



**Baer Engineering**  
*and Environmental Consulting, Inc.*

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February 19, 2016

City of Austin  
Public Works Department  
505 Barton Spring Rd #1300  
Austin, TX 78704

*Sent by email to Jules.Parrish@austintexas.gov.*

Attention: Ms. Jules Parrish, MWR

Subject: **Tree Removal Plan**  
Hornsby Bend Biosolids Management Plant Ponds 1E, 1W, & 2  
2210 South FM 973  
Austin, Texas 78725  
**Baer Engineering Document No. 142069-8i.014**

Dear Ms. Parrish:

Baer Engineering and Environmental Consulting, Inc. (Baer Engineering) is pleased to provide the attached Tree Removal Plan. Baer Engineering visited the Hornsby Bend Biosolids Management Plant (HBBMP) on June 3, 16, and 19, 2015. Based on our field observations and the Texas Commission on Environmental Quality's (TCEQ) mandated vegetation removal around the ponds at HBBMP, we have provided the attached Tree Removal Plan that includes 1) a tree survey of dead, diseased, and damaged trees, 2) details on removal of dead trees and pruning of damaged trees, and 3) a text document to accompany the tree survey and plan details methods. We have drafted our removal plan in a format that can be expanded upon for bidding purposes.

Baer Engineering thanks you for the opportunity to work on this project. If you have questions or comments about this document, please feel free to contact me at 707.616.8583 or [dsperry@baereng.com](mailto:dsperry@baereng.com).

Respectfully Submitted,  
**BAER ENGINEERING & ENVIRONMENTAL CONSULTING, INC.**

David Sperry  
Wildlife/Conservation Biologist

Attachment: Tree Removal Plan

# Tree Removal Plan

## Hornsby Bend Biosolids Management Plant

Prepared for:



Austin Water Utility  
2210 South FM 973  
Austin, Texas 78725



Baer Engineering Project No. 142069-8.014  
February 19, 2016



**Baer Engineering and Environmental Consulting, Inc.**

7756 Northcross Drive, Suite 211, Austin, Texas 78757  
Phone 512/453-3733 Fax 512/453-3316

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## 1.0 SUMMARY

Baer Engineering prepared this Tree Removal Plan report to supplement the tree survey. The tree survey identified 101 dead, diseased, and damaged trees on the berms of three ponds (1E, 1W, and 2) at the Hornsby Bend Biosolids Management Plant (HBBMP). The tree survey was conducted by MWM Design Group and is attached in **Appendix A**. This document provides a summary of the tree survey and additional instructions to facilitate proper removal and pruning of vegetation and berm repair. **Appendix B** provides instructions and example details on procedures for removing trees and stumps, pruning damaged trees, dewatering techniques, and repair methods for the pond berms. In order to quantify results and provide documentation of maintenance records the datasheets in **Appendix C** should be completed by the contractor conducting the scope of work. The scope of work described herein should be conducted between September 16 and March 14 in order to avoid violating the Migratory Bird Treaty Act (MBTA). If work must occur between March 15 and September 15, the contractor will need to follow the MBTA Compliance document provided under a separate cover.

The HBBMP received a Notice of Violation (NOV) from Texas Commission on Environmental Quality (TCEQ) on March 16, 2015. The violation stated HBBMP failed to adequately prevent the proliferation of trees on the berms of ponds 1E, 1W, and 2.

Baer Engineering recommends subcontracting the following scope of work to a qualified landscaping company:

1. Remove the 10 small-diameter trees ( $\leq 6$  inch) identified in this document. Five of these trees will require approval from the COA Arborist. Treat and paint stumps with glyphosate to prevent sprouting;
2. Fell the 42 snags identified in this document, excavate 25 root systems, dewater as necessary;
3. Excavate the 32 stumps and root systems identified in this document, dewater as necessary;
4. Repair berm immediately after excavations;
5. Paint the remaining 23 dead stumps identified in this document with polyurethane to slow decomposition;
6. Prune the 11 damaged trees identified in this document; and
7. Haul and properly dispose of debris off-site.

This document provides the necessary steps and methods to address this portion of the TCEQ's NOV.

## 2.0 INTRODUCTION AND PURPOSE

The existing vegetation along the pond berms at HBBMP provides aesthetic and ecological value to the venue. However, this vegetation can also compromise the integrity of the berm. Plant roots grow into the structure, loosening compacted soil through root penetration, and creating seepage paths and internal erosion issues from decaying roots.

Water infiltrating the pond berms can be valuable in small amounts and detrimental in large amounts. A small amount of moisture in the soil is good as it acts as glue, holding the soil particles together because of the high surface tension of water. A large amount of water in the dam can be detrimental because it increases the space between the soil particles, reducing friction between them. In this situation the water acts as a lubricant, reducing the cohesion of the structure. In addition, root channels create pathways for water flow. These pathways grow over time, through erosion.

The HBBMP received a NOV after a Compliance Evaluation was conducted by the TCEQ on March 16, 2015. The violation stated HBBMP failed to adequately prevent the proliferation of trees on the berms of ponds 1E, 1W, and 2. One of the TCEQ's recommendations was:

- Begin removing dead, diseased, and small trees on or near the embankment of the ponds. All tree removal should be conducted above the water table of the ponds to minimize the potential of unauthorized discharges and to prevent decaying roots from compromising the hydraulic integrity of the embankments.

This document provides the necessary information and methods to accomplish this recommendation.

Keeping the hydraulic integrity of the berms is paramount. All excavation will occur above the current water level unless a dewatering plan is employed prior to the start of excavation. Felling of standing dead and live trees shall occur in such a manner as to prevent contact with the pond liner and submerged portions of the berms. Dead wood currently in the pond is to be left undisturbed, to avoid damaging the pond liner.

In May 2015, MWM Design Group surveyed diseased, dead, and damaged trees on the embankment of the ponds above the water line or within 10 feet of the top of the berms. On June 3, 2015, Mr. David Sperry and Ms. Jennifer Lueckemeyer, both of Baer Engineering, visited the HBBMP and conducted a migratory bird nest survey. On June 16, 2015, Ms. Lueckemeyer revisited the site and reviewed the tree survey. On June 19, 2015, Mr. James Clark, of Baer Engineering, collected additional information on the surveyed trees. The results of these site visits are incorporated into this Tree Removal Plan.

### 3.0 SMALL TREE REMOVAL

Ten immature live trees with damaged branches were identified on the berms of the ponds. The stems of these trees are equal to or less than six (6) inches in diameter at breast height (DBH). These trees will be cut flush with the ground. Immature trees of this size typically do not have a substantial root system and are not expected to impact the berm. As the trees are cut down, they must fall on the berm and not into the water. Each stump will then be immediately treated with glyphosate. The woody debris resulting from this work will be properly removed following direction from HBBMP staff. Additional instructions on felling and stump management are provided in the next section.

Removal of five trees will require an approved permit from the City Arborist for removal. Mitigation may be a condition of the permit approval process. The mitigation for these small diameter trees will be 25% of the total DBH. Mitigation is waived for trees that are dead.

The following trees are listed on the Tree Survey. The trees were tagged with individual numbers. Refer to the Tree Survey plan sheets for the location of these trees.

**Table 1.** A list of small diameter trees that will be cut flush with the ground. The remaining stumps will be properly treated with glyphosate.

Tree Tag (Tree Survey page #)	Common Name	Stem sizes (DBH)	Mitigation Required
566 (18)	Boxelder Ash Maple	6 / 6 / 5 / 4	Yes
567 (18)	Hackberry	6 / 3	No
568 (19)	Hackberry	5 / 5 / 5 / 5 / 4 / 3	Yes
574 (20)	Jerusalem Thorn	5 / 3 / 2	Yes
583 (22)	Jerusalem Thorn	5 / 4	No
584 (22)	Jerusalem Thorn	5 / 4	No
585 (22)	Hackberry	6 / 5	Yes
587 (23)	Jerusalem Thorn	6 / 4 / 3	Yes
591 (24)	Hackberry	6	No
594 (24)	Hackberry	6	No

## 4.0 METHODS FOR SMALL TREE MANAGEMENT

Standing trees will be cut flush with the ground. The trees need to fall on the berm of the ponds and not in the water. Felling trees into the water could damage the liner of the ponds and result in water quality violations. The remaining stump will be treated with glyphosate to prevent sprouting.

### 4.1 Felling Immature Live Trees

The contractor shall directional fell the small diameter live trees onto the earthen berms. Trees should not be felled into the ponds. Felling may be accomplished through a single cut because of the small size of these trees. However, if a single cut is not feasible, please refer to Section 6.1 on felling trees using a directional notch and a felling cut. The remaining stump will be flush with the ground.

Once the tree is down, cut it into pieces that can be loaded into a hauler and disposed of using appropriate methods.

### 4.2 Stump Management for Live Trees

Leaving a stump from a live tree is not ideal because the stump will likely re-sprout. Within five minutes of the final flush cut, glyphosate, or similar acceptable herbicide, will be brushed, with a disposable paint brush, onto the top of the stump, as depicted in **Figure 1**. The herbicide will be applied by a State of Texas licensed applicator with a required certification in Landscape Maintenance and a preferred certification in Aquatic Pest Control. The contractor will follow the manufacturer's instructions on applying the proper concentration of the herbicide. The minimum amount of glyphosate should be used to completely cover the top of the stump. Care should be taken to treat only the target stump. The herbicide should not affect the surrounding vegetation or water.



**Figure 1.** Example of applying glyphosate to a fresh cut stump with paint brush.

## 5.0 DEAD TREE AND STUMP REMOVAL

The following is a list of 42 dead trees (snags) and 38 stumps that were surveyed. Twenty-five snags and 32 of the stumps will be removed from the berms and their roots excavated. Seventeen snags will be felled and the remaining stump, along with six existing stumps, will not be removed because of their close proximity to other large diameter (>6-inch DBH) live trees. Removing these 23 stumps may result in critically damaging the root zone of the live trees. Root excavation may require the installation of a cofferdam and dewatering. All work will occur either above the water level of the ponds or within a dewatered area. Additional instructions on felling, excavation and dewatering are provided in the next section. The trees were tagged with individual numbers. Refer to the tree survey for the locations of these trees.

**Table 2.** A list of dead trees and stumps that require removal.

Tree Tag (Tree Survey page #)	Description	Stem sizes (DBH)	Felling required	Paint Stump or Excavate Roots	Dewatering Required <sup>1</sup>
509 (14)	Dead tree	12 / 10	Yes	Excavate	No
510 (14)	Dead tree	9 / 9 / 10	Yes	Excavate	Yes
513 (14)	Dead tree	9 / 10	Yes	Excavate	Yes
514 (14)	Hackberry	6	Yes	Excavate	No
515 (14)	Dead tree	8	Yes	Excavate	No
516 (14)	Dead tree (on ground)	7	No	Excavate	No
517 (14)	Dead tree (on ground)	12	No	Excavate	Yes
518 (14)	Dead tree (on ground)	8	No	Excavate	No
520 (14)	Hackberry	7	Yes	Excavate	No
521 (14)	Hackberry	10 / 9	Yes	Excavate	Yes
522 (14)	Hackberry	13	Yes	Excavate	Yes
523 (14)	Hackberry	5	Yes	Excavate	No
524 (14)	Hackberry	12	Yes	Excavate	Yes
526 (14)	Dead Hackberry (on ground)	10 / 4	No	Excavate	Yes
527 (14)	Hackberry	19	No	Excavate	Yes
528 (14)	Hackberry	19	Yes	Excavate	Yes
529 (13)	Hackberry	12	Yes	Excavate	No
530 (13)	Hackberry	14 / 13	No	Excavate	Yes
531 (13)	Hackberry	18 / 10 / 5	Yes	Excavate	Yes
535 (13)	Hackberry	11 / 6	No	Excavate	No
536 (13)	Hackberry	12 / 10	No	Excavate	No
537 (13)	Hackberry	11 / 8 / 5	No	Excavate	Yes
538 (12)	Hackberry	9 / 9 / 5	Yes	Excavate	Yes
539 (12)	Hackberry	12 / 11 / 10	Yes	Excavate	Yes
540 (12)	Hackberry	10 / 10 / 6	Yes	Excavate	Yes
541 (12)	Hackberry	14 / 11	Yes	Excavate	Yes
542 (12)	Hackberry	12	Yes	Excavate	Yes
543 (12)	Hackberry	12	No	Paint	No
544 (12)	Hackberry	10	Yes	Paint	No
545 (12)	Hackberry Stump	9 / 9	No	Paint	No
546 (12)	Hackberry	16 / 12 / 11 / 10	Yes	Paint	No
547 (12)	Mulberry	3 / 3 / 2 / 1 / 1	Yes	Paint	No
548 (11)	Hackberry	11 / 10 / 9 / 9	Yes	Excavate	No
549 (11)	Hackberry	18	Yes	Paint	No
550 (10)	Jerusalem Thorn	10 / 8 / 6	Yes	Paint	No
551 (10)	Mulberry	5 / 3 / 2	Yes	Paint	No

Tree Tag (Tree Survey page #)	Description	Stem sizes (DBH)	Felling required	Paint Stump or Excavate Roots	Dewatering Required <sup>1</sup>
552 (10)	Mulberry	6	Yes	Excavate	No
553 (10)	Mulberry Stump	22	No	Excavate	Yes
554 (10)	Hackberry	10 / 10 / 6	Yes	Excavate	Yes
555 (9)	Hackberry	2	Yes	Paint	No
556 (9)	Hackberry	3	Yes	Paint	No
570 (19)	Jerusalem Thorn	7	Yes	Paint	No
571 (19)	Hackberry	3	Yes	Paint	No
577 (21)	Jerusalem Thorn	7	Yes	Paint	No
581 (21)	Jerusalem Thorn	10	Yes	Paint	No
588 (24)	Honey Mesquite	3	No	Excavate	No
589 (24)	Hackberry	7	Yes	Excavate	No
595 (24)	Hackberry	3 / 3	Yes	Paint	No
596 (25)	Hackberry	2	Yes	Paint	No
597 (25)	Hackberry	6	Yes	Paint	No
598 (25)	Jerusalem Thorn	7	Yes	Paint	No
599 (6)	Hackberry Stump	8	No	Paint	No
600 (6)	Mulberry	3 / 3	No	Paint	No
601 (6)	Dead Jerusalem Thorn (on ground)	6 / 4	No	Paint	No
602 (7)	Jerusalem Thorn Stump	6	No	Excavate	No
603 (8)	Jerusalem Thorn Stump	4 / 4 / 3 / 3	No	Excavate	No
604 (8)	Jerusalem Thorn	4	Yes	Excavate	No
605 (8)	Jerusalem Thorn	2 / 2	No	Excavate	No
606 (8)	Jerusalem Thorn	3	No	Excavate	No
607 (8)	Mulberry Stump	2 / 1 / 1 / 1 / 1	No	Excavate	No
608 (8)	Jerusalem Thorn Stump	3	No	Excavate	No
609 (8)	Hackberry	4	Yes	Excavate	No
610 (8)	Jerusalem Thorn Stump	3 / 2	No	Excavate	No
611 (8)	Hackberry Stump	3	No	Excavate	No
612 (8)	Hackberry Stump	2	No	Excavate	No
613 (8)	Jerusalem Thorn Stump	3	No	Excavate	No
614 (8)	Jerusalem Thorn Stump	4	No	Excavate	No
615 (8)	Jerusalem Thorn Stump	3	No	Paint	No
616 (8)	Jerusalem Thorn Stump	4	No	Paint	No
617 (8)	Jerusalem Thorn Stump	2	No	Excavate	No
618 (8)	Hackberry Stump	6	No	Excavate	No
619 (8)	Dead Hackberry (on ground)	5	No	Excavate	No
620 (8)	Hackberry Stump	3	No	Excavate	No
621 (8)	Jerusalem Thorn	8	Yes	Paint	No
632 (14)	Hackberry	20	Yes	Excavate	Yes
633 (15)	Hackberry	6	No	Excavate	No
634 (15)	Hackberry Stump	12	No	Excavate	No
635 (15)	Hackberry	4 / 4 / 4	No	Excavate	No
636 (15)	Hackberry	9 / 8 / 7	No	Excavate	Yes
637 (15)	Pecan Stump	12	No	Excavate	Yes

<sup>1</sup> Dewatering may be required for additional excavation, contractor will make final decisions on dewater requirements.

## **6.0 METHODS FOR DEAD TREE AND STUMP MANAGEMENT**

Eighty dead trees and stumps were tagged for removal. Standing dead trees will be cut to approximately 2 feet above ground level. The trees need to fall onto the berm of the ponds and not into the water. Felling trees in the water could damage the liner of the ponds and result in water quality violations. The remaining stump and root system will either be excavated using hand tools or painted with polyurethane to slow the decaying process. Root systems that are located in close proximity to the water level of the ponds will require a dewatering plan. If water is encountered during excavation, a dewatering plan will need to be implemented before continuing excavation. A layer of bentonite clay will be placed in the excavation and native soil free of debris will fill the remaining excavation. The following steps provide supplemental information to the detail sheets that are included in the tree removal plan set.

### **6.1 Felling trees**

The contractor will fell the dead trees onto the earthen berms. Trees should not be felled into the ponds. If felling the tree in a direction away from the ponds is difficult because of the slope, a winch should be used to help control the fall. Trees should not fall across the berms and into an adjacent pond. Multiple cuts may be required for tall trees. Directional felling requires three separate cuts. These cuts are explained below and graphically depicted in the attached detail sheet in **Appendix B**.

#### **6.1.1 Directional notch**

The directional notch comprises a top cut and bottom cut. The first cut is the top cut and it determines the direction of the fall. The top cut should be at a 45° angle from the horizontal. The second cut is referred to as the bottom cut. The bottom cut is a horizontal cut which meets the top cut. The directional notch depth should equal ¼ of the tree diameter.

#### **6.1.2 Felling Cut**

The third cut, felling cut, will occur on the opposite side of the tree from the directional cut. This cut can either be a straight cut from behind the notch cut, typically used for smaller trees, or the person operating the chainsaw can use a bumper spike. Both techniques should use a felling wedge for larger trees to prevent pinching of the guide bar. Both types of cuts will be 2 inches above the corner of the notch cut.

Once the tree is down, cut it into pieces that can be loaded into a hauler and dispose of properly.

### **6.2 Stump Management**

Leaving stumps in place is not ideal because it will be necessary to manage the decaying roots in the near future. There are two methods for managing stumps at HBBMP: 1) painting the stump, and 2) excavating the stump and roots. Some stumps are at the water's edge and will require a dewatering plan. This section provides methods for managing the stumps at HBBMP.

#### **6.2.1 Painting a Stump**

For those stumps whose root system overlaps with adjacent live trees, the contractor will treat the stump with polyurethane to slow the decaying process. This stump will be removed in subsequent years in conjunction with the removal of the adjacent trees.

#### **6.2.2 Excavating a Stump and its Roots**

The decaying roots of woody species can create channels into the pond berms comprising the berm's integrity. Hand tools only will be used to dig around the base of the stump exposing the root ball. The stump and root ball should be pulled using a winch to loosen the root ball.

Continue to use hand tools to grub around the base of the stump and pull with a winch until the stump and root ball are removed. Once the stump is removed, grub out any remaining roots larger than 2 inches in diameter. If water or saturated soil is encountered during excavations, cut exposed roots and begin berm repair.

### 6.2.3 Dewatering Plan

A temporary dewatering plan will be required for those root systems near the water table. Sufficient size and capacity of the dewatering system is necessary to lower and maintain the water table and to allow material to be excavated in a reasonably dry condition. Dewatering will be accomplished through the use of cofferdams, or equivalent. An example is the use of flexible intermediate bulk containers (FIBC), or bulk bags. An FIBC is depicted in **Figure 2**. If this method is selected, bags will be filled with clean gravel or sand and positioned to form a cofferdam that isolates the work area. Once the FIBC are in place, a pump will be used to dewater the area inside the cofferdam. Polyethylene tarps may be required inside the cofferdam to further seal the work area.



**Figure 2.** Example of FIBC.

The dewatering system will be operated continuously until repair of the berm is completed. The water removed from the excavation should be disposed of in such a manner as will not endanger portions of work under construction. We suggest pumping the water back into the pond. Once the stump and roots have been excavated and the berm has been repaired, the FIBC or bulk bags should be removed. Their contents should be disposed of properly.

### 6.3 Berm Repair

The void resulting from the root excavation should be cleared of loose soil. Slopes should not be steeper than 1:1 (45°). A 4-inch layer of bentonite clay will be layered along the bottom and sides of the excavation. This can be accomplished through the use of dry granules, dry pellets, or select clay. The bentonite will be wetted and compacted before backfilling the excavation in 6-inch lifts of native soils, free of rocks and debris. Soil shall comply with COA Specification 601S. Compact each 6-inch layer using manually operated compaction equipment or compaction equipment attached to a backhoe. The backfill must be compacted to a minimum of 95% of the maximum dry density as determined by ASTM D-698. The backfill should then be graded to blend with the surrounding contour and seeded following the COA Standard Specification 604S Seeding for Erosion Control on all disturbed areas above the water table.

Please check with the COA website for the current Specifications.

## 7.0 PRUNING DAMAGED AND DEAD TREE LIMBS

The remaining 11 trees on the tree survey are either damaged or have dead limbs that require pruning. Damaged limbs need to be pruned to prevent disease from infecting the tree. The dead limbs need to be removed for safety, and to prevent falling limbs from damaging the berms or pond liners.

**Table 3.** A list of damaged trees or trees with dead limbs that require pruning.

Tree Tag (Tree Survey page #)	Description	Stem sizes (DBH)
569 (19)	Hackberry	10
572 (19)	Hackberry	12 / 11 / 10 / 6 / 5
573 (19)	Hackberry	10
575 (20)	Hackberry	13 / 3
576 (20)	Jerusalem Thorn	17
578 (21)	Hackberry	7
579 (21)	Hackberry	7
580 (21)	Jerusalem Thorn	9 / 7
582 (21)	Jerusalem Thorn	11 / 10 / 3
586 (23)	Hackberry	10 / 10 / 6
590 (24)	Hackberry	7 / 7 / 6 / 6 / 5

## **8.0 METHODS FOR PRUNING DAMAGED AND DEAD LIMBS**

Eleven trees with damaged or dead limbs were tagged for pruning. The first cut will notch the underside of the limb several inches from the trunk. The second cut will be farther out on the limb, starting on the underside and continuing straight through. This will leave a manageable stub out to cleanly dress the wound. The final cut will occur just beyond the branch bark collar and branch bark ridge. Pruning should not damage either the branch bark collar or branch bark ridge. The cut begins outside the branch bark ridge and angles down away from the stem of the tree, avoiding injury to the branch collar. The cut should be as close as possible to the stem but outside of the branch bark ridge, so that stem tissue is not injured and the wound can seal in the shortest possible time. A visual explanation of proper pruning techniques are provided in the attached details located in **Appendix B**.

## **9.0 PREVENTION OF PROLIFERATION OF NEW TREES**

A Vegetation Management Plan was prepared under separate cover. The Vegetation Management Plan describes in detail the options for HBBMP to prevent the proliferation of new trees along the berms of the ponds. This section provides a brief outline of the management options detailed in that plan.

### **9.1 Maintenance Activities**

- Wait for live trees to die and remove the trees and root system in a manner consistent with this Tree Removal Plan;
- Remove shrubs and vines growing on the berms;
- Use hand tools, saws, or weed wrench to remove small diameter ( $\leq 6$  inches) woody plants that are growing on the berms;
- Try to re-establish some type of grass as a ground cover where soil is exposed;
- Mow the berms twice a year, once in late September and again in early March; and
- Keep records of inspection and maintenance activities on an annual basis.

Vegetation, including trees, shrubs, and grasses in the project area may provide habitat for migratory birds. Vegetation maintenance, including removing trees (dead or live), shrubs, and mowing grass around the ponds, should occur between September 16 and March 14, to avoid disturbance of migratory birds and their nests.

## 10.0 SEQUENCE OF ACTIVITIES

The following is the sequence of tree removal activities at HBBMP:

1. Cut the 10 small diameter trees ( $\leq 6$  inch), identified in Table 1, flush with the ground;
2. Apply glyphosate to the live stumps to prevent sprouting;
3. Haul and properly dispose of debris off-site;
4. Fell the 42 snags identified in Table 2;
5. Haul and properly dispose of debris;
6. Paint 23 dead stumps, identified in Table 2, with polyurethane to slow decomposition;
7. Excavate the stumps and root systems that do not require a dewatering plan;
8. Repair berm immediately after each extraction;
9. Haul and properly dispose of debris;
10. Install cofferdams around stumps that require dewatering, identified in Table 2.
11. Excavate the stumps and root systems that require a dewatering plan;
12. Repair berm immediately after each extraction;
13. Remove cofferdams;
14. Haul and properly dispose of debris;
15. Prune the 11 trees with damaged and dead limbs, identified in Table 3; and
16. Haul and properly dispose of debris.

## **11.0 QUANTIFY RESULTS**

In order to quantify results and provide documentation of maintenance records, the contractor shall fill out the datasheets in **Appendix C**.

## **12.0 PUBLIC NOTIFICATION**

The Hornsby Bend Bird Observatory (HBBO) is located at the HBBMP. The HBBO is a program of the Austin Water Utility's Center for Environmental Research. HBBMP is known for its biodiversity and ecotourism, and is likely one of the best birding sites in central Texas. Bird watchers are present year round, and monthly bird surveys are conducted on the 2<sup>nd</sup> Saturday of each month.

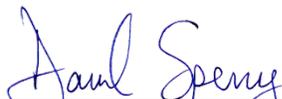
Baer Engineering recommends all tree removal activities described in this document be scheduled in advance and public notifications of those schedules be posted at Hornsby Bend in the Center for Environmental Research. The Center for Environmental Research at Hornsby Bend should be consulted for scheduling and appropriate public outreach coordination.

We suggest including the following information to the public:

1. Justification for maintenance (e.g. protection of water quality);
2. Removal techniques which will be implemented (chainsaw, pruning etc.);
3. Schedule and location(s) for tree removal activities; and
4. Contact information for HBBMP staff responsible for contractor.

### 13.0 QUALIFICATIONS

Field work was performed on June 3, 16, and 19, 2015. Conditions observed, during field work, may not reflect site conditions during other parts of the year. Baer Engineering assessed the potential impacts based on information provided to us by the COA and HBBMP. Subsequent changes in maintenance plans and specific maintenance methods are not covered in this plan.



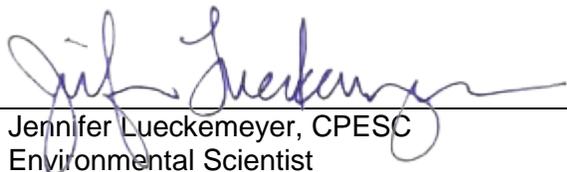
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David Sperry M.S.  
Wildlife/Conservation Biologist



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Rosemary Wyman, P.G. CHMM, CPESC  
Executive Vice President



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Jennifer Lueckemeyer, CPESC  
Environmental Scientist

# Appendix A: Tree Survey

TREE TABLE	
TREE #	DESCRIPTION
509	17" TREE(12/10) (DEAD)
510	19" TREE(2-9/10) (DEAD)
513	14" TREE(9/10) (DEAD)
514	6" HACKBERRY
515	8" TREE(DEAD)
516	7" TREE(DEAD)
517	12" TREE(DEAD)
518	8" TREE(DEAD)
520	7" HACKBERRY
521	15" HACKBERRY (10/9)
522	13" HACKBERRY
523	5" HACKBERRY
524	12" HACKBERRY
526	12" HACKBERRY (10/4) (ON GROUND)
527	19" HACKBERRY
528	19" HACKBERRY
529	12" HACKBERRY
530	20" HACKBERRY (14/13)
531	25" HACKBERRY (18/10/5)
535	14" HACKBERRY (11/6)
536	17" HACKBERRY (12/10)
537	18" HACKBERRY (11/8/5)
538	16" HACKBERRY (2-9/5)

TREE TABLE	
TREE #	DESCRIPTION
539	23" HACKBERRY (12/11/10)
540	18" HACKBERRY (2-10/6)
541	20" HACKBERRY (14/11)
542	12" HACKBERRY
543	12" HACKBERRY
544	10" HACKBERRY
545	14" HACKBERRY (2-9) (STUMP)
546	33" HACKBERRY (16/12/11/10)
547	6" MULBERRY (2-3/2/2-1)
548	25" HACKBERRY (11/10/2-9)
549	18" HACKBERRY
550	17" JERUSALEM THORN (10/8/6)
551	8" MULBERRY (5/3/2)
552	6" MULBERRY
553	22" MULBERRY (STUMP)
554	18" HACKBERRY (2-10/6)
555	2" HACKBERRY
556	3" HACKBERRY
566	14" BOXELDER ASH MAPLE (6/6/5/4)
567	8" HACKBERRY (6/3)
568	16" HACKBERRY (4-5/4/3)
569	10" HACKBERRY
570	7" JERUSALEM THORN

TREE TABLE	
TREE #	DESCRIPTION
571	3" HACKBERRY
572	28" HACKBERRY (12/11/10/6/5)
573	10" HACKBERRY
574	8" JERUSALEM THORN (5/3/2)
575	15" HACKBERRY (13/3)
576	17" HACKBERRY
577	7" JERUSALEM THORN
578	7" HACKBERRY
579	7" HACKBERRY
580	12" JERUSALEM THORN (9/7)
581	10" JERUSALEM THORN
582	18" JERUSALEM THORN (11/10/3)
583	7" JERUSALEM THORN (5/4)
584	7" JERUSALEM THORN (5/4)
585	8" HACKBERRY (6/5)
586	18" HACKBERRY (2-10/6)
587	10" JERUSALEM THORN (6/4/3)
588	3" MESQUITE HONEY
589	7" HACKBERRY
590	19" HACKBERRY (2-7/2-/6/5)
591	6" HACKBERRY
594	6" HACKBERRY
595	5" HACKBERRY (3/3)

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measures one-half  
inch on the original  
drawing. Adjust  
scales accordingly.

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TREE SURVEY**  
  
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**1**  
1 OF 30

TREE TABLE	
TREE #	DESCRIPTION
596	2" HACKBERRY
597	6" HACKBERRY
598	7" JERUSALEM THORN
599	8" HACKBERRY (STUMP)
600	4" MULBERRY (2-3)
601	8" JERUSALEM THORN (6/4)(ON GROUND)
602	6" JERUSALEM THORN (STUMP)
603	9" JERUSALEM THORN (2-4/2-3)(STUMP)
604	4" JERUSALEM THORN
605	3" JERUSALEM THORN (2-2)
606	3" JERUSALEM THORN
607	4" MULBERRY 2/1/1/1/1
608	3" JERUSALEM THORN (STUMP)
609	4" HACKBERRY
610	4" JERUSALEM THORN (3/2) (STUMP)
611	3" HACKBERRY (STUMP)
612	2" HACKBERRY (STUMP)
613	3" JERUSALEM THORN (STUMP)
614	4" JERUSALEM THORN (STUMP)
615	3" JERUSALEM THORN (STUMP)
616	4" JERUSALEM THORN (STUMP)
617	2" JERUSALEM THORN (STUMP)
618	6" HACKBERRY (4/3) (STUMP)

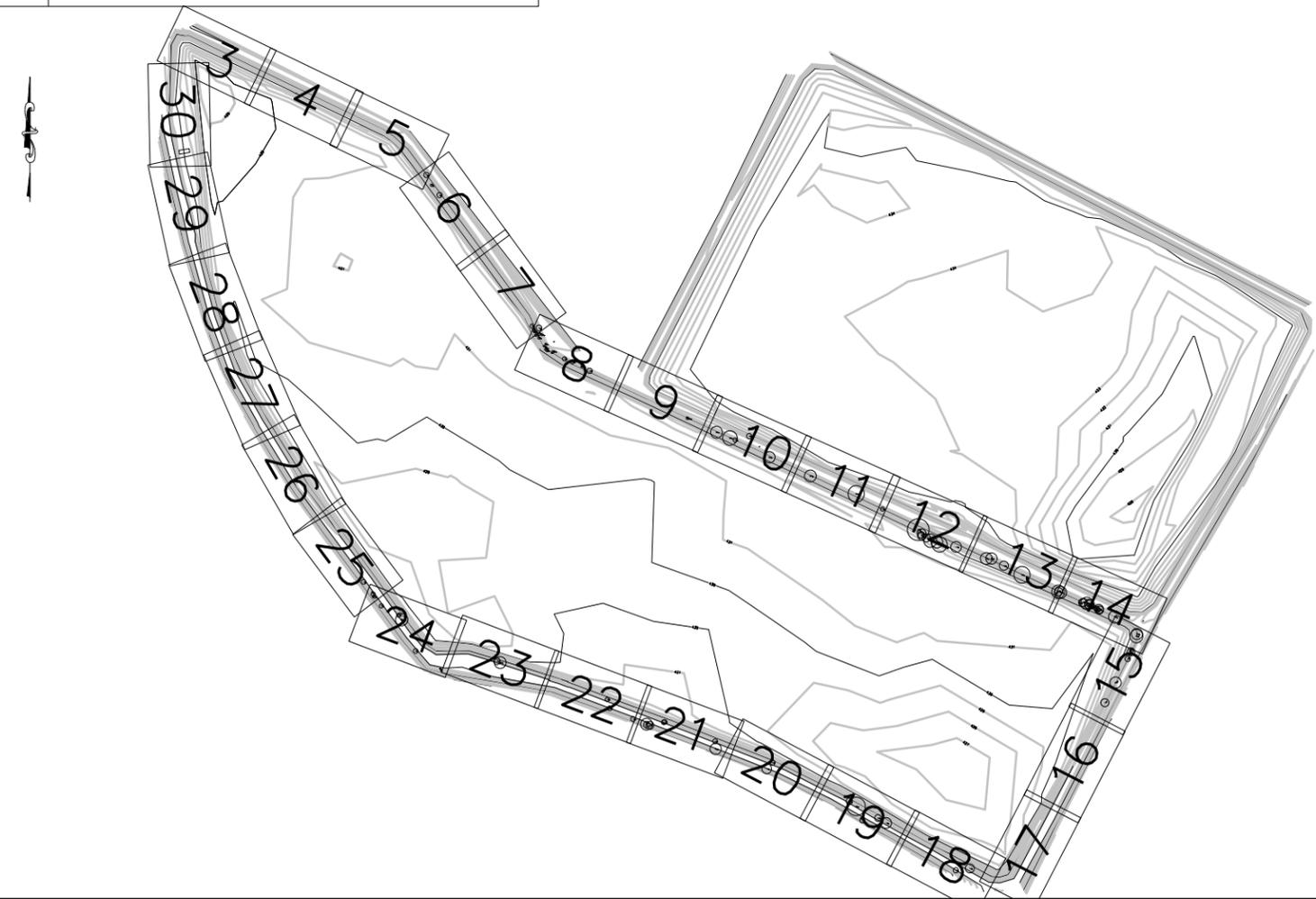
TREE TABLE	
TREE #	DESCRIPTION
619	5" HACKBERRY (4/2) (ON GROUND)
620	3" HACKBERRY (STUMP)
621	8" JERUSALEM THORN
632	20" HACKBERRY
633	6" HACKBERRY
634	12" HACKBERRY (STUMP)
635	8" HACKBERRY (3-4)
636	17" HACKBERRY (9/8/7)
637	12" PECAN (STUMP)

NOTES:

THE COORDINATES SHOWN ARE BASED ON THE TEXAS STATE PLANE, CENTRAL ZONE NAD83(2011)(EPOCH: 2010.0000), MODIFIED TO SURFACE VALUES, USING A SURFACE ADJUSTMENT FACTOR (SAF) OF 1.00004, SURFACE DATA IS MOVED TO GRID LOCATION USING CONTROL POINT 4 N=10054289.265, E=3142993.215.

ONLY DISEASED OR DEAD TREES ON THE EMBANKMENT OF THE PONDS ABOVE WATER LINE OR WITHIN 10' FROM THE TOP OF BERM ARE SHOWN. ALL TREES SHOWN ARE DISEASED UNLESS DESIGNATED "DEAD" OR "STUMP".

CONTOURS SHOWN ON THIS DRAWING WERE PROVIDED BY THE CLIENT. SURVEY PERFORMED BY MACIAS & ASSOCIATES, LP DATED JAN 3 - FEB 16, 2011

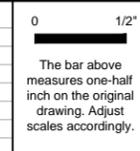


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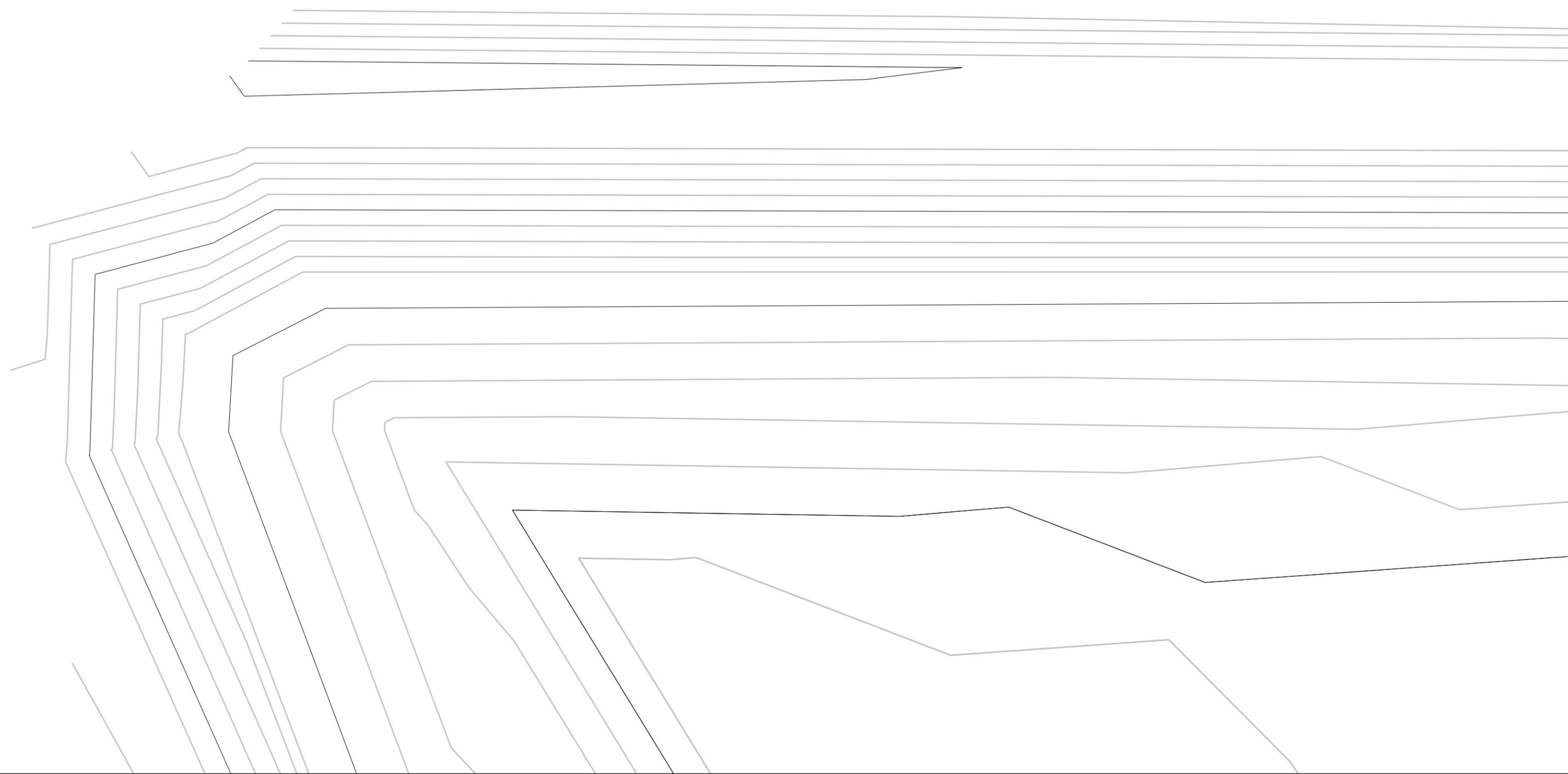
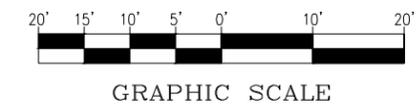


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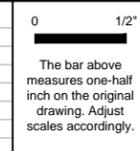


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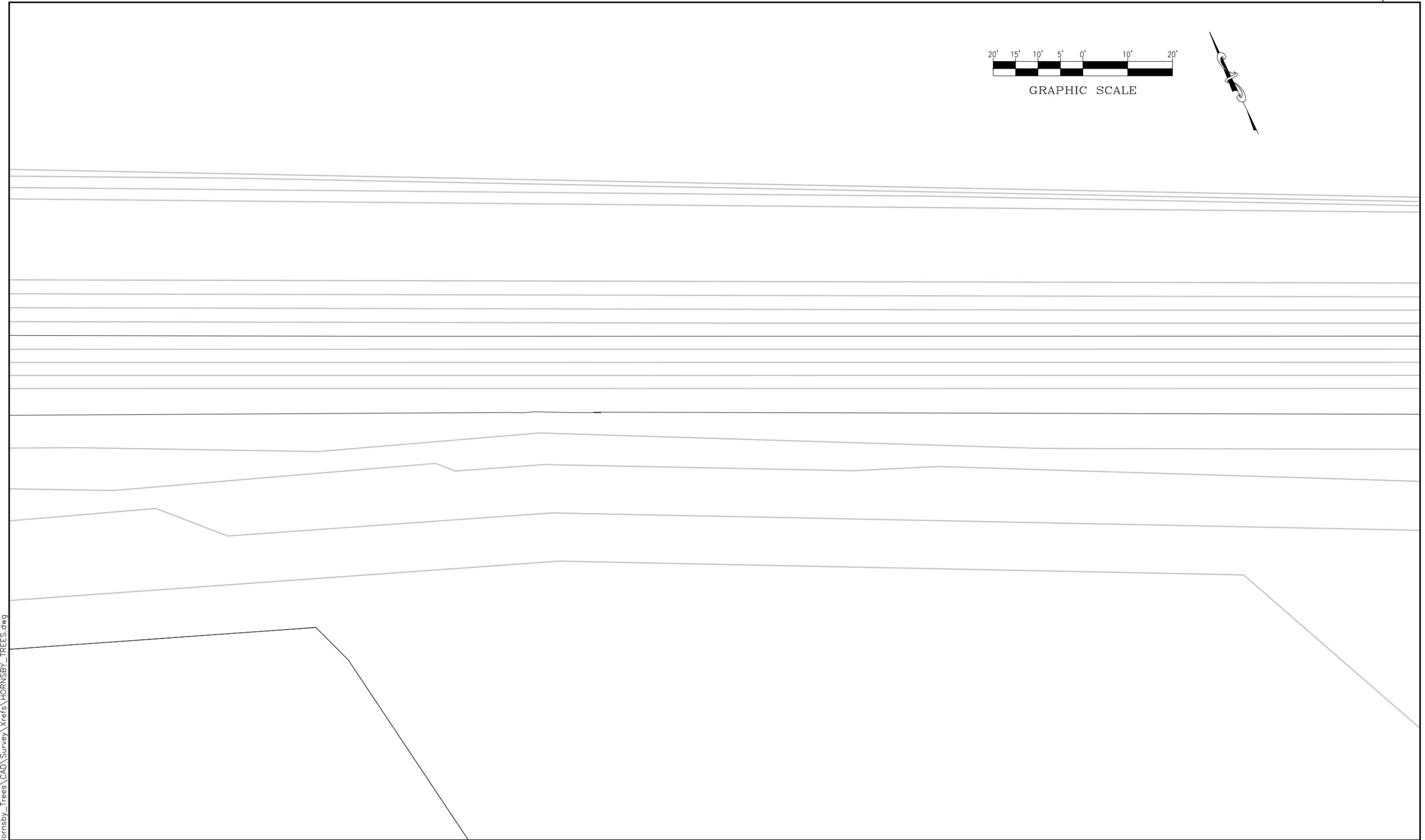
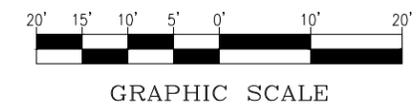


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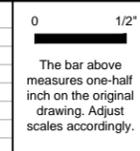


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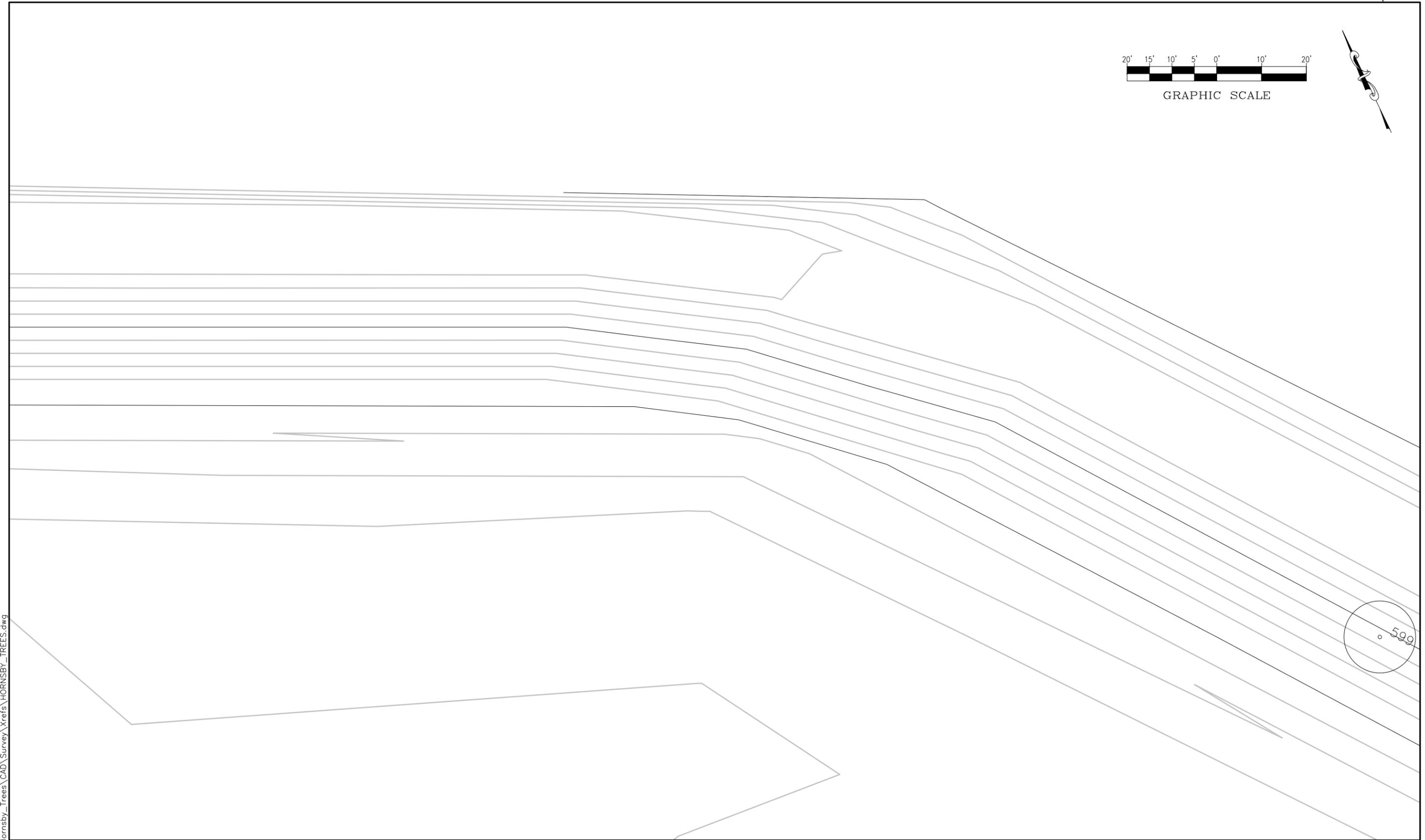
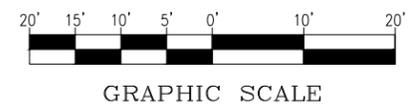


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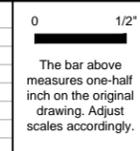


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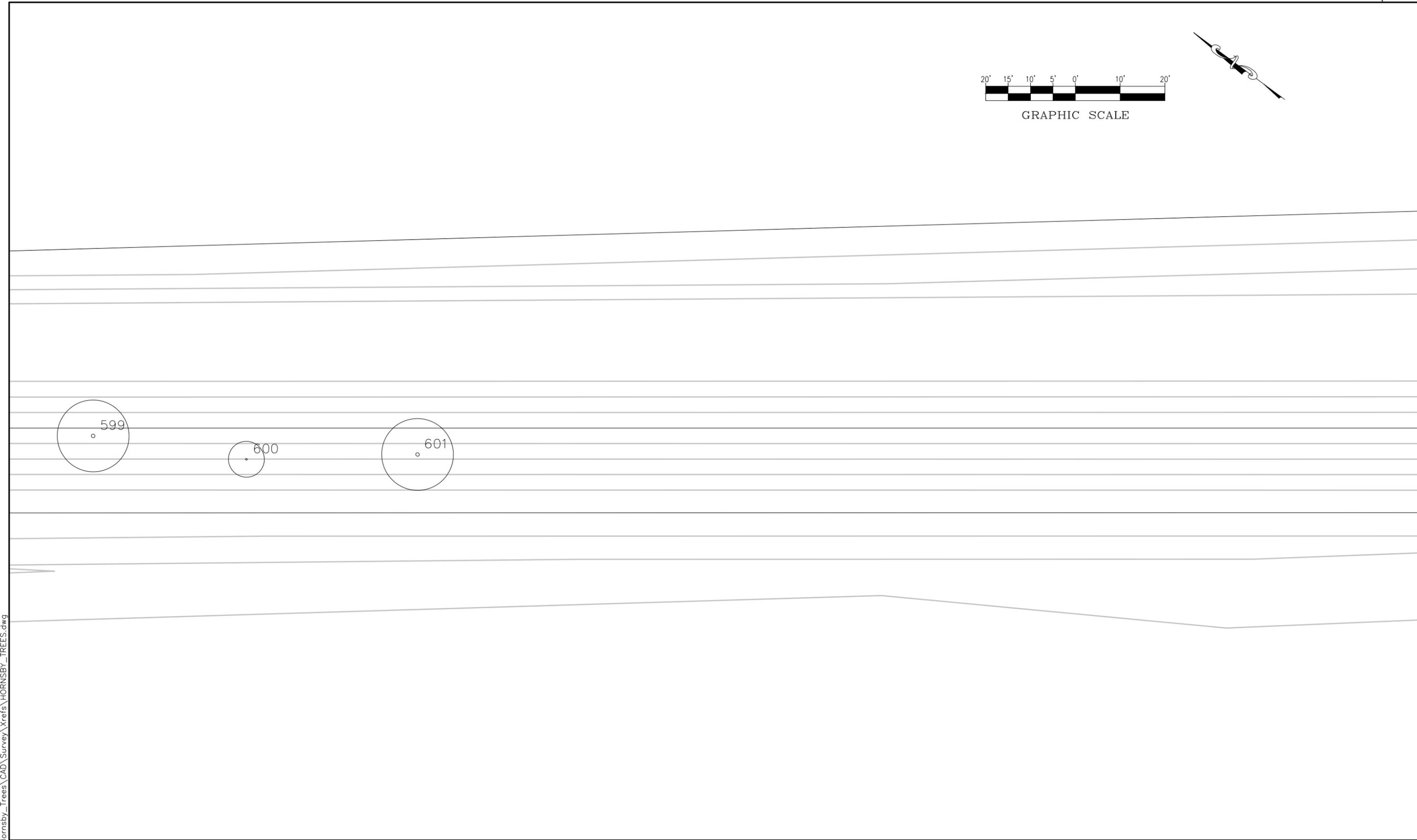
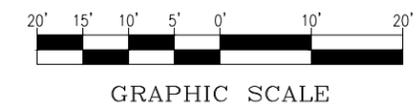


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5 OF 30

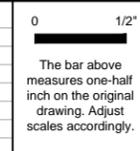


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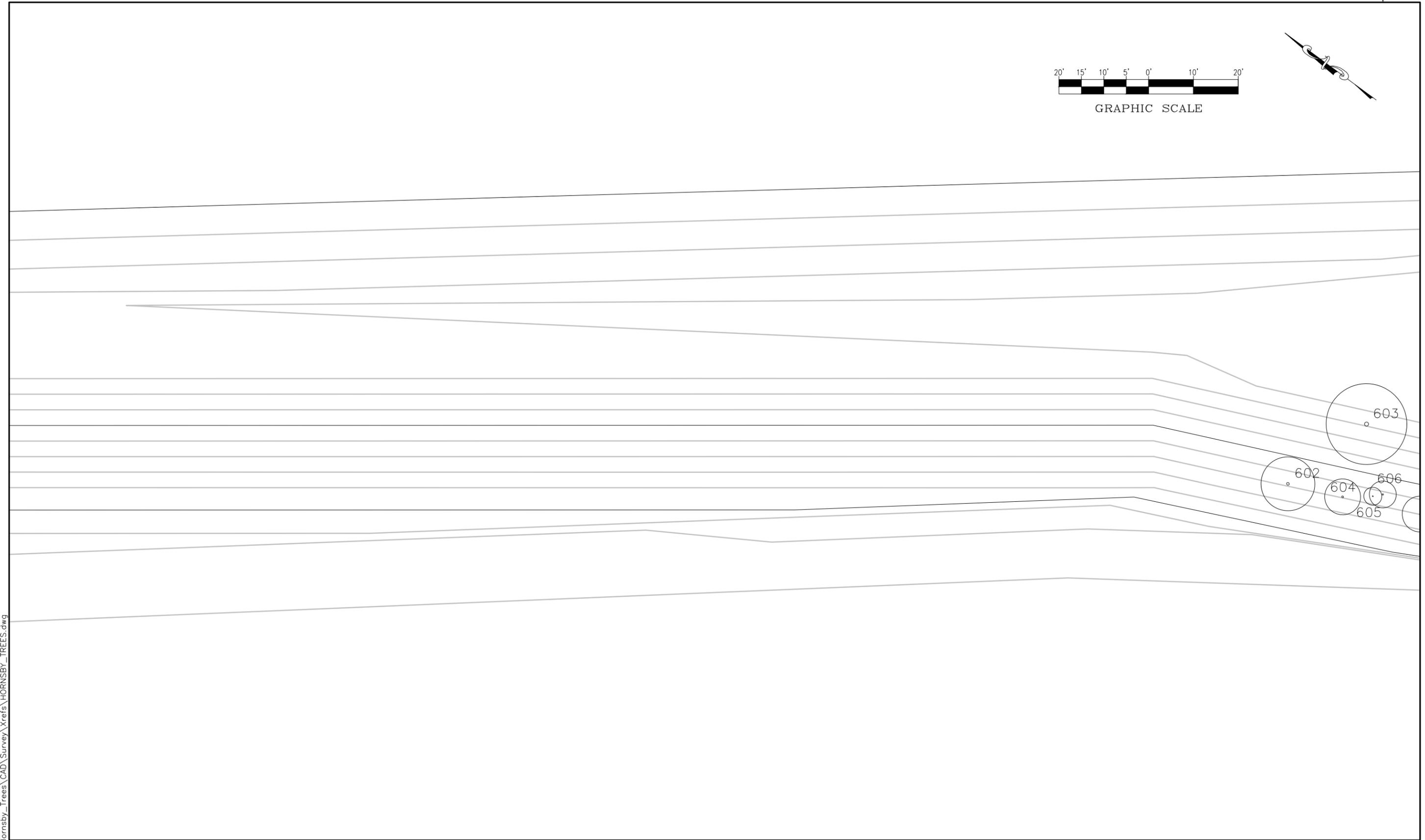
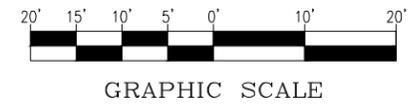


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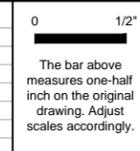


