
SUBSHEET DESIGNATION AND NUMBERING

Subsheet numbers should normally begin with the first letter of the discipline. For example, civil engineering work should begin with C, landscape design work with L, etc. If a discipline has more than one subfunction, these may have separate subsheet letters. Whole numbers should normally be used to number subsheets (for example M1, M2, etc.). If the project is divided into discrete areas, the designers may choose to use fractional subsheet numbers to differentiate the areas (for example A1.1, A2.1, etc.)
CHAPTER SIX

Drafting and Detailing References
6. DRAFTING AND DETAILING REFERENCES

The following is a list of detailing manuals that are used by the National Park Service in the preparation of drawings. The use of the latest edition of these manuals is recommended as a guideline.

STRUCTURAL

CONCRETE: American Concrete Institute (ACI) Standard, Details and Detailing of Concrete Reinforcement, ACI 315

ACI Detailing Manual, SP-66

STEEL: American Institute of Steel Construction, AISC, Detailing for Steel Construction

American Welding Society, Symbols for Welding and Nondestructive Testing, ANSI/AWS A2.4

American Welding Society, Structural Welding Code/Steel, ANSI/AWS D1.1

TIMBER: American Institute of Timber Construction, Timber Construction Manual, AITC 104, Typical Construction Details


Designing and Detailing Masonry, by Christine Beall

PRECAST CONCRETE: Prestressed Concrete Institute, PCI Drafting Handbook, MNL-119

ELECTRICAL: ANSI Y32.2 (Graphic Symbols for Electrical and Electronic Diagrams)

ANSI Y32.9 (Control)

MECHANICAL:

HVAC: ASHRAE Handbook - Fundamentals, Abbreviations and Symbols

Plumbing: ASPE Data Book

Plumbing Fixtures: ANSI Y32.4, Graphic Symbols for Plumbing Fixtures

Fire Sprinkler: NFPA 170, Standard for Firesafety Symbols
APPENDIX A

General Materials Symbols
TYPICAL MATERIAL SYMBOLS

CONCRETE  STEEL  SAND OR GROUT OR MORTAR
SELECT BACKFILL  BACKFILL  AGGREGATE
EARTH SURFACE  ROCK SURFACE  GRAVEL/DRAIN ROCK
INSULATION—RIGID  INSULATION  GYPSUM BOARD
PLASTER  BRICK (SECTION)  CMU (SMALL SCALE)
WOOD FRAMING  BLOCKING  FINISH WOOD
PLYWOOD
APPENDIX B

Sample Survey Sheets

Sample Survey Index Sheet
Sample Topographic Survey (Developed Area)
Sample Topographic Survey (Undeveloped Area)
APPENDIX C

Standard Abbreviations, Standard Symbols, and Sample Construction Drawings

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<tr>
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<td>C1</td>
<td>SAMPLE ABBREVIATION SHEET</td>
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<td>C12</td>
<td>SAMPLE PLAN AND DETAILS FOR ROADWAY SIGNS AND PAVEMENT MARKINGS</td>
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<td>L1</td>
<td>SAMPLE SITE PLAN BUILDING TERRACE</td>
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<td>S2</td>
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<td>SAMPLE ROOF BRACING AND DIAPHRAGM PLAN AND JOIST BEARING DETAILS</td>
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<td>E6</td>
<td>SAMPLE FIRE / INTRUSION ALARM, RISER DIAGRAM, AND LIGHTING PROTECTION</td>
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Note:
These drawings are a sampling of design work of all disciplines for the National Park Service. They are not meant to represent a complete set of construction drawings. Each sheet should be viewed as an individual sheet representing good design drafting practices. Section and detail bubbles, sheet numbers, subsheet numbers, etc., will not cross reference.
GRAND TETON NATIONAL PARK