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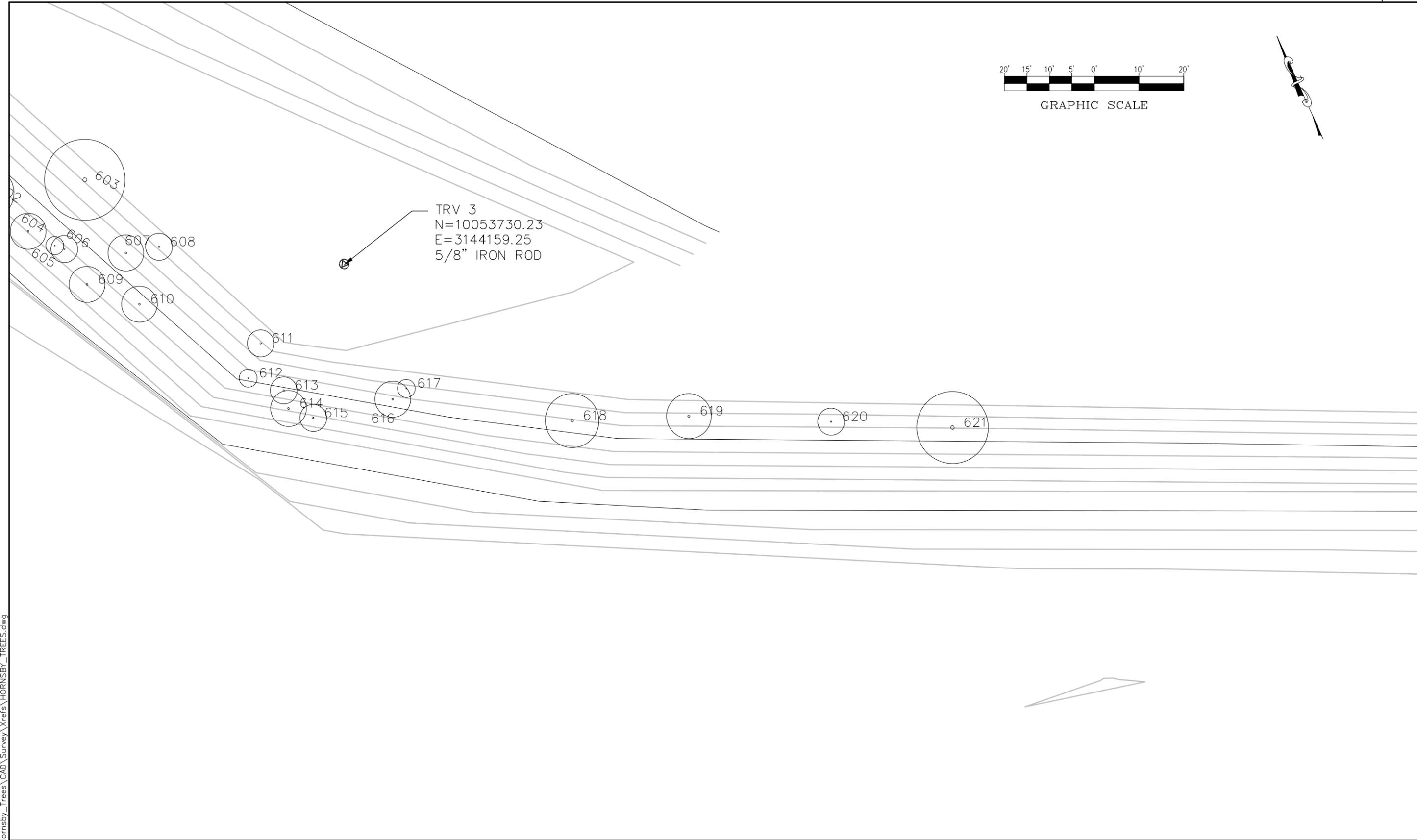
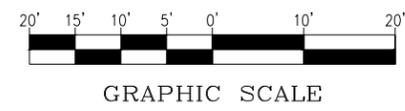


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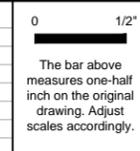


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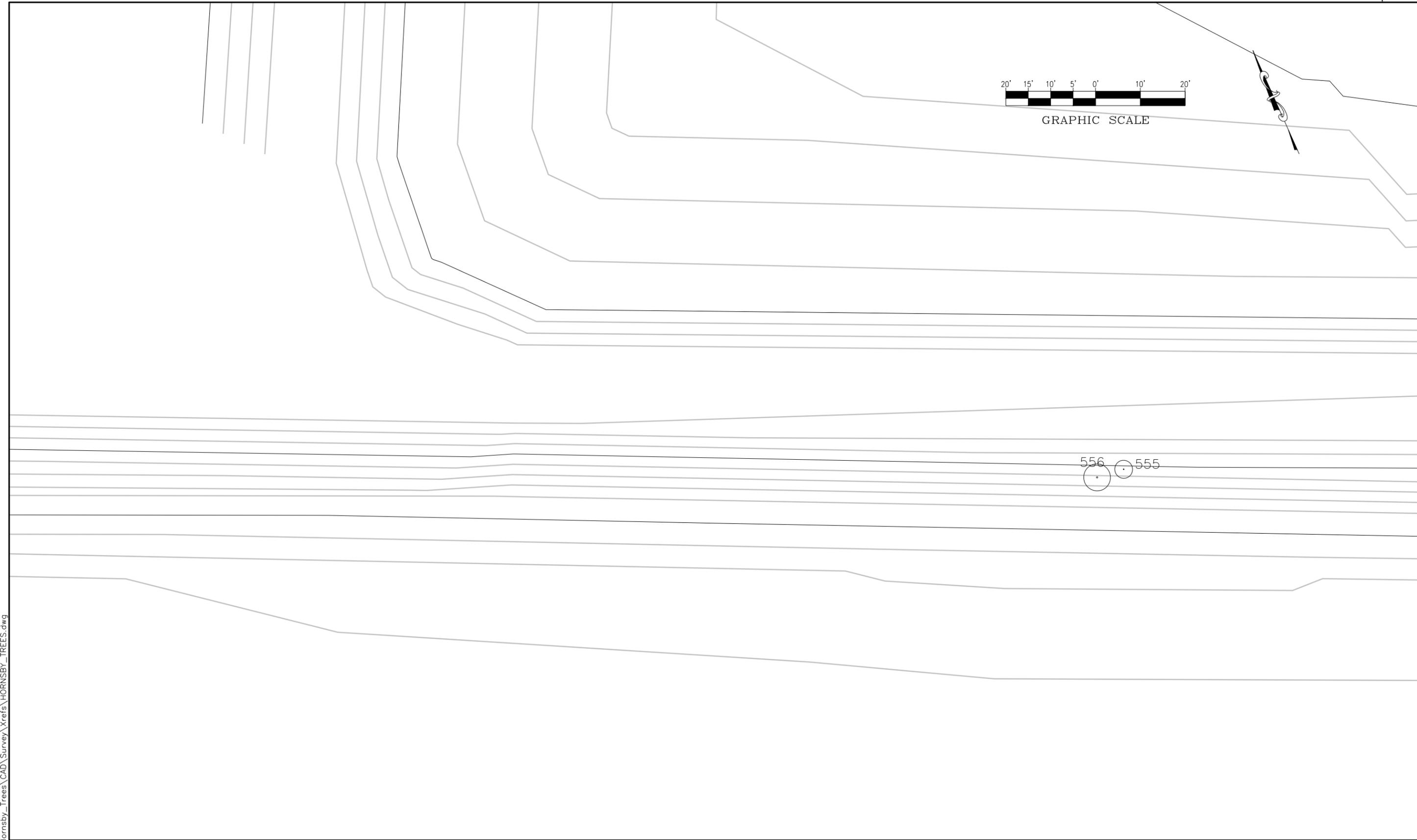


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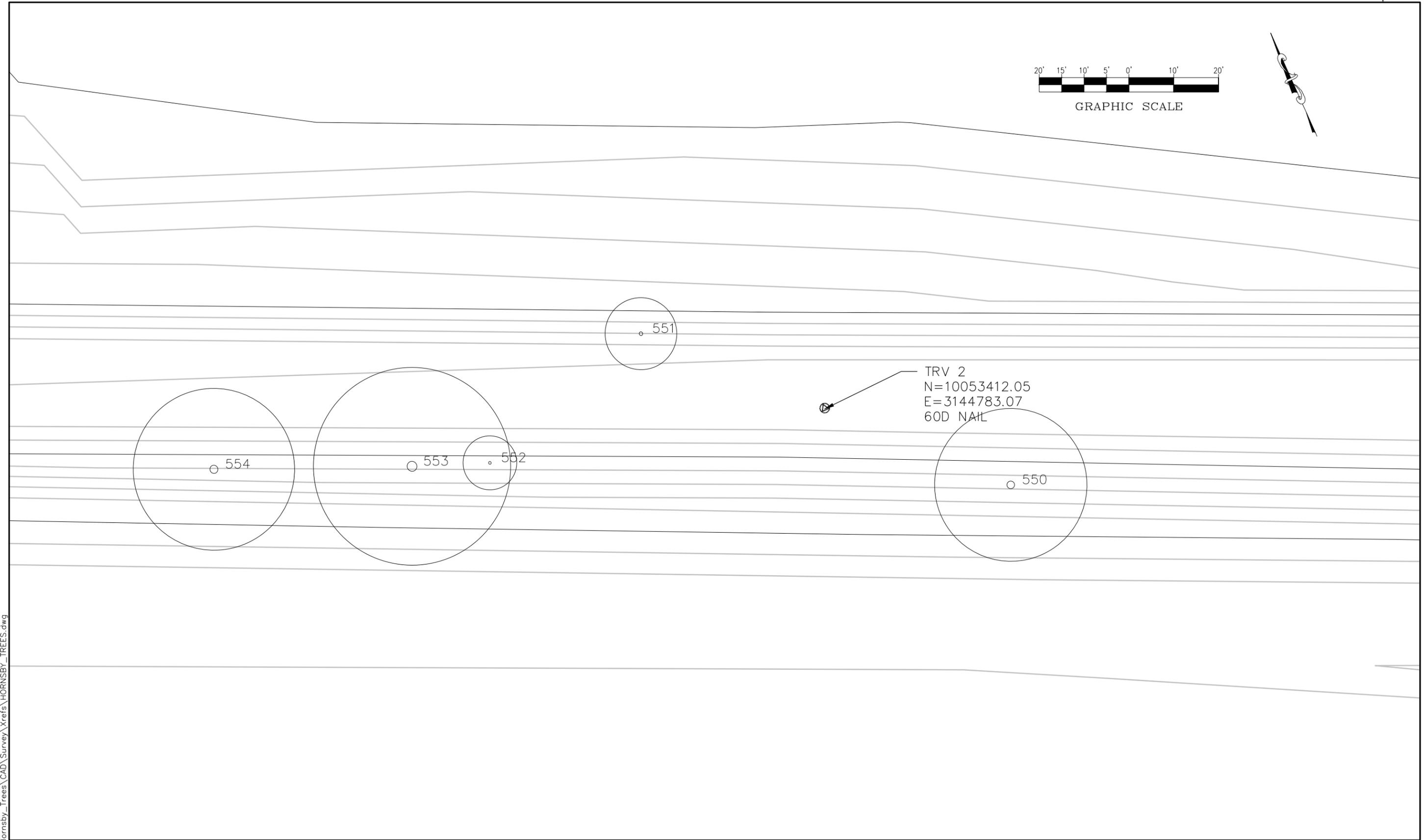
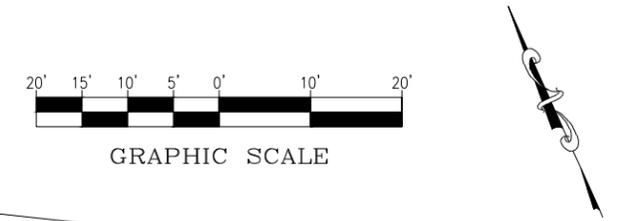
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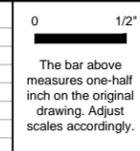


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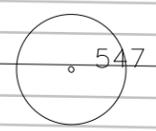
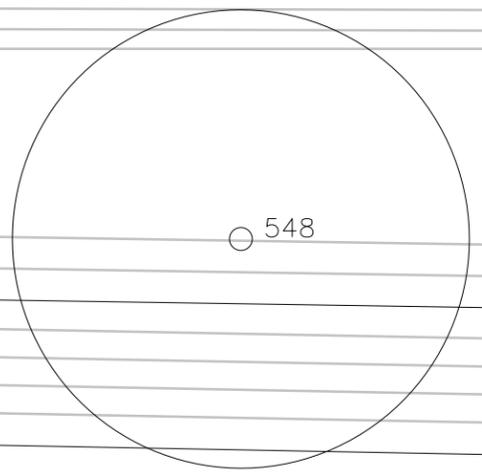
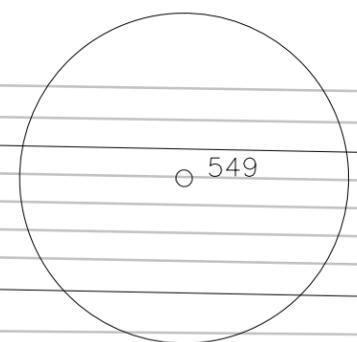
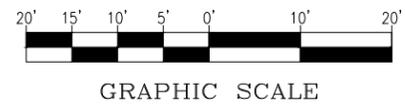


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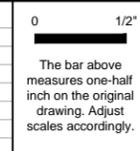


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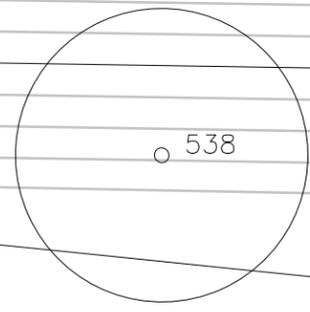
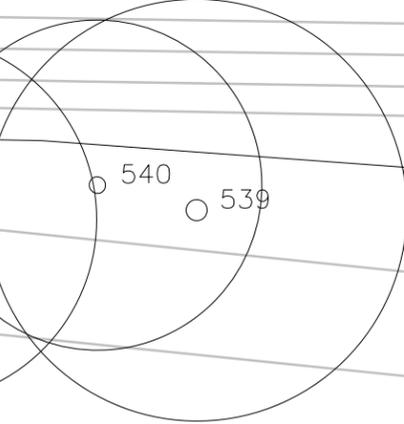
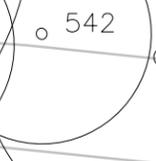
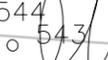
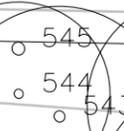
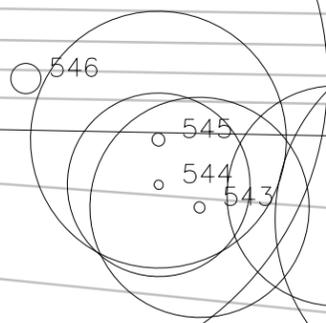
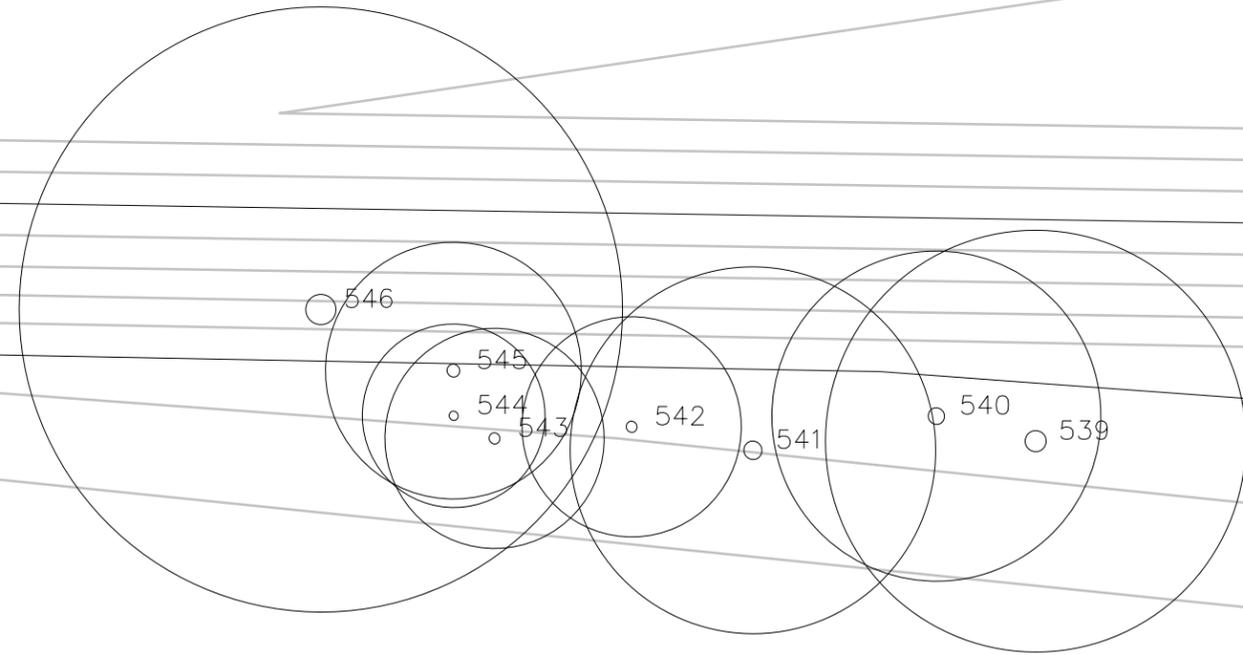
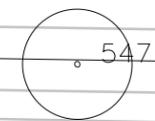
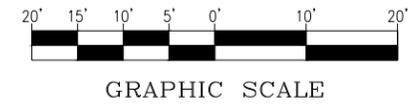


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11 OF 30

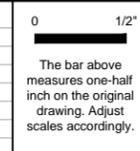


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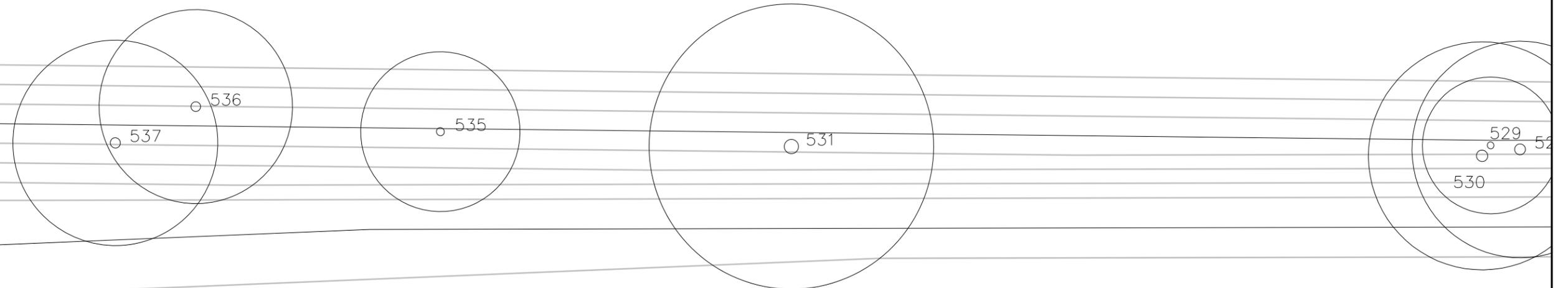
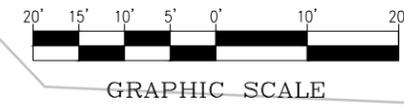


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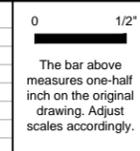


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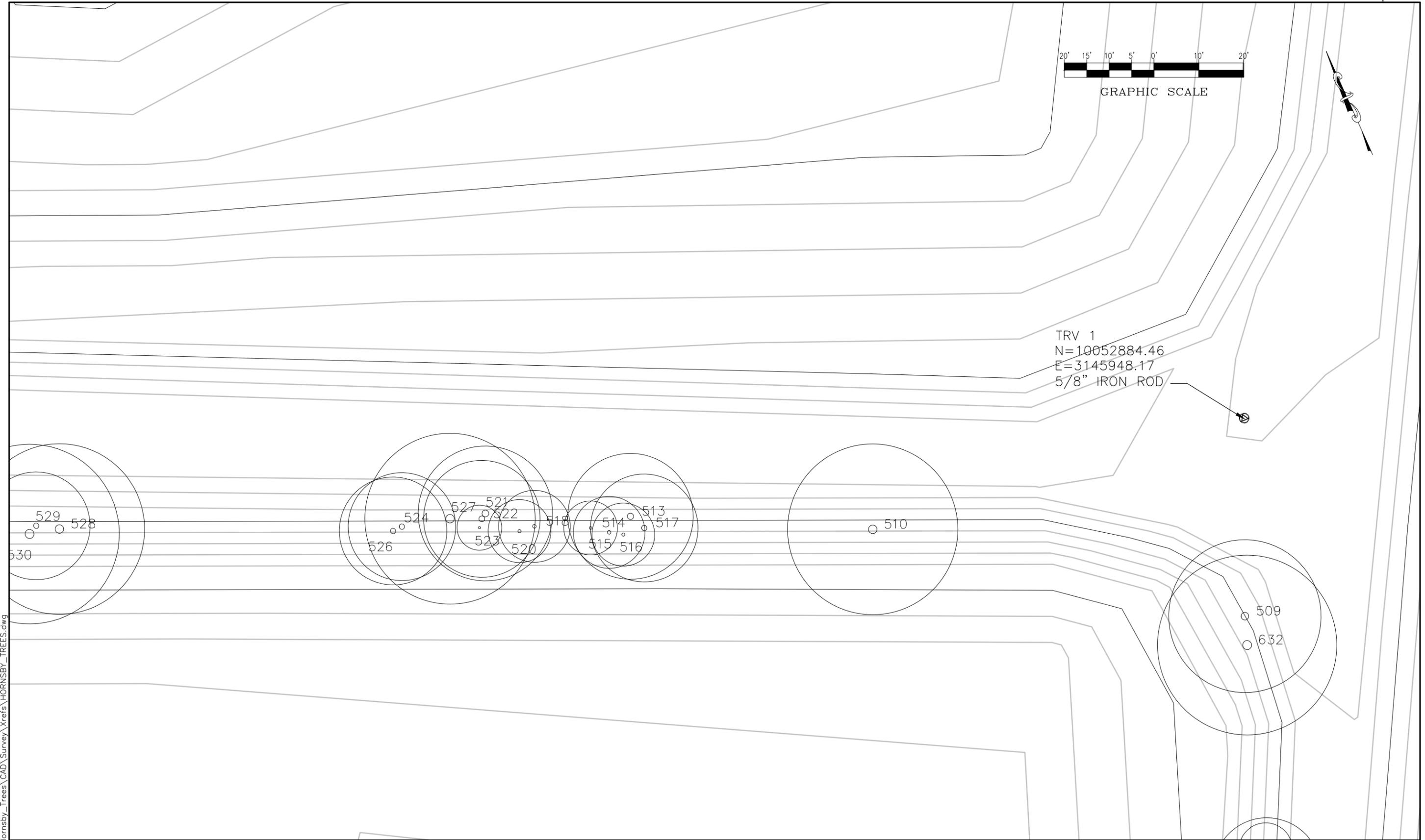


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TREE MITIGATION SURVEY  
TREE SURVEY**

AUSTIN, TEXAS

DATE: 02 JUN 15  
JOB NO: 089-12A  
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**13**  
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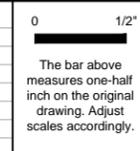


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Austin, Texas 78752  
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f: 512.453.1734  
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No.: 10065600

NO.	DATE	DESCRIPTION	BY

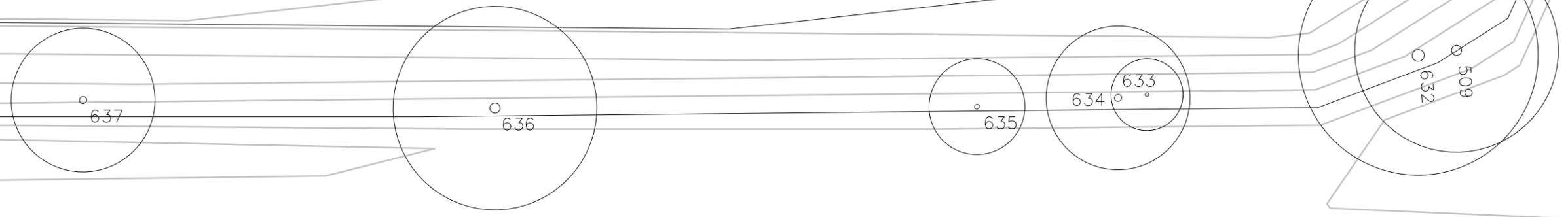
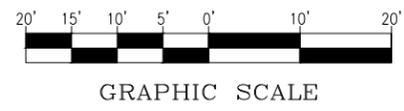


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AUSTIN, TEXAS

DATE: 02 JUN 15  
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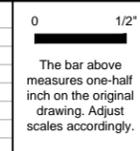


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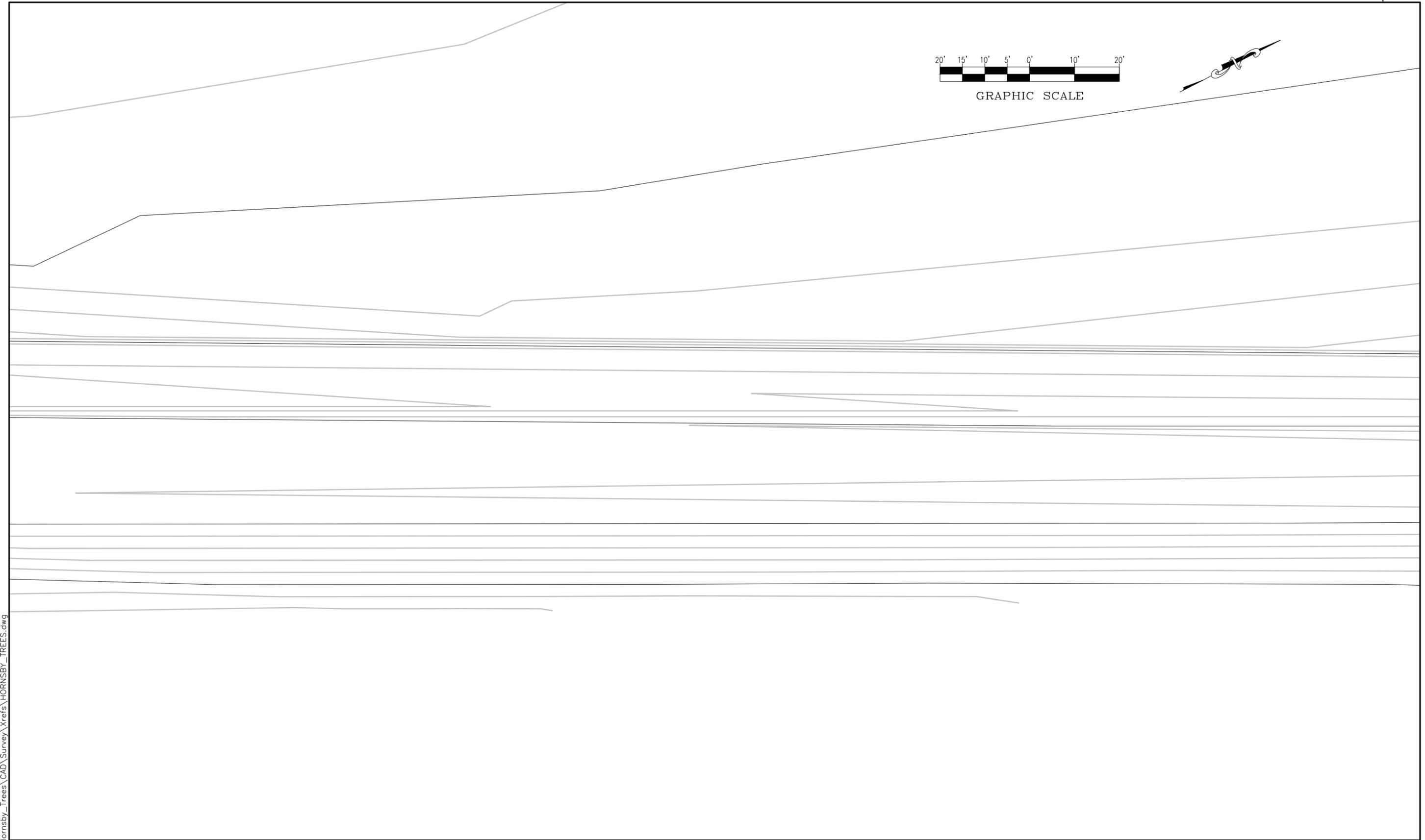
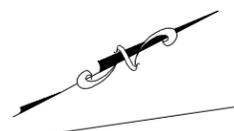
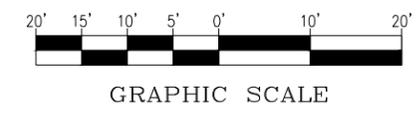


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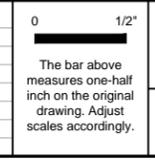


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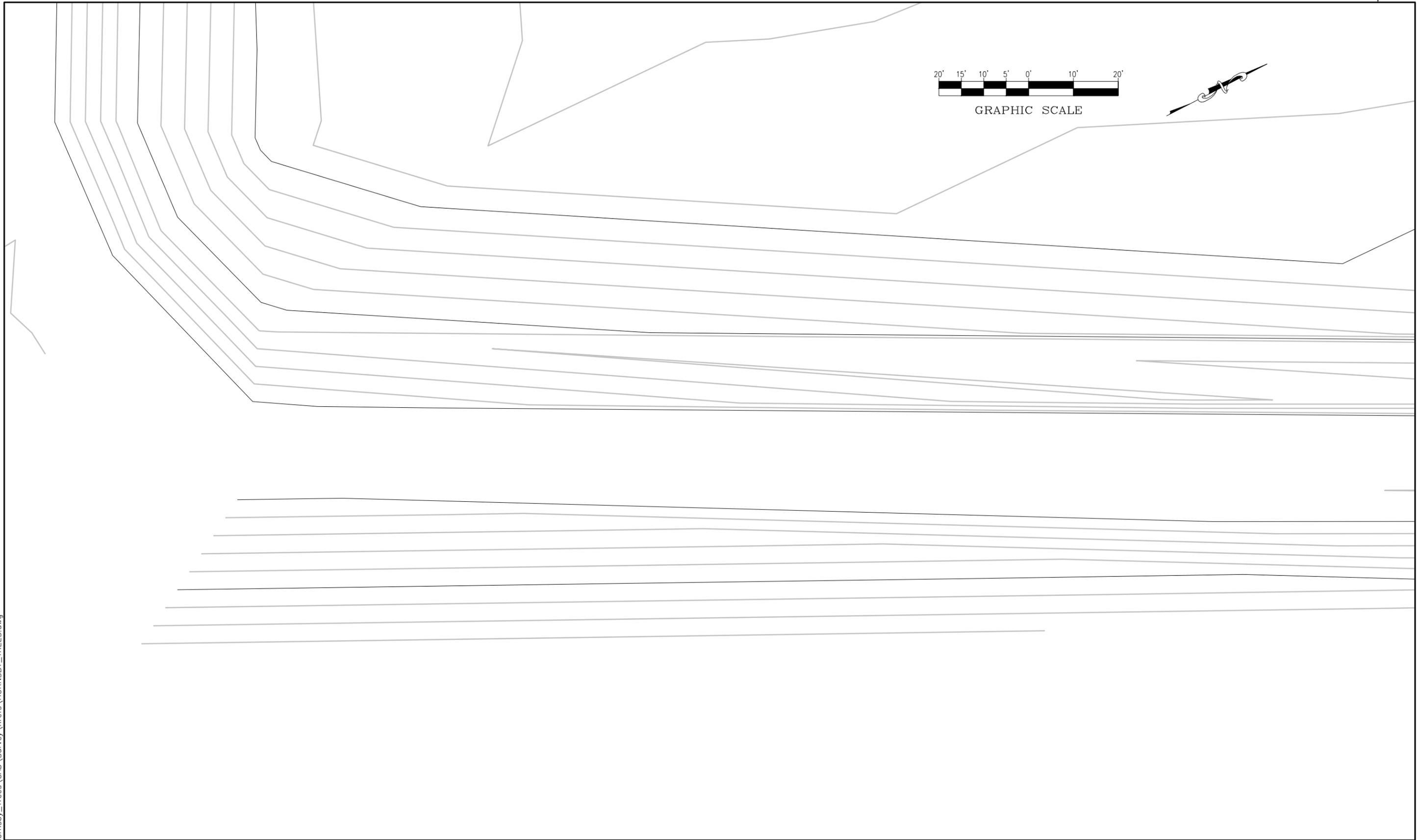


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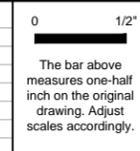


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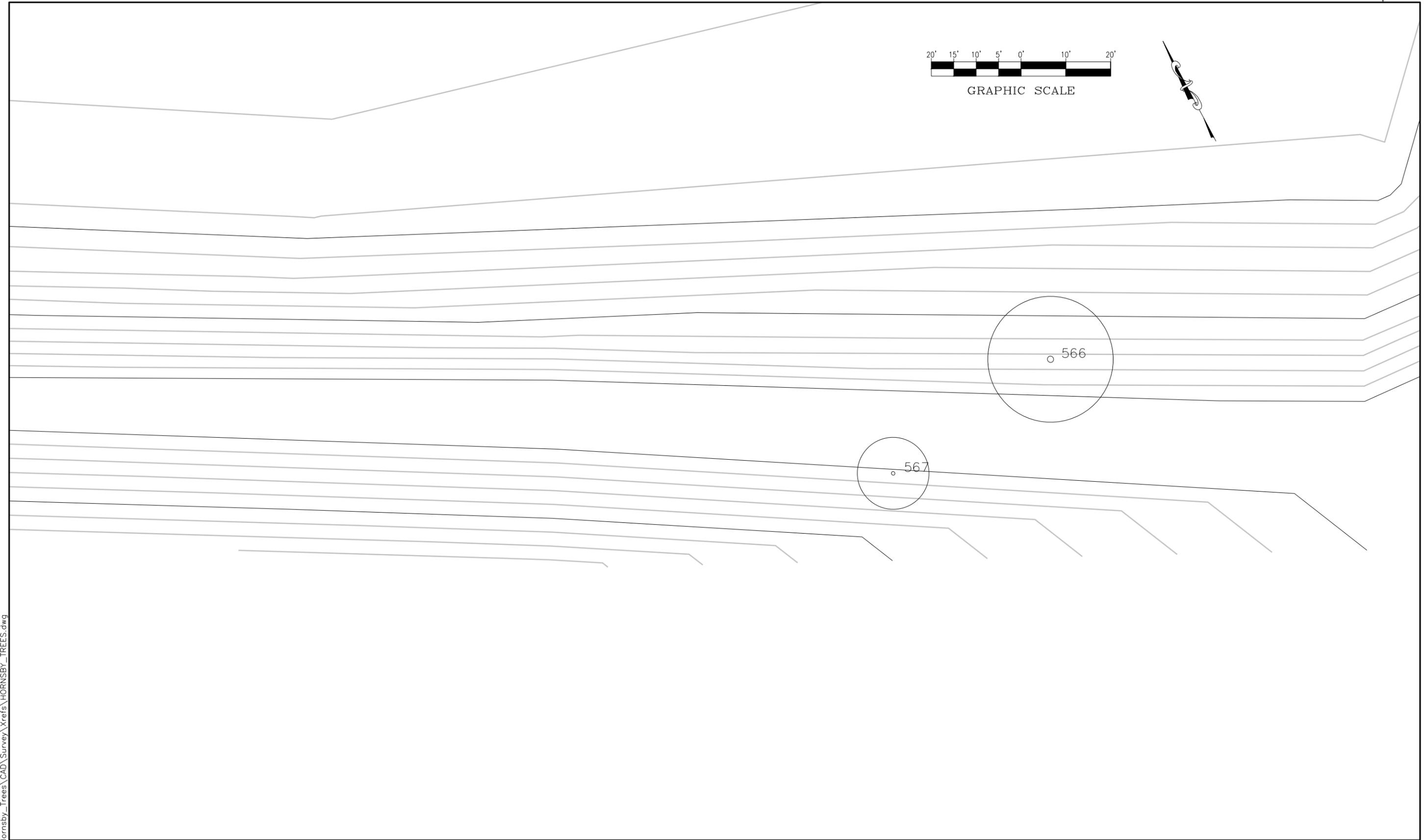
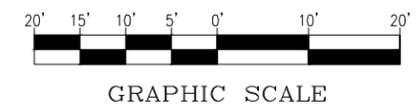


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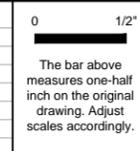


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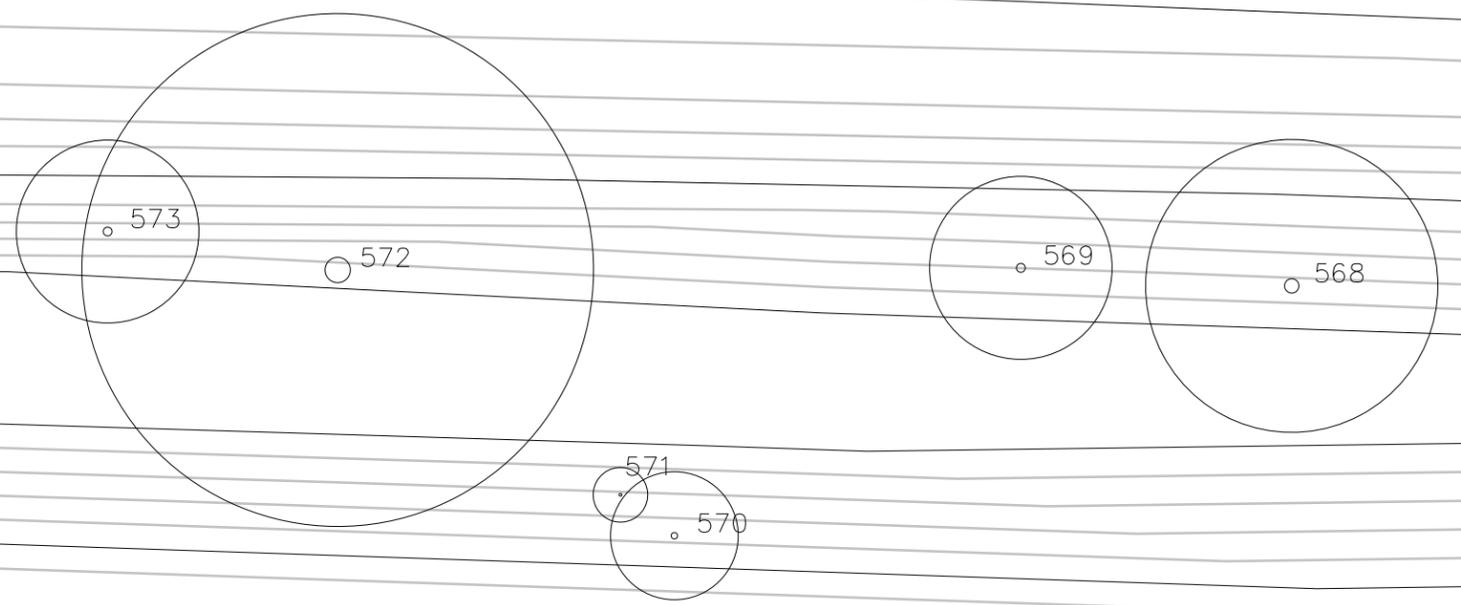
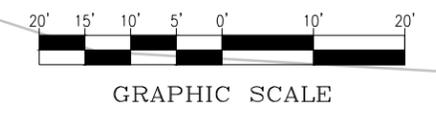


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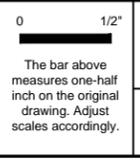


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NO.	DATE	DESCRIPTION	BY

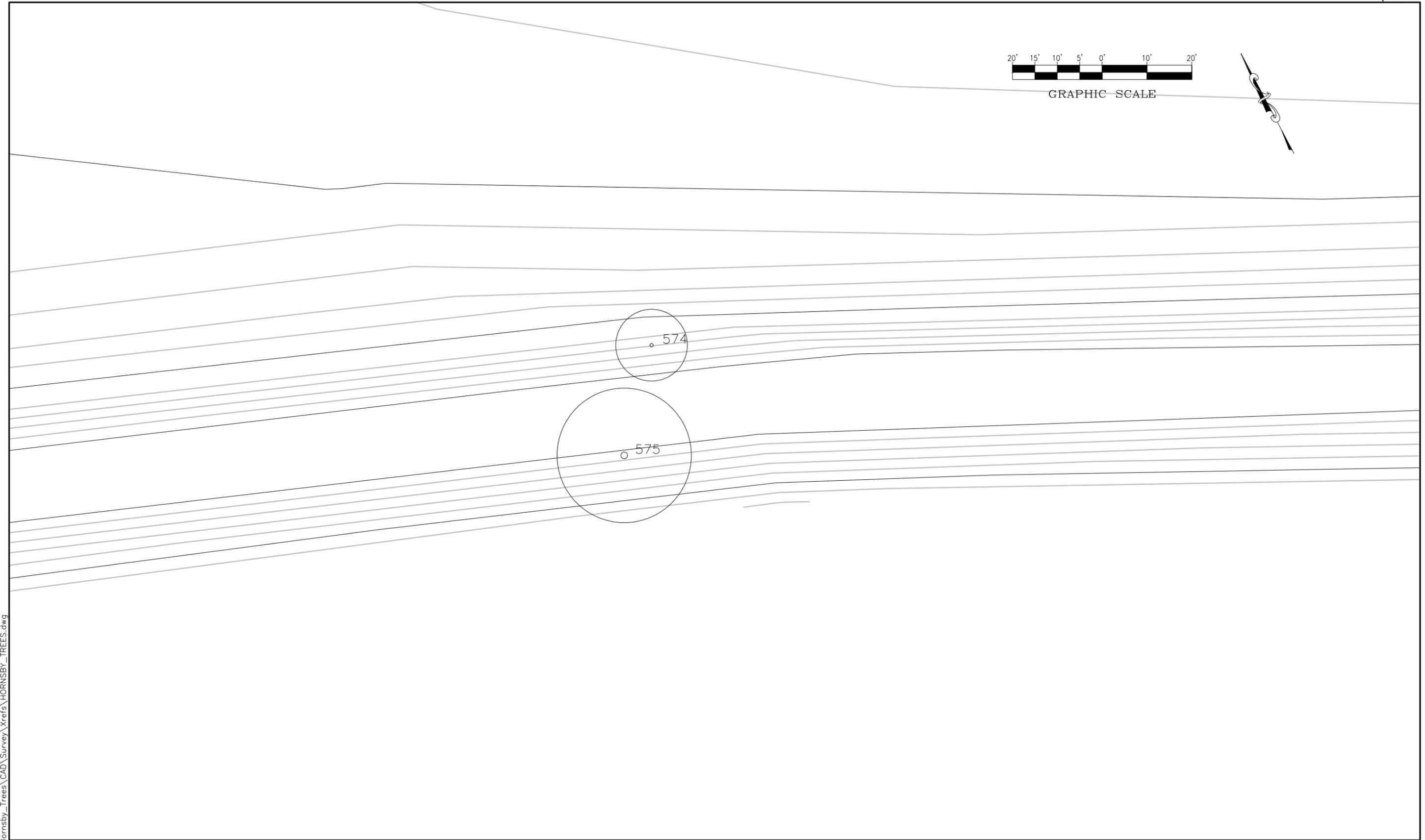
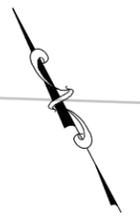
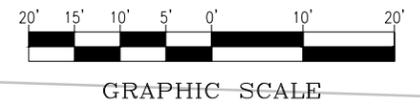


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AUSTIN, TEXAS

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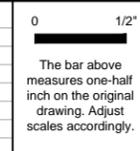


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NO.	DATE	DESCRIPTION	BY

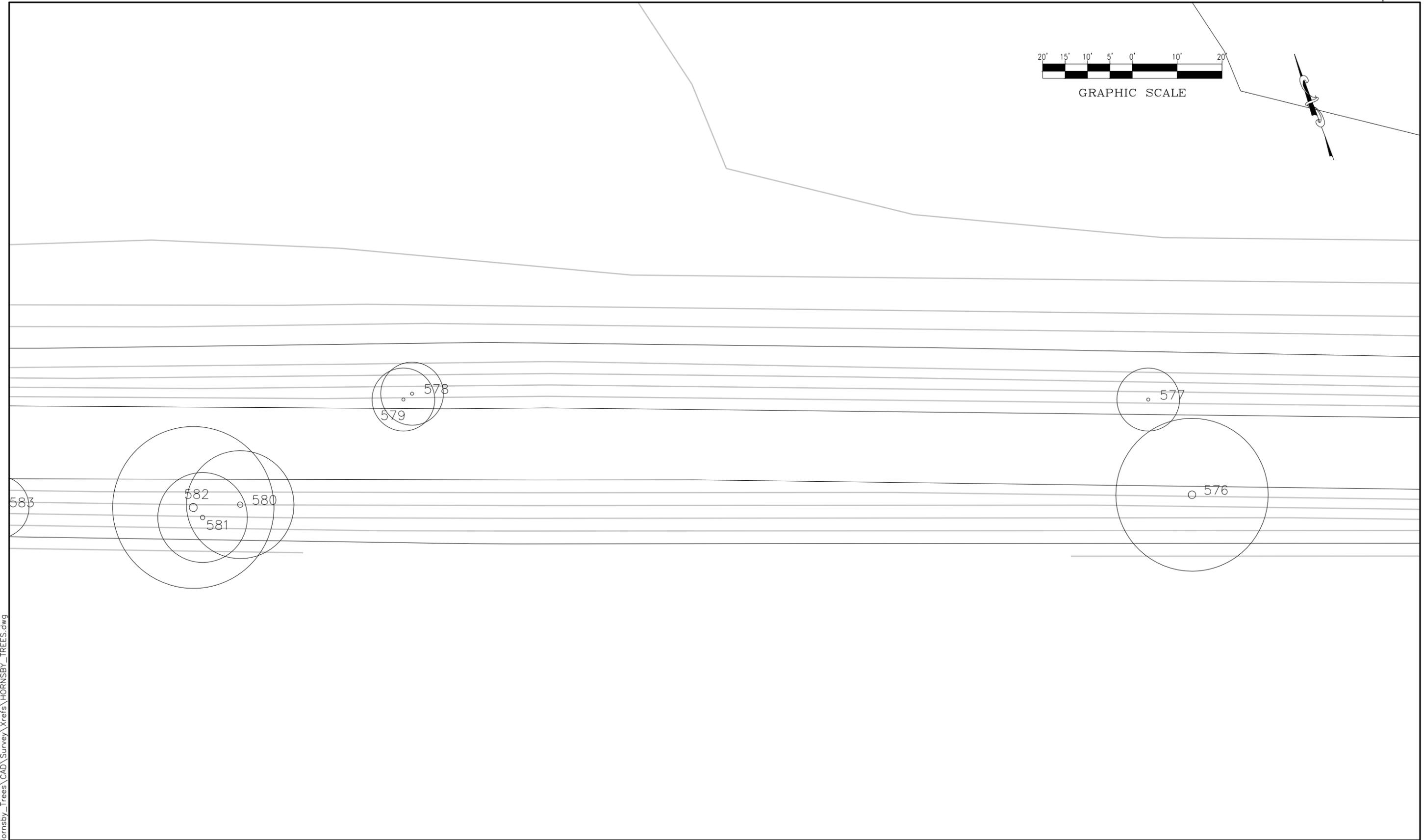
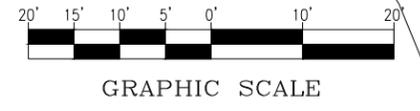


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20 OF 30

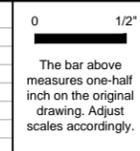


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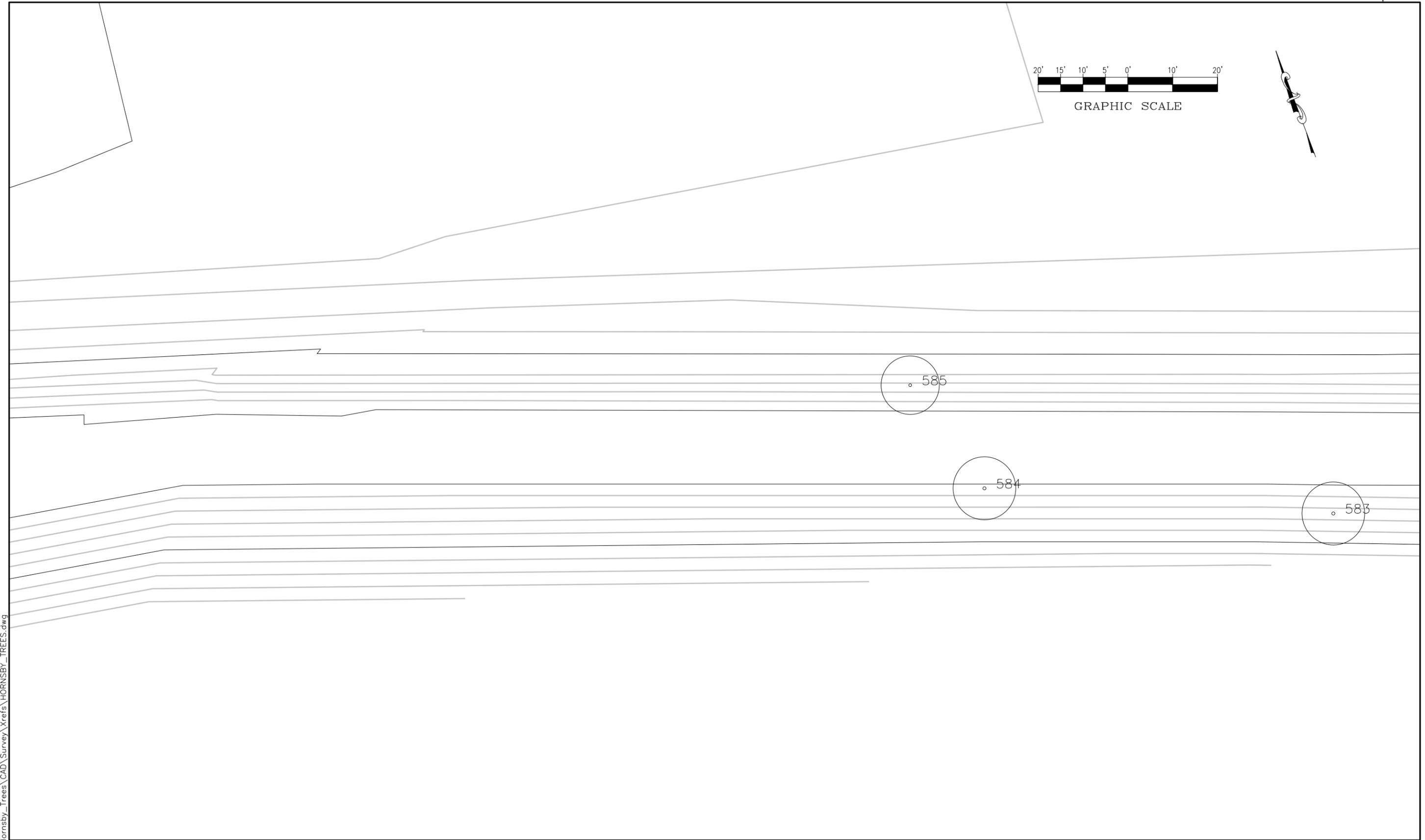
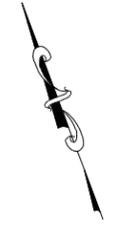
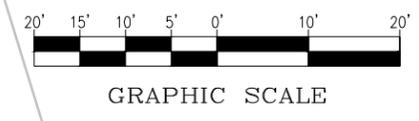


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TREE MITIGATION SURVEY  
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AUSTIN, TEXAS

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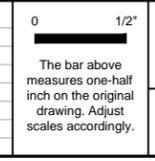


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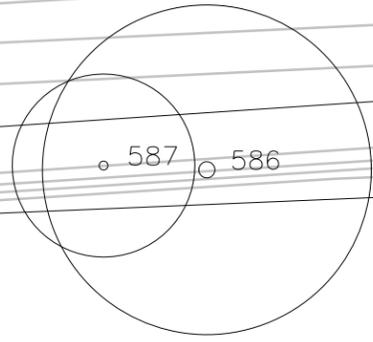
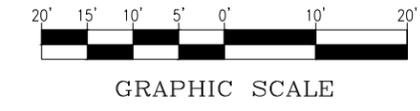


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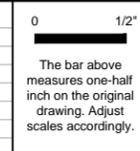


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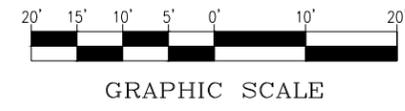
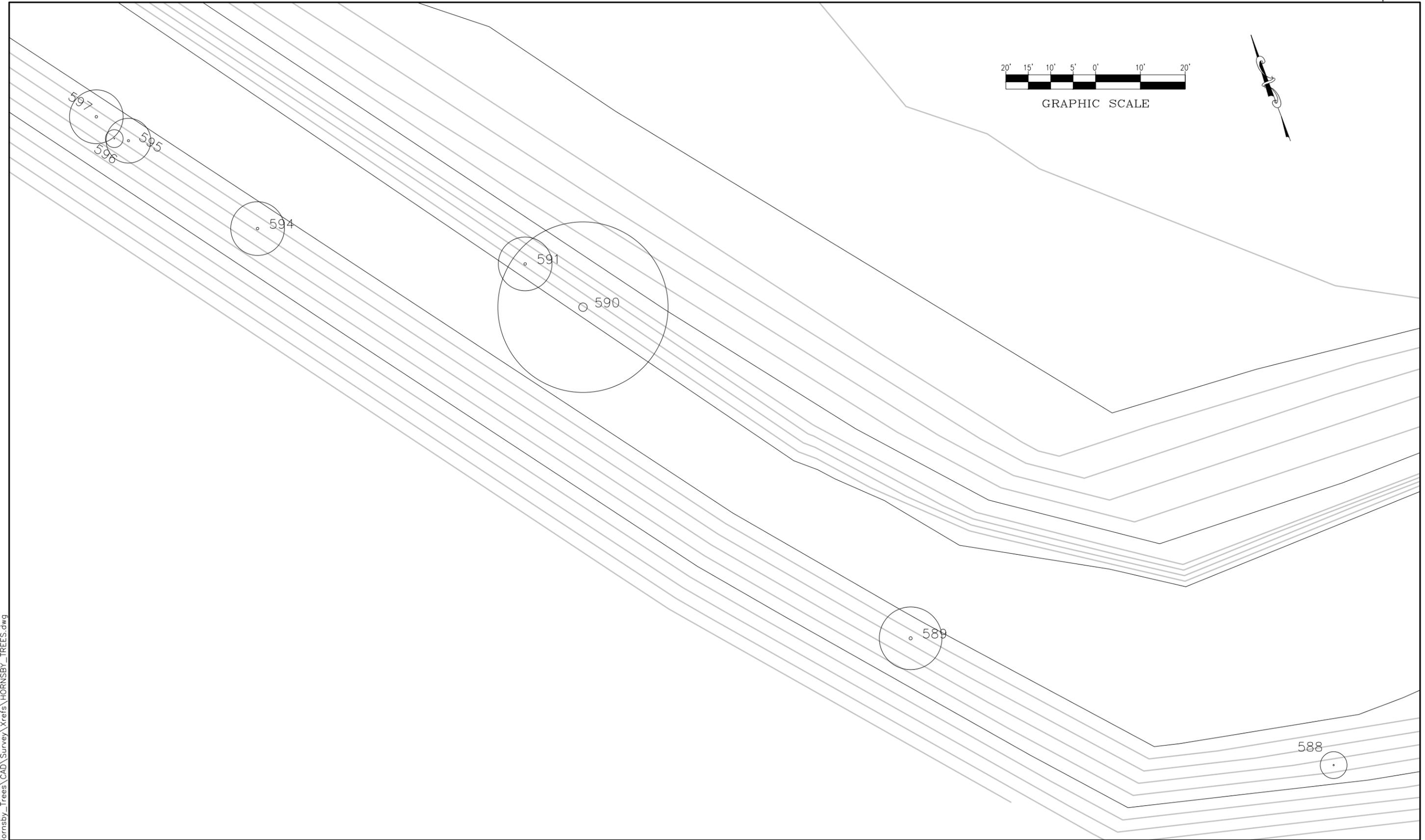


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23 OF 30

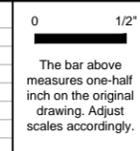


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NO.	DATE	DESCRIPTION	BY

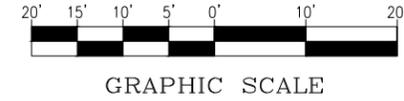


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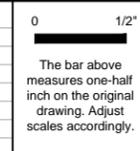


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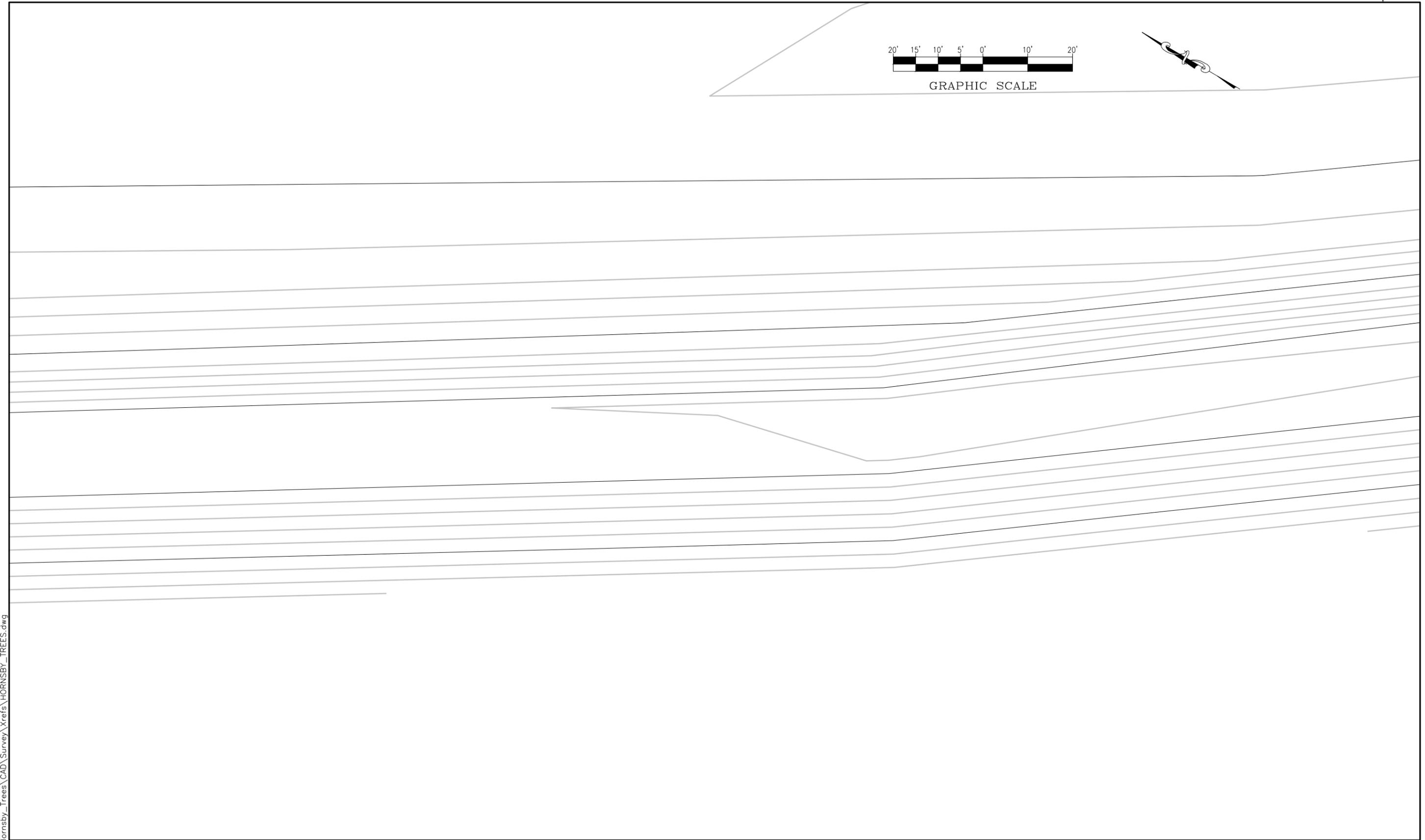
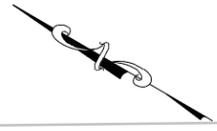
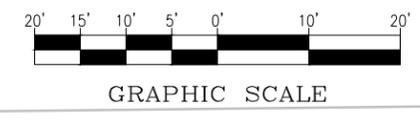


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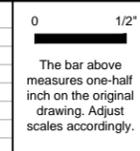


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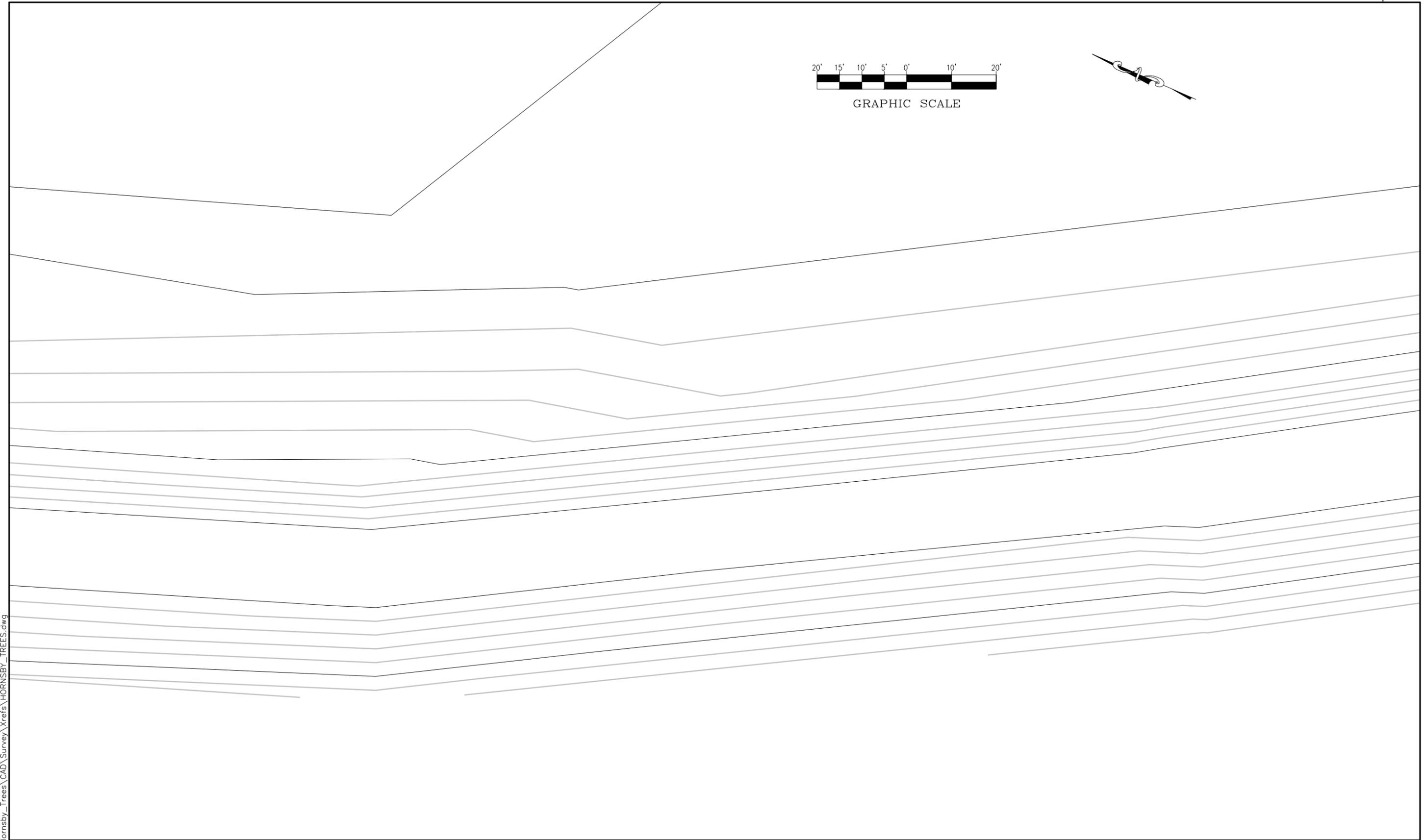
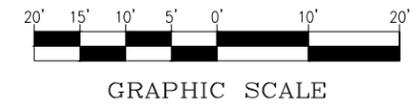


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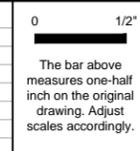


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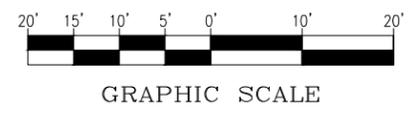


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27 OF 30

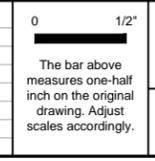


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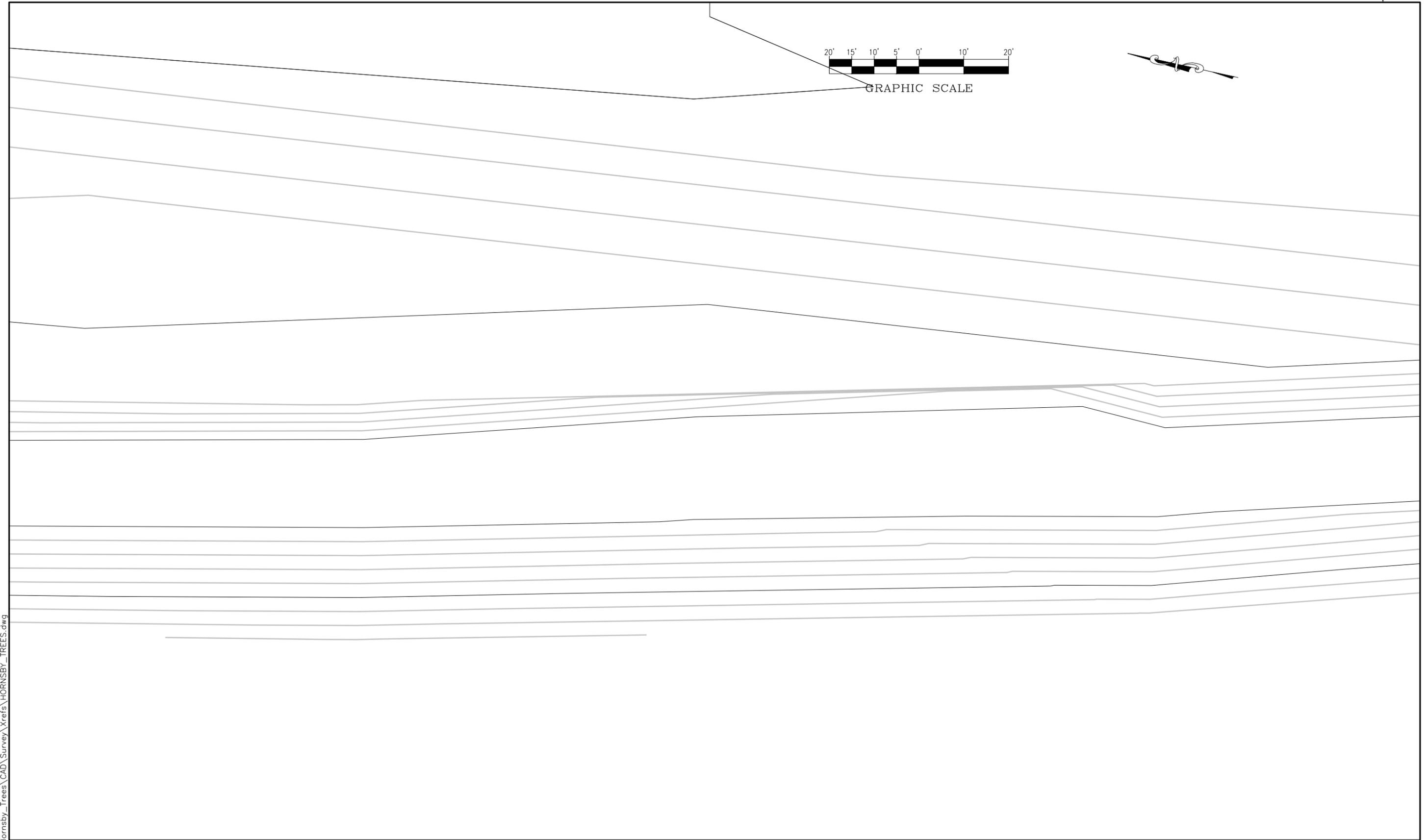
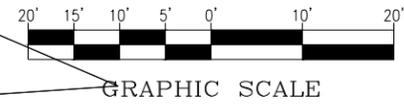


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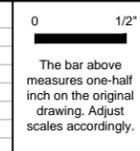


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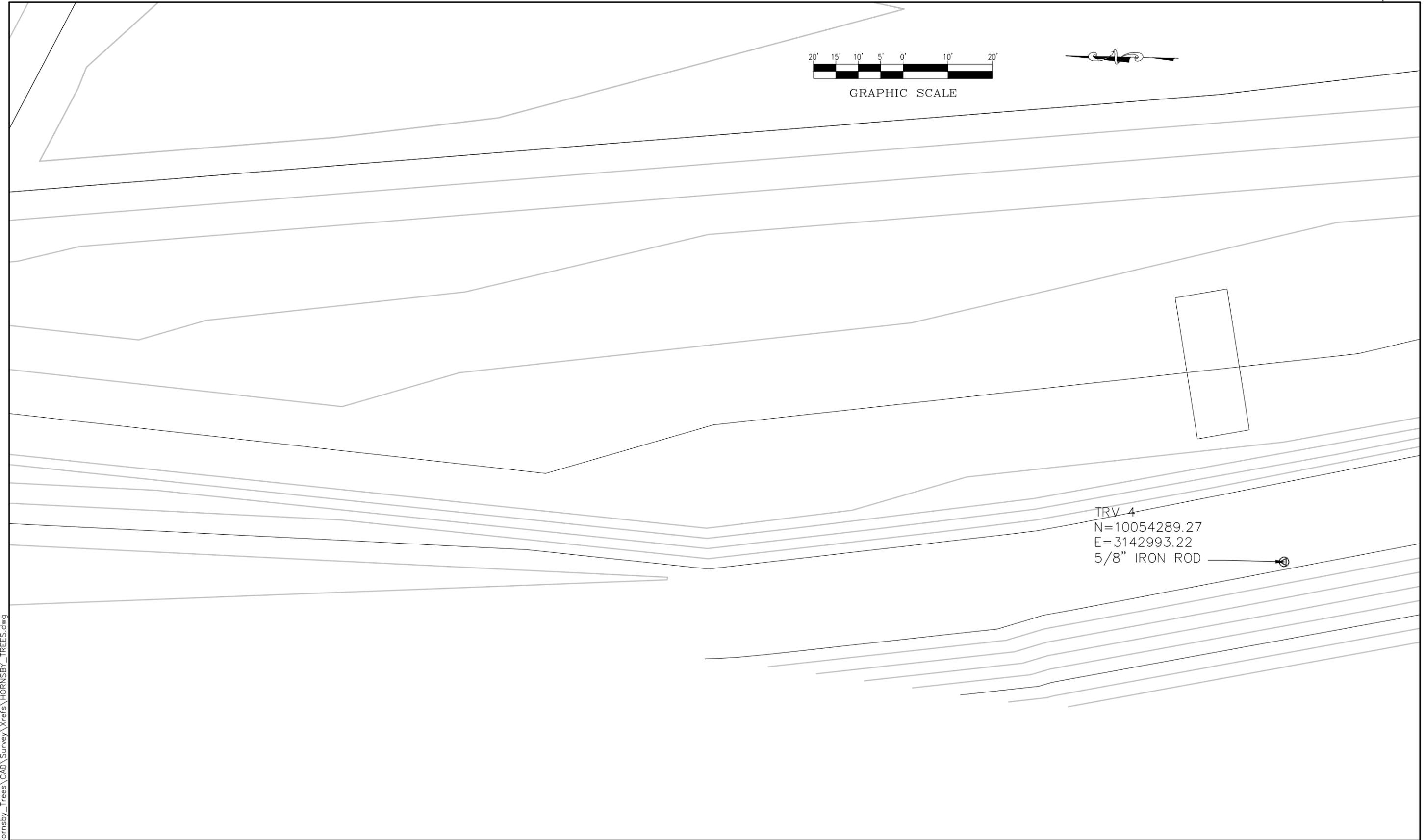
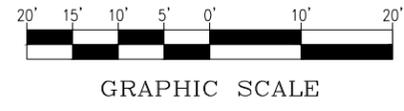


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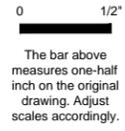
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## Appendix B: Tree Removal Instructions and Example Details



## Appendix C: Contractor Data Sheets

<b>Dates:</b>		<b>Contractor Name:</b>	
<b>Personnel Names:</b>			
<b>Tree Tag:</b>	<b>Action:</b> (Felled, Painted, Excavated, Pruned)	<b>Dewatering Required?</b>	<b>Comments</b>
509			
510			
513			
514			
515			
516			
517			
518			
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548			

<b>Dates:</b>		<b>Contractor Name:</b>	
<b>Personnel Names:</b>			
<b>Tree Tag:</b>	<b>Action:</b> (Felled, Painted, Excavated, Pruned)	<b>Dewatering Required?</b>	<b>Comments</b>
546			
547			
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589			

<b>Dates:</b>		<b>Contractor Name:</b>	
<b>Personnel Names:</b>			
<b>Tree Tag:</b>	<b>Action:</b> (Felled, Painted, Excavated, Pruned)	<b>Dewatering Required?</b>	<b>Comments</b>
590			
591			
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595			
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597			
598			
599			
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**Baer Engineering**  
and Environmental Consulting, Inc.

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October 12, 2015

City of Austin  
Public Works Department  
505 Barton Spring Rd #1300  
Austin, TX 78704

*Sent by email to Jules.Parrish@austintexas.gov.*

Attention: Ms. Jules Parrish, MWR

Subject: **Vegetation Management Plan**  
Hornsby Bend Biosolids Management Plant Ponds 1E, 1W, & 2  
2210 South FM 973  
Austin, Texas 78725  
**Baer Engineering Document No. 142069-8i.013**

Dear Ms. Parrish:

Baer Engineering and Environmental Consulting, Inc. (Baer Engineering) is pleased to provide the attached Vegetation Management Plan for the three ponds located at Hornsby Bend Biosolids Management Plant (HBBMP). Baer Engineering visited the HBBMP on June 3, 2015 and June 16, 2015. This Vegetation Management Plan is based on our field observations and the vegetation management requirements mandated by the TCEQ for the ponds at HBBMP. The Plan includes:

- 1) obtainable management goals,
- 2) guidance on how to achieve those goals, and
- 3) methods to record management progress.

We have drafted our management plan in a format that can be easily disseminated to the maintenance staff.

Baer Engineering thanks you for the opportunity to work on this project. If you have questions or comments about this document, please feel free to contact me at 707.616.8583 or [dsperry@baereng.com](mailto:dsperry@baereng.com).

Respectfully Submitted,  
**BAER ENGINEERING & ENVIRONMENTAL CONSULTING, INC.**

David Sperry  
Wildlife/Conservation Biologist

Attachment: Vegetation Management Plan

# Vegetation Management Plan Pond Embankments

## Hornsby Bend Biosolids Management Plant

Prepared for:



Austin Water Utility  
2210 South FM 973  
Austin, Texas 78725



Baer Engineering Project No. 142069-8i.013  
October 12, 2015



**Baer Engineering**  
*and Environmental Consulting, Inc.*

7756 Northcross Drive, Suite 211 • Austin, Texas, U.S.A. 78757  
Toll Free: 1-800-926-9242 Facsimile: (512) 453-3316  
[www.BaerEng.com](http://www.BaerEng.com)

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Appendix A: Example Maintenance and Inspection Data Sheets

Appendix B: 1957 Recorded Plans

Appendix C: Tree Removal Instruction and Example Details

Appendix D: Chapter 6 - Dam Remediation Design Considerations (FEMA 534,  
September 2005)

## 1.0 SUMMARY

Baer Engineering prepared this Vegetation Management Plan for Hornsby Bend Biosolids Management Plant (HBBMP) to address Texas Commission on Environmental Quality's (TCEQ) recommendation to prevent the proliferation of additional trees on or within 10 feet of the toe of the berms surrounding the ponds 1E, 1W, and 2. This plan will be implemented after the Tree Removal Plan is completed. The Tree Removal Plan will implement the removal of dead and diseased trees located on the berms.

This Vegetation Management Plan includes a general list of maintenance procedures and activities, a schedule to remove existing trees, and a plan to prevent new trees from becoming established on the embankments. The scope of work described herein should be conducted between September 16 and March 14 (of any consecutive years), in order to avoid violating the Migratory Bird Treaty Act (MBTA). If work must occur between March 15 and September 15 (of any year), then the contractor will need to follow the MBTA Compliance Plan provided under a separate cover.

We divided the area surrounding the pond berms into eight management areas. At this time, five of these management areas require the removal of existing living trees and their root systems. The three remaining management areas do not have existing living trees on them. Removal techniques will depend on the size of the tree. To maintain its integrity, the berm must be repaired immediately following root extraction. Berm repairs should be accomplished in accordance with the appropriate berm specifications for soil placement, compaction, and materials testing. Baer Engineering recommends accomplishing tree removal in the five management areas over a period of eight years.

To quantify the maintenance activities, HBBMP will record progress on the enclosed data sheets. Once the woody plants are removed, HBBMP will visually inspect the berm quarterly to check berm integrity. The individuals should be qualified Engineers with experience or training on how to conduct an integrity inspection, using TCEQ guidance documents. Example data sheets for keeping track of maintenance and inspection activities are provided in **Appendix A**, these are examples and other means of documentation are acceptable.

Removing trees with DBH's greater than or equal to eight inches will require mitigation following City of Austin (COA) mitigation calculations. Coordination with the COA Arborist and a Texas-licensed geotechnical engineer is recommended prior to conducting tree removal.

## **2.0 INTRODUCTION AND PURPOSE**

Baer Engineering prepared this document to provide guidance to the HBBMP staff. This document describes the goals of the Vegetation Management Plan, the steps necessary to achieve the goals, and methods to record progress. In addition to this document, the maintenance staff will need to complete the Tree Removal Plan and follow the MBTA Compliance Plan, both provided under separate cover.

It is our understanding that the HBBMP received a Notice of Violation (NOV) after a Compliance Evaluation investigation by the TCEQ on March 16, 2015. The NOV letter stated HBBMP failed to adequately prevent the proliferation of trees on the berms of ponds 1E, 1W, and 2. The TCEQ recommended the following corrective action for the ponds:

1. Begin removing small trees on or near the embankment of the ponds as long as tree removal does not impact the integrity of the embankment and cause an unauthorized discharge.
2. Prepare and implement, with timelines, a Tree Management Plan geared toward removing dead or diseased trees and preventing the proliferation of additional trees on or near the embankment.
3. All tree removal should be conducted above the water table of the ponds to minimize the potential of unauthorized discharges and to prevent decaying roots from compromising the hydraulic integrity of the embankments.
4. Maintenance records should be kept that document actions recommended by the Tree Management Plan.
5. Provide a copy of the Tree Management Plan to the TCEQ Austin Regional Office for review by the compliance due date of October 16, 2015.

Baer Engineering prepared a Tree Removal Plan to address TCEQ's recommendation to remove dead and diseased trees. This Vegetation Management Plan, in conjunction with the Tree Removal Plan, will be provided to TCEQ to demonstrate that HBBMP has addressed TCEQ's corrective action recommendations.

### 3.0 VEGETATION MANAGEMENT GOALS

The goals of this Vegetation Management Plan are to outline a plan to:

1. Remove existing small diameter ( $\leq 6$  inch DBH) trees on or within 10 feet of the toe of the berms surrounding 1E, 1W, and 2 Ponds;
2. Use tree removal methods that do not impact the integrity of the embankment and cause an unauthorized discharge;
3. Prevent proliferation of new trees on or near the embankments; and
4. Provide a schedule and method to measure maintenance progress.

In order to keep the majority of the berm intact during tree removal, we have separated the berms surrounding the ponds into eight management areas. For reference, **Figure 1** depicts these areas. Within management areas 1 through 5, trees and their root systems will be removed. To maintain its integrity, the berm must be repaired immediately following root extraction. Berm repairs should be accomplished in accordance with the appropriate berm specifications for soil placement, compaction, and materials testing. Removing trees with DBH's greater than or equal to eight inches will require mitigation following COA mitigation calculations. Management areas 6, 7, and 8 do not have any existing trees.



**Figure 1.** Hornsby Bend Biosolids Management Plan overview of the eight management areas

## 4.0 TREE REMOVAL ON BERMS

Tree removal is planned on or within 10 feet of the toe of the berms, to illustrate the approximate limits refer to the 1957 Recorded Plans note in **Appendix B**. The berm varies in height from 7.0 feet to 13.5 feet with a side slope of 3:1 (3 feet horizontal to 1 foot vertical) and a 10 foot top width. Therefore the limits would correlate to approximately 36 feet minimum to 55.5 feet maximum from the centerline of the berm.

Tree removal will be conducted in one management area at a time to 1) allow for a solid continuous repair along the berm, 2) ensure berm integrity by determining success of previous repairs, and 3) allow the COA to allocate the necessary funds to achieve the vegetation management goals.

Removal techniques will depend on the size of tree. Removal techniques for trees above and near the waterline are presented in the following subsections and are specified in the attached detail sheet in **Appendix C**.

Trees on the berms may need to be surveyed for size and species before removal begins. Removing trees that are greater than or equal to eight inches in diameter at breast height (DBH) will require mitigation following COA mitigation guidelines. Coordination with the COA Arborist and a Texas-licensed geotechnical engineer is recommended prior to conducting tree removal.

### 4.1 Tree removal

#### 4.1.1 Small diameter trees ( $\leq 6$ inches DBH)

Live small diameter trees exist on and within 10 feet of the toe of the berms surrounding the ponds. Small diameter trees are defined in this plan as those with stems less than or equal to six inches in DBH. These trees will be cut flush with the ground. The trees need to fall on the berm of the ponds and not in the water. Felling trees into the water could damage the liner of the ponds and result in water quality violations. Immature trees of this size typically do not have a substantial root system and are not expected to impact the berm. Leaving a stump from a live tree is not ideal because the stump will likely re-sprout. Within five minutes of the final flush cut, glyphosate or a similarly approved herbicide will be brushed, with a disposable paint brush, onto the top of the stump. The herbicide will be applied by a licensed applicator. The manufacturer's instructions for applying the proper concentration of the herbicide must be followed. The minimum amount of glyphosate should be used to completely cover the top of the stump. Care should be taken to treat only the target stump. The herbicide should not affect the surrounding vegetation or water. The woody debris resulting from this work will be properly removed.

#### 4.1.2 Dead large diameter trees ( $> 6$ inches DBH)

Large diameter trees are defined in this plan as trees with stems that are greater than six inches DBH. COA has opted to leave the existing living large diameter trees and allow these trees to die naturally. As these trees die naturally, they should be felled, and their root systems should be removed within one to two years, following the methods described below.

#### *Directional Notch*

The directional notch comprises a top cut and bottom cut. The first cut is the top cut; it determines the direction of the fall. The top cut should be at a 45° angle from the horizontal. The second cut is referred to as the bottom cut. The bottom cut is a horizontal cut that meets the top cut. The directional notch depth should be equal to one-fourth of the tree's diameter.

### *Felling Cut*

The third cut, or felling cut, will occur on the opposite side of the tree from the directional cut. This cut may be either a straight cut from behind the notch cut (typically used for smaller trees), or the person operating the chainsaw may use a bumper spike. Both techniques should use a felling wedge for larger trees to prevent pinching of the guide bar. Both types of cuts will be two inches above the corner of the notch cut.

Once the tree is down, cut it into pieces that can be loaded into a hauler and mulch for reuse or dispose of properly.

### *Stump and Root Removal*

The decaying roots of woody species can create channels into the pond berms comprising the berm's integrity. Only hand tools will be used to dig around the base of the stump exposing the root ball. The stump and root ball should be pulled using a winch to loosen the root ball. Continue to use hand tools to grub around the base of the stump and pull with a winch until the stump and root ball are removed. Once the stump is removed, grub out any remaining roots greater than two inches in diameter. If water or saturated soil is encountered during excavations, cut exposed roots and begin berm repair under the direction of a Texas-licensed geotechnical engineer.

The critical root zone (CRZ) area should be assigned to each tree, based on the trunk diameter size. For example a 10-inch diameter tree has a 20-foot diameter CRZ. The goal for the stump and root removal is to extract a significant portion of the roots. Therefore we expect one-half of the CRZ will need to be extracted. Stumps that are within a distance of the water's edge that is one-half the CRZ diameter will require a temporary dewatering plan.

## **4.2 Dewatering for dead large diameter trees near water's edge**

A temporary dewatering plan will be required for trees within a distance of the water's edge that is one-half the CRZ diameter. Sufficient size and capacity of the dewatering system is necessary to lower and maintain the water table and to allow material to be excavated in a reasonably dry condition. Dewatering will be accomplished through the use of cofferdams, or equivalent. The dewatering system will be operated continuously until repair of the berm is completed. The water removed from the excavation should be disposed of in such a manner as will not interfere with work under construction. We suggest pumping the water back into the pond. Once the stump and roots have been excavated and the berm has been repaired, the cofferdam should be removed.

Dewatering may or may not be required for trees located farther than one-half the CRZ diameter from the water's edge. This will depend upon the elevation of the water in the ponds and the depth of the rootball. The need for dewatering must be evaluated on a case-by-case basis.

## **4.3 Berm repair (typical)**

The Federal Emergency Management Agency (FEMA) has investigated numerous dam failures caused by vegetation. In its *Technical Manual for Dam Owners – Impacts of Plants on Earthen Dams*, (published as FEMA 534 in September 2005), FEMA describes typical methods of dam repair after tree removal. FEMA states, "Design and construction practices of using optimum compaction of embankment soils reduce potential settlement of embankments, increases shear strength of the embankment soils, decreases the permeability of the embankment soils, and minimizes long-term changes in the physical and engineering properties of soils. When embankment soil compaction results in the attainment of desirable objectives from a geotechnical engineering behavior perspective of earthen slopes, compaction of embankment

soils also precludes tree root growth and elongation as a result of exclusion of most of the requirements for healthy root elongation and tree growth.

Traditional embankment soil compaction specifications require that the soil be compacted to about 95 to 98 percent of the standard Proctor maximum dry density as determined by ASTM D-698. Furthermore, most properly written soil compaction specifications generally require that compaction moisture contents be maintained about two percent below to three percent above optimum moisture content. At these degrees of compaction and at these moisture contents, soil oxygen content, water content, and soil pore size are not available for healthy root elongation and tree growth. Even if there is sufficient moisture content in the soil to otherwise sustain healthy root elongation, the soil pore sizes are so small that available pore water cannot be effectively moved to the root system. Consequently, the compacted dam embankment fill soil produces an exclusion system that mechanically impedes healthy root elongation and tree growth.” In Chapter 6 – Dam Remediation Design Considerations, there are a number of remediation design considerations associated with the removal of trees and woody vegetation from the embankments of earthen dams. Chapter 6 is provided in **Appendix D** to this Vegetation Management Plan as a guidance document. Consultation with a Texas-licensed geotechnical engineer is strongly encouraged when removing large diameter trees that require substantive repairs to the berm after removal.

In order to comply with the COA Land Development Code, soil used for backfill must comply with COA Specification 601S. The backfill should then be graded to blend with the surrounding contours and seeded following the COA Standard Specification 604S Seeding for Erosion Control on all disturbed areas above the water table. Please check with the COA website for the current Specifications.

**5.0 EXISTING LARGE DIAMETER LIVE TREES (>6 INCHES DBH)**

Large diameter trees are defined in this plan as trees with stems that are greater than six inches DBH. COA has opted to leave living large diameter trees and allow these trees to die naturally. The COA is evaluating potential options for management of hydraulic loading and how this may affect whether or not the ponds remain in service over the long term. If the ponds do remain in service at their current capacity, allowing trees to continue to grow on the berms increases the likelihood of future berm instability. The larger the tree is allowed to grow, the larger the “scar” on the berm after extraction.

The following live trees were observed on and near the berms of the ponds:

Hackberry species (*Celtis* spp.) The majority of the live trees surrounding the ponds are a species of hackberry. There are three species which commonly occur in the Austin area: *Celtis laevigata*, *C. occidentalis*, and *C. reticulata*. Hybridization is common with the genus *Celtis* and most species are poorly defined (Elias 1970); therefore we have presented general botanical characteristics for the three species in **Table 1**.

**Table 1.** Botanical characteristics for the three *Celtis* species that commonly occur in the Austin area.

Botanical Characteristics	Celtis Species:		
	<i>C. laevigata</i>	<i>C. occidentalis</i>	<i>C. reticulata</i>
Height Range	60 to 100 feet <sup>1,2</sup>	50 to 110 feet <sup>4,5</sup>	7 to 53 feet <sup>9,10</sup>
Diameter Mature Tree	18 inches <sup>2</sup>	20 inches <sup>4</sup>	
Diameter Maximum		6 feet <sup>5</sup>	24 inches <sup>9,10</sup>
Life Span	<150 years <sup>3</sup>	150 to 200 years <sup>4</sup>	100 to 200 years <sup>11</sup>
Root depths	Shallow <sup>3</sup>	Deep up to 9 feet <sup>6</sup>	Deep up to 15 feet <sup>12,13</sup>
Growth Pattern	Slow <sup>2</sup>	Varies depending on site conditions <sup>7,8</sup>	Slow <sup>12</sup>

Citations: <sup>1</sup>(Bonner 1974); <sup>2</sup>(McKnight 1965); <sup>3</sup>(Burns et al. 1990); <sup>4</sup>(Farrar 1995); <sup>5</sup>(Duncan and Duncan 1988); <sup>6</sup>(Sprackling and Read 1979); <sup>7</sup>(Braun 1989); <sup>8</sup>(Gleason and Cronquist 1991); <sup>9</sup>(GPFA 1986); <sup>10</sup>(Munz 1974); <sup>11</sup>(Simpson 1988); <sup>12</sup>(Sutton 1974); <sup>13</sup>(Zimmerman 1969)

Jerusalem Thorn (*Parkinsonia aculeata*) typically grows up to 15 feet tall with a diameter of 6 to 12 inches (Lady Bird Johnson Wildflower Center 2015). This is a fast growing tree that lives about 30 years (Pima Community College 2015).

The following remaining tree species were observed in lower numbers:

Honey Mesquite (*Prosopis glandulosa*) typically grows up to 20 to 40 feet (Meyer et al. 1971) with tap roots extending to the local water table (3 to 40 feet; Ansley et al. 1989). Mesquite life span ranges between 70 and 110 years (Fisher et al. 1959).

Red Mulberry (*Morus rubra*) is a rapid growing tree which typically averages 15 to 70 feet in height with diameters of 30 inches (Lamson 1990). The root system of red mulberry is shallow and this tree usually lives 125 years or less (Van Dersal 1938).

Box Elder (*Acer negundo*) has a fast growth rate and short life span, typically living for 75 years

or less (Loehle 1988). The root system is typically shallow and spreading (Sutton and Johnson 1974).

Black Willow (*Salix nigra*) is a short lived tree with a shallow root system and an average life span of 55 years (McKnight 1965). Trees can reach 140 feet in height with diameters of 48 inches under ideal conditions.

## **6.0 ONGOING MAINTENANCE ACTIVITIES**

After the initial small diameter tree removal is completed, ongoing maintenance is necessary to prevent woody plants from becoming established on the pond embankment. When the ponds' embankments are free of trees, maintenance staff or assigned contractor should:

1. Remove shrubs and vines growing on the berms in early spring (before March 15) and early fall (after September 15);
2. Use hand tools, saws, or weed wrenches to remove small diameter ( $\leq 6$  inches) woody plants that are growing on the berms in early spring (before March 15) and early fall (after September 15);
3. Remove dead trees using hand tools, saws, winches on the berms in early spring (before March 15) and early fall (after September 15);
4. Attempt to re-establish grass as a ground cover where soil is exposed following COA Standard Specification 604S; and
5. Mow the berms at least twice a year, between September 15 and March 15. Height of grass should be a minimum height of 4 inches high to promote healthy ground cover.

Vegetation, including trees, shrubs, and grasses in the project area may provide habitat for migratory birds. Vegetation maintenance, including removing trees (dead or living), removing shrubs, and mowing grass around the ponds, should occur between September 16 and March 14, to avoid disturbance of migratory birds and their nests.

## 7.0 SCHEDULE OF ACTIVITIES AND RECORDKEEPING

### 7.1 Quarterly Inspections Schedule

Once the small diameter woody plants are removed, visually inspect the berm quarterly to check berm integrity. These inspections will need to be made for several years after root system removal to ensure berm repairs are intact as the roots decay. HBBMP will keep records of the inspection and maintenance activities that are conducted. Example data sheets for keeping track of inspection and maintenance activities are provided in **Appendix A**, these are examples and other means of documentation are acceptable.

The following is a list of inspection activities that should occur along the pond berms at HBBMP.

- Inspect berms for evidence of safety issues (e.g., tension cracks, slope failure scarps, internal and external erosion features, etc.)
- Note if mowing is required, and schedule mowing between September 15 and March 15.
- Inspect berms for exposed soil.
- Inspect berms for sprouting trees, shrubs, and vines.
- Identify dead or diseased trees on the berms or within 10 feet of the berm's toe.

If concerns on the berms (safety issues, exposed soil, or sprouting trees, shrubs, and vines) are documented, schedule a date to make necessary repairs.

### 7.2 Maintenance Schedule

The following is a schedule of vegetation maintenance activities along the pond berms at HBBMP for the next eight years.

#### Year One (September 15, 2015 to March 15, 2016):

- Follow Tree Removal Plan, prepared under a separate cover, and remove as many of the dead and diseased trees from berms as feasible. Document which trees were removed. Repair berm where trees were excavated.
- Mow tall grass on the berms, where trees are not present, to a height of four to six inches.

#### Year Two (September 15, 2016 to March 15, 2017):

- Follow Tree Removal Plan, prepared under a separate cover, and remove as many of the dead and diseased trees from berms as feasible. Document which trees were removed. Repair berm where trees were excavated.
- Mow tall grass on the berms, where trees are not present, to a height of four to six inches.
- Remove dead, diseased and damaged trees and remove small diameter woody plants that are growing on the berm in management area 1.
- Establish grass in areas where soil is exposed, following COA Standard Specification 604S.
- Complete Maintenance Data sheets every day that maintenance activities occur.

Year Three (September 15, 2017 to March 15, 2018):

- If all activities outlined in the Tree Removal Plan were not completed during the previous year, continue to implement the Tree Removal Plan.
- Cut all trees' stems with DBH's less than or equal to six inches flush with the ground and treat all cut stumps with an herbicide to prevent sprouting.
- Mow tall grass on the berms, where trees are not present, to a height of four to six inches.
- Remove dead, diseased and damaged trees and remove small diameter woody plants that are growing on the berm in management area 2.
- Establish grass in areas where soil is exposed; following COA Standard Specification 604S.
- Complete Maintenance Data sheets every day that maintenance activities occur.

Years Four (September 15, 2018 to March 15, 2019):

- Mow tall grass on the berms, where trees are not present, to a height of four to six inches.
- Remove dead, diseased and damaged trees and remove small diameter woody plants that are growing on the berm in management area 3 and others that have been cleared of trees.
- Establish grass in areas where soil is exposed, following COA Standard Specification 604S.
- Complete Maintenance Data sheets every day that maintenance activities occur.

Years Five (September 15, 2019 to March 15, 2020):

- Mow tall grass on the berms, where trees are not present, to a height of four to six inches.
- Remove dead, diseased and damaged trees and remove small diameter woody plants that are growing on the berm in management area 4 and others that have been cleared of trees.
- Establish grass in areas where soil is exposed, following COA Standard Specification 604S.
- Complete Maintenance Data sheets every day that maintenance activities occur.

Years Six (September 15, 2020 to March 15, 2021):

- Mow tall grass on the berms, where trees are not present, to a height of four to six inches.
- Remove dead, diseased and damaged trees and remove small diameter woody plants that are growing on the berm in management area 5 and others that have been cleared of trees.
- Establish grass in areas where soil is exposed, following COA Standard Specification 604S.
- Complete Maintenance Data sheets every day that maintenance activities occur.

Years Seven (September 15, 2021 to March 15, 2022):

- Mow tall grass on the berms, where trees are not present, to a height of four to six inches.
- Remove dead, diseased and damaged trees and remove small diameter woody plants that are growing on the berm in management areas 6 through 8 and others that have been cleared of trees.
- Establish grass in areas where soil is exposed, following COA Standard Specification 604S.
- Complete Maintenance Data sheets every day that maintenance activities occur.

To Be Conducted Yearly After Year Seven (Between September 15 and March 15):

- Mow tall grass on the berms, to a height of four to six inches.
- Remove shrubs and vines growing on the berms.
- Use hand tools to remove small diameter ( $\leq 6$  inches) woody plants growing on the berms
- Remove dead or diseased trees located on the berms or within 10 feet of the berm's toe.
- Establish grass in areas where soil is exposed, following COA Standard Specification 604S.
- Complete Maintenance Data sheets every day that maintenance activities occur.

### **7.3 Inspector Training**

The individual who conduct berm inspections should be trained in how to identify berm safety issues and the methods of evaluation. We recommend the designated individuals be Engineers who have equivalent experience or who have participated in training workshops that educate participants on at least the following items:

- Earthen berm configuration and vernacular
- Evaluation methodology
- Signs of wetting, saturation and seepage

- Safety inspections of the various evaluation zones (i.e., upstream or water side slope, crest, upper and lower downstream or land side slopes, and toe)
- Signs of internal erosion
- Signs of external erosion

In addition, the inspection and Hornsby Bend staff should attend a TCEQ Dam Safety Workshop and/or review the materials available at the following websites.

<https://www.tceq.texas.gov/field/damsafetyprog.html>

[https://www.tceq.texas.gov/assets/public/compliance/field\\_ops/damsafety/Workshop.2015.Session3.pdf](https://www.tceq.texas.gov/assets/public/compliance/field_ops/damsafety/Workshop.2015.Session3.pdf)

## **8.0 PUBLIC NOTIFICATION**

The Hornsby Bend Bird Observatory (HBBO) is located at the HBBMP. The HBBO is a program of the Austin Water Utility's Center for Environmental Research. The HBBMP is known for its biodiversity, ecotourism, and is likely one of the best birding sites in Central Texas. One individual observed 249 species in a single year (Carpenter 2005). Bird watchers are present year-round and monthly bird surveys are conducted on the 2<sup>nd</sup> Saturday of each month.

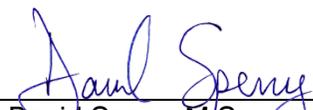
Baer Engineering recommends all vegetation maintenance is scheduled in advance and public notifications of those schedules are posted at Hornsby Bend in the Center for Environmental Research. Scheduling and appropriate public outreach should be coordinated the Center for Environmental Research at Hornsby Bend.

We suggest including the following information in the public announcements:

1. Justification for maintenance (e.g. berm safety, protection of water quality);
2. Methods for complying with the MBTA;
3. Maintenance techniques that will be implemented (e.g., mowing, chainsaw, etc.);
4. Schedule and location(s) for maintenance activities; and
5. Contact information for HBBMP staff responsible for contractor.

## 9.0 QUALIFICATIONS

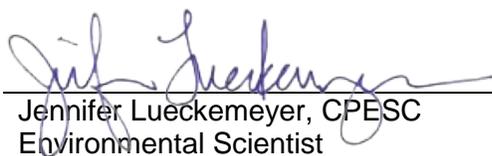
Field work was performed on June 3, 16, and 19, 2015. Conditions observed, during field work, may not reflect site conditions during other parts of the year. Baer Engineering assessed the potential impacts based on information provided to us by the COA and HBBMP. Subsequent changes in maintenance plans and specific maintenance methods are not covered in this plan.



David Sperry M/S.  
Wildlife/Conservation Biologist



Rosemary Wyman, P.G. CHMM, CPESC  
Executive Vice President



Jennifer Lueckemeyer, CPESC  
Environmental Scientist

## 10.0 LITERATURE CITED

- Ansley, R. J.; Jacoby, P. W.; Lawrence, B. K. 1989. Influence of stress history on water use patterns of honey mesquite. In: Wallace, Arthur; McArthur, E. Durant; Haferkamp, Marshall R., compilers. Proceedings--symposium on shrub ecophysiology and biotechnology; 1987 June 30 - July 2; Logan, UT. Gen. Tech. Rep. INT-256. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station.
- Bonner, F. T. 1974. Celtis L. Hackberry. In: Schopmeyer, C. S., technical coordinator. Seeds of woody plants in the United States. Agricultural Handbook. 450. Washington, DC: U.S. Department of Agriculture, Forest Service.
- Braun, E. Lucy. 1989. The woody plants of Ohio. Columbus, OH: Ohio State University Press.
- Burns, Russell M.; Honkala, Barbara H. 1990. Silviculture of North America. Vol 2. Hardwoods. Agric. Handbook. 654. Washington, DC: U.S. Department of Agriculture, Forest Service.
- Duncan, Wilbur H.; Duncan, Marion B. 1988. Trees of the southeastern United States. Athens, GA: The University of Georgia Press.
- Elias, Thomas S. 1970. The genera of *Ulmaceae* in the southeastern United States. Journal of the Arnold Arboretum. 51.
- Farrar, John Laird. 1995. Trees of the northern United States and Canada. Ames, IA: Blackwell Publishing.
- Federal Emergency Management Agency. 2005. Technical Manual for Dam Owners, Impacts of Plants on Earthen Dams. Research Needs Workshop on Plant and Animal Impacts on Earthen Dams.
- Fisher, C. E.; Meadors, C. H.; Behrens, R.; [and others]. 1959. Control of mesquite on grazing lands. Bull. 935. College Station, TX: Texas A&M University, Texas Agricultural Experiment Station. 24 p. In cooperation with: U.S. Department of Agriculture.
- Gleason, Henry A.; Cronquist, Arthur. 1991. Manual of vascular plants of northeastern United States and adjacent Canada. 2nd ed. New York: New York Botanical Garden.
- Great Plains Flora Association. 1986. Flora of the Great Plains. Lawrence, KS: University Press of Kansas.
- Lady Bird Johnson Wildflower Center. 2015. Native Plant Database: *Parkinsonia aculeata*. [http://www.wildflower.org/plants/result.php?id\\_plant=PAAC3](http://www.wildflower.org/plants/result.php?id_plant=PAAC3)
- Lamson, Neil I. 1990. *Morus rubra* L. red mulberry. In: Burns, Russell M.; Honkala, Barbara H., technical coordinators. Silviculture of North America. Volume 2. Hardwoods. Agric. Handbook. 654. Washington, DC: U.S. Department of Agriculture, Forest Service.
- McKnight, J. S. 1965. Silviculture of forest trees of the United States. U.S. Department of Agriculture, Agriculture Handbook 271. Washington, DC.

- Meyer, R. E.; Morton, H. L.; Hass, R. H. 1971. Morphology and anatomy of honey mesquite. Tech. Bull. No. 1423. Washington, DC: U.S. Department of Agriculture. In cooperation with: Texas Agricultural Experiment Station.
- Munz, Philip A. 1974. A flora of southern California. Berkeley, CA: University of California Press.
- Pima Community College. 2015. Desert ecology of Tucson: mexican paloverde (*Parkinsonia aculeata*). [http://wc.pima.edu/Bfiero/tucsonecology/plants/trees\\_mpv.htm](http://wc.pima.edu/Bfiero/tucsonecology/plants/trees_mpv.htm).
- Sprackling, John A.; Read, Ralph A. 1979. Tree root systems in eastern Nebraska. Nebraska Conservation Bulletin Number 37. Lincoln, NE: The University of Nebraska, Institute of Agriculture and Natural Resources, Conservation and Survey Division.
- Sutton, Richard F.; Johnson, Craig W. 1974. Landscape plants from Utah's mountains. EC-368. Logan, UT: Utah State University, Cooperative Extension Service.
- Simpson, Benny J. 1988. A field guide to Texas trees. Austin, TX: Texas Monthly Press.
- Van Dersal, William R. 1938. Native woody plants of the United States, their erosion-control and wildlife values. Washington, DC: U.S. Department of Agriculture.
- Zimmermann, Robert C. 1969. Plant ecology of an arid basin: Tres Alamos-Redington Area, southeastern Arizona. Geological Survey Professional Paper 485-D. Washington, DC: U.S. Department of the Interior, Geological Survey.

# **Appendix A:**

## Example

### Inspection and Maintenance Data Sheets

<b>QUARTERLY BERM INSPECTION DATA SHEET</b>		
Date:	Inspected By:	
<b>Existing Conditions</b>		
<i>Provide a general assessment for each segment.</i>		
<b>Maintenance Area 1.</b>		
Evidence of erosion along embankments?	YES	NO
If yes, provide description:		
Do vegetated areas need mowing?	YES	NO
<i>Only applicable between September 15 and March 15.</i>		
Do areas need to be re-vegetated?	YES	NO
Approximate size of area to be re-vegetated?		
Evidence of trees, shrubs, or vines growing?	YES	NO
If yes, provide approximate height:		
Evidence of dead trees?	YES	NO
<b>Maintenance Area 2.</b>		
Evidence of erosion along embankments?	YES	NO
If yes, provide description:		
Do vegetated areas need mowing?	YES	NO
<i>Only applicable between September 15 and March 15.</i>		
Do areas need to be re-vegetated?	YES	NO
Approximate size of area to be re-vegetated?		
Evidence of trees, shrubs, or vines growing?	YES	NO
If yes, provide approximate height:		
Evidence of dead trees?	YES	NO
<b>Maintenance Area 3.</b>		
Evidence of erosion along embankments?	YES	NO
If yes, provide description:		
Do vegetated areas need mowing?	YES	NO
<i>Only applicable between September 15 and March 15.</i>		
Do areas need to be re-vegetated?	YES	NO
Approximate size of area to be re-vegetated?		
Evidence of trees, shrubs, or vines growing?	YES	NO
If yes, provide approximate height:		
Evidence of dead trees?	YES	NO
<b>Maintenance Area 4.</b>		
Evidence of erosion along embankments?	YES	NO
If yes, provide description:		
Do vegetated areas need mowing?	YES	NO
<i>Only applicable between September 15 and March 15.</i>		
Do areas need to be re-vegetated?	YES	NO
Approximate size of area to be re-vegetated?		
Evidence of trees, shrubs, or vines growing?	YES	NO
If yes, provide approximate height:		
Evidence of dead trees?	YES	NO

<b>Maintenance Area 5.</b>		
Evidence of erosion along embankments?	YES	NO
If yes, provide description:		
Do vegetated areas need mowing?	YES	NO
<i>Only applicable between September 15 and March 15.</i>		
Do areas need to be re-vegetated?	YES	NO
Approximate size of area to be re-vegetated?		
Evidence of trees, shrubs, or vines growing?	YES	NO
If yes, provide approximate height:		
Evidence of dead trees?	YES	NO
<b>Maintenance Area 6.</b>		
Evidence of erosion along embankments?	YES	NO
If yes, provide description:		
Do vegetated areas need mowing?	YES	NO
<i>Only applicable between September 15 and March 15.</i>		
Do areas need to be re-vegetated?	YES	NO
Approximate size of area to be re-vegetated?		
Evidence of trees, shrubs, or vines growing?	YES	NO
If yes, provide approximate height:		
Evidence of dead trees?	YES	NO
<b>Maintenance Area 7.</b>		
Evidence of erosion along embankments?	YES	NO
If yes, provide description:		
Do vegetated areas need mowing?	YES	NO
<i>Only applicable between September 15 and March 15.</i>		
Do areas need to be re-vegetated?	YES	NO
Approximate size of area to be re-vegetated?		
Evidence of trees, shrubs, or vines growing?	YES	NO
If yes, provide approximate height:		
Evidence of dead trees?	YES	NO
<b>Maintenance Area 8.</b>		
Evidence of erosion along embankments?	YES	NO
If yes, provide description:		
Do vegetated areas need mowing?	YES	NO
<i>Only applicable between September 15 and March 15.</i>		
Do areas need to be re-vegetated?	YES	NO
Approximate size of area to be re-vegetated?		
Evidence of trees, shrubs, or vines growing?	YES	NO
If yes, provide approximate height:		
Evidence of dead trees?	YES	NO
Other observations:		

<b>DAILY VEGETATION MAINTENANCE DATA SHEET</b>										
Maintenance Date:	Data sheet Completed By:									
Maintenance Work Completed By (names):										
<i>Fill out this data sheet daily to record vegetation maintenance activities performed at HBBMP.</i>										
<b>MANAGEMENT AREA NUMBER(S):</b>										
Number of small diameter (≤6 inches) trees cut and treated:										
Number of root systems excavated:										
If dewatering was necessary, what method(s) was used?										
Approximate size of dewatered area:										
Number of excavations repaired and approximate volume of each (ft <sup>3</sup> ):	1	2	3	4	5	6	7	8	9	10
Areas revegetated following COA Standard Specification 604S?							YES	NO		
Approximate area (ft <sup>2</sup> ) revegetated?										
<i>Only applicable between September 15 and March 15:</i>										
Mowing conducted?					YES			NO		
Other observations:										

## **Appendix B:** 1957 Recorded Plans

October 12, 2015

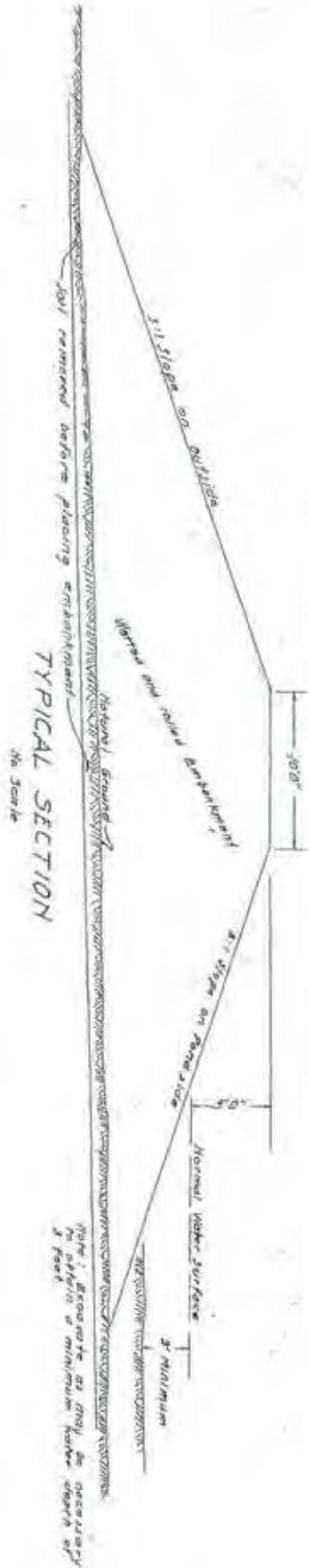
City of Austin: 142069-8i.013  
Vegetation Management Plan for HBBMP Pond Embankments

# 1957 Record Plans

Top of Berm 440'(south/spillway) - 443'(north)MSL

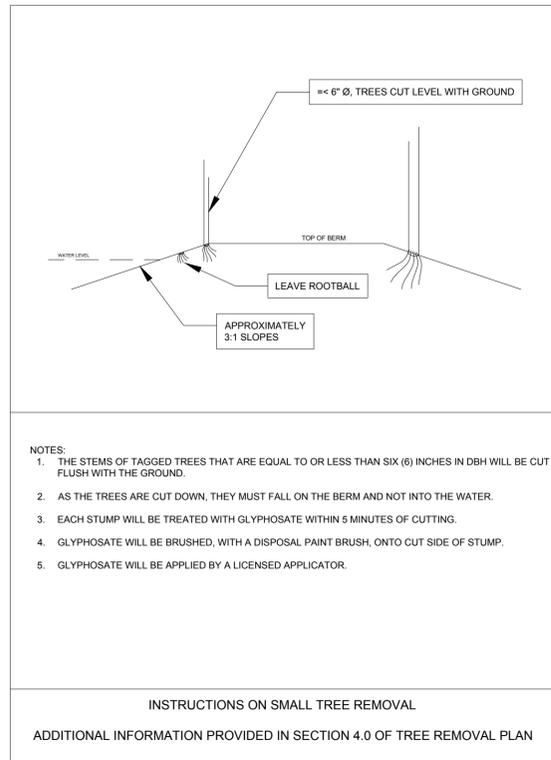
Bottom of Berm varies ~426.5' - 436' MSL

Height of Berms varies ~7' - 13.5'  
with designed 5' free board



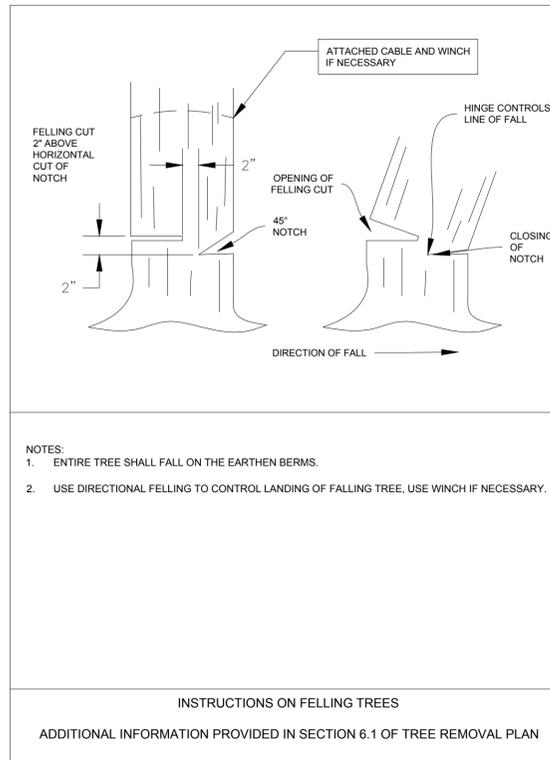
## **Appendix C:**

# Tree Removal Instruction and Example Detail



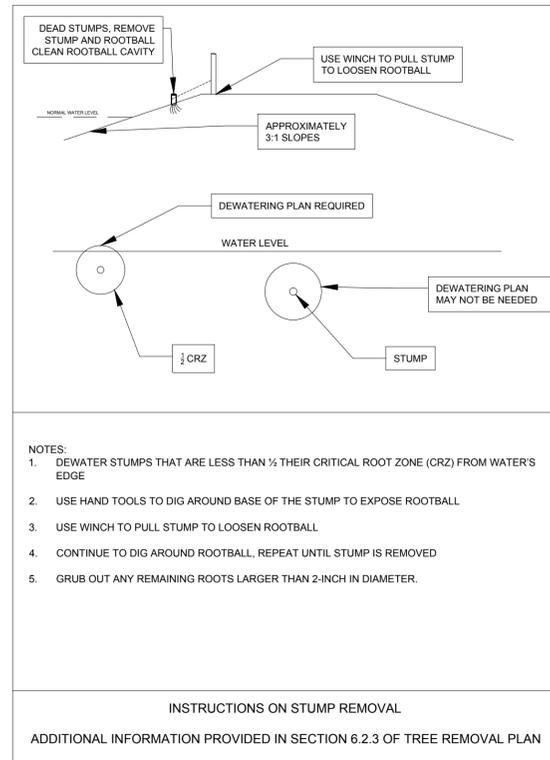
- NOTES:
1. THE STEMS OF TAGGED TREES THAT ARE EQUAL TO OR LESS THAN SIX (6) INCHES IN DBH WILL BE CUT FLUSH WITH THE GROUND.
  2. AS THE TREES ARE CUT DOWN, THEY MUST FALL ON THE BERM AND NOT INTO THE WATER.
  3. EACH STUMP WILL BE TREATED WITH GLYPHOSATE WITHIN 5 MINUTES OF CUTTING.
  4. GLYPHOSATE WILL BE BRUSHED, WITH A DISPOSAL PAINT BRUSH, ONTO CUT SIDE OF STUMP.
  5. GLYPHOSATE WILL BE APPLIED BY A LICENSED APPLICATOR.