INDEX

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PROJ. NO. GRTE108
14431B160092123
SITE WORK GENERAL ABBREVIATIONS

NOTE

USE OF PERIODS IN ABBREVIATIONS IS OPTIONAL.
SITE WORK SYMBOLS

UTILITY LINE SYMBOLS

- **6” ch W**
  - Waterline with Type of Pipe and Diameter
- **6” ch RW**
  - Reclaimed water line with Type of Pipe and Diameter
- **8” PVC S**
  - Gravity sewer line with Type of Pipe and Diameter
- **4” PE FM**
  - Sewer force main with Type of Pipe and Diameter
- **18” RCP ST**
  - Storm drain with Type of Pipe and Diameter
- **4” PVC EMT**
  - Drain line with Type of Pipe and Diameter
- **2” ch LP**
  - Liquid Propane gas line with Type of Pipe and Diameter
- **2” ch A**
  - Air line with Type of Pipe and Diameter
- **4” STL F**
  - Fuel line with Type of Pipe and Diameter
- **AC**
  - Aerial (Overhead) Electrical
- **UC**
  - Underground Electrical
- **AT**
  - Aerial (Overhead) Telephone
- **UT**
  - Underground Telephone
- **AT & E**
  - Aerial Telephone and Electric
- **UT & E**
  - Underground Telephone and Electric

NEW VERSUS EXISTING UTILITY LINES

- **6” ch W**
  - Water line with Type of Pipe and Diameter
- **6” ch W**
  - Existing water line with Type of Pipe and Diameter

UTILITY LINES (SURVEYS)

- **6” ch RW**
  - (Existing) reclaimed water line with Type of Pipe and Diameter

TYPE OF PIPE

- **6”**
  - Water line with Diameter
- **6”**
  - Existing reclaimed water line with Diameter

ABANDONED UTILITY LINES

- **4” ch S**
  - Existing utility (abandoned)
- **4” ch S**
  - Existing utility to be abandoned
- **18” RCP ST**
  - Existing utility to be removed

UTILITIES WITH DIFFERENT SYMBOLS FOR NEW AND EXISTING

- **FIRE HYDRANT**
  - Existing fire hydrant
- **YARD HYDRANT**
  - Existing yard hydrant
- **VALVE**
  - Existing valve
- **CLEANOUT**
  - Existing cleanout
- **MANHOLE**
  - Existing manhole

CONTOURS

#3 PEN

#1 PEN

Existing/New Intermediate contour (Existing-Solid, New-Solid)

Existing/New Index Contour (Existing-Solid, New-Solid)

STATIONING

Station labeling should be placed on the right side of alignments, whenever possible, relative to the direction of increasing stationing, often referred to as the construction layout direction of an alignment. See above road example, reference to direction left or right of a particular alignment always applies to the increasing stationing direction of an alignment.

NOTE

For utility line types not shown, use similar line symbol to examples shown.

DESIGNER NOTE

Legend sheet should include only symbols used on each specific project.

OTHER SYMBOLS

- **W**
  - Water
- **R**
  - Reducer
- **P**
  - Plugged or capped line
- **S**
  - Screened end

ELECTRICAL SITE WORK SYMBOLS

- **△**
  - Pole mounted transformer
- **□**
  - Pad mounted transformer
- **P**
  - Pullbox, 1 indicates pullbox number
- **E**
  - Electrical manhole
- **S**
  - Splice box
- **G**
  - Guy Wire

SLOPES AND BATTERS

Express slopes and batters as the ratio of the horizontal run to the vertical rise. (For example: 2:1)

SLOPES IN PLAN VIEW

- **SLOPE**
  - OR
  - **S = 2.0**
  - OR
  - **S = 2.0**

PLAN

PLAN

PLAN

DATE: 10/94

NAME OF PARK

SYMBOL SHEET

C2

SAMPLE SHEET

41,001

DESIGNER: C. JOE

DESIGNER: C. JOE

REV. SHEET NO.

399

REV. SHEET NO.