INSTRUCTIONS ON SMALL TREE REMOVAL  
ADDITIONAL INFORMATION PROVIDED IN SECTION 4.0 OF TREE REMOVAL PLAN



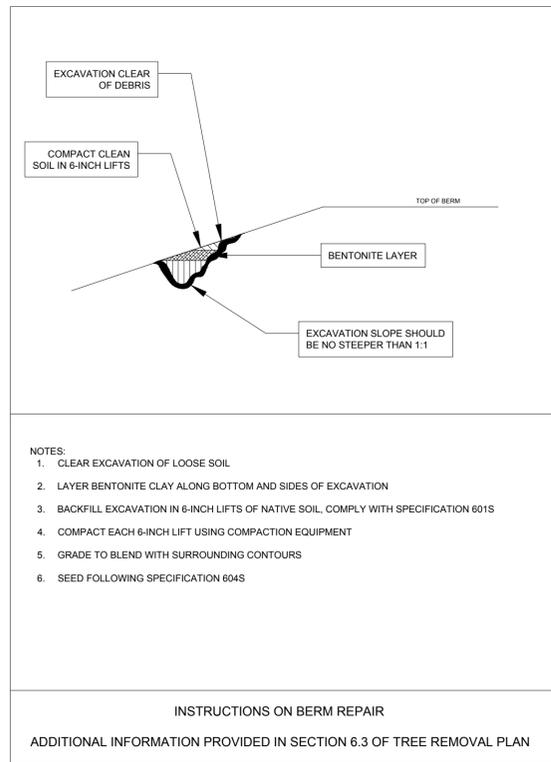
- NOTES:
1. ENTIRE TREE SHALL FALL ON THE EARTHEN BERMS.
  2. USE DIRECTIONAL FELLING TO CONTROL LANDING OF FALLING TREE, USE WINCH IF NECESSARY.

INSTRUCTIONS ON FELLING TREES  
ADDITIONAL INFORMATION PROVIDED IN SECTION 6.1 OF TREE REMOVAL PLAN



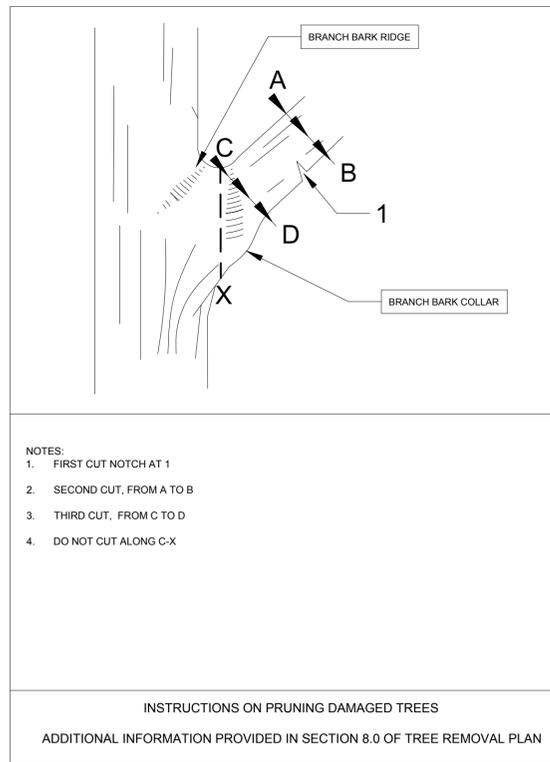
- NOTES:
1. DEWATER STUMPS THAT ARE LESS THAN 1/2 THEIR CRITICAL ROOT ZONE (CRZ) FROM WATER'S EDGE
  2. USE HAND TOOLS TO DIG AROUND BASE OF THE STUMP TO EXPOSE ROOTBALL
  3. USE WINCH TO PULL STUMP TO LOOSEN ROOTBALL
  4. CONTINUE TO DIG AROUND ROOTBALL, REPEAT UNTIL STUMP IS REMOVED
  5. GRUB OUT ANY REMAINING ROOTS LARGER THAN 2-INCH IN DIAMETER.

INSTRUCTIONS ON STUMP REMOVAL  
ADDITIONAL INFORMATION PROVIDED IN SECTION 6.2.3 OF TREE REMOVAL PLAN



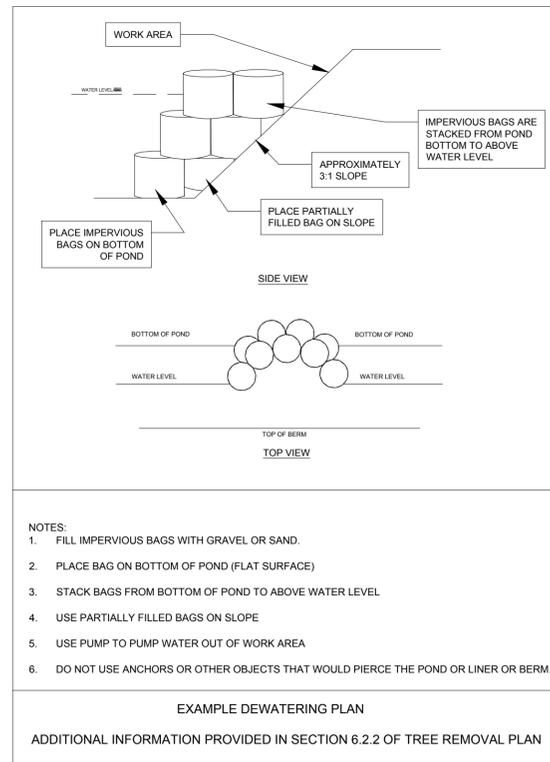
- NOTES:
1. CLEAR EXCAVATION OF LOOSE SOIL
  2. LAYER BENTONITE CLAY ALONG BOTTOM AND SIDES OF EXCAVATION
  3. BACKFILL EXCAVATION IN 6-INCH LIFTS OF NATIVE SOIL, COMPLY WITH SPECIFICATION 601S
  4. COMPACT EACH 6-INCH LIFT USING COMPACTION EQUIPMENT
  5. GRADE TO BLEND WITH SURROUNDING CONTOURS
  6. SEED FOLLOWING SPECIFICATION 604S

INSTRUCTIONS ON BERM REPAIR  
ADDITIONAL INFORMATION PROVIDED IN SECTION 6.3 OF TREE REMOVAL PLAN



- NOTES:
1. FIRST CUT NOTCH AT 1
  2. SECOND CUT, FROM A TO B
  3. THIRD CUT, FROM C TO D
  4. DO NOT CUT ALONG C-X

INSTRUCTIONS ON PRUNING DAMAGED TREES  
ADDITIONAL INFORMATION PROVIDED IN SECTION 8.0 OF TREE REMOVAL PLAN



- NOTES:
1. FILL IMPERVIOUS BAGS WITH GRAVEL OR SAND.
  2. PLACE BAG ON BOTTOM OF POND (FLAT SURFACE)
  3. STACK BAGS FROM BOTTOM OF POND TO ABOVE WATER LEVEL
  4. USE PARTIALLY FILLED BAGS ON SLOPE
  5. USE PUMP TO PUMP WATER OUT OF WORK AREA
  6. DO NOT USE ANCHORS OR OTHER OBJECTS THAT WOULD PIERCE THE POND OR LINER OR BERM.

EXAMPLE DEWATERING PLAN  
ADDITIONAL INFORMATION PROVIDED IN SECTION 6.2.2 OF TREE REMOVAL PLAN

REV	DATE	DESCRIPTION
△	APR	
△	REV	
△	APR	
△	REV	
△	APR	
△	REV	

DESIGNED BY: J.L. LUECKEMEYER	DRAWN BY: L. HAYTON
REVIEWED BY: T. BAUER	CHECKED BY: J. LUECKEMEYER

CITY OF AUSTIN  
PUBLIC WORKS  
DEPARTMENT

**Baer Engineering  
and Environmental Consulting, Inc.**

7756 Northcross Drive, Suite 211, Austin, Texas 78727  
Phone: 512.452.1111  
T.B.P.E. Firm Registration No. P-3981

HORNSBY BEND BIOSOLIDS  
MANAGEMENT PLANT  
TREE REMOVAL PLAN

TREE REMOVAL INSTRUCTIONS AND  
DETAIL EXAMPLES

SHEET  
REFERENCE  
NUMBER  
**CE-001**  
SHEET XX OF XX

# **Appendix D:**

## **Chapter 6**

### **Dam Remediation Design Considerations**

#### **(FEMA 534, September 2005)**

*Note: This FEMA document is public domain; however, the steering committee responsible for its publishing intends to continue technological development in the area of controlling tree and woody vegetation growth on earthen dams. As such, the committee would appreciate documentation of unusual cases of tree and woody vegetation growth related to safety issues associated with earthen dams. Documentation of these issues may be communicated through ASDSO (Association of State Dam Safety Officials) at <http://www.damsafety.org/>.*

## Chapter 6 Dam Remediation Design Considerations

Specific dam remediation design considerations, procedures, and techniques will be considered for each of the previously identified dam safety inspection and evaluation zones. Figure 1 presents these zones as a review prior to discussion of potential dam remediation design considerations for each zone. Dam remediation design alternatives presented herein should be considered examples. These remediation design examples should not be considered the only alternatives for use in dam remediation design to correct deficiencies associated with tree and woody vegetation growth on earthen dams. Some additional dam remediation design alternatives presented for correction of tree and woody vegetation growth related deficiencies also provide positive correction of other deficiencies and protection against other types of earthen dam deterioration.

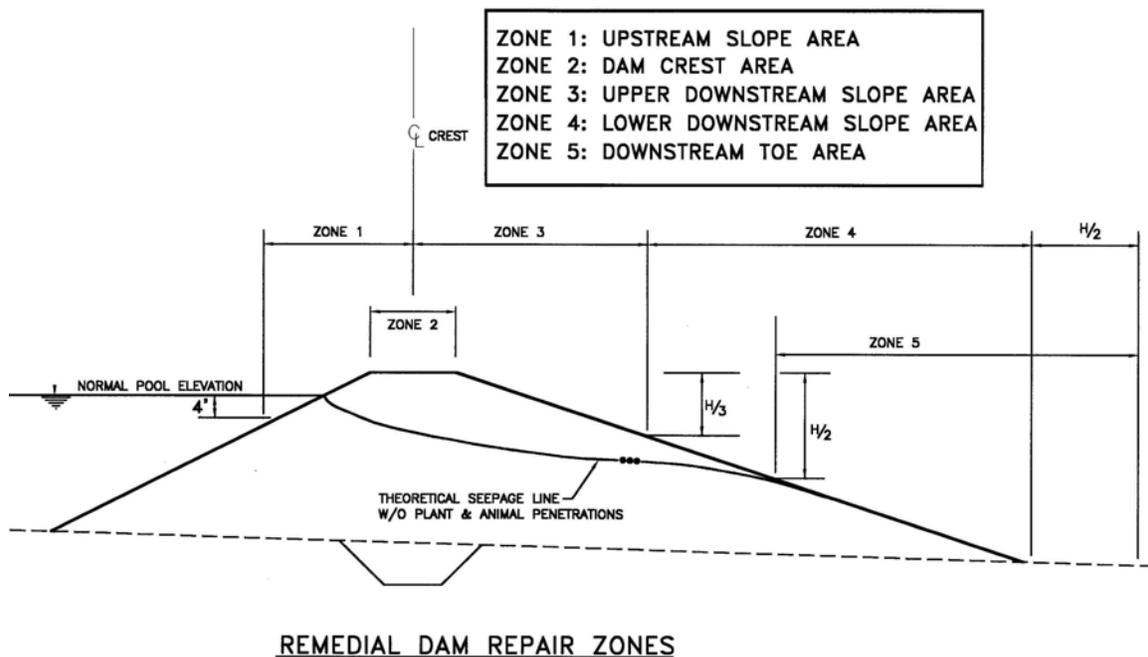


Figure 1

## Inspection and Evaluation Zone 1

Figure 2 illustrates potential problems that can occur in Zone 1 with respect to tree and woody vegetation growth on earthen dams. This illustration also depicts the occurrence of wave erosion, vehicle access, and surface runoff erosion. Potential problems illustrated include instability of relatively large trees on the upstream slope and dam crest, and alteration of the seepage line as a result of wave erosion.

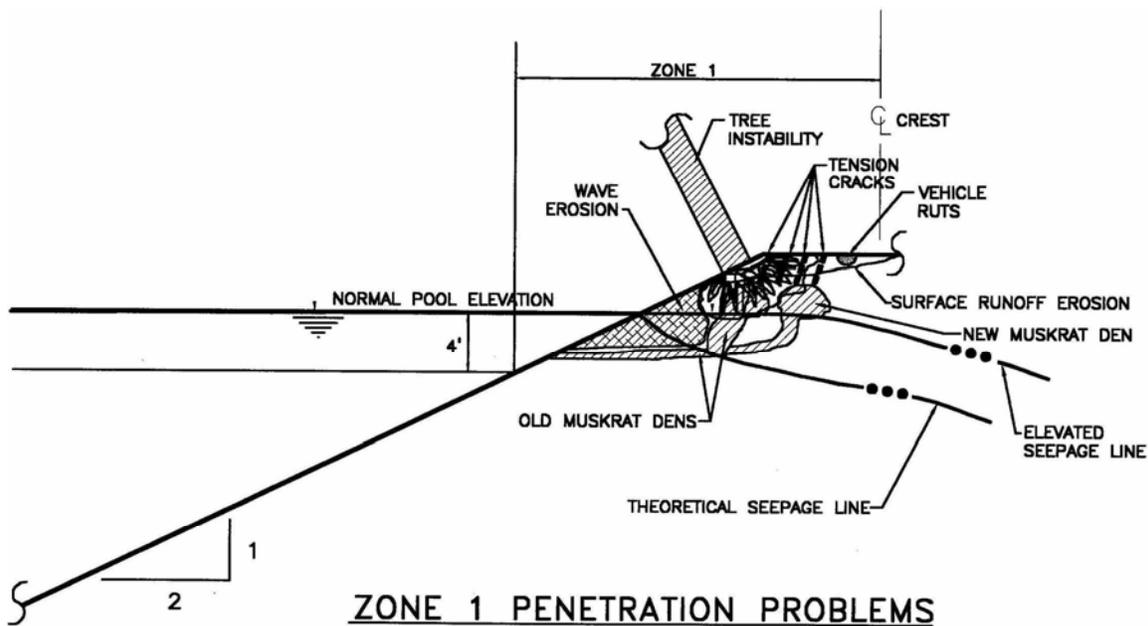


Figure 2

Dam remediation design techniques necessary to address potential problems illustrated in Figure 2 are illustrated in Figures 3 and 4. Dam remediation construction typically requires lowering of the normal pool elevation and/or complete drawdown of the retained reservoir. This is particularly true for dam remediation construction in Zone 1. The normal pool elevation should be lowered as far ahead of the scheduled dam remediation construction as practicable.

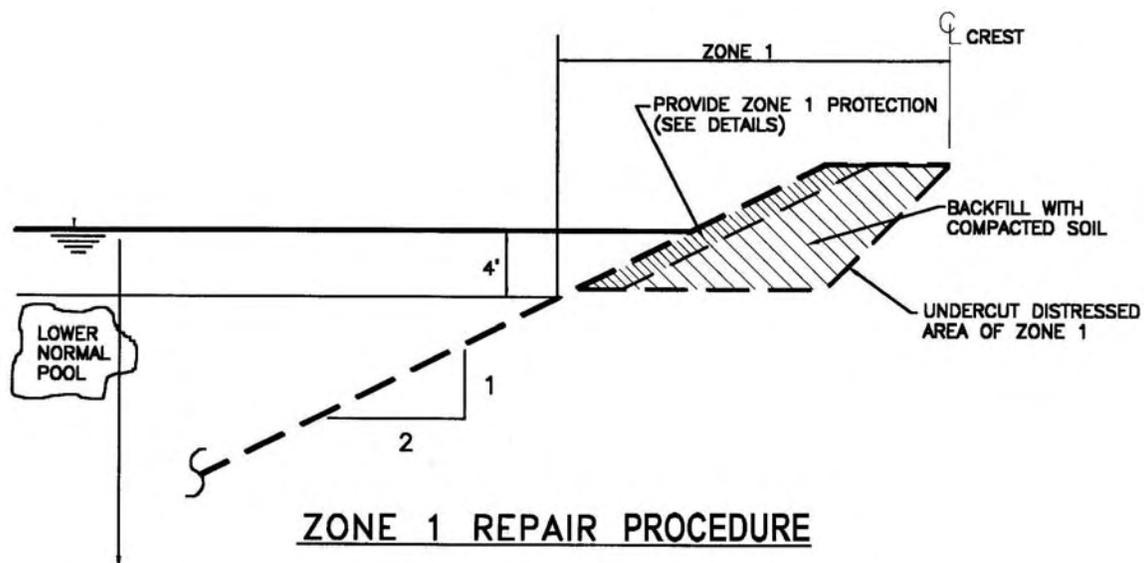
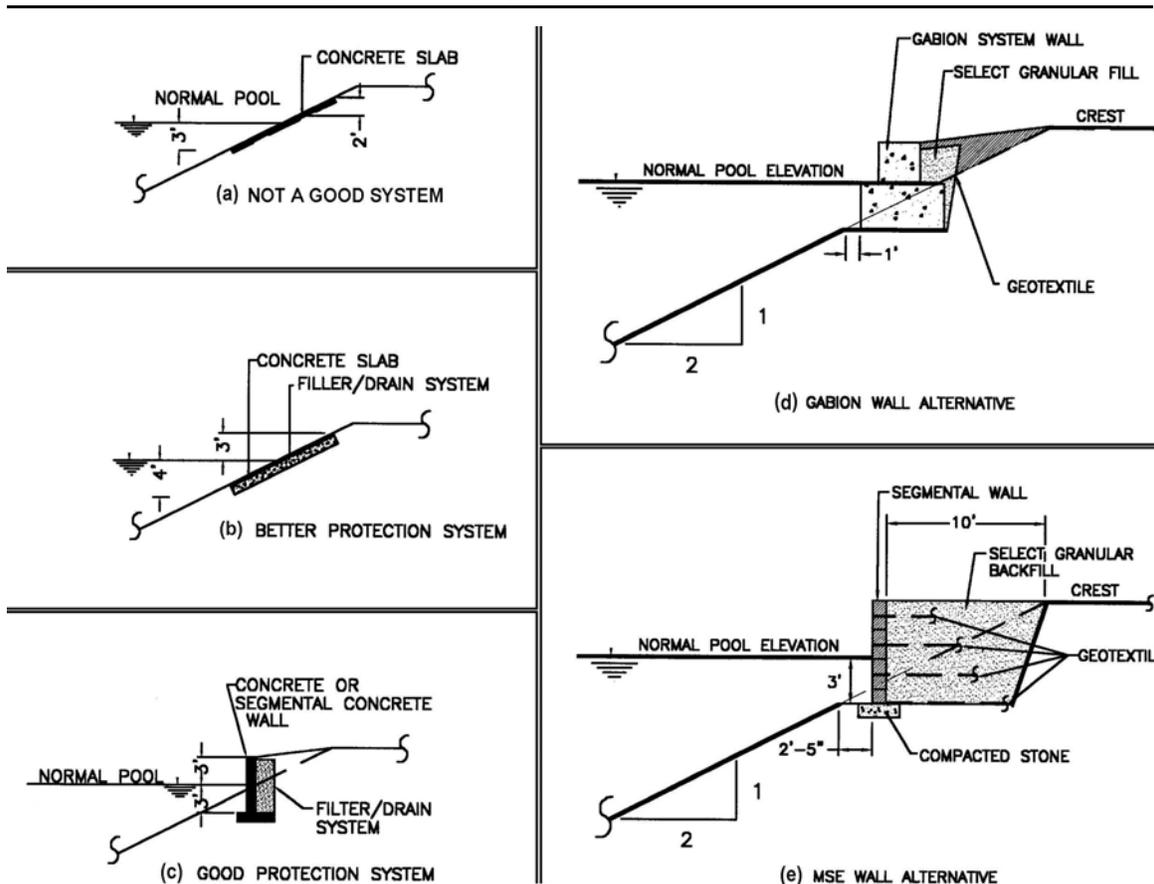


Figure 3



**REMEDIAL REPAIR DESIGN  
ALTERNATIVES FOR ZONE 1**

Figure 4

Tree and woody vegetation growth in Zone 1 must be undercut to remove all stumps, rootballs, and root systems developed by tree penetrations as illustrated in Figure 3. The required depth of undercutting typically extends to near the limits of Zone 1, which is about four feet below normal pool elevation. In the case of earthen dams with narrow crest widths, the backslope of the undercut area will typically extend to near the centerline of the dam crest or the downstream limits of Zone 1. Subsequent to undercutting affected areas of Zone 1, the undercut area must be thoroughly inspected to confirm that all major root systems (greater than about one-half inch in diameter) have been removed during the undercutting operation. Following inspection and approval of the undercut area by the engineer, suitable backfill should be placed in the excavation and properly compacted to the dam remediation design limits. Backfill should consist of approved embankment fill material and should be compacted to a minimum of 95 percent of the maximum dry density of the fill soil as determined by the standard Proctor compaction test (ASTM D-698). In conjunction with the undercutting and backfilling, the dam remediation design should include a slope protection system to deter future tree and woody vegetation growth and reduce the potential for wave and surface runoff erosion.

Figures 4(a) through 4(c) illustrate various configurations of rigid (concrete) upstream embankment slope protection systems. Figure 4(a) illustrates a concrete slab being placed directly on the upstream slope from about three feet below to about two feet above normal pool elevation. While this system is somewhat limited relative to the area of protection, the most critical aspect of this system is that it provides no filtration and/or drainage system beneath the concrete slab. Continual wave action and the buildup of hydrostatic pressures beneath the concrete slab will eventually result in downward movement of the slab. Figure 4(b) illustrates a better dam remediation design utilizing a concrete slab slope protection system. This slope protection system has been improved over the original system by covering a larger area of the upstream slope and by providing a filter system beneath the concrete slab protection system. The author is of the opinion

that the dam remediation protection system shown in Figure 4(c) is the most desirable and cost effective design for use of reinforced concrete for a protection system. The reinforced concrete wall provides a gentle slope to flat backfill area that can easily be maintained by mowing to preclude tree and woody vegetation growth. In addition, this dam remediation design alternative can be used to provide a wider effective dam crest and provides excellent protection against wave erosion.

***NOTE: Reinforced concrete wall and slab systems constructed on the upstream slope must always be provided with filtration/drainage systems to reduce the potential for development of excessive hydrostatic pressures and internal erosion and scour of soil from beneath the structures. The referenced figures are presented for illustrative purposes and should not be used for actual dam remediation design without proper design analyses to confirm any indicated dimensions of the drawings.***

Alternative flexible upstream slope protection system designs for use in Zone 1 are shown in Figures 4(d) and 4(e). The author has utilized both of these flexible slope protection systems effectively to reduce potential tree and woody vegetation growth on upstream slopes and to provide resistance to wave and surface erosion. Figure 4(d) illustrates a typical gabion wall system while Figure 4(e) illustrates the use of a Mechanically Stabilized Earth (MSE) wall system for protection of the upstream slope of an earthen dam.

***NOTE: Granular backfill material used in design and construction of these flexible wall systems must be protected against soil contamination and internal erosion of retained soil by an effective geotextile filter/drainage material and/or a graded aggregate filter. These figures are presented herein for illustrative purposes and should not be used for actual design without proper design analyses to confirm any indicated dimensions of the drawings.***



Two dam remediation design procedures are illustrated in Figure 5 for removal of trees of various sizes. This illustration implies that trees located in the overlap area of Zones 2 and 3 having stump diameters less than about twelve inches could be cut flush with the ground and left in place for future treatment of the decayed stump and rootball system. However, removal of all stumps, rootballs and root systems is always the better and more conservative approach to removal of mature trees. Subsequent to cutting of trees having stump diameter less than about twelve inches in the overlap area of Zones 2 and 3, the surface of the stump can be treated with a protective coating similar to polyurethane that will prolong the decaying process. Conversely, the referenced illustration indicates that any trees in Zone 2 upstream of the overlap area of Zones 2 and 3 having stump diameters of twelve inches or greater should be treated by total removal of the tree, stump, rootball, and root system. The suggested dam remediation design and construction procedure suggested for complete removal of trees, stumps, rootballs, and root systems in Zones 2 and 3 consists of the following activities:

1. **Cut** the tree approximately two feet above ground leaving a well-defined stump that can be used in the rootball removal process;
2. **Remove** the stump and rootball by pulling the stump, or by using a track-mounted backhoe to first loosen the rootball by pulling on the stump and then extracting the stump and rootball all together (this is much the same procedure a dentist would use in extracting a tooth);
3. **Remove** the remaining root system and loose soil from the rootball cavity by excavating the sides of the cavity to slopes no steeper than 1:1 (horizontal to vertical) and the bottom of the cavity approximately horizontal; and
4. **Backfill** the excavation with well-compacted soil placed in relatively thin lifts not greater than about eight inches in loose lift thickness. Compaction of backfilled soils in these tree stump and rootball excavations typically requires the use of manually operated compaction equipment or compaction equipment attached to a backhoe.

***NOTE: All disturbed areas must be protected by seeding and mulching.***

Figure 5 further illustrates that trees located in Zone 3 that have stump diameters greater than about eight inches should be treated by total removal. The removal procedure should be the same as previously described for larger trees in Zone 2. Trees having stump diameter of less than about eight inches could be cut flush with the ground and treated with a waterproofing sealant similar to polyurethane to prolong the stump and rootball decaying process. Again, complete removal of the stumps, rootballs, and root systems of all mature trees is a better and more conservative method of remediation.

### Inspection and Evaluation Zone 4

Figure 6 illustrates potential problems associated with tree and woody vegetation growth in Zone 4 of an earthen dam with suggested dam remediation design and construction procedures.

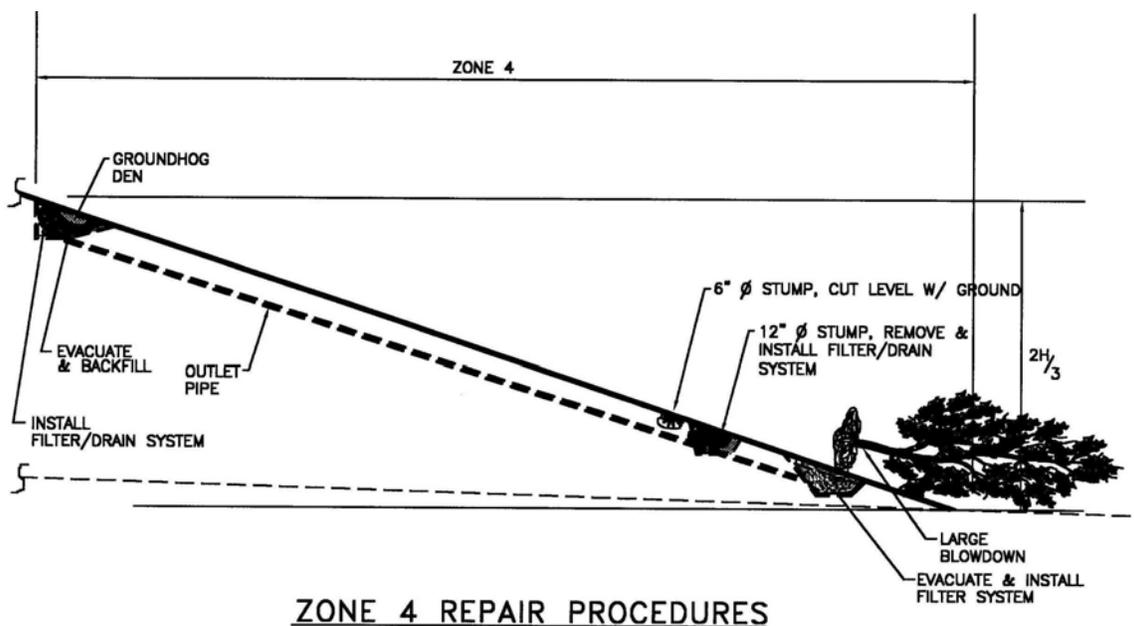


Figure 6

Young immature trees having stump diameters less than about six inches can be removed by cutting flush with the ground and treating the stump with a wood preservative and/or sealant to prolong the decaying process. This procedure is based upon the fact that immature trees of this size typically have not developed a rootball and/or root system that will significantly impact the zone of saturation or the seepage line in Zone 4.

Trees having stump diameters greater than about six inches must be treated by complete removal; however, the dam remediation design and construction procedure for total removal of trees in Zone 4 is somewhat more complicated than total removal of trees in previously discussed zones. Treatment of mature tree penetrations in Zone 4 involves the following activities:

1. **Cut** the tree approximately two feet above ground level leaving a prominent stump for use in the rootball extraction process;
2. **Remove** the stump and rootball by pulling the stump or extracting with a track-mounted backhoe after loosening the rootball by pulling on the stump from different directions;
3. **Clean** the rootball cavity to remove loose soil and the remaining root system by excavating the rootball cavity with maximum 1:1 (horizontal to vertical) side slopes and a horizontal bottom; and
4. **Install** a subdrain and/or filter system in the tree penetration excavation and backfill with compacted soil placed in maximum loose lifts of eight inches.

*Note: Backfill placed in all tree removal excavations must be compacted to a minimum of 95 percent of the maximum dry density as determined by ASTM D-698.*

*Note: Subdrain and/or filter systems installed in tree removal excavations in Zone 4 may be incorporated into major subdrain systems to be installed in the overlap area of Zones 4 and 5.*

### Inspection and Evaluation Zone 5

The author identified Zone 5 as one of the two most critical zones for tree and woody vegetation growth on an earthen dam. Figure 7 illustrates some of the problems that can occur with tree and woody vegetation growth in Zone 5. The major adverse feature in Zone 5 is typically the interception of the downstream embankment slope by the seepage line. The author is a strong advocate of the installation of embankment subdrain systems during dam remediation design and construction even though the earthen dam may have been provided with an embankment subdrain system during original design and construction.

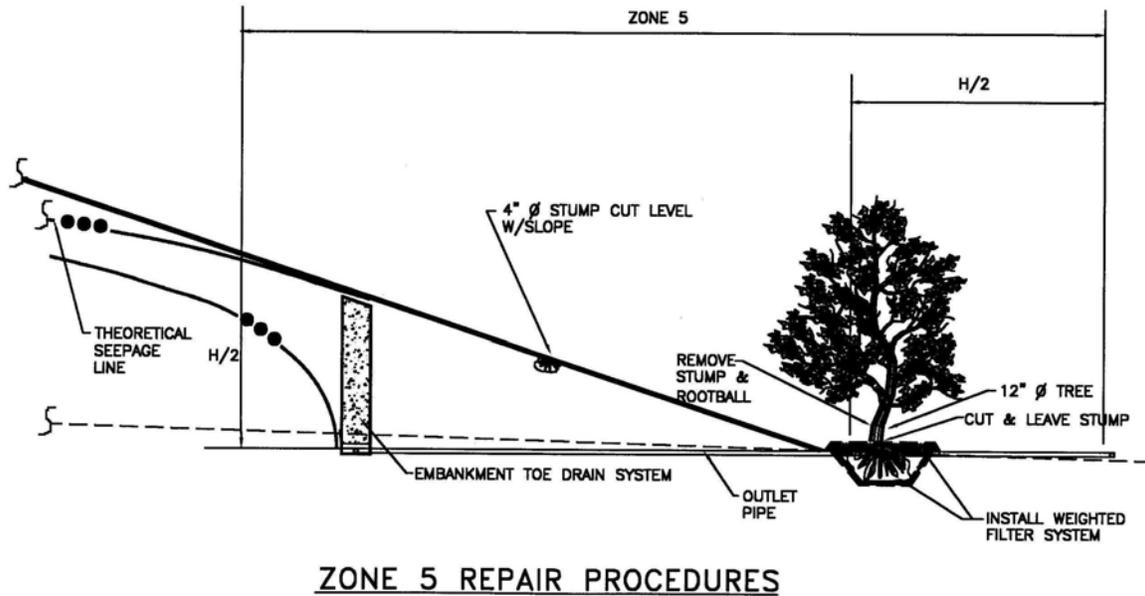


Figure 7

One must understand the impact of tree removal in Zone 5 on the seepage line and the quantity of seepage that will occur subsequent to dam remediation in this zone. As indicated by Figure 7, trees in Zone 5 having stump diameters less than about four inches can be cut flush with the ground and the stump treated with a waterproof sealant to

prolong stump and rootball decay. Trees having stump diameters greater than about four inches must be removed completely. If the embankment toe drain or subdrain system is installed in advance of tree removal in Zone 5, the rootball cavity can be backfilled with compacted soil, provided seepage does not emerge from the excavation and/or the tree is located beyond the toe of the embankment slope. Tree rootball cavities existing beyond the toe of the downstream embankment slope generally require the installation of a filter system and in some cases a weighted filter system as indicated in Figure 7. The weighted filter system may be converted to a weighted drain system by installing a drain and outlet pipes connected to the outlet pipe of the embankment subdrain system.

## **Summary of Dam Remediation Design Considerations**

A summary of dam remediation design considerations for treatment of tree and woody vegetation on earthen dams is presented below. Dam remediation design procedures and techniques are presented for treatment of various size trees in the identified dam safety inspection and evaluation zones.

### **Remedial Repair Zone**

### **Procedures and Techniques**

#### **Zone 1**

Remove all trees, stumps, rootballs, and root system; clean rootball cavity; and backfill with properly placed and compacted soil backfill. Install tree and woody vegetation and wave erosion protection system on the upstream slope from about four feet below normal pool elevation to about three feet above normal pool elevation.

#### **Zone 2**

Cut trees in overlap area of Zone 2 and Zone 3 having stump diameters of twelve inches or less flush with the ground and treat the stump with a waterproof sealant to prolong stump decay.

Completely remove trees having stump diameters of about twelve inches and greater, and backfill rootball cavity with properly compacted backfill soil.

**Zone 3**

Cut trees having stump diameters of about eight inches and less level with the ground and treat the stump with a waterproof sealant to prolong stump and rootball decay.

Completely remove all trees having stump diameters greater than about eight inches and backfill the cleaned rootball cavity with compacted backfill soil.

**Zone 4**

Cut all trees having stump diameters of six inches or less flush with the ground and treat the stump with a waterproof sealant to prolong stump and rootball decay.

Remove all trees having stump diameters greater than about six inches, install subdrain and/or filter systems, and backfill with properly compacted soil around the filter/drain system.

**Zone 5**

Cut all trees having stump diameters of about four inches and smaller flush with the ground and treat the stump to prolong stump and rootball decay.

Install a major embankment toe drain or subdrain system to lower the phreatic surface, filter, collect, and discharge embankment seepage. Incorporate major subdrain with tree rootball and stump removal where possible.

Remove all trees located beyond the toe of the downstream slope having stump diameters greater than about four inches. Install weighted filters and/drain systems in rootball cavities where seepage boiling and soil piping is likely to occur.

## Tree and Woody Vegetation Growth Control Program

Many individual dam owners and small dam owner organizations are not financially capable of undertaking comprehensive dam remediation projects in one major construction contract. Therefore, they must undertake dam remediation programs in a sequential manner. The following sequential dam remediation program for controlling tree and woody vegetation growth provides the owner, regulator, and engineer with a reasonable opportunity to effectively evaluate the condition of an earthen dam and to prioritize dam remediation relative to observed dam safety issues.

1.     **First Year:**             Cut all tall grasses, weeds, underbrush, and trees and woody vegetation having stump diameters of four inches or less flush with the ground and treat all cut stumps with a waterproof preservative to prolong rootball and stump decay.
  
2.     **Second Year:**         Cut all trees in Zones 1 through 4 having stump diameters of six inches or less flush with the ground and treat the stumps to prolong stump and rootball decay. Keep all zones mowed and/or maintained to preclude renewed growth of previously cut woody vegetation. Repair most severe animal penetrations that exhibit seepage flows and/or cause unstable slope conditions on Zones 1, 4, and 5.
  
3.     **Third Year:**            Initiate comprehensive remedial dam repair investigations, analyses, and preliminary design. Remove all trees from Zones 1 through 3 having stump diameters less than about eight inches by cutting flush with the ground and treating the stump with a preservative to prolong stump and rootball decay.
  
4.     **Fourth Year:**           Finalize remedial dam repair design and begin construction of remedial repairs for all plant and animal penetrations that require special remedial dam repair design considerations.

5. **Fifth Year:** Finalize remedial dam repair construction and begin an operation and maintenance program that will preclude the need for future remedial dam repair associated with plant and animal penetrations of earthen dams.

**NOTE:** **Earthen dams that exhibit severe dam safety deficiencies and dam safety issues that cannot be prolonged as a result of potential imminent dam failure are not subject to the use of this type of sequential dam remediation program!!!**



**Baer Engineering**  
*and Environmental Consulting, Inc.*

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October 12, 2015

City of Austin  
Public Works Department  
505 Barton Spring Rd #1300  
Austin, TX 78704

*Sent by email to Jules.Parrish@austintexas.gov.*

Attention: Ms. Jules Parrish, MWR

Subject: **Migratory Bird Treaty Act Compliance Document**  
Hornsby Bend Biosolids Management Plant Ponds 1E, 1W, & 2  
2210 South FM 973  
Austin, Texas 78725  
**Baer Engineering Document No. 142069-8i.013**

Dear Ms. Parrish:

Baer Engineering and Environmental Consulting, Inc. (Baer Engineering) is pleased to provide the attached Migratory Bird Treaty Act (MBTA) compliance document. Baer Engineering has reviewed the MBTA and has provided suggestions on how Hornsby Bend Biosolids Management Plant (HBBMP) can continue maintaining vegetation around the ponds while remaining in compliance with the MBTA. We have outlined our suggestions in a format that can be easily disseminated to the maintenance staff.

Baer Engineering thanks you for the opportunity to work on this project. If you have questions or comments about this document, please feel free to contact me at 707.616.8583 or dsperry@baereng.com.

Respectfully Submitted,  
**BAER ENGINEERING & ENVIRONMENTAL CONSULTING, INC.**

David Sperry  
Wildlife/Conservation Biologist

Attachment: Migratory Bird Treaty Act Compliance Plan

# Migratory Bird Treaty Act Compliance Plan

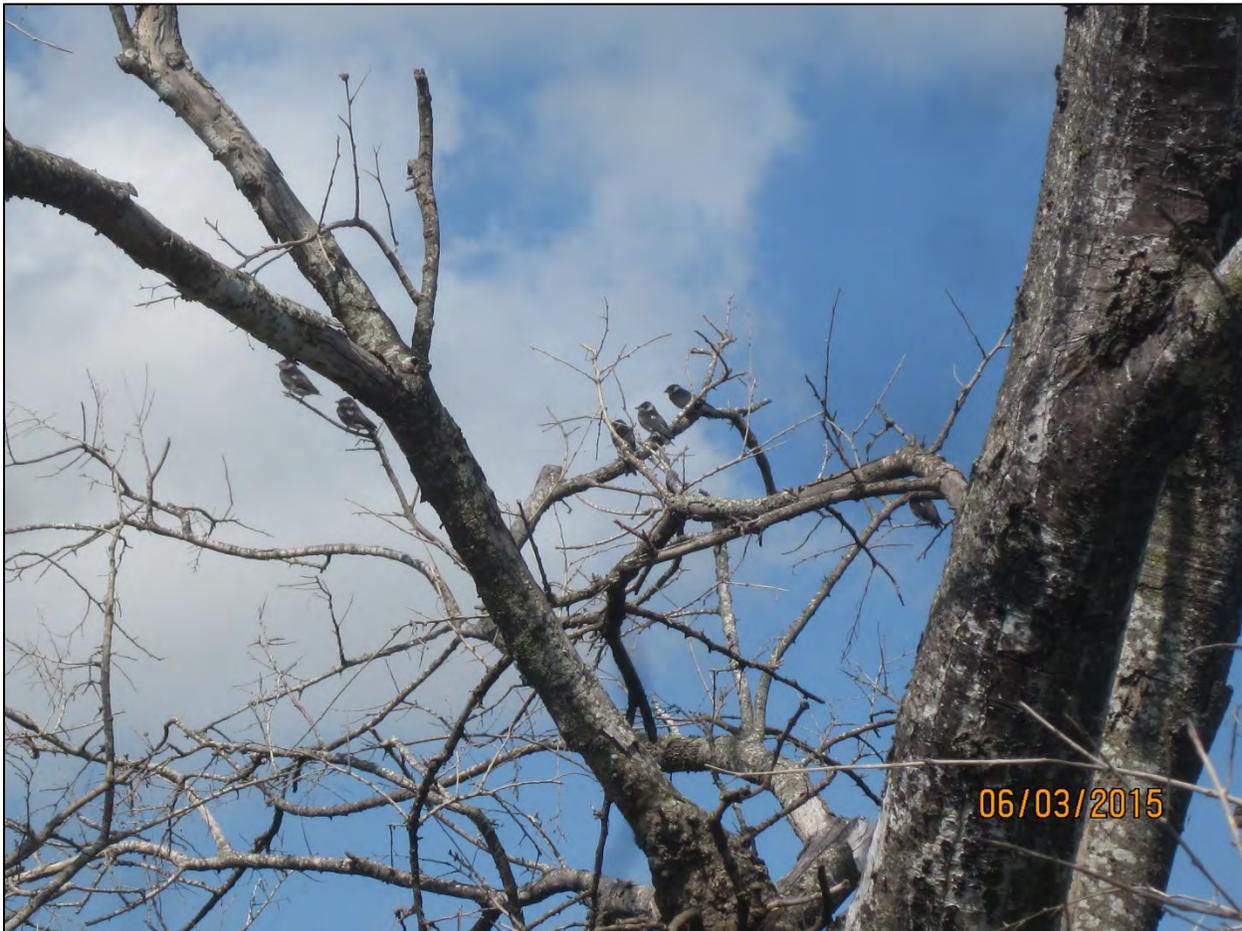
## Hornsby Bend Biosolids Management Plant

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Prepared for:



Austin Water Utility  
2210 South FM 973  
Austin, Texas 78725



Baer Engineering Project No. 142069-8.013  
October 12, 2015



**Baer Engineering and Environmental Consulting, Inc.**

7756 Northcross Drive, Suite 211, Austin, Texas 78757  
Phone 512/453-3733 Fax 512/453-3316

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### APPENDICES

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Final Rule

APPENDIX B: Hornsby Bend Biosolids Management Plant Potential Breeding Bird List

## **1.0 SUMMARY**

Baer Engineering and Environmental Consulting, Inc. (Baer Engineering) prepared this document to provide guidance to the City of Austin (COA) Hornsby Bend Biosolids Management Plant (HBBMP). This document details the necessary steps maintenance staff must follow during vegetation removal and maintenance around the evaporation ponds, in order to remain in compliance with the Migratory Bird Treaty Act (MBTA).

Woody and herbaceous vegetation may provide habitat for migratory birds. Migratory birds are protected by the MBTA of 1918, which prohibits the take of migratory birds, their nests, eggs, or young. The migratory bird breeding season for North America is generally March 15 to September 15. Ideally, removal of trees and vegetation would occur outside the breeding season to avoid disturbance of migratory birds and their nests. However, if trees will need to be removed during the breeding season, nest surveys must be conducted before vegetation is cleared. The COA is obligated to be in accordance with the MBTA.

On June 3, 2015, Mr. David Sperry and Ms. Jennifer Lueckemeyer, both of Baer Engineering, visited the HBBMP and surveyed the evaporation ponds for nesting birds. No active or inactive nests were discovered during the field survey.

Baer Engineering recommends that vegetation maintenance schedules be posted in advance for the public at Hornsby Bend in the Center for Environmental Research.

## 2.0 INTRODUCTION

HBBMP received a Notice of Violation (NOV) after a Compliance Evaluation investigation by the Texas Commission on Environmental Quality (TCEQ) on March 16, 2015. The violation stated HBBMP failed to adequately prevent the proliferation of trees on the berms of ponds 1E, 1W, and 2. The TCEQ recommended the following for the ponds:

- Begin removing small trees on or near the embankment of the ponds as long as tree removal does not impact the integrity of the embankment and cause an unauthorized discharge;
- Prepare and implement, with timelines, a tree management plan geared toward removing dead or diseased trees and preventing the proliferation of additional trees on or near the embankment;
- All tree removal should be conducted above the water table of the ponds to minimize the potential of unauthorized discharges and to prevent decaying roots from compromising the hydraulic integrity of the embankments;
- Maintenance records should be kept that document actions recommended by the tree management plan; and
- Provide a copy of the tree management plan to the TCEQ Austin Region Office for review by the compliance due date of October 16, 2015.

Woody and herbaceous vegetation may provide habitat for migratory birds. Migratory birds are protected by the MBTA of 1918 which prohibits the take of migratory birds, their nests, eggs, or young. The prohibition also includes harassment of nesting birds and young during the breeding season. The migratory bird breeding season for North America is generally March 15 to September 15. Ideally, removal of trees and vegetation would occur outside the breeding season to avoid disturbance of migratory birds and their nests.

To remain in compliance with the MBTA, Baer Engineering recommends that vegetation maintenance be conducted between September 16 and March 14. If maintenance is required during the breeding season, a qualified biologist shall conduct thorough migratory bird nest surveys ahead of maintenance crews along the proposed maintenance area.

On June 3, 2015, Mr. David Sperry and Ms. Jennifer Lueckemeyer, both of Baer Engineering, visited the HBBMP and surveyed the evaporation ponds for nesting birds. Twenty-nine bird species were observed and/or heard while walking the accessible pond perimeters. No active or inactive nests were discovered during the field survey. We did observe hatch year individuals for six species.

### 3.0 REGULATORY AUTHORITY AND GUIDANCE

The Migratory Bird Treaty Act (MBTA) of 1918 prohibits anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale any migratory bird, or the parts, nests, or eggs of a migratory bird, except under the terms and conditions of a valid permit issued in pursuant to Federal regulations. There are 1,026 species of migratory birds protected by the MBTA. For reference, a copy of the 2013 Federal Register: General Provisions, Revised List of Migratory Birds; Final Rule, is provided in **Appendix A**.

As stated in the Federal Register, a species qualifies for protection under the MBTA by meeting one or more of the following four criteria:

- (1) Birds covered by the Canadian Convention of 1916, as amended in 1996, by virtue of meeting the following three criteria: (a) It belongs to a family or group of species named in the Canadian Convention, as amended; (b) Specimens, photographs, videotape recordings or audiotape recordings provide convincing evidence of natural occurrence in the United States or its territories; and (c) The documentation of such records that are recognized by the American Ornithology Union (AOU) or other competent scientific authorities.
- (2) Birds covered by the Mexican Convention of 1936, as amended in 1972, by virtue of meeting the following three criteria: (a) Birds belonging to a family or group of species named in the Mexican Convention, as amended; (b) Specimens, photographs, videotape recordings or audiotape recordings provide convincing evidence of natural occurrence in the United States or its territories; and (c) The documentation of such records that are recognized by the AOU or other competent scientific authorities.
- (3) Birds listed in the annex to the Japanese Convention of 1972, as amended.
- (4) Birds listed in the appendix to the Russian Convention of 1976.

In accordance with the Migratory Bird Treaty Reform Act of 2004 (MBTRA) (Pub. L. No. 108-447, 118 Stat. 2809, 3071-72), all species native to the United States or its territories, which are those that occur as a result of natural biological or ecological processes are included (See 70 FR 12710, March 15, 2005). Non-native species whose occurrences in the United States are solely the result of intentional or unintentional human-assisted introduction are not included.

USFWS contact information for projects occurring in Texas is:

#### **REGION 2**

U.S. Fish and Wildlife Service  
Migratory Bird Permit Office  
P.O. Box 709  
Albuquerque, NM 87103  
Telephone: (505) 248-7882  
Email: [permitsR2MB@fws.gov](mailto:permitsR2MB@fws.gov)

## 4.0 POTENTIAL NESTING SPECIES

As of May 19, 2015, a total of 641 species of birds have been observed in Texas (Texas Bird Records Committee 2015). This number includes winter and summer residents/visitors, migrants, and accidental occurrences. Baer Engineering narrowed this list down to 79 species of birds that could potentially breed at HBBMP. Seventy-four of these species are protected by the MBTA. This list is presented in **Appendix B**. Please be aware that all migratory birds are protected under the MBTA as identified in Section 2.0. We have highlighted those species who could potentially nest at the HBBMP. Potential nesting species were identified because maintenance activities are most likely not going to take adult birds but rather active nests (with eggs or nestlings) or recently fledged young without the ability to sustain flight.

### 4.1 Methods for Identifying Nesting Species

Baer Engineering downloaded data from eBird, an online checklist program that collects bird observations entered by bird watchers, to identify bird species observed at HBBMP. The eBird program provides frequency data for each species per month. Each month is further broken down into 4 periods, each 7 to 10 days. Frequencies are calculated by dividing the number of checklists with a given species by the number of total checklists submitted. The higher the frequency the more likely that species is present for that period. Because we are only interested in breeding birds for this compliance plan, we limited our data to include observations between March and September. We downloaded data from March 1, 1955 to May 18, 2015. We chose March 1, 1955, as our starting point because this is the approximate year the evaporation ponds were installed. We estimated that these dates would provide us with the most conservative (largest) number of species.

Based on the information provided in the *Handbook of Texas Birds*, we removed species that only spend their non-breeding season in Texas or migrate through Texas (Lockwood and Freeman 2014). We then cross-referenced the Hornsby Bend Bird Observatory checklist with eBird frequency data and removed birds which were Uncommon (1-10 records each season), Rare (1 or fewer records each season), and Very Rare (less than 2 records each decade). The eBird frequency data indicated several species are more abundant than the Hornsby Bend Bird Observatory checklist. These species were kept in the final list and flagged as uncommon.

## 4.2 Results

### 4.2.1 Existing data from on-line sources

A total of 2,265 checklists were submitted to eBird between the months of March and September from 1955 to May 18, 2015. A total of 343 species were observed. The number of checklists submitted for each period (approximately one week) ranged between 18 and 189. Using the methods discussed in Section 3.1 we identified 79 species with potential to be nesting at HBBMP. Four of these species, Rock Pigeon (*Columba livia*), Monk Parakeet (*Myiopsitta monachus*), European Starling (*Sturnus vulgaris*), and House Sparrow (*Passer domesticus*) are non-native and are not warranted protection under the MBTA.

A spreadsheet of the potential breeding species is provided in **Appendix B**. The spreadsheet includes the following nesting ecology information:

#### Typical Nest Location:

- Ground – includes nests placed among the roots, or in niches among the roots of fallen trees, among reeds in marshes, among grasses, on bare rock, or simply scraped in the dirt or sand.
- Shrub – includes nests placed within any multi-stemmed woody plant.
- Tree – includes deciduous (broad-leaved trees) or coniferous (bears cones) trees.

- Snag – includes nests in a standing dead or live tree.
- Bank – includes river banks, areas of soft soil on steep island slopes where nest burrows are excavated.
- Cliffs – includes nests situated in natural crevices or on ledges of cliffs typically offering a commanding view of a defensible position.

#### Nest Type:

- Cup – typical of songbirds, hemispherical inside with a rim height several times the diameter of the eggs.
- Saucer – a shallow cup with the height of the rim not more than two times the diameter of the eggs.
- Platform – a structure in a tree, on a cliff, or providing a dry place above marshy ground or water, usually big enough for the bird to land on with or without a distinct depression to hold eggs.
- Cavity – either excavated, as is typical of woodpeckers, or natural cavity found in dead or dying limb or tree.
- Scrape – a simple depression usually with a rim of sufficient height to prevent eggs from rolling away.
- Burrow – eggs placed in a chamber at the end of a tunnel. Tunnels either excavated by the birds or usurped from small mammals.
- Pendant – an elongate saclike nest suspended from a branch.

#### Regional Breeding Habitat:

This describes the typical breeding habitat where nesting occurs. The species may be often found in quite different kinds of environments when foraging, after breeding, during migration, or in the winter.

#### **4.2.2 Field observations**

On June 3, 2015, Mr. David Sperry and Ms. Jennifer Lueckemeyer, both of Baer Engineering, visited the HBBMP and surveyed the berms of evaporation ponds 1E, 1W, and 2, for nesting birds. Mr. Sperry and Ms. Lueckemeyer arrived at the ponds at 9:00 am, the sky was partly cloudy with temperatures between 79° and 88° F. Five hours were spent searching for nesting birds.

We used several methods for nest searching. We observed birds around the ponds noting their age and if they were carrying nesting material or food. We actively looked in shrubs and trees for cup or platform nests. We checked snags and live trees for nest holes looking for cavity-nesting birds. We used an approximately 6-foot long stick to drag across the tops of the Johnson Grass (*Sorghum halepense*) to flush active ground-nesting birds.

Twenty-nine species of birds were observed or heard while walking the accessible pond perimeters. No active or inactive nests were discovered during the field survey. We did observe hatch year individuals for six species: Scissor Tailed Flycatcher (*Tyrannus forficatus*), Barn Swallow (*Hirundo rustica*), Cliff Swallow (*Petrochelidon pyrrhonota*), Purple Martin (*Progne subis*), Red-Winged Blackbird (*Agelaius phoeniceus*), and Great-Tailed Grackle (*Quiscalus mexicanus*). One additional species, the House Sparrow (*Passer domesticus*), was observed carrying nesting material, however, the House Sparrow is not afforded protection under the MBTA.

There are a few possible reasons that no active nests were found. Recent precipitation had raised the water level of the ponds, eliminating the mud flat habitat in Pond 1W and limiting the number of shorebirds using the ponds. Additionally, the breeding season in Texas starts in March and the majority of the breeding pairs at HBBMP had likely completed their breeding season.

Although we did not locate active nests along the berms, we did observe hatch year birds, which is evidence of successful breeding.

## **5.0 SUGGESTED MAINTENANCE SCHEDULE**

Vegetation, including trees, shrubs, and grasses in the project area may provide habitat for migratory birds. Vegetation maintenance, including removing trees (dead or live), shrubs, and mowing grass around the evaporation ponds, should occur between September 16 and March 14, to avoid disturbance of migratory birds and their nests.

If vegetation must be maintained during the breeding season, the COA shall comply with the MBTA. Pre-maintenance surveys for active migratory bird nests shall be conducted. Additional information and methods for the pre-maintenance nesting bird surveys are provided in the following section.

## 6.0 PRE-MAINTENANCE NESTING BIRD SURVEYS

If maintenance is required during the breeding season (March 15 to September 15), a qualified biologist shall conduct migratory bird nest surveys ahead of maintenance crews along the proposed maintenance area. Surveys shall be coordinated so that completion of a survey for a maintenance area is close to the date of the vegetation removal or mowing. Nest surveys will be valid for 5 days. If maintenance crews do not start work within 5 days of when survey is completed, resurveying will be required prior to maintenance activities. The following types of nest searching surveys can be conducted depending on the habitat and maintenance planned for the area. These techniques have been shown to be effective for identifying nesting grassland birds (Winter et al. 2003) and forest birds (Martin and Geupel 1993).

Specifically for migratory bird nests, the MBTA protects nests from possession, sale, purchase, barter, transport, import, export, and take. The other prohibitions of the MBTA: capture, pursue, hunt, and kill are inapplicable to nests, but applicable to migratory birds, eggs, and nestlings. The regulatory definition of take, as defined by 50 CFR 10.12, means to pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect. Only collect applies to nests. Therefore if an inactive nest is located, the MBTA does not afford protections against its destruction, as long as no eggs or nestlings are inside the nest.

### 6.1 Systematic Walking Surveys

In areas with tall grasses, a biologist shall traverse the area in a grid pattern, searching for flushing birds. The entire area proposed for maintenance shall be covered within arms' reach. A stick or pole can be used to disturb the vegetation in front of the surveyor to aid in flushing birds in thick vegetation (Winter et al. 2003). If a bird is seen flushing from an area, the biologist shall identify the bird and search for a nest near where the bird was seen.

In areas that are wooded or contain shrubs, a biologist shall traverse the area around the shrubs and trees searching for flushing birds as they walk and checking trees for possible nest holes (Martin and Geupel 1993). If a bird is seen flushing from a tree or shrub, the biologist shall identify the bird and search for a nest where the bird was seen. If a nest hole is identified, the biologist shall use binoculars and behavior observation, see Section 5.3, to confirm activity.

More than one pass across the survey area may be needed to identify all nests in that area; this is at the discretion of the biologist.

### 6.2 Rope Dragging Surveys

Rope dragging will be used in areas with short vegetation to flush birds on nests. A rope is pulled across the survey area between two people, and flushes the bird from its nest. The biologists will watch for birds flushing just in front of, underneath, and behind the rope (Winter et al. 2003). If a bird is seen flushing from an area, the biologist will identify the bird and search for a nest near where the bird was seen. More than one pass across the survey area may be needed to identify all nests in that area; this is at the discretion of the biologist. See Section 5.3, to confirm activity.

### 6.2 Pole Dragging Surveys

Pole dragging will be used in areas with taller herbaceous vegetation to flush birds on nests. A 5- or 6-foot pole is dragged across the tops of the vegetation through the survey area. This is similar to the rope dragging method and if a bird is actively attending a nest, the pole dragging across the tops of the vegetation will result in the bird flushing from its nest. The biologists will watch for birds flushing just in front of, underneath, and behind the pole. If a bird is seen flushing from an area, the biologist will identify the bird and search for a nest near where the bird was

seen. More than one pass across the survey area may be needed to identify all nests in that area; this is at the discretion of the biologist. See Section 5.3, to confirm activity.

### 6.3 Behavioral Observation Surveys

Behavioral observations shall be included in rope dragging, pole dragging, and systematic walking surveys (Martin and Geupel 1993, Winter et al. 2003). Nesting birds often display unique behaviors or cues such as:

- Alarm chipping;
- Flushing within 5 meters and flying only a short distance;
- Nest material in the bill;
- Food in the bill;
- Fecal sac in the bill;
- Members of a pair in close vicinity to one another;
- Distraction displays;
- Repeated flights towards a distinct area; and
- Begging vocalizations by nestlings.

The biologist will look for these cues during systematic walking, rope dragging surveys, and pole dragging surveys.

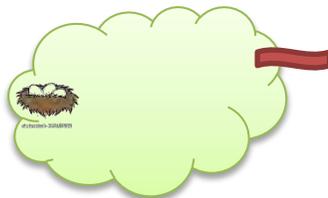
### 6.4 Marking Active Nests

Once a nest is discovered, the biologist will use flagging tape or other visible marker to identify the location of the nest to the maintenance staff. Caution should be used when marking an active nest. Flagging or other markings should be placed at least 3 feet from an active nest. The following protocols should be used to flag active nests:

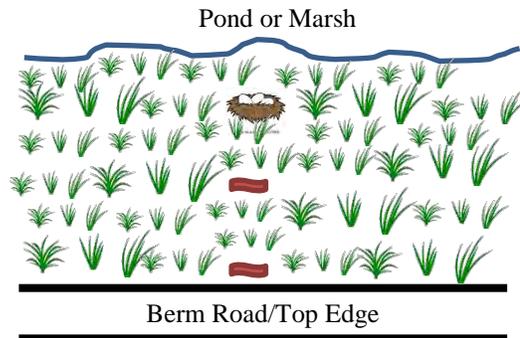
- 1) TREES: the trunk of the tree should be flagged or marked;



- 2) SHRUBS: a branch located on the opposite side of the shrub should be flagged; and



3) **GRASS:** two flags should be placed – one flag should be placed half-way between the nest and the berm edge and the second flag should be placed at the top edge of the berm to create a perpendicular line to the nest.



Maintenance should not be conducted within 50 feet of an active nest. Nests should be checked for activity on a weekly basis until parents and fledglings are no longer observed near the nest. When parents or fledglings are no longer observed at the nest, maintenance activities can commence.

## **7.0 PUBLIC NOTIFICATION**

The Hornsby Bend Bird Observatory (HBBO) is located at the HBBMP. The HBBO is a program of the Austin Water Utility's Center for Environmental Research. HBBMP is known for its biodiversity, ecotourism, and is likely one of the best birding sites in central Texas. One individual observed 249 species in a single year (Carpenter 2005). Bird watchers are present year-round and monthly bird surveys are conducted on the 2<sup>nd</sup> Saturday of each month.

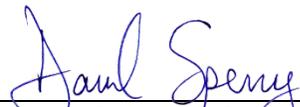
Baer Engineering recommends all pre-maintenance nest surveys and vegetation maintenance be scheduled in advance and public notifications of those schedules be posted at Hornsby Bend in the Center for Environmental Research. The Center for Environmental Research at Hornsby Bend should be included in scheduling nest surveys, vegetation maintenance, and appropriate public outreach options.

We suggest including the following information in the public outreach materials:

1. Justification for maintenance (e.g. protection of water quality);
2. Methods for complying with the MBTA (see Sections 4.0 and 5.0);
3. Maintenance techniques which will be implemented (mowing, chainsaw, etc.);
4. Schedule and location(s) for maintenance activities; and
5. Contact information for maintenance department.

## 8.0 QUALIFICATIONS

Field work was performed on June 3, 2015. Bird species and other conditions observed during field work may not reflect site conditions during other parts of the breeding season. Baer Engineering assessed the potential impacts based on information provided to us by the COA and HBBMP. Subsequent changes in maintenance plans and specific maintenance methods are not covered in this report.



David Sperry M.S.  
Wildlife/Conservation Biologist



Rosemary Wymon, P.G. CHMM, CPESC  
Executive Vice President



Jennifer Lueckemeyer, CPESC  
Environmental Scientist

## 9.0 LITERATURE CITED

Carpenter, E. 2005. Eric Carpenter's Big Year at Hornsby Bend. Last Accessed May 26, 2015. <http://www.hornsbybend.org/bigyear-2005.html>

Lockwood, M.W., and B. Freeman. 2014. The Texas Ornithological Society Handbook of Texas Birds. Texas A&M University Press, College Station, Texas.

Martin, T. E., and G. R. Geupel. 1993. Nest-monitoring plots: methods for locating nests and monitoring success. *Journal of Field Ornithology* 64:507-519.

Texas Bird Records Committee. 2015. Accepted Texas Species List. Last Accessed May 26, 2015. <http://www.texasbirdrecordscommittee.org/home/texas-state-list>.

Winter, M., S. E. Hawks, J. A. Shaffer, and D. H. Johnson. 2003. Guidelines for finding nests of passerine birds in tallgrass prairie. *Prairie Naturalist* 35:197-211.

**APPENDIX A:**  
Federal Register: General Provisions, Revised List of Migratory  
Birds; Final Rule



# FEDERAL REGISTER

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Part III

Department of the Interior

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Fish and Wildlife Service

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50 CFR Parts 10 and 21

General Provisions; Revised List of Migratory Birds; Final Rule

**DEPARTMENT OF THE INTERIOR****Fish and Wildlife Service****50 CFR Parts 10 and 21**[Docket No. FWS-R9-MB-2010-0088,  
FF09M21200-134-FXMB1231099BPP0]

RIN 1018-AX48

**General Provisions; Revised List of Migratory Birds****AGENCY:** Fish and Wildlife Service, Interior.**ACTION:** Final rule.

**SUMMARY:** We, the U.S. Fish and Wildlife Service, revise the List of Migratory Birds by both adding and removing species. Reasons for the changes to the list include adding species based on new taxonomy and new evidence of occurrence in the United States or U.S. territories, removing species no longer known to occur within the United States, and changing names to conform to accepted use. The net increase of 19 species (23 added and 4 removed) brings the total number of species protected by the Migratory Bird Treaty Act (MBTA) to 1,026. We regulate most aspects of the taking, possession, transportation, sale, purchase, barter, exportation, and importation of migratory birds. An accurate and up-to-date list of species protected by the MBTA is essential for public notification and regulatory purposes.

**DATES:** This rule is effective December 2, 2013.**FOR FURTHER INFORMATION CONTACT:** George Allen at 703-358-1825.**SUPPLEMENTARY INFORMATION:****Background****What statutory authority does the service have for this rulemaking?**

We have statutory authority and responsibility for enforcing the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703-712), the Fish and Wildlife Improvement Act of 1978 (16 U.S.C. 7421), and the Fish and Wildlife Act of 1956 (16 U.S.C. 742a-j). The MBTA implements Conventions between the United States and four neighboring countries for the protection of migratory birds, as follows:

(1) Canada: Convention between the United States and Great Britain [on behalf of Canada] for the Protection of Migratory Birds, August 16, 1916, 39 Stat. 1702 (T.S. No. 628);

(2) Mexico: Convention between the United States and Mexico for the Protection of Migratory Birds and Game

Mammals, February 7, 1936, 50 Stat. 1311 (T.S. No. 912);

(3) Japan: Convention between the Government of the United States of America and the Government of Japan for the Protection of Migratory Birds and Birds in Danger of Extinction, and Their Environment, March 4, 1972, 25 U.S.T. 3329 (T.I.A.S. No. 7990); and

(4) Russia: Convention between the United States of America and the Union of Soviet Socialist Republics Concerning the Conservation of Migratory Birds and Their Environment (Russia), November 19, 1976, 29 U.S.T. 4647 (T.I.A.S. No. 9073).

**What is the purpose of this rulemaking?**

Our purpose is to inform the public of the species protected by the MBTA and its implementing regulations. These regulations are found in Title 50, Code of Federal Regulations (CFR), Parts 10, 20, and 21. We regulate most aspects of the taking, possession, transportation, sale, purchase, barter, exportation, and importation of migratory birds. An accurate and up-to-date list of species protected by the MBTA is essential for regulatory purposes.

**Why is this amendment of the list of migratory birds necessary?**

The amendment is needed to: (1) Add five species previously overlooked from a family protected under the MBTA; (2) correct the spelling of six species on the alphabetized list; (3) correct the spelling of three species on the taxonomic list; (4) add 11 species based on new distributional records documenting their natural occurrence in the United States since April 2007; (5) add one species from a family now protected under the MBTA as a result of taxonomic changes; (6) add six species newly recognized as a result of recent taxonomic changes; (7) remove four species not known to occur within the boundaries of the United States or its territories as a result of recent taxonomic changes; (8) change the common (English) names of nine species to conform with accepted use; and (9) change the scientific names of 36 species to conform to accepted use.

The List of Migratory Birds (50 CFR 10.13) was last revised on March 1, 2010 (75 FR 9282). These amendments were necessitated by three published supplements to the 7th (1998) edition of the American Ornithologists' Union's (AOU's) *Check-list of North American birds* (AOU 2008, AOU 2009, and AOU 2010).

In addition, we correct the legal authorities citations at 50 CFR 10.13(a).

We also make a small change to a definition in 50 CFR 21.3. We update

the definition of "raptor" to also include the Order Accipitiformes, corresponding to recent taxonomic changes reflected in the List of Migratory Birds.

**What scientific authorities are used to amend the list of migratory birds?**

Although bird names (common and scientific) are relatively stable, staying current with standardized use is necessary to avoid confusion in communications. In making our determinations, we primarily relied on the American Ornithologists' Union's *Check-list of North American birds* (AOU 1998), as amended (AOU 1999, 2000, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, and 2010), on matters of taxonomy, nomenclature, and the sequence of species and other higher taxonomic categories (orders, families, subfamilies) for species that occur in North America. The AOU Checklist contains all bird species that have occurred in North America from the Arctic through Panama, including the West Indies and the Hawaiian Islands, and includes distributional information for each species, which specifies whether the species is known to occur in the United States. For the 39 species that occur outside the geographic area covered by the *Check-list* (28 that occur in the Pacific island territories and 11 listed in the Japanese and/or Russian conventions that have not occurred in the AOU area), we relied primarily on Clements (2007). Although we primarily rely on the above checklists, when informed taxonomic opinion is inconsistent or controversial, we evaluate available published and unpublished information and come to our own conclusion regarding the validity of taxa.

**What criteria are used to identify individual species protected by the MBTA?**

A species qualifies for protection under the MBTA by meeting one or more of the following four criteria:

(1) It is covered by the Canadian Convention of 1916, as amended in 1996, by virtue of meeting the following three criteria: (a) It belongs to a family or group of species named in the Canadian Convention, as amended; (b) specimens, photographs, videotape recordings, or audiotape recordings provide convincing evidence of natural occurrence in the United States or its territories; and (c) the documentation of such records has been recognized by the AOU or other competent scientific authorities.

(2) It is covered by the Mexican Convention of 1936, as amended in

1972, by virtue of meeting the following three criteria: (a) It belongs to a family or group of species named in the Mexican Convention, as amended; (b) specimens, photographs, videotape recordings, or audiotape recordings provide convincing evidence of natural occurrence in the United States or its territories; and (c) the documentation of such records has been recognized by the AOU or other competent scientific authorities.

(3) It is listed in the annex to the Japanese Convention of 1972, as amended.

(4) It is listed in the appendix to the Russian Convention of 1976.

In accordance with the Migratory Bird Treaty Reform Act of 2004 (MBTRA) (Pub. L. 108-447, 118 Stat. 2809, 3071-72), we include all species native to the United States or its territories, which are those that occur as a result of natural biological or ecological processes (see 70 FR 12710, March 15, 2005). We do not include nonnative species whose occurrences in the United States are solely the result of intentional or unintentional human-assisted introduction(s).

#### How do the changes affect the list of migratory birds?

Several taxonomic changes were made at the Order and Family level by the AOU since our 2010 publication of the list (75 FR 9282, March 1, 2010). These changes affect the inclusion and taxonomic order of species on this list. Specifically, the Orders Phaethontiformes and Suliformes were split from the Pelecaniformes. Phaethontiformes now includes the Family Phaethontidae (tropicbirds); Suliformes now includes the Families Fregatidae (frigatebirds), Sulidae (boobys), Phalacrocoracidae (cormorants), and Anhingidae (anhingas). In addition, the Order Accipitriformes was split from the Falconiformes and now include the Families Cathartidae (vultures), Pandionidae (Osprey), and Accipitridae (hawks and eagles). At the Family level, the Ardeidae (herons and egrets) and Threskiornithidae (ibis and spoonbills) were moved from the Ciconiiformes to the Pelecaniformes Order, the Pandionidae (Osprey) was split from the Accipitridae (hawks and eagles), and the Stercorariidae (jaegers and skuas) was split from the Laridae (gulls, terns, and skimmers). The Polioptilidae (gnatcatchers), Phylloscopidae (*Phylloscopus* warblers), Acrocephalidae (*Acrocephalus* warblers), and Megaluridae (*Locustella* warblers) were split from the Sylviidae, and the Calcariidae (longspurs and

snow buntings) was split from the Emberizidae (buntings and sparrows). The euphonias were put into their own Subfamily (Euphoniinae) and moved from the Thraupidae to the Fringillidae Family. All species within these newly created Families continue to be protected under the MBTA. In addition, the Wrentit was moved from the Timaliidae (babblers) to the Sylviidae and is now in a Family protected by the MBTA.

The amendments (23 additions, 4 removals, and 54 name changes) affect a grand total of 79 species and result in a net addition of 19 species to the List of Migratory Birds, increasing the species total from 1,007 to 1,026. Of the 23 species that we add to the list, 6 were previously covered under the MBTA as subspecies of listed species. These amendments can be logically arranged in the following 9 categories:

(1) Add five species from the family Muscicapidae, a family specifically listed in the 1996 protocol amending the 1916 convention with Canada. The omission of these species on the previous list was an oversight. All are considered accidental or casual in Alaska. The species and relevant AOU publication(s) are:

Mugimaki Flycatcher, *Ficedula mugimaki* (AOU 1987, 1997, 1998);  
Taiga Flycatcher, *Ficedula albicilla* (AOU 1982, 1983, 1998, 2006);  
Dark-sided Flycatcher, *Muscicapa sibirica* (AOU 1982, 1983, 1998, 2004);  
Asian Brown Flycatcher, *Muscicapa dauurica* (AOU 1987, 1989, 1998); and  
Spotted Flycatcher, *Muscicapa striata* (AOU 2004).

(2) Correct the spelling of six scientific names on the alphabetized list:

*Nesofregata fuliginosa* (Polynesian Storm-Petrel), becomes *Nesofregata fuliginosa*;

*Thalasseus maximus* (Royal Tern), becomes *Thalasseus maximus*;

*Thalasseus sandvicensis* (Sandwich Tern), becomes *Thalasseus sandvicensis*;

*Vireo atricapillus* (Black-capped Vireo), becomes *Vireo atricapilla*;

*Phylloscopus sialatrix* (Wood Warbler), becomes *Phylloscopus sibilatrix*; and

*Locustella lanceolata* (Lanceolated Warbler), becomes *Locustella lanceolata*.

(3) Correct the spelling of three scientific names on the taxonomic list:

*Nesofregata fuiginosa* (Polynesian Storm-Petrel), becomes *Nesofregata fuliginosa*;

*Vireo atricapillus* (Black-capped Vireo), becomes *Vireo atricapilla*; and

*Tiaris olivacea* (Yellow-faced Grassquit), becomes *Tiaris olivacea*.

(4) Add 11 species based on review and acceptance by AOU (since April 2007) of new distributional records documenting their occurrence in the United States, Puerto Rico, or the U.S. Virgin Islands. These species belong to families covered by the Canadian and/or Mexican Conventions, and all are considered to be of accidental or casual occurrence. For each species, we list the State in which it has been recorded plus the relevant publication:

Parkinson's Petrel, *Procellaria parkinsoni*—California (AOU 2008);

Swinhoe's Storm-Petrel, *Oceanodroma monorhis*—North Carolina (AOU 2010);

Swallow-tailed Gull, *Creagrurus furcatus*—California (AOU 2008);

Brown Hawk-Owl, *Ninox scutulata*—Alaska (AOU 2009);

White-crested Elaenia, *Elaenia albiceps*—Texas (AOU 2010);

Crowned Slaty Flycatcher,

*Empidonomus aurantioatrocristatus*—Louisiana (AOU 2010);

Sinaloa Wren, *Thryothorus sinaloa*—Arizona (AOU 2010);

Pallas's Leaf-Warbler, *Phylloscopus proregulus*—Alaska (AOU 2008);

Sedge Warbler, *Acrocephalus schoenobaenus*—Alaska (AOU 2009);

Rufous-tailed Robin, *Luscinia sibilans*—Alaska (AOU 2010); and

Yellow-browed Bunting, *Emberiza chrysophrys*—Alaska (AOU 2009).

(5) Add one species because of recent taxonomic changes transferring a species in a family formerly not protected by the MBTA (Timaliidae) into a family protected under the MBTA (Sylviidae). We reference the AOU publication supporting the change: Wrentit, *Chamaea fasciata* (AOU 2010).

(6) Add six species because of recent taxonomic changes in which taxa formerly treated as subspecies have been determined to be distinct species. Given that each of these species was formerly treated as subspecies of a listed species, these additions will not change the protective status of any of these taxa, only the names by which they are known. In each case, we reference the AOU publication supporting the change:

Eastern Spot-billed Duck, *Anas zonorhyncha*—formerly considered a subspecies of *Anas poecilorhyncha*, Spot-billed Duck (AOU 2008);

Black Scoter, *Melanitta americana*—formerly treated as a subspecies of *Melanitta nigra*, Common [Black] Scoter (AOU 2009);

Mexican Whip-poor-will, *Caprimulgus arizonae*—formerly treated as a subspecies of *Caprimulgus vociferus*, Whip-poor-will (AOU 2010);

Pacific Wren, *Troglodytes pacificus*—formerly treated as a subspecies of

*Troglodytes troglodytes*, Eurasian [Winter] Wren (AOU 2010); Winter Wren, *Troglodytes hiemalis*—formerly treated as a subspecies of *Troglodytes troglodytes*, Eurasian [Winter] Wren (AOU 2010); and Puerto Rican Oriole, *Icterus portoricensis*—formerly treated as a subspecies of *Icterus dominicensis*, Hispaniolan [Greater Antillean] Oriole (AOU 2010).

(7) Remove four species based on revised taxonomic treatments and distributional evidence confirming that their known geographic ranges lie entirely outside the political boundaries of the United States and its territories. In each case, we reference the AOU publication supporting these changes: Spot-billed Duck, *Anas poecilorhyncha* (AOU 2008); Common [Black] Scoter, *Melanitta nigra* (AOU 2009); Eurasian [Winter] Wren, *Troglodytes troglodytes* (AOU 2010); and Hispaniolan [Greater Antillean] Oriole, *Icterus dominicensis* (AOU 2010).

(8) Revise the common (English) names of nine species to conform to the most recent nomenclatural treatment. These revisions do not change the protective status of any of these taxa, only the names by which they are known. In each case, we reference the published source for the name change: Greater Flamingo, *Phoenicopterus ruber*, becomes American Flamingo (AOU 2008);

Greater Shearwater, *Puffinus gravis*, becomes Great Shearwater (AOU 2010); Whip-poor-will, *Caprimulgus vociferus*, becomes Eastern Whip-poor-will (AOU 2010);

Green Violet-ear, *Colibri thalassinus*, becomes Green Violetear (AOU 2008); Blue Rock Thrush, *Monticola solitarius*, becomes Blue Rock-Thrush (Clements 2007);

Clay-colored Robin, *Turdus grayi*, becomes Clay-colored Thrush (AOU 2008);

White-throated Robin, *Turdus assimilis*, becomes White-throated Thrush (AOU 2008);

Nelson's Sharp-tailed Sparrow, *Ammodramus nelsoni*, becomes Nelson's Sparrow (AOU 2009); and

Saltmarsh Sharp-tailed Sparrow, *Ammodramus caudacutus*, becomes Saltmarsh Sparrow (AOU 2009).

(9) Revise the scientific names of 36 species to conform to the most recent nomenclatural treatment. These revisions do not change the protective status of any of these taxa, only the names by which they are known. In each case, we reference the AOU publication documenting the name change:

*Larus philadelphia* (Bonaparte's Gull) becomes *Chroicocephalus philadelphia* (AOU 2008);

*Larus cirrocephalus* (Gray-hooded Gull) becomes *Chroicocephalus cirrocephalus* (AOU 2008);

*Larus ridibundus* (Black-headed Gull) becomes *Chroicocephalus ridibundus* (AOU 2008);

*Larus minutus* (Little Gull) becomes *Hydrocoloeus minutus* (AOU 2008);

*Larus atricilla* (Laughing Gull) becomes *Leucophaeus atricilla* (AOU 2008);

*Larus pipixcan* (Franklin's Gull) becomes *Leucophaeus pipixcan* (AOU 2008);

*Cyanocorax morio* (Brown Jay) becomes *Psilorhinus morio* (AOU 2010);

*Poecile hudsonica* (Boreal Chickadee) becomes *Poecile hudsonicus* (AOU 2009);

*Poecile cincta* (Gray-headed Chickadee) becomes *Poecile cinctus* (AOU 2009);

*Calcarius mccownii* (McCown's Longspur) becomes *Rhynchophanes mccownii* (AOU 2010);

*Vermivora pinus* (Blue-winged Warbler) becomes *Vermivora cyanoptera* (AOU 2010);

*Vermivora peregrina* (Tennessee Warbler) becomes *Oreothlypis peregrina* (AOU 2010);

*Vermivora celata* (Orange-crowned Warbler) becomes *Oreothlypis celata* (AOU 2010);

*Vermivora ruficapilla* (Nashville Warbler) becomes *Oreothlypis ruficapilla* (AOU 2010);

*Vermivora virginiae* (Virginia's Warbler) becomes *Oreothlypis virginiae* (AOU 2010);

*Vermivora crissalis* (Colima Warbler) becomes *Oreothlypis crissalis* (AOU 2010);

*Vermivora luciae* (Lucy's Warbler) becomes *Oreothlypis luciae* (AOU 2010);

*Parula superciliosa* (Crescent-chested Warbler) becomes *Oreothlypis superciliosa* (AOU 2010);

*Seiurus noveboracensis* (Northern Waterthrush) becomes *Parkesia noveboracensis* (AOU 2010);

*Seiurus motacilla* (Louisiana Waterthrush) becomes *Parkesia motacilla* (AOU 2010);

*Pipilo fuscus* (Canyon Towhee) becomes *Melozona fusca* (AOU 2010);

*Pipilo crissalis* (California Towhee) becomes *Melozona crissalis* (AOU 2010);

*Pipilo aberti* (Abert's Towhee) becomes *Melozona aberti* (AOU 2010);

*Aimophila carpalis* (Rufous-winged Sparrow) becomes *Peucaea carpalis* (AOU 2010);

*Aimophila botterii* (Botteri's Sparrow) becomes *Peucaea botterii* (AOU 2010);

*Aimophila cassinii* (Cassin's Sparrow) becomes *Peucaea cassinii* (AOU 2010);

*Aimophila aestivalis* (Bachman's Sparrow) becomes *Peucaea aestivalis* (AOU 2010);

*Aimophila quinquestrata* (Five-striped Sparrow) becomes *Amphispiza quinquestrata* (AOU 2010);

*Carduelis flammea* (Common Redpoll) becomes *Acanthis flammea* (AOU 2009);

*Carduelis hornemanni* (Hoary Redpoll) becomes *Acanthis hornemanni* (AOU 2009);

*Carduelis spinus* (Eurasian Siskin) becomes *Spinus spinus* (AOU 2009);

*Carduelis pinus* (Pine Siskin) becomes *Spinus pinus* (AOU 2009);

*Carduelis psaltria* (Lesser Goldfinch) becomes *Spinus psaltria* (AOU 2009);

*Carduelis lawrencei* (Lawrence's Goldfinch) becomes *Spinus lawrencei* (AOU 2009);

*Carduelis tristis* (American Goldfinch) becomes *Spinus tristis* (AOU 2009); and

*Carduelis sinica* (Oriental Greenfinch) becomes *Chloris sinica* (AOU 2009).

For ease of comparison, changes are summarized in the following table (numbers reference the categories treated above). Species whose names have been revised (categories 2, 3, 8, and 9) appear in both the left-hand column (old name removed) and right-hand column (new name added), as are species that have been added based on taxonomic splits (category 6) of extralimital species that have been removed (category 7).

Removed (taxonomically)	Added (taxonomically)
Spot-billed Duck, <i>Anas poecilorhyncha</i> (7)	Eastern Spot-billed Duck, <i>Anas zonorhyncha</i> (6).
Common [Black] Scoter, <i>Melanitta nigra</i> (7)	Black Scoter, <i>Melanitta americana</i> (6).
Greater Flamingo, <i>Phoenicopterus ruber</i> (8)	American Flamingo, <i>Phoenicopterus ruber</i> (8). Parkinson's Petrel, <i>Procellaria parkinsoni</i> (4).
Greater Shearwater, <i>Puffinus gravis</i> (8)	Great Shearwater, <i>Puffinus gravis</i> (8).
Polynesian Storm-Petrel, <i>Nesofregata fuliginosa</i> (2)	Polynesian Storm-Petrel, <i>Nesofregatta fuliginosa</i> (2).

Removed (taxonomically)	Added (taxonomically)
Polynesian Storm-Petrel, <i>Nesofregatta fuliginosa</i> (3)	Polynesian Storm-Petrel, <i>Nesofregatta fuliginosa</i> (3).
Bonaparte's Gull, <i>Larus philadelphia</i> (9)	Swinhoe's Storm-Petrel, <i>Oceanodroma monorhis</i> (4).
Gray-hooded Gull, <i>Larus cirrocephalus</i> (9)	Swallow-tailed Gull, <i>Creagrus furcatus</i> (4).
Black-headed Gull, <i>Larus ridibundus</i> (9)	Bonaparte's Gull, <i>Chroicocephalus philadelphia</i> (9).
Little Gull, <i>Larus minutus</i> (9)	Gray-hooded Gull, <i>Chroicocephalus cirrocephalus</i> (9).
Laughing Gull, <i>Larus atricilla</i> (9)	Black-headed Gull, <i>Chroicocephalus ridibundus</i> (9).
Franklin's Gull, <i>Larus pipixcan</i> (9)	Little Gull, <i>Hydrocoloeus minutus</i> (9).
Royal Tern, <i>Thalasseus maximus</i> (2)	Laughing Gull, <i>Leucophaeus atricilla</i> (9).
Sandwich Tern, <i>Thalasseus sandvicensis</i> (2)	Franklin's Gull, <i>Leucophaeus pipixcan</i> (9).
Whip-poor-will, <i>Caprimulgus vociferus</i> (8)	Royal Tern, <i>Thalasseus maximus</i> (2).
Green Violet-ear, <i>Colibri thalassinus</i> (8)	Sandwich Tern, <i>Thalasseus sandvicensis</i> (2).
Black-capped Vireo, <i>Vireo atricapillus</i> (2, 3)	Brown Hawk-Owl, <i>Ninox scutulata</i> (4).
Brown Jay, <i>Cyanocorax morio</i> (9)	Eastern Whip-poor-will, <i>Caprimulgus vociferus</i> (8).
Boreal Chickadee, <i>Poecile hudsonica</i> (9)	Mexican Whip-poor-will, <i>Caprimulgus arizonae</i> (6).
Gray-headed Chickadee, <i>Poecile cincta</i> (9)	Green Violetear, <i>Colibri thalassinus</i> (8).
Eurasian [Winter] Wren, <i>Troglodytes troglodytes</i> (7)	White-crested Elaenia, <i>Elaenia albiceps</i> (4).
Wood Warbler, <i>Phylloscopus sibilatrix</i> (2)	Crowned Slaty Flycatcher, <i>Empidonomus aurantioatrocristatus</i> (4).
Lanceolated Warbler, <i>Locustella lanceolata</i> (2)	Black-capped Vireo, <i>Vireo atricapilla</i> (2, 3).
Clay-colored Robin, <i>Turdus grayi</i> (8)	Brown Jay, <i>Psilorhinus morio</i> (9).
White-throated Robin, <i>Turdus assimilis</i> (8)	Boreal Chickadee, <i>Poecile hudsonicus</i> (9).
McCown's Longspur, <i>Calcarius mccownii</i> (9)	Gray-headed Chickadee, <i>Poecile cinctus</i> (9).
Blue-winged Warbler, <i>Vermivora pinus</i> (9)	Sinaloa Wren, <i>Thryothorus sinaloa</i> (4).
Tennessee Warbler, <i>Vermivora peregrina</i> (9)	Pacific Wren, <i>Troglodytes pacificus</i> (6).
Orange-crowned Warbler, <i>Vermivora celata</i> (9)	Winter Wren, <i>Troglodytes hiemalis</i> (6).
Nashville Warbler, <i>Vermivora ruficapilla</i> (9)	Wood Warbler, <i>Phylloscopus sibilatrix</i> (2).
Virginia's Warbler, <i>Vermivora virginiae</i> (9)	Pallas's Leaf-Warbler, <i>Phylloscopus proregulus</i> (4).
Colima Warbler, <i>Vermivora crissalis</i> (9)	Lanceolated Warbler, <i>Locustella lanceolata</i> (2).
Lucy's Warbler, <i>Vermivora luciae</i> (9)	Wrentit, <i>Chamaea fasciata</i> (5).
Crescent-chested Warbler, <i>Parula superciliosa</i> (9)	Sedge Warbler, <i>Acrocephalus schoenobaenus</i> (4).
Northern Waterthrush, <i>Seiurus noveboracensis</i> (9)	Mugimaki Flycatcher, <i>Ficedula mugimaki</i> (1).
Louisiana Waterthrush, <i>Seiurus motacilla</i> (9)	Taiga Flycatcher, <i>Ficedula albicilla</i> (1).
Yellow-faced Grassquit, <i>Tiaris olivacea</i> (3)	Dark-sided Flycatcher, <i>Muscicapa sibirica</i> (1).
Canyon Towhee, <i>Pipilo fuscus</i> (9)	Asian Brown Flycatcher, <i>Muscicapa dauurica</i> (1).
California Towhee, <i>Pipilo crissalis</i> (9)	Spotted Flycatcher, <i>Muscicapa striata</i> (1).
Abert's Towhee, <i>Pipilo aberti</i> (9)	Blue Rock-Thrush, <i>Monticola solitarius</i> (8).
Rufous-winged Sparrow, <i>Aimophila carpalis</i> (9)	Rufous-tailed Robin, <i>Luscinia sibilans</i> (4).
Botteri's Sparrow, <i>Aimophila botterii</i> (9)	Clay-colored Thrush, <i>Turdus grayi</i> (8).
Cassin's Sparrow, <i>Aimophila cassinii</i> (9)	White-throated Thrush, <i>Turdus assimilis</i> (8).
Bachman's Sparrow, <i>Aimophila aestivalis</i> (9)	McCown's Longspur, <i>Rhynchophanes mccownii</i> (9).
Five-striped Sparrow, <i>Aimophila quinquestrata</i> (9)	Blue-winged Warbler, <i>Vermivora cyanopectera</i> (9).
Nelson's Sharp-tailed Sparrow, <i>Ammodramus nelsoni</i> (8)	Tennessee Warbler, <i>Oreothlypis peregrina</i> (9).
Saltmarsh Sharp-tailed Sparrow, <i>Ammodramus caudacutus</i> (8)	Orange-crowned Warbler, <i>Oreothlypis celata</i> (9).
Hispaniolan [Greater Antillean] Oriole, <i>Icterus dominicensis</i> (7)	Nashville Warbler, <i>Oreothlypis ruficapilla</i> (9).
Common Redpoll, <i>Carduelis flammea</i> (9)	Virginia's Warbler, <i>Oreothlypis virginiae</i> (9).
Hoary Redpoll, <i>Carduelis hornemanni</i> (9)	Colima Warbler, <i>Oreothlypis crissalis</i> (9).
Eurasian Siskin, <i>Carduelis spinus</i> (9)	Lucy's Warbler, <i>Oreothlypis luciae</i> (9).
Pine Siskin, <i>Carduelis pinus</i> (9)	Crescent-chested Warbler, <i>Oreothlypis superciliosa</i> (9).
Lesser Goldfinch, <i>Carduelis psaltria</i> (9)	Northern Waterthrush, <i>Parkesia noveboracensis</i> (9).
Lawrence's Goldfinch, <i>Carduelis lawrencei</i> (9)	Louisiana Waterthrush, <i>Parkesia motacilla</i> (9).
American Goldfinch, <i>Carduelis tristis</i> (9)	Yellow-faced Grassquit, <i>Tiaris olivaceus</i> (3).
Oriental Greenfinch, <i>Carduelis sinica</i> (9)	Canyon Towhee, <i>Melospiza fusca</i> (9).
	California Towhee, <i>Melospiza crissalis</i> (9).
	Abert's Towhee, <i>Melospiza aberti</i> (9).
	Rufous-winged Sparrow, <i>Peucaea carpalis</i> (9).
	Botteri's Sparrow, <i>Peucaea botterii</i> (9).
	Cassin's Sparrow, <i>Peucaea cassinii</i> (9).
	Bachman's Sparrow, <i>Peucaea aestivalis</i> (9).
	Five-striped Sparrow, <i>Amphispiza quinquestrata</i> (9).
	Nelson's Sparrow, <i>Ammodramus nelsoni</i> (8).
	Saltmarsh Sparrow, <i>Ammodramus caudacutus</i> (8).
	Yellow-browed Bunting, <i>Emberiza chrysophrys</i> (4).

### How do the changes implemented here differ from those discussed in the proposed rule?

The scientific name of one species spelled erroneously in the proposed rule is corrected to conform to the AOU Check-list (1998) and supplements:

Black-capped Vireo, *Vireo atricapillus* becomes *Vireo atricapilla*.

### How is the list of migratory birds organized?

The species are listed in two formats to suit the needs of different segments of the public: alphabetically in 50 CFR 10.13(c)(1) and taxonomically in 50 CFR 10.13(c)(2). In the alphabetical listing, species are listed by common (English) group names, with the scientific name of each species following the English group name. This format, similar to that used in modern telephone directories, is most useful to members of the lay public. In the taxonomic listing, species are listed in phylogenetic sequence by scientific name, with the English name following the scientific name. To help clarify species relationships, we also list the higher-level taxonomic categories of Order, Family, and Subfamily. This format follows the sequence adopted by the AOU (1998, 2010) and is most useful to ornithologists and other scientists.

### What species are not protected by the Migratory Bird Treaty Act?

The MBTA does not apply to:

(1) Nonnative species introduced into the United States or its territories by means of intentional or unintentional human assistance that belong to families or groups covered by the Canadian, Mexican, or Russian Conventions, in accordance with the MBTRA. See 70 FR 12710 (March 15, 2005) for a partial list of nonnative, human-introduced bird species in this category. Note, though, that native species that are introduced into parts of the United States where they are not native are still protected under the MBTA regardless of where they occur in the United States or its territories.

(2) Nonnative, human-introduced species that belong to families or groups not covered by the Canadian, Mexican, or Russian Conventions, including Tinamidae (tinamous), Cracidae (chachalacas), Megapodiidae (megapodes), Phasianidae (grouse, ptarmigan, and turkeys), Turnicidae (buttonquails), Odontophoridae (New World quail), Pteroclididae (sandgrouse), Psittacidae (parrots), Dicuridae (drongos), Rhamphastidae (toucans), Musophagidae (turacos), Bucerotidae (hornbills), Bucorvidae (ground-hornbills), Pycnonotidae

(bulbuls), Pittidae (pittas), Irenidae (fairy-bluebirds), Timaliidae (babblers), Zosteropidae (white-eyes), Sturnidae (starlings; except as listed in the Japanese Convention), Passeridae (Old World sparrows), Ploceidae (weavers), Estrildidae (estrildid finches), and numerous other families not currently represented in the United States or its territories.

(3) Native species that belong to families or groups represented in the United States, but which are not expressly mentioned by the Canadian, Mexican, or Russian Conventions, including the Megapodiidae (megapodes), Phasianidae (grouse, ptarmigan, and turkeys), Odontophoridae (New World quail), Burhinidae (thick-knees), Glareolidae (pratincoles), Psittacidae (parrots), Todidae (todies), Meliphagidae (honeyeaters), Monarchidae (monarch flycatchers [elepaios]), Zosteropidae (white-eyes), and Coerebidae (bananaquit). It should be noted that this rule supersedes the 70 FR 12710 notice to the extent that they are inconsistent. Specifically, the 1996 amendment to the Canadian Convention included the family Muscipidae (Old World flycatchers). Thus, all members of the Muscipidae family are now included on this list. In addition, the Wrenit is now considered a member of the Sylviidae family rather than the Timaliidae family and is now included on this list.

Partial lists of the species included in categories 2 and 3 are available at <http://www.fws.gov/migratorybirds/RegulationsPolicies/mbta/MBTAProtectedNonprotected.html>.

### Responses to Public Comments

On April 26, 2011, we published in the **Federal Register** (76 FR 23428) a proposed rule to revise the list of migratory birds at 50 CFR 10.13. We solicited public comments on the proposed rule for 90 days, ending on July 25, 2011.

We received 7 comments in response to the proposed rule; 5 were from agencies, and 2 were from private individuals. The following text discusses the substantive comments we received and provides our responses to them.

*Comment:* One individual indicated that Brown Hawk-Owl, and the 10 other species we proposed to add based on new distributional records (Category 4), should not be added because they are either extremely rare vagrants or were moved by humans. The commenter further pointed out that the MBTA loses biological and ecological credibility when species are added that do not

naturally occur in the United States or its territories, and pointed to the Eurasian Kestrel as one example.

*Response:* In 2004, the Migratory Bird Treaty Reform Act (MBTRA; Pub. L. 108-447) amended the MBTA. While the primary purpose of the MBTRA was to eliminate protection for introduced species, it also defined native species as those “occurring in the United States or its territories as a result of natural biological or ecological processes.” Vagrancy is a natural biological process, so these species are protected under the MBTA.

There is credible evidence to support our contention that these species have occurred in the United States as natural vagrants unhindered by human intervention. The AOU and other bird record committees take human intervention into account whenever they evaluate such records. Several of these species, including the Brown Hawk-Owl, have occurred in some of the remotest parts of Alaska, and are most unlikely to have been moved there by humans. Furthermore, multiple records of Eurasian Kestrel have been accepted from Western Alaska, and at scattered locations across North America, by the AOU and other competent scientific authorities.

*Comment:* The Arkansas Game and Fish Commission urged the Service to carefully consider the implications to State regulations when making recommendations, and ensure that they do not occur so frequently as to become burdensome. Specifically, they point out that the split of the order Accipitriformes from the Falconiformes will necessitate a change in State falconry regulations.

*Response:* The Service appreciates the State’s concern regarding changes to Federal regulations that affect States, and we make a concerted effort to work closely with the States through the Flyway Councils. To comply with the intent of the migratory bird treaties and the MBTA, we are obligated to update the list at intervals. However, the List of Migratory Birds has been updated only twice since 1985, which is not frequently enough to stay current with changes in bird taxonomy. Consequently, we intend to update this list on a 5-year cycle to coincide with updates to the Birds of Conservation Concern, thus balancing the frequency of updates with the frequency of changes in bird taxonomy. In this update, taxonomic changes at the Order level did not change which species are protected under the MBTA, as the species within those families were previously protected. Furthermore, this is the first change we have made to the

Falconiformes since the families within that Order were first protected in 1972.

*Comment:* The Indiana Division of Fish and Wildlife (IDFW) was pleased that the Service intends to continue to treat cackling geese as Canada geese, pointing out that hunting management of white-cheeked geese could become more difficult if they were split. The IDFW also pointed out that the Mississippi Flyway Council is trying to simplify hunting regulations for Canada geese, and splitting them into two species for management purposes could cause progress toward simplification to stall.

*Response:* The Service recognizes the management concerns referred to by the commenter. While we appreciate the complexities of white-cheeked goose management, our decision to continue to include the Cackling Goose within the listing for Canada Goose is based on lingering uncertainty regarding their taxonomic relationship. Work is currently being conducted in Alaska and northern Canada to resolve that uncertainty. We will consider new information when it is available, at which time we may reconsider our decision. In any case, regardless of name, goose subspecies identified as Cackling Goose by the AOU are currently protected under the MBTA as Canada Goose.

### Required Determinations

#### *Regulatory Planning and Review (Executive Order 12866)*

Executive Order (EO) 12866 provides that the Office of Information and Regulatory Affairs (OIRA) in the Office of Management and Budget will review all significant rules. OIRA has determined that this rule is not significant.

EO 13563 reaffirms the principles of EO 12866, while calling for improvements in the nation's regulatory system to promote predictability, to reduce uncertainty, and to use the best, most innovative, and least burdensome tools for achieving regulatory ends. EO 13563 directs agencies to consider regulatory approaches that reduce burdens and maintain flexibility and freedom of choice for the public where these approaches are relevant, feasible, and consistent with regulatory objectives.

EO 13563 emphasizes further that regulations must be based on the best available science and that the rulemaking process must allow for public participation and an open exchange of ideas. We have developed this rule in a manner consistent with these requirements.

#### *Regulatory Flexibility Act (5 U.S.C. 601 et seq.)*

Under the Regulatory Flexibility Act (5 U.S.C. 601 et seq., as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996 (Pub. L. 104-121)), whenever an agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effect of the rule on small entities (i.e., small businesses, small organizations, and small government jurisdictions). However, no regulatory flexibility analysis is required if the head of an agency certifies the rule does not have a significant economic impact on a substantial number of small entities.

SBREFA amended the Regulatory Flexibility Act to require Federal agencies to provide the statement of the factual basis for certifying that a rule will not have a significant economic impact on a substantial number of small entities. We have examined this rule's potential effects on small entities as required by the Regulatory Flexibility Act, and have determined that this action will not have a significant economic impact on a substantial number of small entities, because we are simply updating the list of migratory bird species protected under the Conventions. Consequently, we certify that because this rule does not have a significant economic effect on a substantial number of small entities, a regulatory flexibility analysis is not required.

This rule is not a major rule under SBREFA (5 U.S.C. 804(2)). It does not have a significant impact on a substantial number of small entities.

a. This rule does not have an annual effect on the economy of \$100 million or more.

b. This rule does not cause a major increase in costs or prices for consumers, individual industries, Federal, State, or local government agencies, or geographic regions.

c. This rule does not have significant adverse effects on competition, employment, investment, productivity, innovation, or the ability of U.S.-based enterprises to compete with foreign-based enterprises.

#### *Unfunded Mandates Reform Act*

In accordance with the Unfunded Mandates Reform Act (2 U.S.C. 1501 et seq.), we have determined the following:

a. This rule does not "significantly or uniquely" affect small governments. A small government agency plan is not required. Actions under the regulation

do not affect small government activities in any significant way.

b. This rule does not produce a Federal mandate of \$100 million or greater in any year; i.e., it is not a "significant regulatory action" under the Unfunded Mandates Reform Act.

#### *Takings*

In accordance with Executive Order 12630, the rule does not have significant takings implications. This rule does not contain a provision for taking of private property. Therefore, a takings implication assessment is not required.

#### *Federalism*

This rule does not have sufficient Federalism effects to warrant preparation of a Federalism summary impact statement under Executive Order 13132. It does not interfere with the States' ability to manage themselves or their funds. No significant economic impacts are expected to result from the updating of the list of migratory bird species.

#### *Civil Justice Reform*

In accordance with Executive Order 12988, the Office of the Solicitor has determined that the rule does not unduly burden the judicial system and meets the requirements of sections 3(a) and 3(b)(2) of the Order.

#### *Paperwork Reduction Act*

We examined this rule under the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.). There are no new information collection requirements associated with this rule. We do not require any new permits, reports, or recordkeeping in this rule.

#### *National Environmental Policy Act (NEPA)*

Given that the revision of 50 CFR 10.13 is strictly administrative in nature and will have no or minor environmental effects, it is categorically excluded from further NEPA requirements (43 CFR 46.210(i)).

#### *Endangered Species Act (ESA)*

Seventy-four of the species on the List of Migratory Birds are also designated as endangered or threatened in all or some portion of their U.S. range under provisions of the Endangered Species Act of 1973 (16 U.S.C. 1531-44; 50 CFR 17.11). No legal complications arise from the dual listing as the two lists are developed under separate authorities and for different purposes. Because the rule is strictly administrative in nature, it has no effect on threatened or endangered species. It does not require ESA consultation.

*Government-to-Government  
Relationship With Tribes*

In accordance with the President's memorandum of April 29, 1994, "Government-to-Government Relations with Native American Tribal Governments" (59 FR 22951), Executive Order 13175, and 512 DM 2, we have evaluated potential effects on federally recognized Indian tribes and have determined that there are no potential effects. The revisions to existing regulations in this rule are purely administrative in nature and do not interfere with the tribes' ability to manage themselves or their funds or to regulate migratory bird activities on tribal lands.

*Energy Supply, Distribution, or Use  
(Executive Order 13211)*

On May 18, 2001, the President issued Executive Order 13211 addressing regulations that significantly affect energy supply, distribution, and use. Executive Order 13211 requires agencies to prepare Statements of Energy Effects when undertaking certain actions. Because this rule only affects the listing of protected species in the United States, it is not a significant regulatory action under Executive Order 12866, and does not significantly affect energy supplies, distribution, or use. Therefore, this action is not a significant energy action and no Statement of Energy Effects is required.

**References Cited**

A complete list of all references cited is available upon request (see **FOR FURTHER INFORMATION CONTACT** above).

**List of Subjects***50 CFR Part 10*

Exports, Fish, Imports, Law enforcement, Plants, Transportation, Wildlife.

*50 CFR Part 21*

Exports, Hunting, Imports, Reporting and recordkeeping requirements, Transportation, Wildlife.

**Regulation Promulgation**

For the reasons discussed in the preamble, we amend title 50, chapter I, subchapter B, parts 10 and 21 of the Code of Federal Regulations, as follows:

**PART 10—[AMENDED]**

■ 1. The authority citation for part 10 continues to read as follows:

**Authority:** 18 U.S.C. 42; 16 U.S.C. 703–712; 16 U.S.C. 668a–d; 19 U.S.C. 1202; 16 U.S.C. 1531–1543; 16 U.S.C. 1361–1384, 1401–1407; 16 U.S.C. 742a–742j–l; 16 U.S.C. 3371–3378.

■ 2. Revise § 10.13 to read as follows:

**§ 10.13 List of Migratory Birds.**

(a) *Legal authority for this list.* The legal authorities for this list are the Migratory Bird Treaty Act (MBTA; 16 U.S.C. 703–712), the Fish and Wildlife Improvement Act of 1978 (16 U.S.C. 742l), and the Fish and Wildlife Act of 1956 (16 U.S.C. 742a–742j). The MBTA implements Conventions between the United States and four neighboring countries for the protection of migratory birds, as follows:

(1) *Canada:* Convention between the United States and Great Britain [on behalf of Canada] for the Protection of Migratory Birds, August 16, 1916, 39 Stat. 1702 (T.S. No. 628), as amended;

(2) *Mexico:* Convention between the United States and Mexico for the Protection of Migratory Birds and Game Mammals, February 7, 1936, 50 Stat. 1311 (T.S. No. 912), as amended;

(3) *Japan:* Convention between the Government of the United States of America and the Government of Japan for the Protection of Migratory Birds and Birds in Danger of Extinction, and Their Environment, March 4, 1972, 25 U.S.T. 3329 (T.I.A.S. No. 7990); and

(4) *Russia:* Convention between the United States of America and the Union of Soviet Socialist Republics Concerning the Conservation of Migratory Birds and Their Environment, November 19, 1976, 20 U.S.T. 4647 (T.I.A.S. No. 9073).

(b) *Purpose of this list.* The purpose is to inform the public of the species protected by regulations that enforce the terms of the MBTA. These regulations, found in parts 10, 20, and 21 of this chapter, cover most aspects of the taking, possession, transportation, sale, purchase, barter, exportation, and importation of migratory birds.

(c) *What species are protected as migratory birds?* Species protected as migratory birds are listed in two formats to suit the varying needs of the user: Alphabetically in paragraph (c)(1) of this section and taxonomically in paragraph (c)(2) of this section. Taxonomy and nomenclature generally follow the 7th edition of the American Ornithologists' Union's *Check-list of North American birds* (1998, as amended through 2010). For species not treated by the AOU *Check-list*, we generally follow *The Clements Checklist of Birds of the World* (Clements 2007).

(1) *Alphabetical listing.* Species are listed alphabetically by common (English) group names, with the scientific name of each species following the common name.