399

SYMBOL NO.

41,001

SYMBOL NO.

41,001

308

13
### SECTION TABLE

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<td>STA 13+45 to STA 19+04.33</td>
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### NOTES

1. The above table does not compensate for intersection and drainage structure variability, see sheets C2 and C3 for intersection and drainage structure layouts.

2. Twenty feet transitions shall be provided whenever applicable, at locations where one typical cross section ends and another typical cross section begins.

3. Starting and ending stations for typical cross sections shall be field adjusted.

4. See sheets C9 through C9 for 50' A-Line cross sections.

### TYPICAL PAVEMENT CONNECTION DETAIL

- **Proposed Roadway**
  - Existing Aggregate Concrete Pavement
  - Existing Subgrade
  - Existing Shoulder

- **Existing Edge of Asphalt Concrete Pavement**
  - Existing Aggregate Concrete Pavement
  - Existing Subbase
  - Existing Subgrade

- **NEW ASPHALT CONCRETE PAVEMENT**
  - NEW AGGREGATE BASE

- **NEW ASPHALT CONCRETE PAVEMENT**
  - NEW AGGREGATE BASE

- **SLOPE ROUNING CHART**
  - **FILL**
    - **SLOPE**
      - 0'-2' 3'1:1 or 4:1 1/1 OR 4:1 1/1
      - 2'-4' 3'1:1 or 4:1 2/2 4/4 OR 4:1 2/2
      - 4'-6' 3'1:1 or 4:1 3/3 6/6 OR 4:1 3/3
      - 6'-10' 3'1:1 6/6 10/10 1/1
    - **SLOPE**
      - 0'-2' 3'1:1 or 4:1 1/1 OR 4:1 1/1
      - 2'-4' 3'1:1 or 4:1 2/2 4/4 OR 4:1 2/2
      - 4'-6' 3'1:1 or 4:1 3/3 6/6 OR 4:1 3/3
      - 6'-10' 3'1:1 6/6 10/10 1/1
NOTES
1. STA 12+50 TO 22+70.51 the utility line shown is the location of the 4" water line.
2. STA 22+70.51 TO 24+00 the utility line shown is the location of the 8" water line.
3. SEE SHEET C3 FOR ROADWAY AND DRAINAGE LAYOUT AND COORDINATE INFORMATION IN THIS AREA.
POINT OF CONNECTION (P.O.C.)

P.O.C. is existing 1½" copper service stubbed out at approximately 24' depth of burial.

Contractor shall provide and install connection 1½" type-K copper service, through meter and backflow preventer, new 1½" PVC mainline, 1½" manual drain valve, and extend mainline toward control valves @ 24' minimum depth of burial. Provide 3 cubic feet drain sump at manual drain valve.

IRRIGATION LEGEND

- Salco high-temperature PVC flex hose (drill line).
- AR-DCO-1HT, resistant to UV radiation, compatible with schedule 40 pipe fittings, infused with algaecide and fungicide to chemicals/fertilizers. See specifications and details for emitter types and fittings.
- Flushing end plug. See details and specifications.
- Rainbird Q.C. quick coupling valves, JRC, with standard locking collar, JKN coupler key.
- Rainbird PEB series remote control valves, sized as shown.
- Kent C-700C 2½" positive displacement water meter.
- Ferco model BOSY 1½" double check valve assembly and related equipment. See details and specifications.
- Class 180 PVC pressure mainline, bell end, solvent weld, with schedule 40 PVC fittings, sized as shown. Throttle block all turns and ends.
- Class 160 PVC slip-nip, 67 for mainlines, control wire conduit and drip laterals.
- Nibco 1½" angle, manual drain valve. See details and specifications.
- Rainbird 5C-24-9H automatic controller, wall mount with lockable cabinet.

114 GPH / GPM = gallons per hour
7.8 GPM / GPM = gallons per minute

See sheet L24 for continuation of system.