ACCENTOR, Siberian, *Prunella montanella*

AKEKEE, *Loxops caeruleirostris*

AKEPA, *Loxops coccineus*

AKIALOA, Greater, *Hemignathus ellisianus*

AKIAPOLAAU, *Hemignathus munroi*

AKIKIKI, *Oreomystis bairdi*

AKOHEKOHE, *Palmeria dolei*

ALAUAHIO, Maui, *Paroreomyza montana*

Oahu, *Paroreomyza maculata*

ALBATROSS, Black-browed,

*Thalassarche melanophris*

Black-footed, *Phoebastria nigripes*

Laysan, *Phoebastria immutabilis*

Light-mantled, *Phoebastria palpebrata*

Short-tailed, *Phoebastria albatrus*

Shy, *Thalassarche cauta*

Wandering, *Diomedea exulans*

Yellow-nosed, *Thalassarche*

*chlororhynchus*

AMAKIHI, Hawaii, *Hemignathus virens*

Kauai, *Hemignathus kauaiensis*

Oahu, *Hemignathus flavus*

ANHINGA, *Anhinga anhinga*

ANI, Groove-billed, *Crotophaga*

*sulcirostris*

Smooth-billed, *Crotophaga ani*

ANIANIAU, *Magnumma parva*

APAPANE, *Himatione sanguinea*

AUKLET, Cassin's, *Ptychoramphus*

*aleuticus*

Crested, *Aethia cristatella*

Least, *Aethia pusilla*

Parakeet, *Aethia psittacula*

Rhinoceros, *Cerorhinca monocerata*

Whiskered, *Aethia pygmaea*

AVOCET, American, *Recurvirostra americana*

BEAN-GOOSE, Taiga, *Anser fabalis*

Tundra, *Anser serrirostris*

BEARDLESS-TYRANNULET, Northern,

*Camptostoma imberbe*

BECARD, Rose-throated, *Pachyramphus aglaiae*

BITTERN, American, *Botaurus lentiginosus*

Black, *Ixobrychus flavicollis*

Least, *Ixobrychus exilis*

Schrenck's, *Ixobrychus eurhythmus*

Yellow, *Ixobrychus sinensis*

BLACK-HAWK, Common, *Buteogallus anthracinus*

BLACKBIRD, Brewer's, *Euphagus cyanocephalus*

Red-winged, *Agelaius phoeniceus*

Rusty, *Euphagus carolinus*

Tawny-shouldered, *Agelaius humeralis*

Tricolored, *Agelaius tricolor*

Yellow-headed, *Xanthocephalus xanthocephalus*

Yellow-shouldered, *Agelaius xanthomus*

BLUEBIRD, Eastern, *Sialia sialis*

Mountain, *Sialia currucoides*

Western, *Sialia mexicana*

BLUETAIL, Red-flanked, *Tarsiger cyanurus*

BLUETHROAT, *Luscinia svecica*

BOBOLINK, *Dolichonyx oryzivorus*

- BOOBY, Blue-footed, *Sula nebouxii*  
Brown, *Sula leucogaster*  
Masked, *Sula dactylatra*  
Red-footed, *Sula sula*
- BRAMBLING, *Fringilla montifringilla*
- BRANT, *Branta bernicla*
- BUFFLEHEAD, *Bucephala albeola*
- BULLFINCH, Eurasian, *Pyrrhula pyrrhula*  
Puerto Rican, *Loxigilla portoricensis*
- BUNTING, Blue, *Cyanocompsa parellina*  
Gray, *Emberiza variabilis*  
Indigo, *Passerina cyanea*  
Little, *Emberiza pusilla*  
Lark, *Calamospiza melanocorys*  
Lazuli, *Passerina amoena*  
McKay's, *Plectrophenax hyperboreus*  
Painted, *Passerina ciris*  
Pallas's, *Emberiza pallasi*  
Pine, *Emberiza leucocephalus*  
Reed, *Emberiza schoeniclus*  
Rustic, *Emberiza rustica*  
Snow, *Plectrophenax nivalis*  
Varied, *Passerina versicolor*  
Yellow-breasted, *Emberiza aureola*  
Yellow-browed, *Emberiza chrysophrys*  
Yellow-throated, *Emberiza elegans*
- BUSHTIT, *Psaltriparus minimus*
- CANVASBACK, *Aythya valisineria*
- CARACARA, Crested, *Caracara cheriway*
- CARDINAL, Northern, *Cardinalis cardinalis*
- CARIB, Green-throated, *Eulampis holosericeus*  
Purple-throated, *Eulampis jugularis*
- CATBIRD, Black, *Melanoptila glabrirostris*  
Gray, *Dumetella carolinensis*
- CHAFFINCH, Common, *Fringilla coelebs*
- CHAT, Yellow-breasted, *Icteria virens*
- CHICKADEE, Black-capped, *Poecile atricapillus*  
Boreal, *Poecile hudsonicus*  
Carolina, *Poecile carolinensis*  
Chestnut-backed, *Poecile rufescens*  
Gray-headed, *Poecile cinctus*  
Mexican, *Poecile sclateri*  
Mountain, *Poecile gambeli*
- CHUCK-WILL'S-WIDOW, *Caprimulgus carolinensis*
- CONDOR, California, *Gymnogyps californianus*
- COOT, American, *Fulica americana*  
Caribbean, *Fulica caribaea*  
Eurasian, *Fulica atra*  
Hawaiian, *Fulica alai*
- CORMORANT, Brandt's, *Phalacrocorax penicillatus*  
Double-crested, *Phalacrocorax auritus*  
Great, *Phalacrocorax carbo*  
Little Pied, *Phalacrocorax melanoleucos*  
Neotropic, *Phalacrocorax brasilianus*  
Pelagic, *Phalacrocorax pelagicus*  
Red-faced, *Phalacrocorax urile*
- COWBIRD, Bronzed, *Molothrus aeneus*  
Brown-headed, *Molothrus ater*  
Shiny, *Molothrus bonariensis*
- CRAKE, Corn, *Crex crex*  
Paint-billed, *Neocrex erythrops*  
Spotless, *Porzana tabuensis*  
Yellow-breasted, *Porzana flaviventer*
- CRANE, Common, *Grus grus*  
Sandhill, *Grus canadensis*  
Whooping, *Grus americana*
- CREEPER, Brown, *Certhia americana*  
Hawaii, *Oreomystis mana*
- CROSSBILL, Red, *Loxia curvirostra*  
White-winged, *Loxia leucoptera*
- CROW, American, *Corvus brachyrhynchos*  
Fish, *Corvus ossifragus*  
Hawaiian, *Corvus hawaiiensis*  
Mariana, *Corvus kubaryi*  
Northwestern, *Corvus caurinus*  
Tamaulipas, *Corvus imparatus*  
White-necked, *Corvus leucognaphalus*
- CUCKOO, Black-billed, *Coccyzus erythrophthalmus*  
Common, *Cuculus canorus*  
Mangrove, *Coccyzus minor*  
Oriental, *Cuculus optatus*  
Yellow-billed, *Coccyzus americanus*
- CURLEW, Bristle-thighed, *Numenius tahitiensis*  
Eskimo, *Numenius borealis*  
Eurasian, *Numenius arquata*  
Far Eastern, *Numenius madagascariensis*  
Little, *Numenius minutus*  
Long-billed, *Numenius americanus*
- DICKCISSEL, *Spiza americana*
- DIPPER, American, *Cinclus mexicanus*
- DOTTEREL, Eurasian, *Charadrius morinellus*
- DOVE, Inca, *Columbina inca*  
Mourning, *Zenaida macroura*  
White-tipped, *Leptotila verreauxi*  
White-winged, *Zenaida asiatica*  
Zenaida, *Zenaida aurita*
- DOVEKIE, *Alle alle*
- DOWITCHER, Long-billed, *Limnodromus scolopaceus*  
Short-billed, *Limnodromus griseus*
- DUCK, American Black, *Anas rubripes*  
Eastern Spot-billed, *Anas zonorhyncha*  
Falcated, *Anas falcata*  
Harlequin, *Histrionicus histrionicus*  
Hawaiian, *Anas wyvilliana*  
Laysan, *Anas laysanensis*  
Long-tailed, *Clangula hyemalis*  
Masked, *Nomonyx dominicus*  
Mottled, *Anas fulvigula*  
Muscovy, *Cairina moschata*  
Pacific Black, *Anas superciliosa*  
Ring-necked, *Aythya collaris*  
Ruddy, *Oxyura jamaicensis*  
Tufted, *Aythya fuligula*  
Wood, *Aix sponsa*
- DUNLIN, *Calidris alpina*
- EAGLE, Bald, *Haliaeetus leucocephalus*  
Golden, *Aquila chrysaetos*  
White-tailed, *Haliaeetus albicilla*
- EGRET, Cattle, *Bubulcus ibis*  
Chinese, *Egretta eulophotes*  
Great, *Ardea alba*  
Intermediate, *Mesophoyx intermedia*  
Little, *Egretta garzetta*  
Reddish, *Egretta rufescens*  
Snowy, *Egretta thula*
- EIDER, Common, *Somateria mollissima*  
King, *Somateria spectabilis*  
Spectacled, *Somateria fischeri*  
Steller's, *Polysticta stelleri*
- ELAENIA, Caribbean, *Elaenia martinica*  
Greenish, *Myiopagis viridicata*  
White-crested, *Elaenia albiceps*
- EMERALD, Puerto Rican, *Chlorostilbon maugaeus*
- EUPHONIA, Antillean, *Euphonia musica*
- FALCON, Aplomado, *Falco femoralis*  
Peregrine, *Falco peregrinus*  
Prairie, *Falco mexicanus*  
Red-footed, *Falco vespertinus*
- FIELDFARE, *Turdus pilaris*
- FINCH, Cassin's, *Carpodacus cassinii*  
House, *Carpodacus mexicanus*  
Laysan, *Telespiza cantans*  
Nihoa, *Telespiza ultima*  
Purple, *Carpodacus purpureus*
- FLAMINGO, American, *Phoenicopterus ruber*
- FLICKER, Gilded, *Colaptes chrysoides*  
Northern, *Colaptes auratus*
- FLYCATCHER, Acadian, *Empidonax virescens*  
Alder, *Empidonax alnorum*  
Ash-throated, *Myiarchus cinerascens*  
Asian Brown, *Muscicapa dauurica*  
Brown-crested, *Myiarchus tyrannulus*  
Buff-breasted, *Empidonax fulvifrons*  
Cordilleran, *Empidonax occidentalis*  
Crowned Slaty, *Empidonax aurantioatrocristatus*  
Dark-sided, *Muscicapa sibirica*  
Dusky, *Empidonax oberholseri*  
Dusky-capped, *Myiarchus tuberculifer*  
Fork-tailed, *Tyrannus savana*  
Gray, *Empidonax wrightii*  
Gray-streaked, *Muscicapa griseisticta*  
Great Crested, *Myiarchus crinitus*  
Hammond's, *Empidonax hammondi*  
La Sagra's, *Myiarchus sagrae*  
Least, *Empidonax minimus*  
Mugimaki, *Ficedula mugimaki*  
Narcissus, *Ficedula narcissina*  
Nutting's, *Myiarchus nuttingi*  
Olive-sided, *Contopus cooperi*  
Pacific-slope, *Empidonax difficilis*  
Piratic, *Legatus leucophalus*  
Puerto Rican, *Myiarchus antillarum*  
Scissor-tailed, *Tyrannus forficatus*  
Social, *Myiozetetes similis*  
Spotted, *Muscicapa striata*  
Sulphur-bellied, *Myiodynastes luteiventris*  
Taiga, *Ficedula albicilla*  
Tufted, *Mitrephanes phaeocercus*  
Variegated, *Empidonax varius*  
Vermilion, *Pyrocephalus rubinus*

- Willow, *Empidonax traillii*  
Yellow-bellied, *Empidonax flaviventris*  
FOREST-FALCON, Collared, *Micrastur semitorquatus*  
FRIGATEBIRD, Great, *Fregata minor*  
Lesser, *Fregata ariel*  
Magnificent, *Fregata magnificens*  
FROG-HAWK, Gray, *Accipiter soloensis*  
FRUIT-DOVE, Crimson-crowned,  
*Ptilinopus porphyraceus*  
Many-colored, *Ptilinopus perousii*  
Mariana, *Ptilinopus roseicapilla*  
FULMAR, Northern, *Fulmarus glacialis*  
GADWALL, *Anas strepera*  
GALLINULE, Azure, *Porphyrio flavirostris*  
Purple, *Porphyrio martinica*  
GANNET, Northern, *Morus bassanus*  
GARGANEY, *Anas querquedula*  
GNATCATCHER, Black-capped,  
*Polioptila nigriceps*  
Black-tailed, *Polioptila melanura*  
Blue-gray, *Polioptila caerulea*  
California, *Polioptila californica*  
GODWIT, Bar-tailed, *Limosa lapponica*  
Black-tailed, *Limosa limosa*  
Hudsonian, *Limosa haemastica*  
Marbled, *Limosa fedoa*  
GOLDEN-PLOVER, American, *Pluvialis dominica*  
European, *Pluvialis apricaria*  
Pacific, *Pluvialis fulva*  
GOLDENEYE, Barrow's, *Bucephala islandica*  
Common, *Bucephala clangula*  
GOLDFINCH, American, *Spinus tristis*  
Lawrence's, *Spinus lawrencei*  
Lesser, *Spinus psaltria*  
GOOSE, Barnacle, *Branta leucopsis*  
Canada, *Branta canadensis* (including  
Cackling Goose, *Branta hutchinsii*)  
Emperor, *Chen canagica*  
Greater White-fronted, *Anser albifrons*  
Hawaiian, *Branta sandvicensis*  
Lesser White-fronted, *Anser erythropus*  
Ross's, *Chen rossii*  
Snow, *Chen caerulescens*  
GOSHAWK, Northern, *Accipiter gentilis*  
GRACKLE, Boat-tailed, *Quiscalus major*  
Common, *Quiscalus quiscula*  
Great-tailed, *Quiscalus mexicanus*  
Greater Antillean, *Quiscalus niger*  
GRASSHOPPER-WARBLER,  
Middendorff's, *Locustella ochotensis*  
GRASSQUIT, Black-faced, *Tiaris bicolor*  
Yellow-faced, *Tiaris olivaceus*  
GREBE, Clark's, *Aechmophorus clarkii*  
Eared, *Podiceps nigricollis*  
Horned, *Podiceps auritus*  
Least, *Tachybaptus dominicus*  
Pied-billed, *Podilymbus podiceps*  
Red-necked, *Podiceps grisegena*  
Western, *Aechmophorus occidentalis*  
GREENFINCH, Oriental, *Chloris sinica*  
GREENSHANK, Common, *Tringa nebularia*  
Nordmann's, *Tringa guttifer*  
GROSBEAK, Black-headed, *Pheucticus melanocephalus*  
Blue, *Passerina caerulea*  
Crimson-collared, *Rhodothraupis celaeno*  
Evening, *Coccothraustes vespertinus*  
Pine, *Pinicola enucleator*  
Rose-breasted, *Pheucticus ludovicianus*  
Yellow, *Pheucticus chrysopleps*  
GROUND-DOVE, Common, *Columbina passerina*  
Friendly, *Gallicolumba stairi*  
Ruddy, *Columbina talpacoti*  
White-throated, *Gallicolumba xanthonura*  
GUILLEMOT, Black, *Cephus grylle*  
Pigeon, *Cephus columba*  
GULL, Belcher's, *Larus belcheri*  
Black-headed, *Chroicocephalus ridibundus*  
Black-tailed, *Larus crassirostris*  
Bonaparte's, *Chroicocephalus philadelphia*  
California, *Larus californicus*  
Franklin's, *Leucophaeus pipixcan*  
Glaucous, *Larus hyperboreus*  
Glaucous-winged, *Larus glaucescens*  
Gray-hooded, *Chroicocephalus cirrocephalus*  
Great Black-backed, *Larus marinus*  
Heermann's, *Larus heermanni*  
Herring, *Larus argentatus*  
Iceland, *Larus glaucooides*  
Ivory, *Pagophila eburnea*  
Kelp, *Larus dominicanus*  
Laughing, *Leucophaeus atricilla*  
Lesser Black-backed, *Larus fuscus*  
Little, *Hydrocoloeus minutus*  
Mew, *Larus canus*  
Ring-billed, *Larus delawarensis*  
Ross's, *Rhodostethia rosea*  
Sabine's, *Xema sabini*  
Slaty-backed, *Larus schistisagus*  
Swallow-tailed, *Creagrus furcatus*  
Thayer's, *Larus thayeri*  
Western, *Larus occidentalis*  
Yellow-footed, *Larus livens*  
Yellow-legged, *Larus michahellis*  
GYRFALCON, *Falco rusticolus*  
HARRIER, Northern, *Circus cyaneus*  
HAWFINCH, *Coccothraustes coccothraustes*  
HAWK, Broad-winged, *Buteo platypterus*  
Cooper's, *Accipiter cooperii*  
Crane, *Geranoospiza caerulescens*  
Ferruginous, *Buteo regalis*  
Gray, *Buteo nitidus*  
Harris's, *Parabuteo unicinctus*  
Hawaiian, *Buteo solitarius*  
Red-shouldered, *Buteo lineatus*  
Red-tailed, *Buteo jamaicensis*  
Roadside, *Buteo magnirostris*  
Rough-legged, *Buteo lagopus*  
Sharp-shinned, *Accipiter striatus*  
Short-tailed, *Buteo brachyurus*  
Swainson's, *Buteo swainsoni*  
White-tailed, *Buteo albicaudatus*  
Zone-tailed, *Buteo albonotatus*  
HAWK-CUCKOO, Hodgson's, *Cuculus fugax*  
HAWK-OWL, Brown, *Ninox scutulata*  
HERON, Gray, *Ardea cinerea*  
Great Blue, *Ardea herodias*  
Green, *Butorides virescens*  
Little Blue, *Egretta caerulea*  
Tricolored, *Egretta tricolor*  
HOBBY, Eurasian, *Falco subbuteo*  
HOOPOE, Eurasian, *Upupa epops*  
HOUSE-MARTIN, Common, *Delichon urbicum*  
HUMMINGBIRD, Allen's, *Selasphorus sasin*  
Anna's, *Calypte anna*  
Antillean Crested, *Orthorhyncus cristatus*  
Berylline, *Amazilia beryllina*  
Black-chinned, *Archilochus alexandri*  
Blue-throated, *Lampornis clemenciae*  
Broad-billed, *Cyanthus latirostris*  
Broad-tailed, *Selasphorus platycercus*  
Buff-bellied, *Amazilia yucatanensis*  
Bumblebee, *Atthis heloisa*  
Calliope, *Stellula calliope*  
Cinnamon, *Amazilia rutila*  
Costa's, *Calypte costae*  
Lucifer, *Calothorax lucifer*  
Magnificent, *Eugenes fulgens*  
Ruby-throated, *Archilochus colubris*  
Rufous, *Selasphorus rufus*  
Violet-crowned, *Amazilia violiceps*  
White-eared, *Hylocharis leucotis*  
Xantus's, *Hylocharis xantusii*  
IBIS, Glossy, *Plegadis falcinellus*  
Scarlet, *Eudocimus ruber*  
White, *Eudocimus albus*  
White-faced, *Plegadis chihi*  
IIWI, *Vestiaria coccinea*  
IMPERIAL-PIGEON, Pacific, *Ducula pacifica*  
JABIRU, *Jabiru myacteria*  
JACANA, Northern, *Jacana spinosa*  
JAEGER, Long-tailed, *Stercorarius longicaudus*  
Parasitic, *Stercorarius parasiticus*  
Pomarine, *Stercorarius pomarinus*  
JAY, Blue, *Cyanocitta cristata*  
Brown, *Psilorhinus morio*  
Gray, *Perisoreus canadensis*  
Green, *Cyanocorax yncas*  
Mexican, *Aphelocoma ultramarina*  
Pinyon, *Gymnorhinus cyanocephalus*  
Steller's, *Cyanocitta stelleri*  
JUNCO, Dark-eyed, *Junco hyemalis*  
Yellow-eyed, *Junco phaeonotus*  
KAKAWAHIE, *Paroreomyza flammea*  
KAMAO, *Myadestes myadestinus*  
KESTREL, American, *Falco sparverius*  
Eurasian, *Falco tinnunculus*  
KILLDEER, *Charadrius vociferus*  
KINGBIRD, Cassin's, *Tyrannus vociferans*  
Couch's, *Tyrannus couchii*  
Eastern, *Tyrannus tyrannus*  
Gray, *Tyrannus dominicensis*  
Loggerhead, *Tyrannus caudifasciatus*

- Thick-billed, *Tyrannus crassirostris*  
Tropical, *Tyrannus melancholicus*  
Western, *Tyrannus verticalis*  
KINGFISHER, Belted, *Megasceryle alcyon*  
Collared, *Todirhamphus chloris*  
Green, *Chloroceryle americana*  
Micronesian, *Todirhamphus cinnamominus*  
Ringed, *Megasceryle torquata*  
KINGLET, Golden-crowned, *Regulus satrapa*  
Ruby-crowned, *Regulus calendula*  
KISKADEE, Great, *Pitangus sulphuratus*  
KITE, Black, *Milvus migrans*  
Hook-billed, *Chondrohierax uncinatus*  
Mississippi, *Ictinia mississippiensis*  
Snail, *Rostrhamus sociabilis*  
Swallow-tailed, *Elanoides forficatus*  
White-tailed, *Elanus leucurus*  
KITTIWAKE, Black-legged, *Rissa tridactyla*  
Red-legged, *Rissa brevirostris*  
KNOT, Great, *Calidris tenuirostris*  
Red, *Calidris canutus*  
LAPWING, Northern, *Vanellus vanellus*  
LARK, Horned, *Eremophila alpestris*  
Sky, *Alauda arvensis*  
LEAF-WARBLER, Pallas's, *Phylloscopus proregulus*  
LIMPKIN, *Aramus guarauna*  
LIZARD-CUCKOO, Puerto Rican, *Coccyzus vieilloti*  
LONGSPUR, Chestnut-collared, *Calcarius ornatus*  
Lapland, *Calcarius lapponicus*  
McCown's, *Rhynchophanes mccownii*  
Smith's, *Calcarius pictus*  
LOON, Arctic, *Gavia arctica*  
Common, *Gavia immer*  
Pacific, *Gavia pacifica*  
Red-throated, *Gavia stellata*  
Yellow-billed, *Gavia adamsii*  
MAGPIE, Black-billed, *Pica hudsonia*  
Yellow-billed, *Pica nuttalli*  
MALLARD, *Anas platyrhynchos*  
MANGO, Antillean, *Anthracothorax dominicus*  
Green, *Anthracothorax viridis*  
Green-breasted, *Anthracothorax prevostii*  
MARTIN, Brown-chested, *Progne tapera*  
Caribbean, *Progne dominicensis*  
Cuban, *Progne cryptoleuca*  
Gray-breasted, *Progne chalybea*  
Purple, *Progne subis*  
Southern, *Progne elegans*  
MEADOWLARK, Eastern, *Sturnella magna*  
Western, *Sturnella neglecta*  
MERGANSER, Common, *Mergus merganser*  
Hooded, *Lophodytes cucullatus*  
Red-breasted, *Mergus serrator*  
MERLIN, *Falco columbarius*  
MILLERBIRD, *Acrocephalus familiaris*  
MOCKINGBIRD, Bahama, *Mimus gundlachii*  
Blue, *Melanotis caerulescens*  
Northern, *Mimus polyglottos*  
MOORHEN, Common, *Gallinula chloropus*  
MURRE, Common, *Uria aalge*  
Thick-billed, *Uria lomvia*  
MURRELET, Ancient, *Synthliboramphus antiquus*  
Craveri's, *Synthliboramphus craveri*  
Kittlitz's, *Brachyramphus brevirostris*  
Long-billed, *Brachyramphus perdix*  
Marbled, *Brachyramphus marmoratus*  
Xantus's, *Synthliboramphus hypoleucus*  
NEEDLETAIL, White-throated, *Hirundapus caudacutus*  
NIGHT-HERON, Black-crowned, *Nycticorax nycticorax*  
Japanese, *Gorsachius goisagi*  
Malayan, *Gorsachius melanolophus*  
Yellow-crowned, *Nyctanassa violacea*  
NIGHTHAWK, Antillean, *Chordeiles gundlachii*  
Common, *Chordeiles minor*  
Lesser, *Chordeiles acutipennis*  
NIGHTINGALE-THRUSH, Black-headed, *Catharus mexicanus*  
Orange-billed, *Catharus aurantirostris*  
NIGHTJAR, Buff-collared, *Caprimulgus ridgwayi*  
Gray, *Caprimulgus indicus*  
Puerto Rican, *Caprimulgus noctitherus*  
NODDY, Black, *Anous minutus*  
Blue-gray, *Procelsterna cerulea*  
Brown, *Anous stolidus*  
NUKUPUU, *Hemignathus lucidus*  
NUTCRACKER, Clark's, *Nucifraga columbiana*  
NUTHATCH, Brown-headed, *Sitta pusilla*  
Pygmy, *Sitta pygmaea*  
Red-breasted, *Sitta canadensis*  
White-breasted, *Sitta carolinensis*  
OLOMAO, *Myadestes lanaiensis*  
OMAO, *Myadestes obscurus*  
ORIOLE, Altamira, *Icterus gularis*  
Audubon's, *Icterus graduacauda*  
Baltimore, *Icterus galbula*  
Black-vented, *Icterus wagleri*  
Bullock's, *Icterus bullockii*  
Hooded, *Icterus cucullatus*  
Orchard, *Icterus spurius*  
Puerto Rican, *Icterus portoricensis*  
Scott's, *Icterus parisorum*  
Streak-backed, *Icterus pustulatus*  
OSPREY, *Pandion haliaetus*  
OU, *Psittirostra psittacea*  
OVENBIRD, *Seiurus aurocapilla*  
OWL, Barn, *Tyto alba*  
Barred, *Strix varia*  
Boreal, *Aegolius funereus*  
Burrowing, *Athene cucularia*  
Elf, *Micrathene whitneyi*  
Flammulated, *Otus flammeolus*  
Great Gray, *Strix nebulosa*  
Great Horned, *Bubo virginianus*  
Long-eared, *Asio otus*  
Mottled, *Ciccaba virgata*  
Northern Hawk, *Surnia ulula*  
Northern Saw-whet, *Aegolius acadicus*  
Short-eared, *Asio flammeus*  
Snowy, *Bubo scandiacus*  
Spotted, *Strix occidentalis*  
Stygian, *Asio stygius*  
OYSTERCATCHER, American, *Haematopus palliatus*  
Black, *Haematopus bachmani*  
Eurasian, *Haematopus ostralegus*  
PALILA, *Loxioides bailleui*  
PALM-SWIFT, Antillean, *Tachornis phoenicobia*  
PARROTBILL, Maui, *Pseudonestor xanthophrys*  
PARULA, Northern, *Parula americana*  
Tropical, *Parula pitiayumi*  
PAURAUQUE, Common, *Nyctidromus albigollis*  
PELICAN, American White, *Pelecanus erythrorhynchos*  
Brown, *Pelecanus occidentalis*  
PETREL, Bermuda, *Pterodroma cahow*  
Black-capped, *Pterodroma hasitata*  
Black-winged, *Pterodroma nigripennis*  
Bonin, *Pterodroma hypoleuca*  
Bulwer's, *Bulweria bulwerii*  
Cook's, *Pterodroma cookii*  
Gould's, *Pterodroma leucoptera*  
Great-winged, *Pterodroma macroptera*  
Hawaiian, *Pterodroma sandwichensis*  
Herald, *Pterodroma arminjoniana*  
Jouanin's, *Bulweria fallax*  
Juan Fernandez, *Pterodroma externa*  
Kermadec, *Pterodroma neglecta*  
Mottled, *Pterodroma inexpectata*  
Murphy's, *Pterodroma ultima*  
Parkinson's, *Procellaria parkinsoni*  
Phoenix, *Pterodroma alba*  
Stejneger's, *Pterodroma longirostris*  
Tahiti, *Pterodroma rostrata*  
White-necked, *Pterodroma cervicalis*  
PEWEE, Cuban, *Contopus caribaeus*  
Greater, *Contopus pertinax*  
Hispaniolan, *Contopus hispaniolensis*  
Lesser Antillean, *Contopus latirostris*  
PHAINOPEPLA, *Phainopepla nitens*  
PHALAROPE, Red, *Phalaropus fulicarius*  
Red-necked, *Phalaropus lobatus*  
Wilson's, *Phalaropus tricolor*  
PHOEBE, Black, *Sayornis nigricans*  
Eastern, *Sayornis phoebe*  
Say's, *Sayornis saya*  
PIGEON, Band-tailed, *Patagioenas fasciata*  
Plain, *Patagioenas inornata*  
Red-billed, *Patagioenas flavirostris*  
Scaly-naped, *Patagioenas squamosa*  
White-crowned, *Patagioenas leucocephala*  
PINTAIL, Northern, *Anas acuta*  
White-cheeked, *Anas bahamensis*  
PIPIT, American, *Anthus rubescens*  
Olive-backed, *Anthus hodgsoni*  
Pechora, *Anthus gustavi*

- Red-throated, *Anthus cervinus*  
Sprague's, *Anthus spragueii*  
Tree, *Anthus trivialis*
- PLOVER, Black-bellied, *Pluvialis squatarola*  
Collared, *Charadrius collaris*  
Common Ringed, *Charadrius hiaticula*  
Little Ringed, *Charadrius dubius*  
Mountain, *Charadrius montanus*  
Piping, *Charadrius melodus*  
Semipalmated, *Charadrius semipalmatus*  
Snowy, *Charadrius alexandrinus*  
Wilson's, *Charadrius wilsonia*
- POCHARD, Baer's, *Aythya baeri*  
Common, *Aythya ferina*
- POND-HERON, Chinese, *Ardeola bacchus*
- POORWILL, Common, *Phalaenoptilus nuttallii*
- POO-ULI, *Melanprosops phaeosoma*
- PUAIOHI, *Myadestes palmeri*
- PUFFIN, Atlantic, *Fratercula arctica*  
Horned, *Fratercula corniculata*  
Tufted, *Fratercula cirrhata*
- PYGMY-OWL, Ferruginous, *Glaucidium brasilianum*  
Northern, *Glaucidium gnoma*
- PYRRHULOXIA, *Cardinalis sinuatus*
- QUAIL-DOVE, Bridled, *Geotrygon mystacea*  
Key West, *Geotrygon chrysis*  
Ruddy, *Geotrygon montana*
- QUETZEL, Eared, *Euptilotis neoxenus*
- RAIL, Black, *Laterallus jamaicensis*  
Buff-banded, *Gallirallus philippensis*  
Clapper, *Rallus longirostris*  
Guam, *Gallirallus owstoni*  
King, *Rallus elegans*  
Spotted, *Pardirallus maculatus*  
Virginia, *Rallus limicola*  
Yellow, *Coturnicops noveboracensis*
- RAVEN, Chihuahuan, *Corvus cryptoleucus*  
Common, *Corvus corax*
- RAZORBILL, *Alca torda*
- REDHEAD, *Aythya americana*
- REDPOLL, Common, *Acanthis flammea*  
Hoary, *Acanthis hornemanni*
- REDSHANK, Spotted, *Tringa erythropus*
- REDSTART, American, *Setophaga ruticilla*  
Painted, *Myioborus pictus*  
Slate-throated, *Myioborus miniatus*
- REED-WARBLER, Nightingale, *Acrocephalus luscini*
- REEF-EGRET, Pacific, *Egretta sacra*
- REEF-HERON, Western, *Egretta gularis*
- ROADRUNNER, Greater, *Geococcyx californianus*
- ROBIN, American, *Turdus migratorius*  
Rufous-backed, *Turdus rufopalliatus*  
Rufous-tailed, *Luscinia sibilans*  
Siberian Blue, *Luscinia cyane*
- ROCK-THRUSH, Blue, *Monticola solitarius*
- ROSEFINCH, Common, *Carpodacus erythrinus*
- ROS-Y-FINCH, Black, *Leucosticte atrata*  
Brown-capped, *Leucosticte australis*  
Gray-crowned, *Leucosticte tephrocotis*
- RUBYTHROAT, Siberian, *Luscinia calliope*
- RUFF, *Philomachus pugnax*
- SANDERLING, *Calidris alba*
- SANDPIPER, Baird's, *Calidris bairdii*  
Broad-billed, *Limicola falcinellus*  
Buff-breasted, *Tryngites subruficollis*  
Common, *Actitis hypoleucos*  
Curlew, *Calidris ferruginea*  
Green, *Tringa ochropus*  
Least, *Calidris minutilla*  
Marsh, *Tringa stagnatilis*  
Pectoral, *Calidris melanotos*  
Purple, *Calidris maritima*  
Rock, *Calidris ptilocnemis*  
Semipalmated, *Calidris pusilla*  
Sharp-tailed, *Calidris acuminata*  
Solitary, *Tringa solitaria*  
Spoon-billed, *Eurynorhynchus pygmeus*  
Spotted, *Actitis macularius*  
Stilt, *Calidris himantopus*  
Terek, *Xenus cinereus*  
Upland, *Bartramia longicauda*  
Western, *Calidris mauri*  
White-rumped, *Calidris fuscicollis*  
Wood, *Tringa glareola*
- SAND-PLOVER, Greater, *Charadrius leschenaultii*  
Lesser, *Charadrius mongolus*
- SAPSUCKER, Red-breasted, *Sphyrapicus ruber*  
Red-naped, *Sphyrapicus nuchalis*  
Williamson's, *Sphyrapicus thyroideus*  
Yellow-bellied, *Sphyrapicus varius*
- SCAUP, Greater, *Aythya marila*  
Lesser, *Aythya affinis*
- SCOPS-OWL, Oriental, *Otus sunia*
- SCOTER, Black, *Melanitta americana*  
Surf, *Melanitta perspicillata*  
White-winged, *Melanitta fusca*
- SCREECH-OWL, Eastern, *Megascops asio*  
Puerto Rican, *Megascops nudipes*  
Western, *Megascops kennicottii*  
Whiskered, *Megascops trichopsis*
- SCRUB-JAY, Florida, *Aphelocoma coerulescens*  
Island, *Aphelocoma insularis*  
Western, *Aphelocoma californica*
- SEA-EAGLE, Steller's, *Haliaeetus pelagicus*
- SEEDEATER, White-collared, *Sporophila torqueola*
- SHEARWATER, Audubon's, *Puffinus lherminieri*  
Black-vented, *Puffinus opisthomelas*  
Buller's, *Puffinus bulleri*  
Cape Verde, *Calonectris edwardsii*  
Christmas, *Puffinus nativitatis*  
Cory's, *Calonectris diomedea*  
Flesh-footed, *Puffinus carneipes*  
Great, *Puffinus gravis*  
Little, *Puffinus assimilis*  
Manx, *Puffinus puffinus*  
Pink-footed, *Puffinus creatopus*
- Short-tailed, *Puffinus tenuirostris*  
Sooty, *Puffinus griseus*  
Streaked, *Calonectris leucomelas*  
Townsend's, *Puffinus auricularis*  
Wedge-tailed, *Puffinus pacificus*
- SHOVELER, Northern, *Anas clypeata*
- SHRIKE, Brown, *Lanius cristatus*  
Loggerhead, *Lanius ludovicianus*  
Northern, *Lanius excubitor*
- SILKY-FLYCATCHER, Gray, *Ptilogonys cinereus*
- SISKIN, Eurasian, *Spinus spinus*  
Pine, *Spinus pinus*
- SKIMMER, Black, *Rynchops niger*
- SKUA, Great, *Stercorarius skua*  
South Polar, *Stercorarius maccormicki*
- SMEW, *Mergellus albellus*
- SNIPE, Common, *Gallinago gallinago*  
Jack, *Lymnocyptes minimus*  
Pin-tailed, *Gallinago stenura*  
Swinhoe's, *Gallinago megala*  
Wilson's, *Gallinago delicata*
- SOLITAIRE, Townsend's, *Myadestes townsendi*
- SORA, *Porzana carolina*
- SPARROW, American Tree, *Spizella arborea*  
Bachman's, *Peucaea aestivalis*  
Baird's, *Ammodramus bairdii*  
Black-chinned, *Spizella atrogularis*  
Black-throated, *Amphispiza bilineata*  
Botteri's, *Peucaea botterii*  
Brewer's, *Spizella breweri*  
Cassin's, *Peucaea cassinii*  
Chipping, *Spizella passerina*  
Clay-colored, *Spizella pallida*  
Field, *Spizella pusilla*  
Five-striped, *Amphispiza quinquestrata*  
Fox, *Passerella iliaca*  
Golden-crowned, *Zonotrichia atricapilla*  
Grasshopper, *Ammodramus savannarum*  
Harris's, *Zonotrichia querula*  
Henslow's, *Ammodramus henslowii*  
Lark, *Chondestes grammacus*  
Le Conte's, *Ammodramus leconteii*  
Lincoln's, *Melospiza lincolni*  
Nelson's, *Ammodramus nelsoni*  
Olive, *Arremonops rufivirgatus*  
Rufous-crowned, *Aimophila ruficeps*  
Rufous-winged, *Peucaea carpalis*  
Sage, *Amphispiza belli*  
Saltmarsh, *Ammodramus caudacutus*  
Savannah, *Passerculus sandwichensis*  
Seaside, *Ammodramus maritimus*  
Song, *Melospiza melodia*  
Swamp, *Melospiza georgiana*  
Vesper, *Poocetes gramineus*  
White-crowned, *Zonotrichia leucophrys*  
White-throated, *Zonotrichia albicollis*  
Worthen's, *Spizella wortheni*
- SPARROWHAWK, Japanese, *Accipiter gularis*
- SPINDALIS, Puerto Rican, *Spindalis portoricensis*

- Western, *Spindalis zena*  
SPOONBILL, Roseate, *Platalea ajaja*  
STARLING, Chestnut-cheeked, *Sturnus philippensis*  
White-cheeked, *Sturnus cineraceus*  
STARTRHROAT, Plain-capped, *Heliomaster constantii*  
STILT, Black-necked, *Himantopus mexicanus*  
Black-winged, *Himantopus himantopus*  
STINT, Little, *Calidris minuta*  
Long-toed, *Calidris subminuta*  
Red-necked, *Calidris ruficollis*  
Temminck's, *Calidris temminckii*  
STONECHAT, *Saxicola torquatus*  
STORK, Wood, *Mycteria americana*  
STORM-PETREL, Ashy, *Oceanodroma homochroa*  
Band-rumped, *Oceanodroma castro*  
Black, *Oceanodroma melania*  
Black-bellied, *Fregetta tropica*  
Fork-tailed, *Oceanodroma furcata*  
Leach's, *Oceanodroma leucorhoa*  
Least, *Oceanodroma microsoma*  
Matsudaira's, *Oceanodroma matsudairae*  
Polynesian, *Nesofregetta fuliginosa*  
Ringed, *Oceanodroma hornbyi*  
Swinhoe's, *Oceanodroma monorhis*  
Tristram's, *Oceanodroma tristrami*  
Wedge-rumped, *Oceanodroma tethys*  
White-faced, *Pelagodroma marina*  
White-bellied, *Fregetta grallaria*  
Wilson's, *Oceanites oceanicus*  
SURFBIRD, *Aphriza virgata*  
SWALLOW, Bahama, *Tachycineta cyaneoviridis*  
Bank, *Riparia riparia*  
Barn, *Hirundo rustica*  
Cave, *Petrochelidon fulva*  
Cliff, *Petrochelidon pyrrhonota*  
Mangrove, *Tachycineta albilinea*  
Northern Rough-winged, *Stelgidopteryx serripennis*  
Tree, *Tachycineta bicolor*  
Violet-green, *Tachycineta thalassina*  
SWAMPHEN, Purple, *Porphyrio porphyrio*  
SWAN, Trumpeter, *Cygnus buccinator*  
Tundra, *Cygnus columbianus*  
Whooper, *Cygnus cygnus*  
SWIFT, Alpine, *Apus melba*  
Black, *Cypseloides niger*  
Chimney, *Chaetura pelagica*  
Common, *Apus apus*  
Fork-tailed, *Apus pacificus*  
Short-tailed, *Chaetura brachyura*  
Vaux's, *Chaetura vauxi*  
White-collared, *Streptoprocne zonaris*  
White-throated, *Aeronautes saxatalis*  
SWIFTLET, Mariana, *Aerodramus bartschi*  
White-rumped, *Aerodramus spodiopygius*  
TANAGER, Flame-colored, *Piranga bidentata*  
Hepatic, *Piranga flava*  
Puerto Rican, *Nesospingus speculiferus*  
Scarlet, *Piranga olivacea*  
Summer, *Piranga rubra*  
Western, *Piranga ludoviciana*  
TATTLER, Gray-tailed, *Tringa brevipes*  
Wandering, *Tringa incana*  
TEAL, Baikal, *Anas formosa*  
Blue-winged, *Anas discors*  
Cinnamon, *Anas cyanoptera*  
Green-winged, *Anas crecca*  
TERN, Aleutian, *Onychoprion aleuticus*  
Arctic, *Sterna paradisaea*  
Black, *Chlidonias niger*  
Black-naped, *Sterna sumatrana*  
Bridled, *Onychoprion anaethetus*  
Caspian, *Hydroprogne caspia*  
Common, *Sterna hirundo*  
Elegant, *Thalasseus elegans*  
Forster's, *Sterna forsteri*  
Gray-backed, *Onychoprion lunatus*  
Great Crested, *Thalasseus bergii*  
Gull-billed, *Gelochelidon nilotica*  
Large-billed, *Phaetusa simplex*  
Least, *Sternula antillarum*  
Little, *Sternula albifrons*  
Roseate, *Sterna dougallii*  
Royal, *Thalasseus maximus*  
Sandwich, *Thalasseus sandvicensis*  
Sooty, *Onychoprion fuscatus*  
Whiskered, *Chlidonias hybrida*  
White, *Gygis alba*  
White-winged, *Chlidonias leucopterus*  
THRASHER, Bendire's, *Toxostoma bendirei*  
Brown, *Toxostoma rufum*  
California, *Toxostoma redivivum*  
Crissal, *Toxostoma crissale*  
Curve-billed, *Toxostoma curvirostre*  
Le Conte's, *Toxostoma lecontei*  
Long-billed, *Toxostoma longirostre*  
Pearly-eyed, *Margarops fuscatus*  
Sage, *Oreoscoptes montanus*  
THRUSH, Aztec, *Ridgwayia pinicola*  
Bicknell's, *Catharus bicknelli*  
Clay-colored, *Turdus grayi*  
Dusky, *Turdus naumanni*  
Eyebrowed, *Turdus obscurus*  
Gray-cheeked, *Catharus minimus*  
Hermit, *Catharus guttatus*  
Red-legged, *Turdus plumbeus*  
Swainson's, *Catharus ustulatus*  
Varied, *Ixoreus naevius*  
White-throated, *Turdus assimilis*  
Wood, *Hylocichla mustelina*  
TITMOUSE, Black-crested, *Baeolophus atricristatus*  
Bridled, *Baeolophus wollweberi*  
Juniper, *Baeolophus ridgwayi*  
Oak, *Baeolophus inornatus*  
Tufted, *Baeolophus bicolor*  
TITYRA, Masked, *Tityra semifasciata*  
TOWHEE, Abert's, *Melospiza aberti*  
California, *Melospiza crissalis*  
Canyon, *Melospiza fusca*  
Eastern, *Pipilo erythrophthalmus*  
Green-tailed, *Pipilo chlorurus*  
Spotted, *Pipilo maculatus*  
TROGON, Elegant, *Trogon elegans*  
TROPICBIRD, Red-billed, *Phaethon aethereus*  
Red-tailed, *Phaethon rubricauda*  
White-tailed, *Phaethon lepturus*  
TURNSTONE, Black, *Arenaria melanocephala*  
Ruddy, *Arenaria interpres*  
TURTLE-DOVE, Oriental, *Streptopelia orientalis*  
VEERY, *Catharus fuscescens*  
VERDIN, *Auriparus flaviceps*  
VIOLETEAR, Green, *Colibri thalassinus*  
VIREO, Bell's, *Vireo bellii*  
Black-capped, *Vireo atricapilla*  
Black-whiskered, *Vireo altiloquus*  
Blue-headed, *Vireo solitarius*  
Cassin's, *Vireo cassinii*  
Gray, *Vireo vicinior*  
Hutton's, *Vireo huttoni*  
Philadelphia, *Vireo philadelphicus*  
Plumbeous, *Vireo plumbeus*  
Puerto Rican, *Vireo latimeri*  
Red-eyed, *Vireo olivaceus*  
Thick-billed, *Vireo crassirostris*  
Warbling, *Vireo gilvus*  
White-eyed, *Vireo griseus*  
Yellow-green, *Vireo flavoviridis*  
Yellow-throated, *Vireo flavifrons*  
Yucatan, *Vireo magister*  
VULTURE, Black, *Coragyps atratus*  
Turkey, *Cathartes aura*  
WAGTAIL, Citrine, *Motacilla citreola*  
Eastern Yellow, *Motacilla tschutschensis*  
Gray, *Motacilla cinerea*  
White, *Motacilla alba*  
WARBLER, Adelaide's, *Dendroica adelaidae*  
Arctic, *Phylloscopus borealis*  
Bachman's, *Vermivora bachmanii*  
Bay-breasted, *Dendroica castanea*  
Black-and-white, *Mniotilta varia*  
Black-throated Blue, *Dendroica caerulescens*  
Black-throated Gray, *Dendroica nigrescens*  
Black-throated Green, *Dendroica virens*  
Blackburnian, *Dendroica fusca*  
Blackpoll, *Dendroica striata*  
Blue-winged, *Vermivora cyanoptera*  
Canada, *Wilsonia canadensis*  
Cape May, *Dendroica tigrina*  
Cerulean, *Dendroica cerulea*  
Chestnut-sided, *Dendroica pennsylvanica*  
Colima, *Oreothlypis crissalis*  
Connecticut, *Oporornis agilis*  
Crescent-chested, *Oreothlypis superciliosa*  
Dusky, *Phylloscopus fuscatus*  
Elfin-woods, *Dendroica angelae*  
Fan-tailed, *Euthlypis lachrymosa*  
Golden-cheeked, *Dendroica chrysoparia*  
Golden-crowned, *Basileuterus culicivorus*  
Golden-winged, *Vermivora chrysoptera*

- Grace's, *Dendroica graciae*  
 Hermit, *Dendroica occidentalis*  
 Hooded, *Wilsonia citrina*  
 Kentucky, *Oporornis formosus*  
 Kirtland's, *Dendroica kirtlandii*  
 Lanceolated, *Locustella lanceolata*  
 Lucy's, *Oreothlypis luciae*  
 MacGillivray's, *Oporornis tolmiei*  
 Magnolia, *Dendroica magnolia*  
 Mourning, *Oporornis philadelphia*  
 Nashville, *Oreothlypis ruficapilla*  
 Olive, *Peucedramus taeniatus*  
 Orange-crowned, *Oreothlypis celata*  
 Palm, *Dendroica palmarum*  
 Pine, *Dendroica pinus*  
 Prairie, *Dendroica discolor*  
 Prothonotary, *Protonotaria citrea*  
 Red-faced, *Cardellina rubrifrons*  
 Rufous-capped, *Basileuterus rufifrons*  
 Sedge, *Acrocephalus schoenobaenus*  
 Swainson's, *Limnithlypis swainsonii*  
 Tennessee, *Oreothlypis peregrina*  
 Townsend's, *Dendroica townsendi*  
 Virginia's, *Oreothlypis virginiae*  
 Willow, *Phylloscopus trochilus*  
 Wilson's, *Wilsonia pusilla*  
 Wood, *Phylloscopus sibilatrix*  
 Worm-eating, *Helmitheros vermivorum*  
 Yellow, *Dendroica petechia*  
 Yellow-browed, *Phylloscopus inornatus*  
 Yellow-rumped, *Dendroica coronata*  
 Yellow-throated, *Dendroica dominica*  
 WATERTHRUSH, Louisiana, *Parkesia motacilla*  
 Northern, *Parkesia noveboracensis*  
 WAXWING, Bohemian, *Bombycilla garrulus*  
 Cedar, *Bombycilla cedrorum*  
 WHEATEAR, Northern, *Oenanthe oenanthe*  
 WHIMBREL, *Numenius phaeopus*  
 WHIP-POOR-WILL, Eastern, *Caprimulgus vociferus*  
 Mexican, *Caprimulgus arizonae*  
 WHISTLING-DUCK, Black-bellied, *Dendrocygna autumnalis*  
 Fulvous, *Dendrocygna bicolor*  
 West Indian, *Dendrocygna arborea*  
 WHITETHROAT, Lesser, *Sylvia curruca*  
 WIGEON, American, *Anas americana*  
 Eurasian, *Anas penelope*  
 WILLET, *Tringa semipalmata*  
 WOOD-PEWEE, Eastern, *Contopus virens*  
 Western, *Contopus sordidulus*  
 WOODCOCK, American, *Scolopax minor*  
 Eurasian, *Scolopax rusticola*  
 WOODPECKER, Acorn, *Melanerpes formicivorus*  
 American Three-toed, *Picoides dorsalis*  
 Arizona, *Picoides arizonae*  
 Black-backed, *Picoides arcticus*  
 Downy, *Picoides pubescens*  
 Gila, *Melanerpes uropygialis*  
 Golden-fronted, *Melanerpes aurifrons*  
 Great Spotted, *Dendrocopos major*  
 Hairy, *Picoides villosus*  
 Ivory-billed, *Campephilus principalis*  
 Ladder-backed, *Picoides scalaris*  
 Lewis's, *Melanerpes lewis*  
 Nuttall's, *Picoides nuttallii*  
 Pileated, *Dryocopus pileatus*  
 Puerto Rican, *Melanerpes portoricensis*  
 Red-bellied, *Melanerpes carolinus*  
 Red-cockaded, *Picoides borealis*  
 Red-headed, *Melanerpes erythrocephalus*  
 White-headed, *Picoides albolarvatus*  
 WOODSTAR, Bahama, *Calliphlox evelynae*  
 WREN, Bewick's *Thryomanes bewickii*  
 Cactus, *Campylorhynchus brunneicapillus*  
 Canyon, *Catherpes mexicanus*  
 Carolina, *Thryothorus ludovicianus*  
 House, *Troglodytes aedon*  
 Marsh, *Cistothorus palustris*  
 Pacific, *Troglodytes pacificus*  
 Rock, *Salpinctes obsoletus*  
 Sedge, *Cistothorus platensis*  
 Sinaloa, *Thryothorus sinaloa*  
 Winter, *Troglodytes hiemalis*  
 WRENTIT, *Chamaea fasciata*  
 WRYNECK, Eurasian, *Jynx torquilla*  
 YELLOWLEGS, Greater, *Tringa melanoleuca*  
 Lesser, *Tringa flavipes*  
 YELLOWTHROAT, Common, *Geothlypis trichas*  
 Gray-crowned, *Geothlypis poliocephala*  
 (2) *Taxonomic listing.* Species are listed in phylogenetic sequence by scientific name, with the common (English) name following the scientific name. To help clarify species relationships, we also list the higher-level taxonomic categories of Order, Family, and Subfamily.  
 Order ANSERIFORMES  
 Family ANATIDAE  
 Subfamily DENDROCYGNINAE  
*Dendrocygna autumnalis*, Black-bellied Whistling-Duck  
*Dendrocygna arborea*, West Indian Whistling-Duck  
*Dendrocygna bicolor*, Fulvous Whistling-Duck  
 Subfamily ANSERINAE  
*Anser fabalis*, Taiga Bean-Goose  
*Anser serrirostris*, Tundra Bean-Goose  
*Anser albifrons*, Greater White-fronted Goose  
*Anser erythropus*, Lesser White-fronted Goose  
*Chen canagica*, Emperor Goose  
*Chen caerulescens*, Snow Goose  
*Chen rossii*, Ross's Goose  
*Branta bernicla*, Brant  
*Branta leucopsis*, Barnacle Goose  
*Branta canadensis*, Canada Goose (including *Branta hutchinsii*, Cackling Goose)  
*Branta sandvicensis*, Hawaiian Goose  
*Cygnus buccinator*, Trumpeter Swan  
*Cygnus columbianus*, Tundra Swan  
*Cygnus cygnus*, Whooper Swan  
 Subfamily ANATINAE  
*Cairina moschata*, Muscovy Duck  
*Aix sponsa*, Wood Duck  
*Anas strepera*, Gadwall  
*Anas falcata*, Falcated Duck  
*Anas penelope*, Eurasian Wigeon  
*Anas americana*, American Wigeon  
*Anas rubripes*, American Black Duck  
*Anas platyrhynchos*, Mallard  
*Anas fulvigula*, Mottled Duck  
*Anas wyvilliana*, Hawaiian Duck  
*Anas laysanensis*, Laysan Duck  
*Anas zonorhyncha*, Eastern Spot-billed Duck  
*Anas superciliosa*, Pacific Black Duck  
*Anas discors*, Blue-winged Teal  
*Anas cyanoptera*, Cinnamon Teal  
*Anas clypeata*, Northern Shoveler  
*Anas bahamensis*, White-cheeked Pintail  
*Anas acuta*, Northern Pintail  
*Anas querquedula*, Garganey  
*Anas formosa*, Baikal Teal  
*Anas crecca*, Green-winged Teal  
*Aythya valisineria*, Canvasback  
*Aythya americana*, Redhead  
*Aythya ferina*, Common Pochard  
*Aythya baeri*, Baer's Pochard  
*Aythya collaris*, Ring-necked Duck  
*Aythya fuligula*, Tufted Duck  
*Aythya marila*, Greater Scaup  
*Aythya affinis*, Lesser Scaup  
*Polysticta stelleri*, Steller's Eider  
*Somateria fischeri*, Spectacled Eider  
*Somateria spectabilis*, King Eider  
*Somateria mollissima*, Common Eider  
*Histrionicus histrionicus*, Harlequin Duck  
*Melanitta perspicillata*, Surf Scoter  
*Melanitta fusca*, White-winged Scoter  
*Melanitta americana*, Black Scoter  
*Clangula hyemalis*, Long-tailed Duck  
*Bucephala albeola*, Bufflehead  
*Bucephala clangula*, Common Goldeneye  
*Bucephala islandica*, Barrow's Goldeneye  
*Mergellus albellus*, Smew  
*Lophodytes cucullatus*, Hooded Merganser  
*Mergus merganser*, Common Merganser  
*Mergus serrator*, Red-breasted Merganser  
*Nomonyx dominicus*, Masked Duck  
*Oxyura jamaicensis*, Ruddy Duck  
 Order GAVIIFORMES  
 Family GAVIIDAE  
*Gavia stellata*, Red-throated Loon  
*Gavia arctica*, Arctic Loon  
*Gavia pacifica*, Pacific Loon  
*Gavia immer*, Common Loon  
*Gavia adamsii*, Yellow-billed Loon  
 Order PODICIPEDIFORMES  
 Family PODICIPEDIDAE

<i>Tachybaptus dominicus</i> , Least Grebe	Shearwater	<i>Fregata minor</i> , Great Frigatebird
<i>Podilymbus podiceps</i> , Pied-billed Grebe	<i>Puffinus carneipes</i> , Flesh-footed Shearwater	<i>Fregata ariel</i> , Lesser Frigatebird
<i>Podiceps auritus</i> , Horned Grebe	<i>Puffinus gravis</i> , Great Shearwater	Family SULIDAE
<i>Podiceps grisegena</i> , Red-necked Grebe	<i>Puffinus pacificus</i> , Wedge-tailed Shearwater	<i>Sula dactylatra</i> , Masked Booby
<i>Podiceps nigricollis</i> , Eared Grebe	<i>Puffinus bulleri</i> , Buller's Shearwater	<i>Sula nebouxii</i> , Blue-footed Booby
<i>Aechmophorus occidentalis</i> , Western Grebe	<i>Puffinus griseus</i> , Sooty Shearwater	<i>Sula leucogaster</i> , Brown Booby
<i>Aechmophorus clarkii</i> , Clark's Grebe	<i>Puffinus tenuirostris</i> , Short-tailed Shearwater	<i>Sula sula</i> , Red-footed Booby
Order PHOENICOPTERIFORMES	<i>Puffinus nativitatis</i> , Christmas Shearwater	<i>Morus bassanus</i> , Northern Gannet
Family PHOENICOPTERIDAE	<i>Puffinus puffinus</i> , Manx Shearwater	Family PHALACROCORACIDAE
<i>Phoenicopterus ruber</i> , American Flamingo	<i>Puffinus auricularis</i> , Townsend's Shearwater	<i>Phalacrocorax penicillatus</i> , Brandt's Cormorant
Order PROCELLARIIFORMES	<i>Puffinus opisthomelas</i> , Black-vented Shearwater	<i>Phalacrocorax brasilianus</i> , Neotropic Cormorant
Family DIOMEDEIDAE	<i>Puffinus lherminieri</i> , Audubon's Shearwater	<i>Phalacrocorax auritus</i> , Double-crested Cormorant
<i>Thalassarche chlororhynchos</i> , Yellow-nosed Albatross	<i>Puffinus assimilis</i> , Little Shearwater	<i>Phalacrocorax carbo</i> , Great Cormorant
<i>Thalassarche cauta</i> , Shy Albatross	Family HYDROBATIDAE	<i>Phalacrocorax urile</i> , Red-faced Cormorant
<i>Thalassarche melanophris</i> , Black-browed Albatross	<i>Oceanites oceanicus</i> , Wilson's Storm-Petrel	<i>Phalacrocorax pelagicus</i> , Pelagic Cormorant
<i>Phoebastria palpebrata</i> , Light-mantled Albatross	<i>Pelagodroma marina</i> , White-faced Storm-Petrel	<i>Phalacrocorax melanoleucos</i> , Little Pied Cormorant
<i>Diomedea exulans</i> , Wandering Albatross	<i>Fregetta tropica</i> , Black-bellied Storm-Petrel	Family ANHINGIDAE
<i>Phoebastria immutabilis</i> , Laysan Albatross	<i>Fregetta grallaria</i> , White-bellied Storm-Petrel	<i>Anhinga anhinga</i> , Anhinga
<i>Phoebastria nigripes</i> , Black-footed Albatross	<i>Nesofregetta fuliginosa</i> , Polynesian Storm-Petrel	Order PELECANIFORMES
<i>Phoebastria albatrus</i> , Short-tailed Albatross	<i>Oceanodroma furcata</i> , Fork-tailed Storm-Petrel	Family PELECANIDAE
Family PROCELLARIIDAE	<i>Oceanodroma hornbyi</i> , Ringed Storm-Petrel	<i>Pelecanus erythrorhynchos</i> , American White Pelican
<i>Fulmarus glacialis</i> , Northern Fulmar	<i>Oceanodroma monorhis</i> , Swinhoe's Storm-Petrel	<i>Pelecanus occidentalis</i> , Brown Pelican
<i>Pterodroma macroptera</i> , Great-winged Petrel	<i>Oceanodroma leucorhoa</i> , Leach's Storm-Petrel	Family ARDEIDAE
<i>Pterodroma neglecta</i> , Kermadec Petrel	<i>Oceanodroma homochroa</i> , Ashy Storm-Petrel	<i>Botaurus lentiginosus</i> , American Bittern
<i>Pterodroma arminjoniana</i> , Herald Petrel	<i>Oceanodroma castro</i> , Band-rumped Storm-Petrel	<i>Ixobrychus sinensis</i> , Yellow Bittern
<i>Pterodroma ultima</i> , Murphy's Petrel	<i>Oceanodroma tethys</i> , Wedge-rumped Storm-Petrel	<i>Ixobrychus exilis</i> , Least Bittern
<i>Pterodroma inexpectata</i> , Mottled Petrel	<i>Oceanodroma matsudairae</i> , Matsudaira's Storm-Petrel	<i>Ixobrychus eurhythmus</i> , Schrenck's Bittern
<i>Pterodroma cahow</i> , Bermuda Petrel	<i>Oceanodroma melania</i> , Black Storm-Petrel	<i>Ixobrychus flavicollis</i> , Black Bittern
<i>Pterodroma hasitata</i> , Black-capped Petrel	<i>Oceanodroma tristrami</i> , Tristram's Storm-Petrel	<i>Ardea herodias</i> , Great Blue Heron
<i>Pterodroma externa</i> , Juan Fernandez Petrel	<i>Oceanodroma microsoma</i> , Least Storm-Petrel	<i>Ardea cinerea</i> , Gray Heron
<i>Pterodroma sandwichensis</i> , Hawaiian Petrel	Order PHAETHONTIFORMES	<i>Ardea alba</i> , Great Egret
<i>Pterodroma cervicalis</i> , White-necked Petrel	Family PHAETHONTIDAE	<i>Mesophoyx intermedia</i> , Intermediate Egret
<i>Pterodroma hypoleuca</i> , Bonin Petrel	<i>Phaethon lepturus</i> , White-tailed Tropicbird	<i>Egretta eulophotes</i> , Chinese Egret
<i>Pterodroma nigripennis</i> , Black-winged Petrel	<i>Phaethon aethereus</i> , Red-billed Tropicbird	<i>Egretta garzetta</i> , Little Egret
<i>Pterodroma cookii</i> , Cook's Petrel	<i>Phaethon rubricauda</i> , Red-tailed Tropicbird	<i>Egretta sacra</i> , Pacific Reef-Egret
<i>Pterodroma longirostris</i> , Stejneger's Petrel	Order CICONIIFORMES	<i>Egretta gularis</i> , Western Reef-Heron
<i>Pterodroma alba</i> , Phoenix Petrel	Family CICONIIDAE	<i>Egretta thula</i> , Snowy Egret
<i>Pterodroma leucoptera</i> , Gould's Petrel	<i>Jabiru mycteria</i> , Jabiru	<i>Egretta caerulea</i> , Little Blue Heron
<i>Pterodroma rostrata</i> , Tahiti Petrel	<i>Mycteria americana</i> , Wood Stork	<i>Egretta tricolor</i> , Tricolored Heron
<i>Bulweria bulwerii</i> , Bulwer's Petrel	Order SULIFORMES	<i>Egretta rufescens</i> , Reddish Egret
<i>Bulweria fallax</i> , Jouanin's Petrel	Family FREGATIDAE	<i>Bubulcus ibis</i> , Cattle Egret
<i>Procellaria parkinsoni</i> , Parkinson's Petrel	<i>Fregata magnificens</i> , Magnificent Frigatebird	<i>Ardeola bacchus</i> , Chinese Pond-Heron
<i>Calonectris leucomelas</i> , Streaked Shearwater		<i>Butorides virescens</i> , Green Heron
<i>Calonectris diomedea</i> , Cory's Shearwater		<i>Nycticorax nycticorax</i> , Black-crowned Night-Heron
<i>Calonectris edwardsii</i> , Cape Verde Shearwater		<i>Nyctanassa violacea</i> , Yellow-crowned Night-Heron
<i>Puffinus creatopus</i> , Pink-footed		<i>Gorsachius goesagi</i> , Japanese Night-Heron
		<i>Gorsachius melanolophus</i> , Malayan Night-Heron
		Family THRESKIORNITHIDAE
		Subfamily THRESKIORNITHINAE
		<i>Eudocimus albus</i> , White Ibis
		<i>Eudocimus ruber</i> , Scarlet Ibis
		<i>Plegadis falcinellus</i> , Glossy Ibis
		<i>Plegadis chihi</i> , White-faced Ibis