Scale of Feet

20 30 40
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<td>E22</td>
<td>LIQUID COOLANT</td>
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<td>NEMA</td>
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<td>E24</td>
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<td>NLC</td>
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<td>ND</td>
<td>NUMBER</td>
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<td>E26</td>
<td>LIQUID COOLANT</td>
<td>NDO</td>
<td>NORMALLY OPEN</td>
</tr>
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<td>E27</td>
<td>LIQUID COOLANT</td>
<td>NPS</td>
<td>NATIONAL PARK SERVICE</td>
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<td>E28</td>
<td>LIQUID COOLANT</td>
<td>O.G.</td>
<td>ON CENTER, OVERCURRENT</td>
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<td>OH</td>
<td>OVERLOAD</td>
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<td>E30</td>
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<td>OLT</td>
<td>OVERLOAD CONTACTS, OVERLOAD RELAY</td>
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<td>P</td>
<td>PUMP, # INDICATES UNIT NUMBER</td>
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<td>PBX</td>
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<td>PRIMARY</td>
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<td>FLOOR</td>
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**ELECTRICAL ABBREVIATIONS**

PS-# | PRESSURE SWITCH, # INDICATES UNIT NUMBER |
---|---|
PSI | POUNDS PER SQUARE INCH |
PT | POTENTIAL TRANSFORMER |
PUC | PUBLIC UTILITIES COMMISSION |
PUO | PUBLIC UTILITY DISTRICT |
PVC | POLYVINYL CHLORIDE |
PRL-# | RELAY, # INDICATES UNIT NUMBER |
PRF | PRIMARY |
PRJ | PROJECT: PROJECT: PROJECT |
PS#-# | PRESSURE SWITCH, # INDICATES UNIT NUMBER |
U3MS | UNDERGROUND THREE-PHASE SECONDARY |
V | VOLTS |
VA | VOLT AMPERES |
VAC | VOLTS, ALTERNATING CURRENT |
W | WATTS, WATT: WIDE |
W | WITHE | ELECTRIC WATER HEATER |
WP | WEATHERPROOF |
WPH | WEATHERPROOF |
| PHASE |
Z | SINGLE PHASE |
| THREE PHASE |
| NUMBER |

**DESIGNER NOTE**

LEGEND SHEET SHOULD INCLUDE ONLY SYMBOLS USED ON EACH SPECIFIC PROJECT.
RELAY AND CONTROL SCHEDULE

IR  - INDUCTION RELAY, WITH INTERCHANGEABLE 25 AMPERE DOUBLE BREAK CONTACTS, 120 VAC, COIL, 24V SECONDARY COIL, B/W CONTROLS DIVISION, SECTION 1030
IR1 - P/N 1500-D-L1-52-DC-X (SHOWN WITH POWER OFF AND SECONDARY COIL OPEN CIRCUIT FROM HIGH LEVEL ALARM PRESSURE SWITCH PS-1)
IR2 - P/N 1500-D-L1-52-DC-X (SHOWN WITH POWER OFF, WHEN AC POWER IS APPLIED AND PS-3 INDICATING LOW WATER, CONTACTS WILL REVERSE SO THAT N.O. CONTACT TO AST OPEN AND N.C. CONTACT TO 10 LEVEL ALARM CLOSES.)
IR3 - P/N 1500-C-L1-52-DC-X (SHOWN WITH POWER OFF, WHEN AC POWER IS APPLIED THEN PS-2 BEING CLOSED (LOW WATER) THEN IR3 CONTACTS WILL CLOSE TO INITIATE PUMP MOTOR START UP, WATER RISING WILL OPEN PS-2 AND PUMP WILL BE STOPPED.)
IR4 - P/N 1500-D-L1-52-DC-X (SHOWN WITH POWER OFF, WHEN POWER IS APPLIED AND CRT ENERGIZED THEN IR4 CONTACT WILL BE CLOSED FOR NO ALARM AND ALARM LIGHT WILL BE OFF.)

CR - CONTROL RELAY, 10 AMPERE CONTACTS, 120V COIL, SQUARE D CLASS B501
MLM - MOTOR LOAD MONITOR, OVER AND UNDER LOAD, TIME MARK MODEL 400
MS - MOTOR STARTER, COMBINATION TYPE WITH CIRCUIT BREAKER AND BIMETALIC OVERLOAD RELAY, THERMAL UNITS PER MANUFACTURER'S RECOMMENDATION.
MS1 - NEMA SIZE 1 4 HP MOTOR
MS2 - NEMA SIZE 2 5 HP MOTOR (N.C.)
RTI - RUN TIME INDICATOR 0-99.999 HOURS, 120V
CT - CURRENT TRANSFORMER, TIME MARK MODEL 276A
1/4 HP P/N 276A-15
1/2 HP P/N 276A-40
FIRE ALARM SYSTEM FUNCTIONS AS FOLLOWS:
1. CONDENSATION AND SMOKE DETECTORS ACTIVATE ALARM BELLS ON BUILDING AND SHUT DOWN HVAC SYSTEM.
2. FT, FF/PR AND M5 DEVICES ACTIVATE ALARM BELLS, TELEPHONE DIALER, AND WSP SHUNT TRIP BREAKERS.
3. FLOW SWITCH ACTIVATES FIRE PUMP THROUGH FIRE PUMP CONTROLLER, ALARM BELLS, TELEPHONE DIALER AND WSP SHUNT TRIP BREAKERS.

FIRE/INTRUSION ALARM SYSTEM RISER DIAGRAM
NO SCALE

LIGHTNING PROTECTION

NOTES
1. ROOF PENETRATIONS (BONDED TO CONDUCTOR AS SHOWN)
   • OUTSIDE AIR INTAKE
   • 4" VENT THRU ROOF
   • 2" VENT THRU ROOF
   • EXHAUST FAN
   • CONDENSING UNIT
   • 18" OIA. GAS VENT
   • 10" OIA. GAS VENT
   • ELEVATOR SHAFT VENT
   • DRYER VENT
   • 4" ROOF DRAIN
   • 6" GALVANIZED DOWNSPOUT WITH COLLECTOR HEAD
   • GALVANIZED FLASHER AND CROCKET AT SKYLIGHTS
   • PVC THRU-ROOF CONNECTOR
   • RIGID SHIMPLES 6/12 INCH
   • MEMBRANE ROOTING (FLAT)

2. LIGHTNING PROTECTION SYMBOLS
   • AIR TERMINALS
   • CONDUCTOR
   • DRIVEN GROUND ROD

3. MOUNT AIR TERMINALS ON ADHESIVE AIR TERMINAL BASE.

4. FASTEN EXPOSED CABLES WITH ADHESIVE CABLE HOLDERS NOT MORE THAN 3 FEET APART.

5. DOWN CONDUCTORS TO BE IN PVC CONDUIT, PAINT TO MATCH SURROUNDINGS ALONGSIDE DOWN SPOUT WHERE AVAILABLE, USE COLLECTOR HEAD TO PENETRATE PARAPET.

6. DOWN CONDUCTOR AT SOUTHEAST CORNER (ON OLD FORT STREET) TO START AT THRU-ROOF CONNECTOR, HENCE IN PVC TO CORNER OF DRIVEWAY WHERE GROUND RED IS TO BE DRIVEN.

SCALE OF FEET

5 0 2 10

DESIGNED:
SHEET NO.
SAMPLE:
NAME OF PARK

41-001
E6
999
999
43
APPENDIX D

Sample Amendment or Modification

SAMPLE COVER SHEET
SAMPLE REVISED SHEET
APPENDIX E

Sample As-Constructed Drawing Cover Sheet

SAMPLE COVER SHEET
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