- Subfamily PLATALEINAE  
*Platalea ajaja*, Roseate Spoonbill
- Order ACCIPITRIFORMES  
Family CATHARTIDAE  
*Coragyps atratus*, Black Vulture  
*Cathartes aura*, Turkey Vulture  
*Gymnogyps californianus*, California Condor
- Family PANDIONIDAE  
*Pandion haliaetus*, Osprey
- Family ACCIPITRIDAE  
*Chondrohierax uncinatus*, Hook-billed Kite  
*Elanoides forficatus*, Swallow-tailed Kite  
*Elanus leucurus*, White-tailed Kite  
*Rostrhamus sociabilis*, Snail Kite  
*Ictinia mississippiensis*, Mississippi Kite  
*Milvus migrans*, Black Kite  
*Haliaeetus leucocephalus*, Bald Eagle  
*Haliaeetus albicilla*, White-tailed Eagle  
*Haliaeetus pelagicus*, Steller's Sea-Eagle  
*Circus cyaneus*, Northern Harrier  
*Accipiter soloensis*, Gray Frog-Hawk  
*Accipiter gularis*, Japanese Sparrowhawk  
*Accipiter striatus*, Sharp-shinned Hawk  
*Accipiter cooperii*, Cooper's Hawk  
*Accipiter gentilis*, Northern Goshawk  
*Geranospiza caerulescens*, Crane Hawk  
*Buteogallus anthracinus*, Common Black-Hawk  
*Parabuteo unicinctus*, Harris's Hawk  
*Buteo magnirostris*, Roadside Hawk  
*Buteo lineatus*, Red-shouldered Hawk  
*Buteo platypterus*, Broad-winged Hawk  
*Buteo nitidus*, Gray Hawk  
*Buteo brachyurus*, Short-tailed Hawk  
*Buteo swainsoni*, Swainson's Hawk  
*Buteo albicaudatus*, White-tailed Hawk  
*Buteo albonotatus*, Zone-tailed Hawk  
*Buteo solitarius*, Hawaiian Hawk  
*Buteo jamaicensis*, Red-tailed Hawk  
*Buteo regalis*, Ferruginous Hawk  
*Buteo lagopus*, Rough-legged Hawk  
*Aquila chrysaetos*, Golden Eagle
- Order FALCONIFORMES  
Family FALCONIDAE  
Subfamily MICRASTURINAE  
*Micrastur semitorquatus*, Collared Forest-Falcon
- Subfamily CARACARINAE  
*Caracara cheriway*, Crested Caracara
- Subfamily FALCONINAE  
*Falco tinnunculus*, Eurasian Kestrel  
*Falco sparverius*, American Kestrel  
*Falco vespertinus*, Red-footed Falcon  
*Falco columbarius*, Merlin  
*Falco subbuteo*, Eurasian Hobby  
*Falco femoralis*, Aplomado Falcon  
*Falco rusticolus*, Gyrfalcon  
*Falco peregrinus*, Peregrine Falcon
- Falco mexicanus*, Prairie Falcon
- Order GRUIFORMES  
Family RALLIDAE  
*Coturnicops noveboracensis*, Yellow Rail  
*Laterallus jamaicensis*, Black Rail  
*Gallirallus philippensis*, Buff-banded Rail  
*Gallirallus owstoni*, Guam Rail  
*Crex crex*, Corn Crane  
*Rallus longirostris*, Clapper Rail  
*Rallus elegans*, King Rail  
*Rallus limicola*, Virginia Rail  
*Porzana carolina*, Sora  
*Porzana tabuensis*, Spotless Crane  
*Porzana flaviventer*, Yellow-breasted Crane  
*Neocrex erythrops*, Paint-billed Crane  
*Pardirallus maculatus*, Spotted Rail  
*Porphyrio porphyrio*, Purple Swamphen  
*Porphyrio martinica*, Purple Gallinule  
*Porphyrio flavirostris*, Azure Gallinule  
*Gallinula chloropus*, Common Moorhen  
*Fulica atra*, Eurasian Coot  
*Fulica alai*, Hawaiian Coot  
*Fulica americana*, American Coot  
*Fulica caribaea*, Caribbean Coot
- Family ARAMIDAE  
*Aramus guarana*, Limpkin
- Family GRUIDAE  
*Grus canadensis*, Sandhill Crane  
*Grus grus*, Common Crane  
*Grus americana*, Whooping Crane
- Order CHARADRIIFORMES  
Family CHARADRIIDAE  
Subfamily VANELLINAE  
*Vanellus vanellus*, Northern Lapwing
- Subfamily CHARADRIINAE  
*Pluvialis squatarola*, Black-bellied Plover  
*Pluvialis apricaria*, European Golden-Plover  
*Pluvialis dominica*, American Golden-Plover  
*Pluvialis fulva*, Pacific Golden-Plover  
*Charadrius mongolus*, Lesser Sand-Plover  
*Charadrius leschenaultii*, Greater Sand-Plover  
*Charadrius collaris*, Collared Plover  
*Charadrius alexandrinus*, Snowy Plover  
*Charadrius wilsonia*, Wilson's Plover  
*Charadrius hiaticula*, Common Ringed Plover  
*Charadrius semipalmatus*, Semipalmated Plover  
*Charadrius melodus*, Piping Plover  
*Charadrius dubius*, Little Ringed Plover  
*Charadrius vociferus*, Killdeer  
*Charadrius montanus*, Mountain Plover  
*Charadrius morinellus*, Eurasian Dotterel
- Family HAEMATOPODIDAE  
*Haematopus ostralegus*, Eurasian Oystercatcher  
*Haematopus palliatus*, American Oystercatcher  
*Haematopus bachmani*, Black Oystercatcher
- Family RECURVIROSTRIDAE  
*Himantopus himantopus*, Black-winged Stilt  
*Himantopus mexicanus*, Black-necked Stilt  
*Recurvirostra americana*, American Avocet
- Family JACANIDAE  
*Jacana spinosa*, Northern Jacana
- Family SCOLOPACIDAE  
Subfamily SCOLOPAGINAE  
*Xenus cinereus*, Terek Sandpiper  
*Actitis hypoleucos*, Common Sandpiper  
*Actitis macularius*, Spotted Sandpiper  
*Tringa ochropus*, Green Sandpiper  
*Tringa solitaria*, Solitary Sandpiper  
*Tringa brevipes*, Gray-tailed Tattler  
*Tringa incana*, Wandering Tattler  
*Tringa erythropus*, Spotted Redshank  
*Tringa melanoleuca*, Greater Yellowlegs  
*Tringa nebularia*, Common Greenshank  
*Tringa guttifer*, Nordmann's Greenshank  
*Tringa semipalmata*, Willet  
*Tringa flavipes*, Lesser Yellowlegs  
*Tringa stagnatilis*, Marsh Sandpiper  
*Tringa glareola*, Wood Sandpiper  
*Bartramia longicauda*, Upland Sandpiper  
*Numenius minutus*, Little Curlew  
*Numenius borealis*, Eskimo Curlew  
*Numenius phaeopus*, Whimbrel  
*Numenius tahitiensis*, Bristle-thighed Curlew  
*Numenius madagascariensis*, Far Eastern Curlew  
*Numenius arquata*, Eurasian Curlew  
*Numenius americanus*, Long-billed Curlew  
*Limosa limosa*, Black-tailed Godwit  
*Limosa haemastica*, Hudsonian Godwit  
*Limosa lapponica*, Bar-tailed Godwit  
*Limosa fedoa*, Marbled Godwit  
*Arenaria interpres*, Ruddy Turnstone  
*Arenaria melanocephala*, Black Turnstone  
*Aphriza virgata*, Surfbird  
*Calidris tenuirostris*, Great Knot  
*Calidris canutus*, Red Knot  
*Calidris alba*, Sanderling  
*Calidris pusilla*, Semipalmated Sandpiper  
*Calidris mauri*, Western Sandpiper  
*Calidris ruficollis*, Red-necked Stint  
*Calidris minuta*, Little Stint  
*Calidris temminckii*, Temminck's Stint  
*Calidris subminuta*, Long-toed Stint  
*Calidris minutilla*, Least Sandpiper  
*Calidris fuscicollis*, White-rumped

Sandpiper	<i>Larus fuscus</i> , Lesser Black-backed Gull	Murrelet
<i>Calidris bairdii</i> , Baird's Sandpiper	<i>Larus schistisagus</i> , Slaty-backed Gull	<i>Synthliboramphus antiquus</i> , Ancient Murrelet
<i>Calidris melanotos</i> , Pectoral Sandpiper	<i>Larus glaucescens</i> , Glaucous-winged Gull	<i>Ptychoramphus aleuticus</i> , Cassin's Auklet
<i>Calidris acuminata</i> , Sharp-tailed Sandpiper	<i>Larus hyperboreus</i> , Glaucous Gull	<i>Aethia psittacula</i> , Parakeet Auklet
<i>Calidris maritima</i> , Purple Sandpiper	<i>Larus marinus</i> , Great Black-backed Gull	<i>Aethia pusilla</i> , Least Auklet
<i>Calidris ptilocnemis</i> , Rock Sandpiper	<i>Larus dominicanus</i> , Kelp Gull	<i>Aethia pygmaea</i> , Whiskered Auklet
<i>Calidris alpina</i> , Dunlin	Subfamily STERNINAE	<i>Aethia cristatella</i> , Crested Auklet
<i>Calidris ferruginea</i> , Curlew Sandpiper	<i>Anous stolidus</i> , Brown Noddy	<i>Cerorhinca monocerata</i> , Rhinoceros Auklet
<i>Calidris himantopus</i> , Stilt Sandpiper	<i>Anous minutus</i> , Black Noddy	<i>Fratercula arctica</i> , Atlantic Puffin
<i>Eurynorhynchus pygmeus</i> , Spoon-billed Sandpiper	<i>Procelsterna cerulea</i> , Blue-gray Noddy	<i>Fratercula corniculata</i> , Horned Puffin
<i>Limicola falcinellus</i> , Broad-billed Sandpiper	<i>Gygis alba</i> , White Tern	<i>Fratercula cirrhata</i> , Tufted Puffin
<i>Tryngites subruficollis</i> , Buff-breasted Sandpiper	<i>Onychoprion fuscatus</i> , Sooty Tern	Order COLUMBIFORMES
<i>Philomachus pugnax</i> , Ruff	<i>Onychoprion lunatus</i> , Gray-backed Tern	Family COLUMBIDAE
<i>Limnodromus griseus</i> , Short-billed Dowitcher	<i>Onychoprion anaethetus</i> , Bridled Tern	<i>Patagioenas squamosa</i> , Scaly-naped Pigeon
<i>Limnodromus scolopaceus</i> , Long-billed Dowitcher	<i>Onychoprion aleuticus</i> , Aleutian Tern	<i>Patagioenas leucocephala</i> , White-crowned Pigeon
<i>Lymnocyptes minimus</i> , Jack Snipe	<i>Sternula albifrons</i> , Little Tern	<i>Patagioenas flavirostris</i> , Red-billed Pigeon
<i>Gallinago delicata</i> , Wilson's Snipe	<i>Sternula antillarum</i> , Least Tern	<i>Patagioenas inornata</i> , Plain Pigeon
<i>Gallinago gallinago</i> , Common Snipe	<i>Phaetusa simplex</i> , Large-billed Tern	<i>Patagioenas fasciata</i> , Band-tailed Pigeon
<i>Gallinago stenura</i> , Pin-tailed Snipe	<i>Gelochelidon nilotica</i> , Gull-billed Tern	<i>Streptopelia orientalis</i> , Oriental Turtle-Dove
<i>Gallinago megala</i> , Swinhoe's Snipe	<i>Hydroprogne caspia</i> , Caspian Tern	<i>Zenaida asiatica</i> , White-winged Dove
<i>Scolopax rusticola</i> , Eurasian Woodcock	<i>Chlidonias niger</i> , Black Tern	<i>Zenaida aurita</i> , Zenaida Dove
<i>Scolopax minor</i> , American Woodcock	<i>Chlidonias leucopterus</i> , White-winged Tern	<i>Zenaida macroura</i> , Mourning Dove
Subfamily PHALAROPODINAE	<i>Chlidonias hybridus</i> , Whiskered Tern	<i>Columbina inca</i> , Inca Dove
<i>Phalaropus tricolor</i> , Wilson's Phalarope	<i>Sterna dougallii</i> , Roseate Tern	<i>Columbina passerina</i> , Common Ground-Dove
<i>Phalaropus lobatus</i> , Red-necked Phalarope	<i>Sterna sumatrana</i> , Black-naped Tern	<i>Columbina talpacoti</i> , Ruddy Ground-Dove
<i>Phalaropus fulicarius</i> , Red Phalarope	<i>Sterna hirundo</i> , Common Tern	<i>Leptotila verreauxi</i> , White-tipped Dove
Family LARIDAE	<i>Sterna paradisaea</i> , Arctic Tern	<i>Geotrygon chrysia</i> , Key West Quail-Dove
Subfamily LARINAE	<i>Sterna forsteri</i> , Forster's Tern	<i>Geotrygon mystacea</i> , Bridled Quail-Dove
<i>Creagrus furcatus</i> , Swallow-tailed Gull	<i>Thalasseus maximus</i> , Royal Tern	<i>Geotrygon montana</i> , Ruddy Quail-Dove
<i>Rissa tridactyla</i> , Black-legged Kittiwake	<i>Thalasseus bergii</i> , Great Crested Tern	<i>Gallicolumba xanthonura</i> , White-throated Ground-Dove
<i>Rissa brevirostris</i> , Red-legged Kittiwake	<i>Thalasseus sandvicensis</i> , Sandwich Tern	<i>Gallicolumba stairi</i> , Friendly Ground-Dove
<i>Pagophila eburnea</i> , Ivory Gull	<i>Thalasseus elegans</i> , Elegant Tern	<i>Ptilinopus perousii</i> , Many-colored Fruit-Dove
<i>Xema sabini</i> , Sabine's Gull	Subfamily RYNCHOPINAE	<i>Ptilinopus porphyraceus</i> , Crimson-crowned Fruit-Dove
<i>Chroicocephalus philadelphia</i> , Bonaparte's Gull	<i>Rynchops niger</i> , Black Skimmer	<i>Ptilinopus roseicapilla</i> , Mariana Fruit-Dove
<i>Chroicocephalus cirrocephalus</i> , Gray-hooded Gull	Family STERCORARIIDAE	<i>Ducula pacifica</i> , Pacific Imperial-Pigeon
<i>Chroicocephalus ridibundus</i> , Black-headed Gull	<i>Stercorarius skua</i> , Great Skua	Order CUCULIFORMES
<i>Hydrocoloeus minutus</i> , Little Gull	<i>Stercorarius maccormicki</i> , South Polar Skua	Family CUCULIDAE
<i>Rhodostethia rosea</i> , Ross's Gull	<i>Stercorarius pomarinus</i> , Pomarine Jaeger	Subfamily CUCULINAE
<i>Leucophaeus atricilla</i> , Laughing Gull	<i>Stercorarius parasiticus</i> , Parasitic Jaeger	<i>Cuculus fugax</i> , Hodgson's Hawk-Cuckoo
<i>Leucophaeus pipixcan</i> , Franklin's Gull	<i>Stercorarius longicaudus</i> , Long-tailed Jaeger	<i>Cuculus canorus</i> , Common Cuckoo
<i>Larus belcheri</i> , Belcher's Gull	Family ALCIDAE	<i>Cuculus optatus</i> , Oriental Cuckoo
<i>Larus crassirostris</i> , Black-tailed Gull	<i>Alle alle</i> , Dovekie	<i>Coccyzus americanus</i> , Yellow-billed Cuckoo
<i>Larus heermanni</i> , Heermann's Gull	<i>Uria aalge</i> , Common Murre	<i>Coccyzus minor</i> , Mangrove Cuckoo
<i>Larus canus</i> , Mew Gull	<i>Uria lomvia</i> , Thick-billed Murre	<i>Coccyzus erythrophthalmus</i> , Black-billed Cuckoo
<i>Larus delawarensis</i> , Ring-billed Gull	<i>Alca torda</i> , Razorbill	<i>Coccyzus vieilloti</i> , Puerto Rican Lizard-Cuckoo
<i>Larus occidentalis</i> , Western Gull	<i>Cephus grylle</i> , Black Guillemot	
<i>Larus livens</i> , Yellow-footed Gull	<i>Cephus columba</i> , Pigeon Guillemot	
<i>Larus californicus</i> , California Gull	<i>Brachyramphus perdix</i> , Long-billed Murrelet	
<i>Larus argentatus</i> , Herring Gull	<i>Brachyramphus marmoratus</i> , Marbled Murrelet	
<i>Larus michahellis</i> , Yellow-legged Gull	<i>Brachyramphus brevirostris</i> , Kittlitz's Murrelet	
<i>Larus thayeri</i> , Thayer's Gull	<i>Synthliboramphus hypoleucus</i> , Xantus's Murrelet	
<i>Larus glaucoides</i> , Iceland Gull	<i>Synthliboramphus craveri</i> , Craveri's	

Subfamily NEOMORPHINAE	<i>Streptoprocne zonaris</i> , White-collared Swift	<i>Atthis heloisa</i> , Bumblebee Hummingbird
<i>Geococcyx californianus</i> , Greater Roadrunner	Subfamily CHAETURINAE	<i>Selasphorus platycercus</i> , Broad-tailed Hummingbird
Subfamily CROTOPHAGINAE	<i>Chaetura pelagica</i> , Chimney Swift	<i>Selasphorus rufus</i> , Rufous Hummingbird
<i>Crotophaga ani</i> , Smooth-billed Ani	<i>Chaetura vauxi</i> , Vaux's Swift	<i>Selasphorus sasin</i> , Allen's Hummingbird
<i>Crotophaga sulcirostris</i> , Groove-billed Ani	<i>Hirundapus caudacutus</i> , White-throated Needletail	Order TROGONIFORMES
Order STRIGIFORMES	<i>Aerodramus spodiopygius</i> , White-rumped Swiftlet	Family TROGONIDAE
Family TYTONIDAE	<i>Aerodramus bartschi</i> , Mariana Swiftlet	Subfamily TROGONINAE
<i>Tyto alba</i> , Barn Owl	Subfamily APODINAE	<i>Trogon elegans</i> , Elegant Trogon
Family STRIGIDAE	<i>Apus apus</i> , Common Swift	<i>Euptilotis neoxenus</i> , Eared Quetzal
<i>Otus flammeolus</i> , Flammulated Owl	<i>Apus pacificus</i> , Fork-tailed Swift	Order UPUPIFORMES
<i>Otus sunia</i> , Oriental Scops-Owl	<i>Apus melba</i> , Alpine Swift	Family UPUIDAE
<i>Megascops kennicottii</i> , Western Screech-Owl	<i>Aeronautes saxatalis</i> , White-throated Swift	<i>Upupa epops</i> , Eurasian Hoopoe
<i>Megascops asio</i> , Eastern Screech-Owl	<i>Tachornis phoenicobia</i> , Antillean Palm-Swift	Order CORACIIFORMES
<i>Megascops trichopsis</i> , Whiskered Screech-Owl	Family TROCHILIDAE	Family ALCEDINIDAE
<i>Megascops nudipes</i> , Puerto Rican Screech-Owl	Subfamily TROCHILINAE	Subfamily HALCYONINAE
<i>Bubo virginianus</i> , Great Horned Owl	<i>Colibri thalassinus</i> , Green Violetear	<i>Todirhamphus cinnamominus</i> , Micronesian Kingfisher
<i>Bubo scandiacus</i> , Snowy Owl	<i>Anthracothonax prevostii</i> , Green-breasted Mango	<i>Todirhamphus chloris</i> , Collared Kingfisher
<i>Surnia ulula</i> , Northern Hawk Owl	<i>Anthracothonax dominicus</i> , Antillean Mango	Subfamily CERYLINAE
<i>Glaucidium gnoma</i> , Northern Pygmy-Owl	<i>Anthracothonax viridis</i> , Green Mango	<i>Megaceryle torquata</i> , Ringed Kingfisher
<i>Glaucidium brasilianum</i> , Ferruginous Pygmy-Owl	<i>Eulampis jugularis</i> , Purple-throated Carib	<i>Megaceryle alcyon</i> , Belted Kingfisher
<i>Micrathene whitneyi</i> , Elf Owl	<i>Eulampis holosericeus</i> , Green-throated Carib	<i>Chloroceryle americana</i> , Green Kingfisher
<i>Athene cunicularia</i> , Burrowing Owl	<i>Orthorhyncus cristatus</i> , Antillean Crested Hummingbird	Order PICIFORMES
<i>Ciccaba virgata</i> , Mottled Owl	<i>Chlorostilbon maugaeus</i> , Puerto Rican Emerald	Family PICIDAE
<i>Strix occidentalis</i> , Spotted Owl	<i>Cyananthus latirostris</i> , Broad-billed Hummingbird	Subfamily JYNGINAE
<i>Strix varia</i> , Barred Owl	<i>Hylocharis leucotis</i> , White-eared Hummingbird	<i>Jynx torquilla</i> , Eurasian Wryneck
<i>Strix nebulosa</i> , Great Gray Owl	<i>Hylocharis xantusii</i> , Xantus's Hummingbird	Subfamily PICINAE
<i>Asio otus</i> , Long-eared Owl	<i>Amazilia beryllina</i> , Berylline Hummingbird	<i>Melanerpes lewis</i> , Lewis's Woodpecker
<i>Asio stygius</i> , Stygian Owl	<i>Amazilia yucatanensis</i> , Buff-bellied Hummingbird	<i>Melanerpes portoricensis</i> , Puerto Rican Woodpecker
<i>Asio flammeus</i> , Short-eared Owl	<i>Amazilia rutila</i> , Cinnamon Hummingbird	<i>Melanerpes erythrocephalus</i> , Red-headed Woodpecker
<i>Aegolius funereus</i> , Boreal Owl	<i>Amazilia violiceps</i> , Violet-crowned Hummingbird	<i>Melanerpes formicivorus</i> , Acorn Woodpecker
<i>Aegolius acadicus</i> , Northern Saw-whet Owl	<i>Lampornis clemenciae</i> , Blue-throated Hummingbird	<i>Melanerpes uropygialis</i> , Gila Woodpecker
<i>Ninox scutulata</i> , Brown Hawk-Owl	<i>Eugenes fulgens</i> , Magnificent Hummingbird	<i>Melanerpes aurifrons</i> , Golden-fronted Woodpecker
Order CAPRIMULGIFORMES	<i>Helioaster constantii</i> , Plain-capped Starthroat	<i>Melanerpes carolinus</i> , Red-bellied Woodpecker
Family CAPRIMULGIDAE	<i>Calliphlox evelynae</i> , Bahama Woodstar	<i>Sphyrapicus thyroideus</i> , Williamson's Sapsucker
Subfamily CHORDEILINAE	<i>Calothorax lucifer</i> , Lucifer Hummingbird	<i>Sphyrapicus varius</i> , Yellow-bellied Sapsucker
<i>Chordeiles acutipennis</i> , Lesser Nighthawk	<i>Archilochus colubris</i> , Ruby-throated Hummingbird	<i>Sphyrapicus nuchalis</i> , Red-naped Sapsucker
<i>Chordeiles minor</i> , Common Nighthawk	<i>Archilochus alexandri</i> , Black-chinned Hummingbird	<i>Sphyrapicus ruber</i> , Red-breasted Sapsucker
<i>Chordeiles gundlachii</i> , Antillean Nighthawk	<i>Calypte anna</i> , Anna's Hummingbird	<i>Dendrocopos major</i> , Great Spotted Woodpecker
Subfamily CAPRIMULGINAE	<i>Calypte costae</i> , Costa's Hummingbird	<i>Picoides scalaris</i> , Ladder-backed Woodpecker
<i>Nyctidromus albicollis</i> , Common Pauraque	<i>Stellula calliope</i> , Calliope Hummingbird	<i>Picoides nuttallii</i> , Nuttall's Woodpecker
<i>Phalaenoptilus nuttallii</i> , Common Poorwill		<i>Picoides pubescens</i> , Downy Woodpecker
<i>Caprimulgus carolinensis</i> , Chuck-will's-widow		<i>Picoides villosus</i> , Hairy Woodpecker
<i>Caprimulgus ridgwayi</i> , Buff-collared Nightjar		<i>Picoides arizonae</i> , Arizona Woodpecker
<i>Caprimulgus vociferus</i> , Eastern Whip-poor-will		<i>Picoides borealis</i> , Red-cockaded Woodpecker
<i>Caprimulgus arizonae</i> , Mexican Whip-poor-will		
<i>Caprimulgus noctitherus</i> , Puerto Rican Nightjar		
<i>Caprimulgus indicus</i> , Gray Nightjar		
Order APODIFORMES		
Family APODIDAE		
Subfamily CYPSELOIDINAE		
<i>Cypseloides niger</i> , Black Swift		

<i>Picoides albolarvatus</i> , White-headed Woodpecker	Flycatcher	<i>Cyanocitta stelleri</i> , Steller's Jay
<i>Picoides dorsalis</i> , American Three-toed Woodpecker	<i>Myiarchus tyrannulus</i> , Brown-crested Flycatcher	<i>Cyanocitta cristata</i> , Blue Jay
<i>Picoides arcticus</i> , Black-backed Woodpecker	<i>Myiarchus sagrae</i> , La Sagra's Flycatcher	<i>Aphelocoma coerulescens</i> , Florida Scrub-Jay
<i>Colaptes auratus</i> , Northern Flicker	<i>Myiarchus antillarum</i> , Puerto Rican Flycatcher	<i>Aphelocoma insularis</i> , Island Scrub-Jay
<i>Colaptes chrysoides</i> , Gilded Flicker	<i>Pitangus sulphuratus</i> , Great Kiskadee	<i>Aphelocoma californica</i> , Western Scrub-Jay
<i>Dryocopus pileatus</i> , Pileated Woodpecker	<i>Myiozetetes similis</i> , Social Flycatcher	<i>Aphelocoma ultramarina</i> , Mexican Jay
<i>Campephilus principalis</i> , Ivory-billed Woodpecker	<i>Myiodynastes luteiventris</i> , Sulphur-bellied Flycatcher	<i>Nucifraga columbiana</i> , Clark's Nutcracker
Order PASSERIFORMES	<i>Legatus leucophalus</i> , Piratic Flycatcher	<i>Pica hudsonia</i> , Black-billed Magpie
Family TYRANNIDAE	<i>Empidonomus varius</i> , Variegated Flycatcher	<i>Pica nuttalli</i> , Yellow-billed Magpie
Subfamily ELAENINAE	<i>Empidonomus aurantioatrocristatus</i> , Crowned Slaty Flycatcher	<i>Corvus kubaryi</i> , Mariana Crow
<i>Camptostoma imberbe</i> , Northern Beardless-Tyrannulet	<i>Tyrannus melancholicus</i> , Tropical Kingbird	<i>Corvus brachyrhynchos</i> , American Crow
<i>Myiopagis viridicata</i> , Greenish Elaenia	<i>Tyrannus couchii</i> , Couch's Kingbird	<i>Corvus caurinus</i> , Northwestern Crow
<i>Elaenia martinica</i> , Caribbean Elaenia	<i>Tyrannus vociferans</i> , Cassin's Kingbird	<i>Corvus leucognaphalus</i> , White-necked Crow
<i>Elaenia albiceps</i> , White-crested Eleania	<i>Tyrannus crassirostris</i> , Thick-billed Kingbird	<i>Corvus imparatus</i> , Tamaulipas Crow
Subfamily FLUVICOLINAE	<i>Tyrannus verticalis</i> , Western Kingbird	<i>Corvus ossifragus</i> , Fish Crow
<i>Mitrephanes phaeocercus</i> , Tufted Flycatcher	<i>Tyrannus tyrannus</i> , Eastern Kingbird	<i>Corvus hawaiiensis</i> , Hawaiian Crow
<i>Contopus cooperi</i> , Olive-sided Flycatcher	<i>Tyrannus dominicensis</i> , Gray Kingbird	<i>Corvus cryptoleucus</i> , Chihuahuan Raven
<i>Contopus pertinax</i> , Greater Pewee	<i>Tyrannus caudifasciatus</i> , Loggerhead Kingbird	<i>Corvus corax</i> , Common Raven
<i>Contopus sordidulus</i> , Western Wood-Pewee	<i>Tyrannus forficatus</i> , Scissor-tailed Flycatcher	Family ALAUDIDAE
<i>Contopus virens</i> , Eastern Wood-Pewee	<i>Tyrannus savana</i> , Fork-tailed Flycatcher	<i>Alauda arvensis</i> , Sky Lark
<i>Contopus caribaeus</i> , Cuban Pewee	<i>Pachyrhamphus aglaiae</i> , Rose-throated Becard	<i>Eremophila alpestris</i> , Horned Lark
<i>Contopus hispaniolensis</i> , Hispaniolan Pewee	<i>Tityra semifasciata</i> , Masked Tityra	Family HIRUNDINIDAE
<i>Contopus latirostris</i> , Lesser Antillean Pewee	Family LANIIDAE	Subfamily HIRUNDININAE
<i>Empidonax flaviventris</i> , Yellow-bellied Flycatcher	<i>Lanius cristatus</i> , Brown Shrike	<i>Progne subis</i> , Purple Martin
<i>Empidonax virescens</i> , Acadian Flycatcher	<i>Lanius ludovicianus</i> , Loggerhead Shrike	<i>Progne cryptoleuca</i> , Cuban Martin
<i>Empidonax alnorum</i> , Alder Flycatcher	<i>Lanius excubitor</i> , Northern Shrike	<i>Progne dominicensis</i> , Caribbean Martin
<i>Empidonax traillii</i> , Willow Flycatcher	Family VIREONIDAE	<i>Progne chalybea</i> , Gray-breasted Martin
<i>Empidonax minimus</i> , Least Flycatcher	<i>Vireo griseus</i> , White-eyed Vireo	<i>Progne elegans</i> , Southern Martin
<i>Empidonax hammondi</i> , Hammond's Flycatcher	<i>Vireo crassirostris</i> , Thick-billed Vireo	<i>Progne tapera</i> , Brown-chested Martin
<i>Empidonax wrightii</i> , Gray Flycatcher	<i>Vireo latimeri</i> , Puerto Rican Vireo	<i>Tachycineta bicolor</i> , Tree Swallow
<i>Empidonax oberholseri</i> , Dusky Flycatcher	<i>Vireo bellii</i> , Bell's Vireo	<i>Tachycineta albilinea</i> , Mangrove Swallow
<i>Empidonax difficilis</i> , Pacific-slope Flycatcher	<i>Vireo atricapilla</i> , Black-capped Vireo	<i>Tachycineta thalassina</i> , Violet-green Swallow
<i>Empidonax occidentalis</i> , Cordilleran Flycatcher	<i>Vireo vicinior</i> , Gray Vireo	<i>Tachycineta cyaneoviridis</i> , Bahama Swallow
<i>Empidonax fulvifrons</i> , Buff-breasted Flycatcher	<i>Vireo flavifrons</i> , Yellow-throated Vireo	<i>Stelgidopteryx serripennis</i> , Northern Rough-winged Swallow
<i>Sayornis nigricans</i> , Black Phoebe	<i>Vireo plumbeus</i> , Plumbeous Vireo	<i>Riparia riparia</i> , Bank Swallow
<i>Sayornis phoebe</i> , Eastern Phoebe	<i>Vireo cassinii</i> , Cassin's Vireo	<i>Petrochelidon pyrrhonota</i> , Cliff Swallow
<i>Sayornis saya</i> , Say's Phoebe	<i>Vireo solitarius</i> , Blue-headed Vireo	<i>Petrochelidon fulva</i> , Cave Swallow
<i>Pyrocephalus rubinus</i> , Vermilion Flycatcher	<i>Vireo huttoni</i> , Hutton's Vireo	<i>Hirundo rustica</i> , Barn Swallow
Subfamily TYRANNINAE	<i>Vireo gilvus</i> , Warbling Vireo	<i>Delichon urbicum</i> , Common House-Martin
<i>Myiarchus tuberculifer</i> , Dusky-capped Flycatcher	<i>Vireo philadelphicus</i> , Philadelphia Vireo	Family PARIDAE
<i>Myiarchus cinerascens</i> , Ash-throated Flycatcher	<i>Vireo olivaceus</i> , Red-eyed Vireo	<i>Poecile carolinensis</i> , Carolina Chickadee
<i>Myiarchus nuttingi</i> , Nutting's Flycatcher	<i>Vireo flavoviridis</i> , Yellow-green Vireo	<i>Poecile atricapillus</i> , Black-capped Chickadee
<i>Myiarchus crinitus</i> , Great Crested Flycatcher	<i>Vireo altiloquus</i> , Black-whiskered Vireo	<i>Poecile gambeli</i> , Mountain Chickadee
	<i>Vireo magister</i> , Yucatan Vireo	<i>Poecile sclateri</i> , Mexican Chickadee
	Family CORVIDAE	<i>Poecile rufescens</i> , Chestnut-backed Chickadee
	<i>Perisoreus canadensis</i> , Gray Jay	<i>Poecile hudsonicus</i> , Boreal Chickadee
	<i>Psilorhinus morio</i> , Brown Jay	<i>Poecile cinctus</i> , Gray-headed Chickadee
	<i>Cyanocorax yncas</i> , Green Jay	<i>Baeolophus wollweberi</i> , Bridled Titmouse
	<i>Gymnorhinus cyanocephalus</i> , Pinyon Jay	

- Baeolophus inornatus*, Oak Titmouse  
*Baeolophus ridgwayi*, Juniper Titmouse  
*Baeolophus bicolor*, Tufted Titmouse  
*Baeolophus atricristatus*, Black-crested Titmouse  
Family REMIZIDAE  
*Auriparus flaviceps*, Verdin  
Family AEGITHALIDAE  
*Psaltriparus minimus*, Bushtit  
Family SITTIDAE  
Subfamily SITTINAE  
*Sitta canadensis*, Red-breasted Nuthatch  
*Sitta carolinensis*, White-breasted Nuthatch  
*Sitta pygmaea*, Pygmy Nuthatch  
*Sitta pusilla*, Brown-headed Nuthatch  
Family CERTHIIDAE  
Subfamily CERTHIINAE  
*Certhia americana*, Brown Creeper  
Family TROGLODYTIDAE  
*Campylorhynchus brunneicapillus*, Cactus Wren  
*Salpinctes obsoletus*, Rock Wren  
*Catherpes mexicanus*, Canyon Wren  
*Thryothorus sinaloa*, Sinaloa Wren  
*Thryothorus ludovicianus*, Carolina Wren  
*Thryomanes bewickii*, Bewick's Wren  
*Troglodytes aedon*, House Wren  
*Troglodytes pacificus*, Pacific Wren  
*Troglodytes hiemalis*, Winter Wren  
*Cistothorus platensis*, Sedge Wren  
*Cistothorus palustris*, Marsh Wren  
Family POLIOPTILIDAE  
*Polioptila caerulea*, Blue-gray Gnatcatcher  
*Polioptila californica*, California Gnatcatcher  
*Polioptila melanura*, Black-tailed Gnatcatcher  
*Polioptila nigriceps*, Black-capped Gnatcatcher  
Family CINCLIDAE  
*Cinclus mexicanus*, American Dipper  
Family REGULIDAE  
*Regulus satrapa*, Golden-crowned Kinglet  
*Regulus calendula*, Ruby-crowned Kinglet  
Family PHYLLOSCOPIDAE  
*Phylloscopus trochilus*, Willow Warbler  
*Phylloscopus sibilatrix*, Wood Warbler  
*Phylloscopus fuscatus*, Dusky Warbler  
*Phylloscopus proregulus*, Pallas's Leaf-Warbler  
*Phylloscopus inornatus*, Yellow-browed Warbler  
*Phylloscopus borealis*, Arctic Warbler  
Family SYLVIIDAE  
*Sylvia curruca*, Lesser Whitethroat  
*Chamaea fasciata*, Wrentit  
Family ACROCEPHALIDAE  
*Acrocephalus luscini*, Nightingale Reed-Warbler  
*Acrocephalus familiaris*, Millerbird  
*Acrocephalus schoenobaenus*, Sedge Warbler  
Family MEGALURIDAE  
*Locustella ochotensis*, Middendorff's Grasshopper-Warbler  
*Locustella lanceolata*, Lanceolated Warbler  
Family MUSCICAPIDAE  
*Ficedula narcissina*, Narcissus Flycatcher  
*Ficedula mugimaki*, Mugimaki Flycatcher  
*Ficedula albicilla*, Taiga Flycatcher  
*Muscicapa sibirica*, Dark-sided Flycatcher  
*Muscicapa griseisticta*, Gray-streaked Flycatcher  
*Muscicapa dauurica*, Asian Brown Flycatcher  
*Muscicapa striata*, Spotted Flycatcher  
Family TURDIDAE  
*Monticola solitarius*, Blue Rock-Thrush  
*Luscinia sibilans*, Rufous-tailed Robin  
*Luscinia calliope*, Siberian Rubythroat  
*Luscinia svecica*, Bluethroat  
*Luscinia cyane*, Siberian Blue Robin  
*Tarsiger cyanurus*, Red-flanked Bluetail  
*Oenanthe oenanthe*, Northern Wheatear  
*Saxicola torquatus*, Stonechat  
*Sialia sialis*, Eastern Bluebird  
*Sialia mexicana*, Western Bluebird  
*Sialia currucoides*, Mountain Bluebird  
*Myadestes townsendi*, Townsend's Solitaire  
*Myadestes myadestinus*, Kamao  
*Myadestes lanaiensis*, Olomao  
*Myadestes obscurus*, Omao  
*Myadestes palmeri*, Puaiohi  
*Catharus aurantiirostris*, Orange-billed Nightingale-Thrush  
*Catharus mexicanus*, Black-headed Nightingale-Thrush  
*Catharus fuscescens*, Veery  
*Catharus minimus*, Gray-cheeked Thrush  
*Catharus bicknelli*, Bicknell's Thrush  
*Catharus ustulatus*, Swainson's Thrush  
*Catharus guttatus*, Hermit Thrush  
*Hylocichla mustelina*, Wood Thrush  
*Turdus obscurus*, Eyebrowed Thrush  
*Turdus naumanni*, Dusky Thrush  
*Turdus pilaris*, Fieldfare  
*Turdus grayi*, Clay-colored Thrush  
*Turdus assimilis*, White-throated Thrush  
*Turdus rufopalliatu*, Rufous-backed Robin  
*Turdus migratorius*, American Robin  
*Turdus plumbeus*, Red-legged Thrush  
*Ixoreus naevius*, Varied Thrush  
*Ridgwayia pinicola*, Aztec Thrush  
Family MIMIDAE  
*Dumetella carolinensis*, Gray Catbird  
*Melanoptila glabrirostris*, Black Catbird  
*Mimus polyglottos*, Northern Mockingbird  
*Mimus gundlachii*, Bahama Mockingbird  
*Oreoscoptes montanus*, Sage Thrasher  
*Toxostoma rufum*, Brown Thrasher  
*Toxostoma longirostre*, Long-billed Thrasher  
*Toxostoma bendirei*, Bendire's Thrasher  
*Toxostoma curvirostre*, Curve-billed Thrasher  
*Toxostoma redivivum*, California Thrasher  
*Toxostoma crissale*, Crissal Thrasher  
*Toxostoma lecontei*, Le Conte's Thrasher  
*Melanotis caerulescens*, Blue Mockingbird  
*Margarops fuscatus*, Pearly-eyed Thrasher  
Family STURNIDAE  
*Sturnus philippensis*, Chestnut-cheeked Starling  
*Sturnus cineraceus*, White-cheeked Starling  
Family PRUNELLIDAE  
*Prunella montanella*, Siberian Accentor  
Family MOTACILLIDAE  
*Motacilla tschutschensis*, Eastern Yellow Wagtail  
*Motacilla citreola*, Citrine Wagtail  
*Motacilla cinerea*, Gray Wagtail  
*Motacilla alba*, White Wagtail  
*Anthus trivialis*, Tree Pipit  
*Anthus hodgsoni*, Olive-backed Pipit  
*Anthus gustavi*, Pechora Pipit  
*Anthus cervinus*, Red-throated Pipit  
*Anthus rubescens*, American Pipit  
*Anthus spragueii*, Sprague's Pipit  
Family BOMBYCILLIDAE  
*Bombycilla garrulus*, Bohemian Waxwing  
*Bombycilla cedrorum*, Cedar Waxwing  
Family PTILOGONATIDAE  
*Ptilogonys cinereus*, Gray Silky-flycatcher  
*Phainopepla nitens*, Phainopepla  
Family PEUCEDRAMIDAE  
*Peucedramus taeniatus*, Olive Warbler  
Family CALCARIIDAE  
*Calcarius lapponicus*, Lapland Longspur  
*Calcarius ornatus*, Chestnut-collared Longspur  
*Calcarius pictus*, Smith's Longspur  
*Rhynchophanes mccownii*, McCown's Longspur  
*Plectrophenax nivalis*, Snow Bunting  
*Plectrophenax hyperboreus*, McKay's Bunting  
Family PARULIDAE  
*Vermivora bachmanii*, Bachman's Warbler  
*Vermivora cyanoptera*, Blue-winged

Warbler	Waterthrush	<i>Chondestes grammacus</i> , Lark Sparrow
<i>Vermivora chrysoptera</i> , Golden-winged Warbler	<i>Oporornis formosus</i> , Kentucky Warbler	<i>Amphispiza quinquestrata</i> , Five-striped Sparrow
<i>Oreothlypis peregrina</i> , Tennessee Warbler	<i>Oporornis agilis</i> , Connecticut Warbler	<i>Amphispiza bilineata</i> , Black-throated Sparrow
<i>Oreothlypis celata</i> , Orange-crowned Warbler	<i>Oporornis philadelphia</i> , Mourning Warbler	<i>Amphispiza belli</i> , Sage Sparrow
<i>Oreothlypis ruficapilla</i> , Nashville Warbler	<i>Oporornis tolmiei</i> , MacGillivray's Warbler	<i>Calamospiza melanocorys</i> , Lark Bunting
<i>Oreothlypis virginiae</i> , Virginia's Warbler	<i>Geothlypis trichas</i> , Common Yellowthroat	<i>Passerculus sandwichensis</i> , Savannah Sparrow
<i>Oreothlypis crissalis</i> , Colima Warbler	<i>Geothlypis poliocephala</i> , Gray-crowned Yellowthroat	<i>Ammodramus savannarum</i> , Grasshopper Sparrow
<i>Oreothlypis luciae</i> , Lucy's Warbler	<i>Wilsonia citrina</i> , Hooded Warbler	<i>Ammodramus bairdii</i> , Baird's Sparrow
<i>Oreothlypis superciliosa</i> , Crescent-chested Warbler	<i>Wilsonia pusilla</i> , Wilson's Warbler	<i>Ammodramus henslowii</i> , Henslow's Sparrow
<i>Parula americana</i> , Northern Parula	<i>Wilsonia canadensis</i> , Canada Warbler	<i>Ammodramus leconteii</i> , Le Conte's Sparrow
<i>Parula pitiayumi</i> , Tropical Parula	<i>Cardellina rubrifrons</i> , Red-faced Warbler	<i>Ammodramus nelsoni</i> , Nelson's Sparrow
<i>Dendroica petechia</i> , Yellow Warbler	<i>Myioborus pictus</i> , Painted Redstart	<i>Ammodramus caudacutus</i> , Saltmarsh Sparrow
<i>Dendroica pensylvanica</i> , Chestnut-sided Warbler	<i>Myioborus miniatus</i> , Slate-throated Redstart	<i>Ammodramus maritimus</i> , Seaside Sparrow
<i>Dendroica magnolia</i> , Magnolia Warbler	<i>Euthlypis lachrymosa</i> , Fan-tailed Warbler	<i>Passerella iliaca</i> , Fox Sparrow
<i>Dendroica tigrina</i> , Cape May Warbler	<i>Basileuterus culicivorus</i> , Golden-crowned Warbler	<i>Melospiza melodia</i> , Song Sparrow
<i>Dendroica caerulescens</i> , Black-throated Blue Warbler	<i>Basileuterus rufifrons</i> , Rufous-capped Warbler	<i>Melospiza lincolni</i> , Lincoln's Sparrow
<i>Dendroica coronata</i> , Yellow-rumped Warbler	<i>Icteria virens</i> , Yellow-breasted Chat	<i>Melospiza georgiana</i> , Swamp Sparrow
<i>Dendroica nigrescens</i> , Black-throated Gray Warbler	Family THRAUPIDAE	<i>Zonotrichia albicollis</i> , White-throated Sparrow
<i>Dendroica chrysoparia</i> , Golden-cheeked Warbler	<i>Nesospingus speculariferus</i> , Puerto Rican Tanager	<i>Zonotrichia querula</i> , Harris's Sparrow
<i>Dendroica virens</i> , Black-throated Green Warbler	<i>Spindalis zena</i> , Western Spindalis	<i>Zonotrichia leucophrys</i> , White-crowned Sparrow
<i>Dendroica townsendi</i> , Townsend's Warbler	<i>Spindalis portoricensis</i> , Puerto Rican Spindalis	<i>Zonotrichia atricapilla</i> , Golden-crowned Sparrow
<i>Dendroica occidentalis</i> , Hermit Warbler	Family EMBERIZIDAE	<i>Junco hyemalis</i> , Dark-eyed Junco
<i>Dendroica fusca</i> , Blackburnian Warbler	<i>Sporophila torqueola</i> , White-collared Seedeater	<i>Junco phaeonotus</i> , Yellow-eyed Junco
<i>Dendroica dominica</i> , Yellow-throated Warbler	<i>Tiaris olivaceus</i> , Yellow-faced Grassquit	<i>Emberiza leucocephalos</i> , Pine Bunting
<i>Dendroica graciae</i> , Grace's Warbler	<i>Tiaris bicolor</i> , Black-faced Grassquit	<i>Emberiza chrysophrys</i> , Yellow-browed Bunting
<i>Dendroica adelaidae</i> , Adelaide's Warbler	<i>Loxigilla portoricensis</i> , Puerto Rican Bullfinch	<i>Emberiza pusilla</i> , Little Bunting
<i>Dendroica pinus</i> , Pine Warbler	<i>Arremonops rufivirgatus</i> , Olive Sparrow	<i>Emberiza rustica</i> , Rustic Bunting
<i>Dendroica kirtlandii</i> , Kirtland's Warbler	<i>Pipilo chlorurus</i> , Green-tailed Towhee	<i>Emberiza elegans</i> , Yellow-throated Bunting
<i>Dendroica discolor</i> , Prairie Warbler	<i>Pipilo maculatus</i> , Spotted Towhee	<i>Emberiza aureola</i> , Yellow-breasted Bunting
<i>Dendroica palmarum</i> , Palm Warbler	<i>Pipilo erythrophthalmus</i> , Eastern Towhee	<i>Emberiza variabilis</i> , Gray Bunting
<i>Dendroica castanea</i> , Bay-breasted Warbler	<i>Aimophila ruficeps</i> , Rufous-crowned Sparrow	<i>Emberiza pallasi</i> , Pallas's Bunting
<i>Dendroica striata</i> , Blackpoll Warbler	<i>Melospiza fusca</i> , Canyon Towhee	<i>Emberiza schoeniclus</i> , Reed Bunting
<i>Dendroica cerulea</i> , Cerulean Warbler	<i>Melospiza crissalis</i> , California Towhee	Family CARDINALIDAE
<i>Dendroica angela</i> , Elfin-woods Warbler	<i>Melospiza aberti</i> , Abert's Towhee	<i>Piranga flava</i> , Hepatic Tanager
<i>Mniotilta varia</i> , Black-and-white Warbler	<i>Peucaea carpalis</i> , Rufous-winged Sparrow	<i>Piranga rubra</i> , Summer Tanager
<i>Setophaga ruticilla</i> , American Redstart	<i>Peucaea botterii</i> , Botteri's Sparrow	<i>Piranga olivacea</i> , Scarlet Tanager
<i>Protonotaria citrea</i> , Prothonotary Warbler	<i>Peucaea cassinii</i> , Cassin's Sparrow	<i>Piranga ludoviciana</i> , Western Tanager
<i>Helmitheros vermivorum</i> , Worm-eating Warbler	<i>Peucaea aestivalis</i> , Bachman's Sparrow	<i>Piranga bidentata</i> , Flame-colored Tanager
<i>Limnithlypis swainsonii</i> , Swainson's Warbler	<i>Spizella arborea</i> , American Tree Sparrow	<i>Rhodothraupis celaeno</i> , Crimson-collared Grosbeak
<i>Seiurus aurocapilla</i> , Ovenbird	<i>Spizella passerina</i> , Chipping Sparrow	<i>Cardinalis cardinalis</i> , Northern Cardinal
<i>Parkesia noveboracensis</i> , Northern Waterthrush	<i>Spizella pallida</i> , Clay-colored Sparrow	<i>Cardinalis sinuatus</i> , Pyrrhuloxia
<i>Parkesia motacilla</i> , Louisiana	<i>Spizella breweri</i> , Brewer's Sparrow	<i>Pheucticus chrysopheplus</i> , Yellow Grosbeak
	<i>Spizella pusilla</i> , Field Sparrow	<i>Pheucticus ludovicianus</i> , Rose-breasted Grosbeak
	<i>Spizella wortheni</i> , Worthen's Sparrow	<i>Pheucticus melanocephalus</i> , Black-headed Grosbeak
	<i>Spizella atrogularis</i> , Black-chinned Sparrow	
	<i>Poocetes gramineus</i> , Vesper Sparrow	

*Cyanocompsa parellina*, Blue Bunting  
*Passerina caerulea*, Blue Grosbeak  
*Passerina amoena*, Lazuli Bunting  
*Passerina cyanea*, Indigo Bunting  
*Passerina versicolor*, Varied Bunting  
*Passerina ciris*, Painted Bunting  
*Spiza americana*, Dickcissel  
 Family ICTERIDAE  
*Dolichonyx oryzivorus*, Bobolink  
*Agelaius phoeniceus*, Red-winged Blackbird  
*Agelaius tricolor*, Tricolored Blackbird  
*Agelaius humeralis*, Tawny-shouldered Blackbird  
*Agelaius xanthomus*, Yellow-shouldered Blackbird  
*Sturnella magna*, Eastern Meadowlark  
*Sturnella neglecta*, Western Meadowlark  
*Xanthocephalus xanthocephalus*, Yellow-headed Blackbird  
*Euphagus carolinus*, Rusty Blackbird  
*Euphagus cyanocephalus*, Brewer's Blackbird  
*Quiscalus quiscula*, Common Grackle  
*Quiscalus major*, Boat-tailed Grackle  
*Quiscalus mexicanus*, Great-tailed Grackle  
*Quiscalus niger*, Greater Antillean Grackle  
*Molothrus bonariensis*, Shiny Cowbird  
*Molothrus aeneus*, Bronzed Cowbird  
*Molothrus ater*, Brown-headed Cowbird  
*Icterus portoricensis*, Puerto Rican Oriole  
*Icterus wagleri*, Black-vented Oriole  
*Icterus spurius*, Orchard Oriole  
*Icterus cucullatus*, Hooded Oriole  
*Icterus pustulatus*, Streak-backed Oriole  
*Icterus bullockii*, Bullock's Oriole  
*Icterus gularis*, Altamira Oriole

*Icterus graduacauda*, Audubon's Oriole  
*Icterus galbula*, Baltimore Oriole  
*Icterus parisorum*, Scott's Oriole  
 Family FRINGILLIDAE  
 Subfamily FRINGILLINAE  
*Fringilla coelebs*, Common Chaffinch  
*Fringilla montifringilla*, Brambling  
 Subfamily EUPHONIINAE  
*Euphonia musica*, Antillean Euphonia  
 Subfamily CARDUELINAE  
*Leucosticte tephrocotis*, Gray-crowned Rosy-Finch  
*Leucosticte atrata*, Black Rosy-Finch  
*Leucosticte australis*, Brown-capped Rosy-Finch  
*Pinicola enucleator*, Pine Grosbeak  
*Carpodacus erythrinus*, Common Rosefinch  
*Carpodacus purpureus*, Purple Finch  
*Carpodacus cassinii*, Cassin's Finch  
*Carpodacus mexicanus*, House Finch  
*Loxia curvirostra*, Red Crossbill  
*Loxia leucoptera*, White-winged Crossbill  
*Acanthis flammea*, Common Redpoll  
*Acanthis hornemanni*, Hoary Redpoll  
*Spinus pinus*, Eurasian Siskin  
*Spinus pinus*, Pine Siskin  
*Spinus psaltria*, Lesser Goldfinch  
*Spinus lawrencei*, Lawrence's Goldfinch  
*Spinus tristis*, American Goldfinch  
*Chloris sinica*, Oriental Greenfinch  
*Pyrrhula pyrrhula*, Eurasian Bullfinch  
*Coccothraustes vespertinus*, Evening Grosbeak  
*Coccothraustes coccothraustes*, Hawfinch  
 Subfamily DREPANIDINAE  
*Telespiza cantans*, Laysan Finch  
*Telespiza ultima*, Nihoa Finch  
*Psittirostra psittacea*, Ou  
*Loxioides bailleui*, Palila  
*Pseudonestor xanthophrys*, Maui

Parrotbill  
*Hemignathus virens*, Hawaii Amakihi  
*Hemignathus flavus*, Oahu Amakihi  
*Hemignathus kauaiensis*, Kauai Amakihi  
*Hemignathus ellisianus*, Greater Akialoa  
*Hemignathus lucidus*, Nukupuu  
*Hemignathus munroi*, Akiapolaau  
*Magumma parva*, Anianiau  
*Oreomystis bairdi*, Akikiki  
*Oreomystis mana*, Hawaii Creeper  
*Paroreomyza maculata*, Oahu Alauahio  
*Paroreomyza flammea*, Kakawahie  
*Paroreomyza montana*, Maui Alauahio  
*Loxops caeruleirostris*, Akekee  
*Loxops coccineus*, Akepa  
*Vestiaria coccinea*, Iiwi  
*Palmeria dolei*, Akohekohe  
*Himatione sanguinea*, Apapane  
*Melamprosops phaeosoma*, Poo-uli

**PART 21—[AMENDED]**

■ 3. Revise the authority citation for part 21 to read as follows:

**Authority:** Pub. L. 65–186, 40 Stat. 755 (1918) (16 U.S.C. 703–712), as amended.

**§ 21.3 [Amended]**

■ 4. In § 21.3, amend the definition of “Raptor” by adding the words “the Order Accipitriformes,” immediately before the words “the Order Falconiformes” and adding a comma after “Falconiformes”.

Dated: September 17, 2013.

**Michael J. Bean,**

*Acting Principal Deputy Assistant Secretary for Fish and Wildlife and Parks.*

[FR Doc. 2013–26061 Filed 10–31–13; 8:45 am]

**BILLING CODE 4310–55–P**

**APPENDIX B:**  
Hornsby Bend Biosolids Management Plant Potential Breeding  
Bird List

Common Name	Protected Under MBTA	Nest Location and Type	Regional Breeding Habitat
Black-bellied Whistling-Duck	yes	Cavity in snag or on ground	Fresh and brackish marshes, pond and stream borders with floating vegetation and exposed mud.
Wood Duck	yes	Cavity in snag or nest box	Wooded swamp, bottomland slough, flooded forest, pond, marsh.
Mallard (Domestic type)	yes	Ground near water	Shallow pond, lake, marsh, flooded field.
Least Grebe (U)	yes	Over water on floating vegetation mat	Freshwater lakes, streams, ponds, and lagoons.
Neotropic Cormorant	yes	Shrub or ground, nest platform	Rivers, lakes, and marshes.
Great Blue Heron	yes	Tree or shrub, nest platform	Freshwater and brackish marshes, swamps, lakes, and rivers.
Great Egret	yes	Tree or shrub, nest platform	Marshes, swamps, irrigation ditches, fresh water margins.
Snowy Egret	yes	Tree or shrub, nest platform	Marshes, lakes, and ponds.
Little Blue Heron	yes	Tree or shrub, nest platform	Marshes, ponds, lakes, meadows, and streams.
Cattle Egret	yes	Tree or shrub, nest platform	Wet pastures, plowed fields, marshes, and lawns.
Green Heron	yes	Tree or shrub, nest platform, usually near or over water	Forested margins of ponds, rivers, lakes, marshes, and swamps.
Yellow-crowned Night-Heron (U)	yes	Tree or shrub, nest platform	Marshes, swamps, lakes, and lagoons.
White Ibis (U)	yes	Deciduous tree, nest platform, near water edge	Marshes, lakes, and estuaries.
White-faced Ibis	yes	Ground, shrub, or tree, nest platform, near water edge	Marshes, swamps, ponds, and rivers.
Black Vulture	yes	Cliff, stump, or ground, no nest	Open lowlands, avoids heavily forested areas.
Turkey Vulture	yes	Cave or hollow stump, no nest	Open habitats.
Red-shouldered Hawk	yes	Deciduous or conifer tree, nest platform	Riparian forest or wooded swamp.
Red-tailed Hawk	yes	Large deciduous tree, nest platform	Woodland and open country with scattered trees.
American Coot	yes	Over water in vegetation	Freshwater lakes, ponds, marshes, rivers.
Black-necked Stilt	yes	Variable, near shoreline or over water	Marshes, wet savannas, mud flats, shallow ponds and flooded fields.
Killdeer	yes	Variable, in open often far from water	Fields, meadows, pastures, mud flats, and freshwater margins.
Spotted Sandpiper	yes	Ground, scrape	Wide variety of habitats.
Rock Pigeon	no	Cliff, nest saucer	Cities, towns, rural areas near human habitations.
Inca Dove	yes	Shrub or ground, nest saucer	Woodland edge, open country with trees, and riparian thickets.
White-winged Dove	yes	Deciduous tree, nest saucer	Riparian woodland or thickets.
Mourning Dove	yes	Ground or deciduous tree, nest saucer	Open woodland and agricultural areas.
Yellow-billed Cuckoo	yes	Deciduous tree or shrub, nest platform	Open woodland with dense undergrowth.
Great Horned Owl	yes	Deciduous tree or cliff, uses abandoned nest	Deciduous forest and woodland, swamp, and riparian forest.
Barred Owl	yes	Cavity in snag	Dense deciduous forest, wooded swamp and river valleys.
Common Nighthawk	yes	Ground, no nest	Open and semiopen habitats, savanna, grassland, and field.
Chimney Swift	yes	Chimney or hollow tree, saucer	Woodland, open areas near human habitation.
Belted Kingfisher	yes	Bank or snag, cavity	Along watercourses.
Red-bellied Woodpecker	yes	Cavity in snag	Deciduous woodland, riparian forest.
Downy Woodpecker	yes	Cavity in snag	Deciduous woodland, riparian forest.
Crested Caracara (U)	yes	Shrub or deciduous tree, nest platform	Open country, brushland, pasture land, or cultivated areas.
Monk Parakeet (U)	no	Tree and utility lines, communal roost	Suburban areas and wetlands.
Eastern Phoebe	yes	Bridge, culvert, cliff, nest cup	Open and riparian woodlands, and farmland.
Great Crested Flycatcher	yes	Deciduous tree or snag, cavity	Deciduous forest edge or woodlands.
Western Kingbird	yes	Deciduous tree or shrub, nest cup	Savanna, dry open country, agricultural lands, riparian woodland.
Eastern Kingbird	yes	Deciduous tree or shrub, nest cup	Farmland, open or riparian woodland, forest edge.
Scissor-tailed Flycatcher	yes	Deciduous tree or shrub, nest cup	Open prairie, scrub, open country with scattered tree.
Loggerhead Shrike	yes	Shrub or tree, nest cup	Open fields with scattered trees and open woodland.
White-eyed Vireo	yes	Shrub or tree, nest cup	Brushy moist areas near streams, old fields with thickets, scrub in open forest.
Red-eyed Vireo (U)	yes	Shrub or tree, nest cup	Deciduous forest and woodland.
Blue Jay	yes	Tree or shrub, nest cup	Deciduous forest, open woodland, park, or residential area.
American Crow	yes	Tree or shrub, nest cup	Woodland, farmland, and riparian woodland.
Purple Martin	yes	Cavity in snag	Open country, savanna, rural areas, usually near water.
Tree Swallow (U)	yes	Cavity in snag	Open country, woodland edge, usually near water.
Bank Swallow	yes	Bank in burrow	Open country, savanna, especially near running water.
Barn Swallow	yes	Bridge, cliff, building, cup nest	Open country, savanna, especially near running water.
Cliff Swallow	yes	Bridge, cliff, building, gourd nest	Open country, savanna, especially near running water.
Cave Swallow	yes	Cave or culverts, cup nest	Open country, savanna, especially near running water.
Carolina Chickadee	yes	Cavity in snag or live tree	Deciduous woodland, swamps, and thickets.
Black-crested Titmouse (U)	yes	Cavity in snag or live tree	Forest, woodland, and parks.
Tufted x Black-crested Titmouse (hybrid)	yes	Cavity in snag or live tree	Forest, woodland, and parks.
Carolina Wren	yes	Roots or upturned tree or natural cavity	Open deciduous woodland.
Bewick's Wren (U)	yes	Roots or upturned tree or natural cavity	Open woodland, shrubland, farms, or suburbs.
Blue-gray Gnatcatcher	yes	Tree limb (live or snag), nest cup	Habitat generalist
Eastern Bluebird (U)	yes	Cavity of snag or live tree	Forest edge, burned woodland, open country with scattered trees.

Common Name	Protected Under MBTA	Nest Location and Type	Regional Breeding Habitat
Northern Mockingbird	yes	Shrub or tree, nest cup	Habitat generalist
European Starling	no	Cavity of tree	Habitat generalist
Black-and-white Warbler (U)	yes	Ground, nest cup	Decidious forest, especially on hillsides and in ravines.
Common Yellowthroat	yes	Shrub, nest cup	Overgrown fields, hedgerows, woodland margins, freshwater marshes.
Field Sparrow (U)	yes	Ground, sapling, or shrub, nest cup	Old fields, brush, decidious forest edge, or scrub.
Grasshopper Sparrow (U)	yes	Ground, nest cup	Grassland, cultivated fields, prairie, old fields, open savanna.
Summer Tanager (U)	yes	Tree, nest cup	Decidious forest, and open and riparian woodland.
Northern Cardinal	yes	Shrub or sapling, nest cup	Thickets, dense shrubs, undergrowth, and riparian thickets.
Indigo Bunting	yes	Tree, shrub, or vine tangle, nest cup	Decidious forest edge and clearings, open woodland, weedy fields, and shrub lands.
Painted Bunting	yes	Tree or shrub, nest cup	Areas of scattered brush and trees, riparian thickets, weedy and shrubby areas.
Dickcissel	yes	Ground or shrub, nest cup	Grassland, meadows, savanna, cultivated or abandoned fields.
Red-winged Blackbird	yes	Reeds, nest cup near or over water	Freshwater marshes, riparian habitats, and fields.
Eastern Meadowlark	yes	Ground, nest cup	Grassland, savanna, or fields.
Common Grackle	yes	Tree, shrub, marsh vegetation, tree cavity, nest cup	Partly open areas with scattered trees, open woodlands, around human habitation.
Great-tailed Grackle	yes	Tree, shrub, reeds, nest cup	Open areas with scattered trees, cultivated areas, pastures, and riparian thickets.
Brown-headed Cowbird	yes	Shrub or ground, nest parasite	Woodland, forest, forest edge, grassland.
Orchard Oriole (U)	yes	Shrub or tree, pendant	Scrub or open woodland
House Finch	yes	Shrub, tree, or building, cavity	Open woodland, urban areas, and cultivated lands.
Lesser Goldfinch (U)	yes	Shrub or tree, nest cup	Open habitats with scattered trees or brush, forest edge, fields, and suburban areas.
House Sparrow	no	Tree or building, cavity or globe	Cultivated lands, woodland and edge, around human habitation

(U) likely an uncommon breeder

## ITEM NO. 604S - SEEDING FOR EROSION CONTROL 8-18-10

## 604S.1 - Description

This item shall govern the preparation of a seed bed for temporary or permanent erosion control; sowing of seeds; fertilizing; mulching with straw, cellulose fiber wood chips, and recycled paper mulch; and other management practices along and across such areas as indicated in the Drawings or as directed by the Landscape Architect, Engineer or designated representative.

This specification is applicable for projects or work involving either inch-pound or SI units. Within the text, inch-pound units are given preference with SI units shown within parentheses.

Source: [Rule No. R161-14.29, 12-30-2014](#).

## 604S.2 - Submittals

The following submittal items are required in writing during construction:

- A. Identification of the seed species, source, mixture, and pure live seed (PLS) of the seed as listed on the analysis tags and certification tags from all seed bags. Seed calculation worksheet per Table 9. PLS is the percentage of seed purity multiplied by the percentage of germination, plus dormant seed. The analysis tag, required on all seed sold in Texas, includes information on quality: kind and variety of seed, lot number, percent pure live seed, percent other crop seed, percent inert matter, percent weed seeds, germination percentage, and date of test. The certification tag also verifies seed quality, an assurance of seed variety and attesting to standards for germination and purity. Information provided includes class of certification, kind of crop, variety, lot number, and name and address of the owner.
- B. If fertilizer is proposed, results of a recent soil test (6 months old or less) of the area to be seeded, before fertilization. Soil samples shall be collected after final grading, when topsoil has been placed. The test results must include soil lab recommended additions of Nitrogen (N), Phosphorus (P), and Potassium (K) for the type of vegetation proposed, as well as soil organic matter percentage and textural class.
- C. Fertilizer formulation and release rate based on a soil test (see B above).
- D. For hydromulch applications, proposed application rate of seed, type of mulch and tacking agent, and other relevant information. An example of the required documentation is in Table 1.
- E. Type of hydraulic seeding equipment and nozzles proposed for use.
- F. If pesticide use is proposed, an IPM plan for pest removal including pesticide label, proposed application rate and timing, and MSDS sheets.
- G. One gallon sample of proposed vegetative mulch.

The following submittal items are required before Substantial Completion:

- A. For hydromulch applications, the complete hydromulch application log, including date, time and quantity of product units placed in the slurry tank. An example of an application log is provided in Table 2. This log may be requested at any time during construction by the Landscape Architect, Engineer, or designated representative.
- B. Pesticide application tracking log. As of January 1, 2012, documentation of all outdoor pesticide use on city-owned properties is required to demonstrate compliance with the EPA/TCEQ mandated Municipal Stormwater Permit, the TPDES General Pesticide Permit, City Code, and the IPM program.

Table 1: Example of proposed hydromulch application rates

				Hydro Slurry Unit (per acre rates)				
Hydro Mix	Sheet No.	Seed Mix	Acres	Seed (Bags/AC)	Tackifier (Buckets/AC)	Mulch (Bales/AC)	Fertilizer (Bags/AC)	Addl. Amendments (Bags/AC)
1	L2	A	1.0	1	100	1000	50	5
2	L3	A	0.5	2	200	1500	50	5
3	L5	B	3.0	3	300	3000	50	5

Table 2: Example of hydromulch application log

						Hydro Slurry Unit (per acre rates)				
Date	Start Time	Finish Time	AC/Tank	Water (gal)	Seed Mix	Seed (Bags/AC)	Tackifier (Buckets/AC)	Mulch (Bales/AC)	Fertilizer (Bags/AC)	Addl. Amendments (Bags/AC)
4/13	10:30	11:15	1.0	3300	A	1	100	1000	50	5
4/17	2:00	2:30	0.5	3300	A	2	200	1500	50	5
5/20	8:30	10:00	1.2	3300	B	3	300	3000	50	5
					Totals	6	600	5500	127	15

Source: [Rule No. R161-14.29, 12-30-2014.](#)

## 604S.3. - Materials

- A. Seed. All seed must meet the requirements of the Texas Seed Law including the labeling requirements for showing PLS, name and type of seed, and all other required elements of the Analysis and Certification Tags.

The seed furnished shall be of the previous season's crop and the date of analysis shown on each bag shall be within twelve (12) months of the time of delivery to the project. Each variety of seed shall be furnished and delivered in separate bags or containers, unless a specific mix is proposed for use. A sample of each variety of seed shall be furnished for analysis and testing when directed by the Landscape Architect, Engineer or designated representative.

The amount of seed planted per square yard (0.84 square meters) or acre (hectare [ha]) shall be of the type specified in Sections 604S.5 and 604S.6.

- B. Water. Water shall be clean and free of industrial wastes and other substances harmful to the growth of plant material or the area irrigated.
- C. Topsoil. Topsoil shall conform to Item No. 601S.3(A).
- D. Fertilizer. The fertilizer shall conform to Item No. 606S, "Fertilizer". The type and rate of fertilizer should be based on chemical tests of recent (no older than 6 months before application) representative site soil samples. Fertilizer should be applied only when plants can take them up for growth, during: 1) seed germination and plant establishment and 2) after plant establishment. Fertilizer shall not be applied within 48 hours of a potential rain event.
- E. Straw Mulch or Hay Mulch. Straw Mulch shall be oat, wheat or rice straw. Hay mulch shall be prairie grass, or other hay approved by the Landscape Architect, Engineer or designated representative. The straw or hay shall be free of Johnson grass or other noxious weeds and foreign materials. It shall be kept in a dry condition and shall not be moldy or rotted.
- F. Tackifier. The tackifier shall be a biodegradable tacking agent, approved by the Landscape Architect, Engineer or designated representative.
- G. Cellulose Fiber Mulch (Natural Wood). Cellulose Fiber Mulch shall be natural cellulose fiber mulch produced from grinding clean whole wood chips. The mulch shall be designed for use in conventional mechanical planting, hydraulic planting of seed or hydraulic mulching of grass seed, either alone or with fertilizers and other additives. The mulch shall be such, that when applied, the material shall form a strong, moisture-retaining mat without the need of an asphalt binder.
- H. Recycled Paper Mulch. Recycled paper mulch shall be specifically manufactured from post-consumer paper and shall contain a minimum of 85% recycled paper content by weight, shall contain no more than 15% moisture and 1.6% ash, and shall contain no growth inhibiting material or weed seeds. The recycled paper mulch shall be mixed with grass seed and fertilizer (see "fertilizer" above) for hydro-seeding/mulching, erosion control, and a binder over straw mulch. The mulch, when applied, shall form a strong, moisture-retaining mat of a green color without the need of an asphalt binder.
- I. Mulch. Mulches, acting as seed coverings, can enhance seed germination and seedling establishment. Characteristics of ideal mulches for seeding are those that protect seeds from wind (drying), excessive solar radiation, high evapotranspiration rates, and erosion, while allowing germination and growth. Relatively coarsely shredded, weed-free vegetative mulch should be used on seed installations, especially in open, sunny areas. These materials shall be clean, free of foreign matter, and dry enough to spread evenly.
- J. Pesticide. A least toxic, integrated pest management (IPM) approach shall be used to control weeds. A written request for approval of weed control products and materials shall be submitted to the City of Austin IPM program coordinator (512-974-2581) for approval. Additional information can be found at <http://www.austintexas.gov/ipm>.

Source: [Rule No. R161-14.29, 12-30-2014.](#)

#### 604S.4 - Construction Methods

- A. General. The Contractor shall limit preparation of the seedbed to areas that will be seeded immediately. When seeding for permanent erosion control, weed species listed in Table 3 shall be managed by application of an appropriate herbicide and/or by physical removal by the roots before the seeding operation. The goal of weed management is to facilitate establishment of the permanent vegetative cover. Additionally, the Owner may require removal of any plant species that appears to be out-competing seeded or planted species during the construction period.

Table 3: Weed List

Weed Type	Botanical Name	Common Name
Annual Grass	Cenchrus spp.	Sandbur
Herb	Cnidoscolus texanus	Bull Nettle
Herb	Urtica spp.	Stinging Nettle
Vine	Toxicodendron radicans	Poison Ivy
Perennial Grass	Sorghum halapense	Johnson Grass
Perennial Grass	Arundo donax	Giant Cane
Perennial Grass	Phyllostachys aurea	Golden Bamboo
Summer Annual Herb	Ambrosia trifida	Ragweed
Winter Annual Herb	Rapistrum rugosum	Bastard Cabbage
Winter Annual Herb	Bromus arvensis	Japanese Brome
Winter Annual Herb	Lolium multiflorum	Annual Ryegrass

- B. Preparing Seed Bed. After the designated areas have been rough graded to the lines, grades and typical sections indicated in the Drawings or as provided for in other items of this contract and for any other soil area disturbed by the construction, a suitable seedbed shall be prepared. The seedbed shall consist of a minimum of either 6 inches (150 millimeters) of approved topsoil or 6 inches (150 millimeters) of approved salvaged topsoil

The topsoil or growing medium must be prepared so that compaction is appropriate for plant growth, and to achieve acceptable bulk density or hydrologic function. Rippers and subsoilers may be used to loosen compacted soil and roughen the surface. Disks, plows and excavator attachments are good for compaction reduction, roughening and incorporating amendments. A roughened soil surface of micro-ridges and valleys is an optimal seed bed with a microenvironment of increased moisture, higher humidity, wind protection, and shelter from the sun for seeds. If tracked machinery is used in seedbed preparation, cleat marks should run with the contour to prevent rills. The optimum depth for seeding shall be ¼ inch (6 millimeters).

Water shall be gently applied as required to prepare the seedbed prior to the planting operation either by broadcast seeding or hydraulic planting. Seeding shall be performed in accordance with the requirements described below.

- C. Watering. All watering shall comply with City Code Chapter 6-4 (Water Conservation). All seeded areas regardless of seed type and method of seeding (e.g., broadcast, hydroseed) shall be watered immediately after installation. For seed germination and establishment it is important to keep the seedbed in a moist condition favorable for the growth of plant materials.

Watering applications shall constantly maintain the seedbed in a moist condition favorable for the growth of plant materials. Watering shall continue until the plant material is at least 1 -1/2 inches (40 mm) in height and accepted by the Landscape Architect, Engineer or designated representative. Supplemental watering can be postponed immediately after a half-inch (12.5 mm) or greater rainfall on the site but shall be resumed before the soil dries out.

- D. Cool Season Cover Crop. From September 15 to March 1, non-native and native seeding shall include a cool season cover crop at the rate specified in Table 8. Cool season cover crops are not permanent erosion control. If installed separately from the permanently erosion control seed mix, the cool season cover crops shall be mowed to a height of less than one (1) inch after March 1, and the area shall be re-seeded at the specified seeding rate for non-native or native warm-season species (March 1 to September 15).

Source: [Rule No. R161-14.29, 12-30-2014.](#)

#### 604S.5 - Non-Native Seeding

- A. Method A - Broadcast Seeding. The seed or seed mixture in the quantity specified shall be uniformly distributed over the prepared seed bed areas indicated on the Drawings or where directed by the Engineer or designated representative. If the sowing of seed is by hand, rather than by mechanical methods, the seed shall be sown in two directions at right angles to each other. If mechanical equipment is used, all varieties of seed, as well as fertilizer (if required), may be distributed at the same time, provided that each component is uniformly applied at the specified rate. After planting, the planted area shall be rolled with a corrugated roller of the "Cultipacker" type. All rolling of the slope areas shall be on the contour.

#### Seed Mixture and Rate of Application for Broadcast Seeding:

From March 1 to September 15, seeding shall be with hulled Bermuda Grass at a rate of at least 45 lbs/AC (5.0 kilograms per hectare ) with a minimum PLS = 0.83. Fertilizer shall be applied if warranted by a soil test, and shall conform to Item No. 606S, "Fertilizer". Bermuda grass is a warm-season grass and is therefore considered permanent erosion control once established.

Method B - Hydraulic Planting. The seedbed shall be prepared as specified above and hydraulic planting equipment, which is capable of placing all materials in a single operation, shall be used. Information about hydromulching for temporary and permanent vegetation stabilization is in the Environmental Criteria Manual (ECM) Section 1.4.7. Hydroseeding equipment shall be clean and free of all previous seeds, fertilizer, mulch, or any hydroseeding products used on prior jobs.

From March 1 to September 15.

Hydraulic planting mixture and minimum rate of application pounds per acre or square yard (kilograms per ha):

Hulled Bermuda Seed (min. PLS=0.83)	Fiber Mulch		Soil Tackifier
	Cellulose	Wood	
45 lbs/AC (50.44 kg/ha)	2000 lbs/AC (2242 kg/ha)		60.98 lbs/AC (68.36 kg/ha)
		2500 lbs/AC (2803 kg/ha)	65.34 lbs/AC (73.25 kg/ha)

Source: [Rule No. R161-14.29, 12-30-2014.](#)

604S.6 - Native Grass and Forb Seeding

The seed mixture shall include a diversity of grasses and wildflowers. The grass mix shall be seeded at a rate of at least 131 lb/AC (146.85 lb/ha) and shall include a minimum of 8 species from Table 4 (dry, open sites) or 6 species from Table 5 (wet, open sites). The species indicated with an asterisk shall be included in all proposed mixes. No species shall constitute more than 20% of a seed mix. Any species proposed for installation and not included in Tables 4 or 5 shall be approved by a landscape architect or other qualified landscape professional, and shall be native to Central Texas as referenced by the LBJ Wildflower Center plant database ([www.wildflower.org](http://www.wildflower.org)) or USDA plant database.

Table 4: Native Grasses: Dry, Open Sites

Common Name	Botanical Name	Exposure	Application Rates	
			Lbs/AC	kg/ha
Sideoats grama*	<i>Bouteloua curtipendula</i>	Full-pt sun	7.0	7.8
Green sprangletop*	<i>Leptochloa dubia</i>	Full sun	6.0	6.7
Buffalograss	<i>Buchloe dactyloides</i>	Full sun	24.0	27.0
Blue Grama Grass	<i>Bouteloua gracilis</i>	Full-pt sun	10.0	11.2
Canada Wild Rye	<i>Elymus canadensis</i>	Full-pt sun	10.0	11.2

Purple Three-Awn*	<i>Aristida purpurea</i>	Full sun	4.0	4.5
Cane Bluestem	<i>Bothriochloa barbinodis</i>	Full sun	3.0	3.3
Galleta	<i>Pleuraphis jamesii</i>	Full sun	10.0	11.2
Black Grama*	<i>Bouteloua eripoda</i>	Full sun	10.0	11.2
Sand Dropseed*	<i>Sporobolus cryptandrus</i>	Full sun	1.0	1.1
Alkali Sacaton	<i>Sporobolus airoides</i>	Full sun	0.5	1.7
Curly Mesquite	<i>Hilaria belangeri</i>	Full sun	2.0	2.2
Sand Lovegrass	<i>Eragrostis trichodes</i>	Full sun	2.0	2.2
*These species must be included in the mix, plus an additional three (3) species from the list or other approved species, for a total of eight (8) species.				

Table 5: Native Grasses: Wet, Open Sites

Common Name	Botanical Name	Exposure	Application Rates	
			Lbs/AC	Kg/ha
White Tridens	<i>Tridens albescens</i>	Full-pt sun	0.5	0.56
Plains Bristlegrass	<i>Setaria leucopila</i>	Full-pt sun	6.0	6.7
Switchgrass	<i>Panicum virgatum</i>	Full-pt sun	4.0	4.5
Inland Sea Oats	<i>Chasmanthium latifolium</i>	Shade	12.0	13.5
Canada Wild Rye	<i>Elymus canadensis</i>	Full sun - shade	10.0	11.2
Big Bluestem	<i>Andropogon gerardii</i>	Full sun	4.0	4.5

Bushy Bluestem	Andropogon glomeratus	Full sun	3.0	3.4
Green Sprangletop*	Leptochloa dubia	Full sun	2.0	2.2
Eastern Gamagrass	Tripsacum dactyloides	Full sun - shade	3.0	3.4
*This species must be included in the mix, plus an additional five (5) species from the list or other approved species, for a total of six (6) species.				

The native forb mix shall be seeded at a rate of at least 65.34 lbs/AC (73.25 kg/ha) and shall include a minimum of two legumes and eight (8) other forbs from Table 6 (open, dry sites) or a minimum of two legumes and five (5) species of forbs from Table 7 (open, wet sites).

Table 6: Native Forbs: Dry, Open Sites

Common Name	Botanical Name	Exposure	Application Rates	
			Lbs/AC	kg/ha
Black-Eyed Susan	Rudbeckia hirta	Full-pt sun; dappled shade	2.0	2.2
Illinois Bundleflower*	Desmanthus illinoensis (legume)	Full-pt sun; dappled shade	15.0	16.8
Scarlet Sage	Salvia coccinea	Full-pt sun; dappled shade	8.0	9.0
Pink Evening Primrose	Oenothera speciosa	Full-pt sun; dappled shade	1.0	1.1
Drummond Phlox	Phlox drummondii	Full-pt sun	8.0	9.0
Plains Coreopsis	Coreopsis tinctoria	Full-pt sun	2.0	2.2
Greenthread	Thelesperma filifolium	Full sun	6.0	6.7
Purple Prairie Clover*	Dalea purpurea (legume)	Full sun	4.0	4.5
Cutleaf Daisy	Engelmannia pinnatifida	Full-pt sun; dappled shade	18.0	20.1
Partridge Pea*	Chamaecrista fasciculate (legume)	Full-pt sun	20.0	22.4

Indian Blanket	Gaillardia pulchella	Full-pt sun	10.0	11.2
Bluebonnet*	Lupinus texensis (legume)	Full sun	20.0	22.4
Mexican Hat	Ratibida columnaris	Full-pt sun	2.0	2.2
Maximilian Sunflower	Helianthus maximiliani	Full-pt sun	5.0	5.6
Prairie Coneflower	Ratibida columnifera	Full-pt sun	2.0	2.2
Clasping Coneflower	Dracopis amplexicaulis	Full-pt sun	3.0	3.4
Purple Coneflower	Echinacea purpurea	Full-pt sun; dappled shade	10.0	11.2
Lemon Mint	Monarda citriodora	Full-pt sun	3.0	3.4
Huisache Daisy	Amblyolepis setigera	Full-pt sun	8.0	9.0
Texas Yellow Star	Lindheimera texana	Full-pt sun	12.0	13.5
Lanceleaf Coreopsis	Coreopsis lanceolata	Full-pt sun; dappled shade	10.0	11.2
Bush Sunflower	Simsia calva	Full-pt sun	3.0	3.4
Winecup	Callirhoe involucrata	Full-pt sun; dappled shade	5.0	5.6
*These species must be included in the mix.				

Table 7: Native Forbs: Wet, Open Sites

Common Name	Botanical Name	Exposure	Application Rates	
			Lbs/AC	kg/ha
American Basketflower	Centaurea americana	Full sun	10.0	11.2

Antelope Horns	<i>Asclepias asperula</i>	Full sun	7.0-12.0	7.8-13.4
Green Antelope Horns	<i>Asclepias viridis</i>	Full sun	7.0-12.0	7.8-13.4
Blue Mistflower	<i>Conoclinium coelestinum</i>	Full-pt sun	0.5	0.6
Clasping Coneflower	<i>Dracopsis amplexicaulis</i>	Full-pt sun	3.0	3.4
Maximilian Sunflower	<i>Helianthus maximiliani</i>	Full-pt sun	4.0	4.5
Prairie Blazing Star	<i>Liatris pycnostachya</i>	Full sun	2.0	2.2
Pink Evening Primrose	<i>Oenothera speciosa</i>	Full sun-dappled shade	1.0	1.1
Mexican Hat	<i>Ratibida columnifera</i>	Full-pt sun	2.0	2.2
Black-eyed Susan	<i>Rudbeckia hirta</i>	Full sun-dappled shade	2.0	2.2
Illinois Bundleflower	<i>Desmanthus illinoensis</i> (legume)	Full sun-dappled shade	15.0	16.8
Obedient Plant	<i>Physostegia virginiana</i>	Full sun-dappled shade	4.0	4.5
Partridge Pea*	<i>Camaecrista fasciculata</i> (legume)	Full-pt sun	20.0	22.4
Purple Prairie Clover	<i>Dalea purpurea</i> var <i>purpurea</i> (legume)	Full sun	4.0	4.5
Pitcher Sage	<i>Salvia azurea</i>	Full-pt sun	3.0	3.4
Showy Tick Trefoil	<i>Desmodium canadense</i>	Full sun	0.5	0.6
Winecup*	<i>Callirhoe involucrata</i>	Full-pt sun	5.0	5.6

\*This specie must be included in the mix.

Table 8: Cool Season Cover Crop

Common Name	Botanical Name	Exposure	Application rates	
			Lbs/AC	kg/ha
Western Wheatgrass	Pascopyrum smithii	Full-pt sun; dappled shade	5.6	6.28
Oats	Avena sativa	Full sun	4.0	4.48
Cereal Rye Grain	Secale cereale	Full sun	34.0	38.11

One cover crop species of the listed species is required to be planted between September 15 to March 1. Contractor must ensure that any seed application requiring a cool season cover crop does not utilize annual ryegrass (*Lolium multiflorum*) or perennial ryegrass (*Lolium perenne*). Only cereal rye grain (*Secale cereale*), oats (*Avena sativa*) and western wheatgrass (*Pascopyrum smithii*) are approved as cool season cover crop.

Species substitution as necessary due to availability shall be approved by the Landscape Architect, Engineer or designated representative. Watering and fertilizer application shall follow procedures outlined above or as otherwise specified on the Drawings.

Seed shall be applied by broadcast, hydromulch, blown compost, or drill method and shall be distributed evenly over the topsoil areas. Mulching shall immediately follow seed application for broadcast and hydromulch applications.

**Seed Rate Calculations**

The amount of seed needed to be planted on a project shall be calculated before installation to ensure adequate seed is placed, and provided as a submittal. Table 9 is an example worksheet, followed by an example calculation. Information for calculation can be obtained from seed tags or the supplier.

Table 9. Seed Calculation Worksheet

Plant Group	Desired Seeding Rate (lbs/AC)	PLS (pure live seed)	Bulk Rate (lbs/AC)	Seeding Area (AC)	Amt. of Seed to be Installed (lbs)
Grasses					

Forbs					
TOTAL					

**FORMULAS:**

PLS (pure live seed) = (Purity × Germination) × 100. Can also use average PLS from seed tags.

Bulk Rate (lbs/AC) =Desired Seed Rate (lbs/AC)/PLS

Amt. of Seed to be Installed (lbs) = Bulk Rate (lbs/AC) × Seeding Area (AC)

Example:

Plant Group	Desired Seeding Rate (lbs/AC)	PLS [pure live seed] (% decimal)	Bulk Rate (lbs/AC)	Seeding Area (AC)	Amt. of Seed to be Installed (lbs)
Grasses	131.00	0.81	161.73	1.50*	242.60
Forbs	65.34	0.87	75.10	1.50*	112.70
TOTAL	196.34	0.84 (ave.)	236.83	1.50	355.30

\*applied over the same 1.5 AC area

Source: [Rule No. R161-14.29, 12-30-2014.](#)

**604S.7 - Mulch**

Mulches may be used to help prevent soil erosion until final stabilization is achieved. Mulch shall be used to cover broadcasted seeds, especially in sunny, open areas, to protect them from drying out during germination.

**A. Straw Mulch.**

Straw mulch shall be spread uniformly over the area indicated or as designated by the Engineer or designated representative at the rate of 2 to 2½ tons of straw per acre (4.5 to 5.6 megagrams of straw per hectare). The actual rate of application will be designated by the Landscape Architect, Engineer or designated representative. Straw may be hand or machine placed and adequately secured.

**B. Hydromulch.**

Refer to ECM Section 1.4.7 for hydromulching applications.

C. Shredded Brush Mulch.

Small brush or tree limbs, which have been shredded, may be used for mulching Native Grass seeding.

Source: [Rule No. R161-14.29, 12-30-2014](#).

604S.8 - Management Practices

Management Practices include (1) weed management (pesticide application or mechanical removal) to so that 90 percent of the revegetation area is free of weeds listed in Table 3, and (2) reseeding areas of poor germination to achieve coverage and height per 604S.9, with no bare areas greater than 16 s.f.

Ninety (90) percent of a permanent revegetation area must be free of weeds listed in Table 3. Weeds shall be controlled in the most efficient manner possible. Management of weed species should begin early in the project, before seeding for permanent control, and extend into plant establishment, especially for perennial weeds. Manual removal or application of an appropriate herbicide may be required after the initial seeding if emergence of an annual weed species threatens establishment of sufficient preferred plant cover. Disturbance due to weed management after the initial seeding may necessitate re-seeding of the area to establish sufficient preferred plant coverage. Care should be taken to temporarily stabilize areas where physical removal of weeds has been performed to prevent erosion and sediment runoff.

The entire root system of perennial weeds shall be removed to prevent re-sprouting. Weeds may be controlled with an approved contact, systemic herbicide, provided the product is used with appropriate care and is applied in accordance with label instructions and the following guidelines:

1. Herbicide shall not be applied when the wind is greater than 8 mph (12.9 kph),
2. Herbicide shall not be applied when rainfall is expected within 24 hours,
3. Herbicide shall not contact surface water, i.e. creeks, rivers, and lakes,
4. Herbicide shall not contact desirable vegetation (a wicking method shall be used, if necessary, to accurately contact target weed only during application).

The Landscape Architect, Engineer or designated representative shall be consulted to determine appropriate weed control management when weeds are located in an environmentally sensitive location (e.g. near water or adjacent to a critical environmental feature).

At locations that fail to show an acceptable stand of planting for any reason during the initial seeding, repair and/or reseed locations as determined by the Landscape Architect, Engineer or designated representative. A successful stand of grasses and forbs for erosion control should exhibit the following:

- Seedlings with vigorous green foliage;
- Green leaves remaining throughout the summer, at least at the plant bases;
- Uniform density, with grasses and/or forbs well intermixed;
- Minimum of 95% cover; and
- No exposed soil greater than 16 s.f. in aerial extent.

The Contractor shall meet the requirements of the initial seeding, including seeding method, seed mix, and application rates, unless otherwise agreed to in writing by the Owner. Corrected deficiencies will be re-inspected and approved by the Owner, and final acceptance will be granted upon satisfactory completion.

Source: [Rule No. R161-14.29, 12-30-2014.](#)

#### 604S.9 - Measurement

Work and acceptable material for Seeding for Erosion Control will be measured by the square yard (meter: 1 meter equals 1.196 square yards) or by the acre (hectare: 1 hectare equals 2.471 acres), complete in place, with a minimum of 95 percent total coverage for the non-native mix, and 95 percent coverage for the native mix. Bare areas shall not exceed 16 square feet (1.5 square meters), and the average height of vegetation shall stand at a minimum of 1½ inch (40 millimeters). Ninety (90) percent of the revegetated area must be free of weeds listed in Table 3. Bare areas greater than 16 s.f. shall be re-prepared and reseeded as required to develop an acceptable stand of plant material.

Source: [Rule No. R161-14.29, 12-30-2014.](#)

#### 604S.10 - Payment

The work performed and materials furnished and measured will be paid for at the unit bid price for Seeding for Erosion Control of the method specified on the Drawings and type of mulch. The unit bid price shall include full compensation for furnishing all materials, including all topsoil, water, seed, tackifier, fertilizer or mulch and for performing all operations necessary to complete the work.

All fertilizer will be measured and paid for conforming to Item No. 606S, "Fertilizer".

Payment will be made under one of the following:

Pay Item No. 604S-A:	Non-Native Seeding for Erosion Control Method, Hydraulic Planting Per Square Yard
Pay Item No. 604S-B:	Non-Native Seeding for Erosion Control, Broadcast Seeding, Per Square Yard
Pay Item No. 604S-C:	Non-Native Seeding for Erosion Control Method, Hydraulic Planting Per Acre
Pay Item No. 604S-D:	Native Seeding for Erosion Control Method, Hydraulic Planting Per Square Yard
Pay Item No. 604S-E:	Native Seeding for Erosion Control, Broadcast Seeding, Per Square Yard
Pay Item No. 604S-F:	Native Seeding for Erosion Control Method, Hydraulic Planting Per Acre
Pay Item No. 604S-G:	Mulch, Per Square Yard
Pay Item No. 604S-H:	Mulch, Per Acre
Pay Item No. 604S-I:	Topsoil and Seedbed Preparation, Per Square Yard
Pay Item No. 604S-J:	Topsoil and Seedbed Preparation, Per Acre

Pay Item No. 604S-K:	Watering, Per 1000 gal (Kgal)
Pay Item No. 604S-L:	Management Practices, Per Square Yard
Pay Item No. 604S-M:	Management Practices, Per Acre

End

SPECIFIC CROSS REFERENCE MATERIALS	
Specification Item 604S "Seeding for Erosion Control"	
City of Austin Technical Specifications	
Designation	Description
Item No. 130S	Borrow
Item No. 601S	Salvaging and Placing Topsoil
Item No. 606S	Fertilizer
City of Austin Land Development Code	
Designation	Description
Section 6-4	Water Conservation

RELATED CROSS REFERENCE MATERIALS	
Specification Item 604S "Seeding for Erosion Control"	

City of Austin Technical Specifications	
Designation	Description
Item No. 601S	Salvaging and Placing Topsoil
Item No. 602S	Sodding for Erosion Control
Item No. 605S	Soil Retention Blanket
Item No. 607S	Slope Stabilization
Item No. 608S	Planting
City of Austin Standards (Details)	
Designation	Description
627S-1	Grass Lined Swale
633S-1	Landgrading
Texas Department of Transportation: Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges	
Designation	Description
Item No. 160	Topsoil
Item No. 162	Sodding for Erosion Control
Item No. 164	Seeding for Erosion Control
Item No. 166	Fertilizer
Item No. 168	Vegetative Watering
Item No. 169	Soil Retention Blanket

Item No. 180	Wildflower Seeding
Item No. 192	Landscape Planting

# American National Standard for Tree Care Operations –

## Tree, Shrub, and Other Woody Plant Maintenance – Standard Practices (Pruning)

### 1 ANSI A300 standards

#### 1.1 Scope

ANSI A300 standards present performance standards for the care and maintenance of trees, shrubs, and other woody plants.

#### 1.2 Purpose

ANSI A300 standards are intended as guides for federal, state, municipal and private authorities including property owners, property managers, and utilities in the drafting of their maintenance specifications.

#### 1.3 Application

ANSI A300 standards shall apply to any person or entity engaged in the business, trade, or performance of repairing, maintaining, or preserving trees, shrubs, or other woody plants.

#### 1.4 Implementation

Specifications for tree maintenance should be written and administered by an arborist.

### 2 Part 1 – Pruning standards

#### 2.1 Purpose

The purpose of this document is to provide standards for developing specifications for tree pruning.

#### 2.2 Reasons for pruning

The reasons for tree pruning may include, but are not limited to, reducing risk, maintaining or improving tree health and structure, improving aesthetics, or satisfying a specific need. Pruning practices for agricultural, horticultural production, or silvicultural purposes are exempt from this standard.

#### 2.3 Safety

**2.3.1** Tree maintenance shall be performed only by arborists or arborist trainees who, through related training or on-the-job experience, or both, are familiar with the practices and hazards of arboriculture and the equipment used in such operations.

**2.3.2** This standard shall not take precedence over arboricultural safe work practices.

**2.3.3** Operations shall comply with applicable Occupational Safety and Health Administration (OSHA) standards, ANSI Z133.1, as well as state and local regulations.

### 3 Normative references

The following standards contain provisions, which, through reference in the text, constitute provisions of this American National Standard. All standards are subject to revision, and parties to agreements based on this American National Standard shall apply the most recent edition of the standards indicated below.

ANSI Z60.1, *Nursery stock*

ANSI Z133.1, *Tree care operations - Pruning, trimming, repairing, maintaining, and removing trees, and cutting brush - Safety requirements*

29 CFR 1910, General industry <sup>1)</sup>

29 CFR 1910.268, Telecommunications <sup>1)</sup>

29 CFR 1910.269, Electric power generation, transmission, and distribution <sup>1)</sup>

29 CFR 1910.331 - 335, Electrical safety-related work practices <sup>1)</sup>

### 4 Definitions

**4.1 anvil-type pruning tool:** A pruning tool that

## ANSI A300 (Part 1)-2001 Pruning

has a sharp straight blade that cuts against a flat metal cutting surface, in contrast to a *hook-and-blade-type pruning tool* (4.21).

**4.2 apical dominance:** Inhibition of growth of lateral buds by the terminal bud.

**4.3 arboriculture:** The art, science, technology, and business of commercial, public, and utility tree care.

**4.4 arborist:** An individual engaged in the profession of arboriculture who, through experience, education, and related training, possesses the competence to provide for or supervise the management of trees and other woody plants.

**4.5 arborist trainee:** An individual undergoing on-the-job training to obtain the experience and the competence required to provide for or supervise the management of trees and other woody plants. Such trainees shall be under the direct supervision of an arborist.

**4.6 branch bark ridge:** The raised area of bark in the branch crotch that marks where the branch and parent meet.

**4.7 branch collar:** The swollen area at the base of a branch.

**4.8 callus:** Undifferentiated tissue formed by the cambium around a wound.

**4.9 cambium:** The dividing layer of cells that forms sapwood (xylem) to the inside and inner bark (phloem) to the outside.

**4.10 cleaning:** Selective pruning to remove one or more of the following parts: dead, diseased, and/or broken branches (5.6.1).

**4.11 climbing spurs:** Sharp, pointed devices affixed to a climber's boot used to assist in climbing trees. (syn.: gaffs, hooks, spurs, spikes, climbers)

**4.12 closure:** The process of woundwood covering a cut or other tree injury.

**4.13 crown:** The leaves and branches of a tree measured from the lowest branch on the trunk to the top of the tree.

**4.14 decay:** The degradation of woody tissue

caused by microorganisms.

**4.15 espalier:** The combination of pruning, supporting, and training branches to orient a plant in one plane (5.7.2).

**4.16 establishment:** The point after planting when a tree's root system has grown sufficiently into the surrounding soil to support shoot growth and anchor the tree.

**4.17 facility:** A structure or equipment used to deliver or provide protection for the delivery of an essential service, such as electricity or communications.

**4.18 final cut:** A cut that completes the removal or reduction of a branch or stub.

**4.19 frond:** A leaf of a palm.

**4.20 heading:** 1. Cutting a currently growing, or a 1-year-old shoot, back to a bud. 2. Cutting an older branch or stem back to a stub in order to meet a defined structural objective. 3. Cutting an older branch or stem back to a lateral branch not large enough to assume apical dominance in order to meet a defined structural objective. Heading may or may not be an acceptable pruning practice, depending on the application.

**4.21 hook-and-blade-type pruning tool:** A pruning tool that has a sharp curved blade that overlaps a supporting hook; in contrast to an *anvil-type pruning tool* (4.1). (syn.: by-pass pruner)

**4.22 interfering branches:** Crossing, rubbing, or upright branches that have the potential to damage tree structure and/or health.

**4.23 internodal cut:** A cut located between lateral branches or buds.

**4.24 lateral branch:** A shoot or stem growing from a parent branch or stem.

**4.25 leader:** A dominant or co-dominant, upright stem.

**4.26 limb:** A large, prominent branch.

**4.27 lion's tailing:** The removal of an excessive number of inner, lateral branches from parent

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branches. Lion's tailing is not an acceptable pruning practice (5.5.7).

**4.28 mechanical pruning:** A utility pruning technique where large-scale power equipment is used to cut back branches (5.9.2.2).

**4.29 parent branch or stem:** A tree trunk, limb, or prominent branch from which shoots or stems grow.

**4.30 peeling:** *For palms:* The removal of only the dead frond bases at the point they make contact with the trunk without damaging living trunk tissue. (syn.: shaving)

**4.31 petiole:** A stalk of a leaf or frond.

**4.32 phloem:** Inner bark conducting tissues that transport organic substances, primarily carbohydrates, from leaves and stems to other parts of the plant.

**4.33 pollarding:** The maintenance of a tree by making internodal cuts to reduce the size of a young tree, followed by the annual removal of shoot growth at its point of origin (5.7.3).

**4.34 pruning:** The selective removal of plant parts to meet specific goals and objectives.

**4.35 qualified line-clearance arborist:** An individual who, through related training and on-the-job experience, is familiar with the equipment and hazards in line clearance and has demonstrated the ability to perform the special techniques involved. This individual may or may not be currently employed by a line-clearance contractor.

**4.36 qualified line-clearance arborist trainee:** An individual undergoing line-clearance training and who, in the course of such training, is familiar with the hazards and equipment involved in line clearance and has demonstrated ability in the performance of the special techniques involved. This individual shall be under the direct supervision of a qualified line-clearance arborist.

**4.37 raising:** Selective pruning to provide vertical clearance (5.6.3).

**4.38 reduction:** Selective pruning to decrease height and/or spread (5.6.4).

**4.39 remote/rural areas:** Locations associated

with very little human activity, land improvement, or development.

**4.40 restoration:** Selective pruning to improve the structure, form, and appearance of trees that have been severely headed, vandalized, or damaged (5.7.4).

**4.41 shall:** As used in this standard, denotes a mandatory requirement.

**4.42 should:** As used in this standard, denotes an advisory recommendation.

**4.43 stub:** An undesirable short length of a branch remaining after a break or incorrect pruning cut is made.

**4.44 thinning:** Selective pruning to reduce density of live branches (5.6.2).

**4.45 throwline:** A small, lightweight line with a weighted end used to position a climber's rope in a tree.

**4.46 topping:** The reduction of a tree's size using heading cuts that shorten limbs or branches back to a predetermined crown limit. Topping is not an acceptable pruning practice (5.5.7).

**4.47 tracing:** The removal of loose, damaged tissue from in and around the wound.

**4.48 urban/residential areas:** Locations, such as populated areas including public and private property, that are normally associated with human activity.

**4.49 utility:** An entity that delivers a public service, such as electricity or communications.

**4.50 utility space:** The physical area occupied by a utility's facilities and the additional space required to ensure its operation.

**4.51 vista pruning:** Selective pruning to allow a specific view (5.7.5).

**4.52 watersprouts:** New stems originating from epicormic buds. (syn.: epicormic shoots)

**4.53 wound:** An opening that is created when the bark of a live branch or stem is penetrated, cut, or removed.

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**4.54 woundwood:** Partially differentiated tissue responsible for closing wounds. Woundwood develops from callus associated with wounds.

**4.55 xylem:** Wood tissue. Active xylem is sapwood; inactive xylem is heartwood.

**4.56 young tree:** A tree young in age or a newly transplanted tree.

## 5 Pruning practices

### 5.1 Tree inspection

**5.1.1** An arborist or arborist trainee shall visually inspect each tree before beginning work.

**5.1.2** If a condition is observed requiring attention beyond the original scope of the work, the condition should be reported to an immediate supervisor, the owner, or the person responsible for authorizing the work.

### 5.2 Tools and equipment

**5.2.1** Equipment and work practices that damage living tissue and bark beyond the scope of the work should be avoided.

**5.2.2** Climbing spurs shall not be used when climbing and pruning trees.

#### Exceptions:

- when limbs are more than throwline distance apart and there is no other means of climbing the tree;
- when the bark is thick enough to prevent damage to the cambium;
- in remote or rural utility rights-of-way.

### 5.3 Pruning cuts

**5.3.1** Pruning tools used in making pruning cuts shall be sharp.

**5.3.2** A pruning cut that removes a branch at its point of origin shall be made close to the trunk or parent limb, without cutting into the branch bark ridge or collar, or leaving a stub (see Figure 5.3.2).

**5.3.3** A pruning cut that reduces the length of a branch or parent stem should bisect the angle between its branch bark ridge and an imaginary line perpendicular to the branch or stem (see Figure 5.3.3).

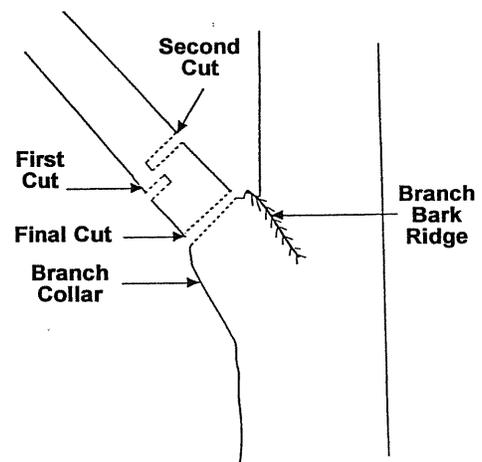
**5.3.4** The final cut shall result in a flat surface with adjacent bark firmly attached.

**5.3.5** When removing a dead branch, the final cut shall be made just outside the collar of living tissue.

**5.3.6** Tree branches shall be removed in such a manner so as not to cause damage to other parts of the tree or to other plants or property. Branches too large to support with one hand shall be precut to avoid splitting of the wood or tearing of the bark (see Figure 5.3.2). Where necessary, ropes or other equipment shall be used to lower large branches or portions of branches to the ground.

**5.3.7** A final cut that removes a branch with a narrow angle of attachment should be made from the outside of the branch to prevent damage to the parent limb (see Figure 5.3.7).

**5.3.8** Severed limbs shall be removed from the crown upon completion of the pruning, at times when the tree would be left unattended, or at the end of the workday.



**Figure 5.3.2.** – A pruning cut that removes a branch at its point of origin shall be made close to the trunk or parent limb, without cutting into the branch bark ridge or collar, or leaving a stub. Branches too large to support with one hand shall be precut to avoid splitting of the wood or tearing of the bark.

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### 5.4 Wound treatment

5.4.1 Wound treatments should not be used to cover wounds or pruning cuts, except when recommended for disease, insect, mistletoe, or sprout control, or for cosmetic reasons.

5.4.2 Wound treatments that are damaging to tree tissues shall not be used.

5.4.3 When tracing wounds, only loose, damaged tissue should be removed.

### 5.5 Pruning objectives

5.5.1 Pruning objectives shall be established prior to beginning any pruning operation.

5.5.2 To obtain the defined objective, the growth cycles and structure of individual species and the type of pruning to be performed should be considered.

5.5.3 Not more than 25 percent of the foliage should be removed within an annual growing season. The percentage and distribution of foliage to be removed shall be adjusted according to the plant's species, age, health, and site.

5.5.4 Not more than 25 percent of the foliage of a branch or limb should be removed when it is cut back to a lateral. That lateral should be large enough to assume apical dominance.

5.5.5 Pruning cuts should be made in accordance with 5.3 *Pruning cuts*.

5.5.6 Heading should be considered an acceptable practice for shrub or specialty pruning when needed to reach a defined objective.

5.5.7 Topping and lion's tailing shall be considered unacceptable pruning practices for trees.

### 5.6 Pruning types

Specifications for pruning should consist of, but are not limited to, one or more of the following types:

5.6.1 **Clean:** Cleaning shall consist of selective pruning to remove one or more of the following parts: dead, diseased, and/or broken branches.

5.6.1.1 Location of parts to be removed shall be specified.

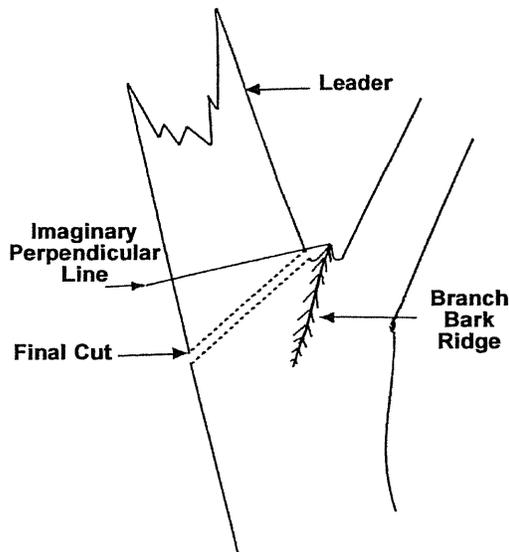


Figure 5.3.3. – A pruning cut that reduces the length of a branch or parent stem should bisect the angle between its branch bark ridge and an imaginary line perpendicular to the branch or stem.

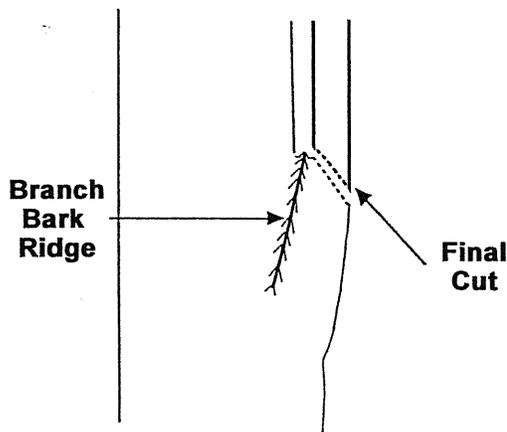


Figure 5.3.7. – A final cut that removes a branch with a narrow angle of attachment should be made from the outside of the branch to prevent damage to the parent limb.

## ANSI A300 (Part 1)-2001 Pruning

**5.6.1.2** Size range of parts to be removed shall be specified.

**5.6.2 Thin:** Thinning shall consist of selective pruning to reduce density of live branches.

**5.6.2.1** Thinning should result in an even distribution of branches on individual limbs and throughout the crown.

**5.6.2.2** Not more than 25 percent of the crown should be removed within an annual growing season.

**5.6.2.3** Location of parts to be removed shall be specified.

**5.6.2.4** Percentage of foliage and size range of parts to be removed shall be specified.

**5.6.3 Raise:** Raising shall consist of selective pruning to provide vertical clearance.

**5.6.3.1** Vertical clearance should be specified.

**5.6.3.2** Location and size range of parts to be removed should be specified.

**5.6.4 Reduce:** Reduction shall consist of selective pruning to decrease height and/or spread.

**5.6.4.1** Consideration shall be given to the ability of a species to tolerate this type of pruning.

**5.6.4.2** Location of parts to be removed and clearance should be specified.

**5.6.4.3** Size range of parts should be specified.

### 5.7 Specialty pruning

Consideration shall be given to the ability of a species to tolerate specialty pruning, using one or more pruning types (5.6).

#### 5.7.1 Young trees

**5.7.1.1** The reasons for young tree pruning may include, but are not limited to, reducing risk, maintaining or improving tree health and structure, improving aesthetics, or satisfying a specific need.

**5.7.1.2** Young trees that will not tolerate repetitive

pruning and have the potential to outgrow their space should be considered for relocation or removal.

#### 5.7.1.3 At planting

**5.7.1.3.1** Pruning should be limited to cleaning (5.6.1).

**5.7.1.3.2** Branches should be retained on the lower trunk.

#### 5.7.1.4 Once established

**5.7.1.4.1** Cleaning should be performed (5.6.1).

**5.7.1.4.2** Rubbing and poorly attached branches should be removed.

**5.7.1.4.3** A central leader or leader(s) as appropriate should be developed.

**5.7.1.4.4** A strong, properly spaced scaffold branch structure should be selected and maintained.

**5.7.1.4.5** Interfering branches should be reduced or removed.

#### 5.7.2 Espalier

**5.7.2.1** Branches that extend outside the desired plane of growth shall be pruned or tied back.

**5.7.2.2** Ties should be replaced as needed to prevent girdling the branches at the attachment site.

#### 5.7.3 Pollarding

**5.7.3.1** Consideration shall be given to the ability of the individual tree to respond to pollarding.

**5.7.3.2** Management plans shall be made prior to the start of the pollarding process for routine removal of watersprouts.

**5.7.3.3** Internodal cuts shall be made at specific locations to start the pollarding process. After the initial cuts are made, no additional internodal cut shall be made.

**5.7.3.4** Watersprouts growing from the cut ends of branches (knuckles) should be removed annually during the dormant season.

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### 5.7.4 Restoration

**5.7.4.1** Restoration shall consist of selective pruning to improve the structure, form, and appearance of trees that have been severely headed, vandalized, or damaged.

**5.7.4.2** Location in tree, size range of parts, and percentage of watersprouts to be removed should be specified.

### 5.7.5 Vista pruning

**5.7.5.1** Vista pruning shall consist of selective pruning to allow a specific view.

**5.7.5.2** Size range of parts, location in tree, and percentage of foliage to be removed should be specified.

### 5.8 Palm pruning

**5.8.1** Palm pruning should be performed when fronds, fruit, or loose petioles may create a dangerous condition.

**5.8.2** Live healthy fronds, initiating at an angle of 45 degrees or greater from horizontal, with frond tips at or below horizontal, should not be removed.

**5.8.3** Fronds removed should be severed close to the petiole base without damaging living trunk tissue.

**5.8.4** Palm peeling (shaving) should consist of the removal of only the dead frond bases at the point they make contact with the trunk without damaging living trunk tissue.

### 5.9 Utility pruning

#### 5.9.1 General

**5.9.1.1** The purpose of utility pruning is to prevent the loss of service, comply with mandated clearance laws, prevent damage to equipment, avoid access impairment, and uphold the intended usage of the facility/utility space.

**5.9.1.2** Only a qualified line clearance arborist or line clearance arborist trainee shall be assigned to line clearance work in accordance with ANSI Z133.1, 29 CFR 1910.331 – 335, 29 CFR 1910.268 or 29 CFR 1910.269.

**5.9.1.3** Utility pruning operations are exempt from requirements in 5.1 Tree Inspection:

**5.1.1** *An arborist or arborist trainee shall visually inspect each tree before beginning work.*

**5.1.2** *If a condition is observed requiring attention beyond the original scope of the work, the condition should be reported to an immediate supervisor, the owner, or the person responsible for authorizing the work.*

**5.9.1.4** Safety inspections of the work area are required as outlined in ANSI Z133.1 4.1.3, *job briefing*.

#### 5.9.2 Utility crown reduction pruning

##### 5.9.2.1 Urban/residential environment

**5.9.2.1.1** Pruning cuts should be made in accordance with 5.3, Pruning cuts. The following requirements and recommendations of 5.9.2.1.1 are repeated from 5.3 Pruning cuts.

**5.9.2.1.1.1** A pruning cut that removes a branch at its point of origin shall be made close to the trunk or parent limb, without cutting into the branch bark ridge or collar, or leaving a stub (see Figure 5.3.2).

**5.9.2.1.1.2** A pruning cut that reduces the length of a branch or parent stem should bisect the angle between its branch bark ridge and an imaginary line perpendicular to the branch or stem (see Figure 5.3.3).

**5.9.2.1.1.3** The final cut shall result in a flat surface with adjacent bark firmly attached.

**5.9.2.1.1.4** When removing a dead branch, the final cut shall be made just outside the collar of living tissue.

**5.9.2.1.1.5** Tree branches shall be removed in such a manner so as not to cause damage to other parts of the tree or to other plants or property. Branches too large to support with one hand shall be precut to avoid splitting of the wood or tearing of the bark (see Figure 5.3.2). Where necessary, ropes or other equipment shall be used to lower large branches or portions of branches to the ground.

**5.9.2.1.1.6** A final cut that removes a branch

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with a narrow angle of attachment should be made from the bottom of the branch to prevent damage to the parent limb (see Figure 5.3.7).

**5.9.2.1.2** A minimum number of pruning cuts should be made to accomplish the purpose of facility/utility pruning. The natural structure of the tree should be considered.

**5.9.2.1.3** Trees directly under and growing into facility/utility spaces should be removed or pruned. Such pruning should be done by removing entire branches or by removing branches that have laterals growing into (or once pruned, will grow into) the facility/utility space.

**5.9.2.1.4** Trees growing next to, and into or toward facility/utility spaces should be pruned by reducing branches to laterals (5.3.3) to direct growth away from the utility space or by removing entire branches. Branches that, when cut, will produce watersprouts that would grow into facilities and/or utility space should be removed.

**5.9.2.1.5** Branches should be cut to laterals or the parent branch and not at a pre-established clearing limit. If clearance limits are established, pruning cuts should be made at laterals or parent branches outside the specified clearance zone.

### **5.9.2.2 Rural/remote locations – mechanical pruning**

Cuts should be made close to the main stem, outside of the branch bark ridge and branch collar. Precautions should be taken to avoid stripping or tearing of bark or excessive wounding.

### **5.9.3 Emergency service restoration**

During a utility-declared emergency, service must be restored as quickly as possible in accordance with ANSI Z133.1, 29 CFR 1910.331 – 335, 29 CFR 1910.268, or 29 CFR 1910.269. At such times it may be necessary, because of safety and the urgency of service restoration, to deviate from the use of proper pruning techniques as defined in this standard. Following the emergency, corrective pruning should be done as necessary.