United States Department of the Interior

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C.D. (Dan) Reagan
Division Administrator
Federal Highway Administration
Federal Building, Room 826
300 East 8th Street
Austin, Texas 78701

Dear Mr. Reagan:

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion regarding the construction and operation of a new highway known as Wonder World Drive Extension (Farm to Market (FM) 3407) located in San Marcos, Hays County, Texas, and its effects on the endangered golden-cheeked warbler (*Dendroica chrysoparia*) (GCW) in accordance with the Endangered Species Act of 1973, as amended (Act)(16 U.S.C. 1531 et seq.).

We have reviewed the FHWA's Biological Assessment (BA), dated March 2003, draft Environmental Assessment (EA), dated November 2002, and FHWA's and City of San Marcos' comments on the draft biological opinion and draft revised biological opinion. This biological opinion is based on information provided in the EA, BA, Golden-cheeked Warbler Recovery Plan (U.S. Fish and Wildlife Service 1992), field investigations, and other sources of information. A complete administrative record of this consultation is on file at the Austin, Texas, Ecological Services Field Office.

Consultation History

Informal consultation, involving multiple meetings and communications between the Service and City of San Marcos (and its consultants), and Texas Department of Transportation (TXDOT), occurred as early as February 1999. Formal consultation began on March 20, 2003.

On May 20, 2003, we received the biological assessment accompanied by a letter dated May 19, 2003 from FHWA. That letter requested initiation of formal consultation on the golden-cheeked warbler. We had discussions regarding the extent of the action area and species / critical habitat that may be affected by the project and we needed to clarify the scope of the formal consultation and, in particular, resolve which species and critical habitat would be

included in the formal consultation. We missed our 30 day deadline to provide comments on the adequacy of the BA to FHWA. The Service did not request an extension to formal consultation before 90 days. FHWA did not agree to an extension of formal consultation. The Service missed the 135 day deadline to complete the biological opinion. In our September 18, 2003, letter, we asked for additional information and determinations on other listed species and critical habitats in the action area. We met with representatives of FHWA, TXDOT, City of San Marcos, and Hicks and Company on September 26, 2003.

We received additional information from the FHWA on October 24, 2003. In our December 1, 2003, letter, we conveyed our concurrence for the FHWA determinations for golden-cheeked warbler, black-capped vireo (*Vireo atricapilla*), Texas wild-rice (*Zizania texana*), San Marcos gambusia (*Gambusia georgei*), Comal Springs riffle beetle (*Heterelmis comalensis*), and Texas blind salamander (*Eurycea rathbuni*). We also stated that the project effects were likely insignificant or discountable for the San Marcos salamander and fountain darter.

On February 5, 2004, we received FHWA's determinations of "no effect" to critical habitat of Texas wild-rice and San Marcos gambusia and determinations of "may affect, not likely to adversely affect" critical habitat for the fountain darter and San Marcos salamander (Deocampo 2004). In our March 10, 2004, letter, we notified FHWA that February 5, 2004, was the date of the initiation of formal consultation.

In summary, we received the following FHWA effect determinations:

Species Common name and Critical Habitat	Species Scientific name	FHWA Determination
Texas wild-rice	*Zizania texana*	no effect
Texas wild-rice critical habitat	*Zizania texana*	no effect
Comal Springs riffle beetle	*Heterelmis comalensis*	no effect
San Marcos gambusia	*Gambusia georgei*	no effect
San Marcos gambusia critical habitat	*Gambusia georgei*	no effect
fountain darter	*Etheostoma fonticola*	no effect
fountain darter critical habitat	*Etheostoma fonticola*	may affect, not likely to adversely affect

Species Common name and Critical Habitat	Species Scientific name	FHWA Determination
San Marcos gambusia	*Eurycea nana*	no effect
San Marcos gambusia critical habitat	*Eurycea nana*	may affect, not likely to adversely affect
Texas blind salamander	*Eurycea rathbuni =Typhlomolge rathbuni*	may affect, not likely to adversely affect
black-capped vireo	*Vireo atricapilla*	may affect, not likely to adversely affect
golden-cheeked warbler	*Dendroica chrysoparia*	may affect, likely to adversely affect

BIOLOGICAL OPINION

I. Description of Proposed Action

The proposed action is described on page 2 of the BA. The proposed construction consists of a new 3.7 mile (5.95 kilometer) four-lane divided road called FM 3407 connecting Ranch Road (RR) 12 to Wonder World Drive at Hunter Road (FM 2439) and is estimated to cost $24.5 million (Figure 1). The road will be controlled access with only one intersection near the center of the project (Craddock Avenue). This consultation includes all of FM 3407 and the section of Craddock Avenue extension that is under federal jurisdiction.

Typical sections of the road are provided in Figure 2 (from the EA). The project includes a depressed median, curb and gutter, and five structural best management practice ponds (water quality BMPs) incorporating hazardous material traps and sedimentation/filtration basins. General flowpaths in the sedimentation/filtration/hazardous material trap are provided in figures in an October 22, 2001, letter from Brian Reis and Rustin Roussel of Espey Consultants to Jeff Seiler of Huggins/Seiler and Associates (Appendix 1). The project will include an elevated bridge section over Purgatory Creek and part of the Natural Resources Conservation Service (NRCS) – Upper San Marcos Watershed District Purgatory Creek flood retention structure. The minimum right-of-way needed for the project is 200 feet (61 meters). The right-of-way needed for sections with BMPs will be wider than 200 feet (61 meters) and the total right-of-way needed is estimated at 84.2 acres (34.1 hectares).

The proposed project includes measures to avoid and minimize impacts to the federally listed endangered GCWs known to occur on the property. The major elements of the planned highway include:

Measures to Minimize Impacts to GCW.

- **$** Efforts will be made to ensure clearing in, or within, 300 feet (91.4 meters) of GCW habitat in development areas will not be initiated during the time of year when birds are present (March 1 through August 1).

- **$** All clearing will be consistent with the current practices recommended by the Texas Forest Service to prevent the spread of oak wilt. Project design uses the minimum right-of-way needed. No GCW habitat outside the FM 3407 right-of-way will be adversely affected.

Measures to Offset Impacts to GCW.

- **$** The City of San Marcos will offset the impacts of the highway through incorporation of 472.67 acres (191.2 hectares) into the municipal park system. An undetermined but significant portion of the " 473 acres contains woodlands of Ashe juniper (*Juniperus ashei*), plateau live oak (*Quercus fusiformis*) and other deciduous trees.

- **$** The City of San Marcos has made the commitment through FHWA to contribute $149,969.31 to a fund for the conservation of the golden-cheeked warbler no later than one week prior to any irretrievable commitment of resources for the construction of FM 3407 (i.e., ground breaking and habitat clearing) (BA - FHWA 2003). This would effectively provide for the purchase through fee-simple title or permanent conservation easement of about 24 acres (9.7 hectares) of suitable GCW habitat in the San Marcos vicinity based on City's determination this land costs about $6,186 per acre.

II. Status of the Species

One federally listed threatened species occurs in Hays County, Texas: San Marcos salamander. Seven federally listed endangered species occur within Hays County: Texas wild-rice, Comal Springs riffle beetle, San Marcos gambusia, fountain darter, Texas blind salamander, black-capped vireo, and GCW. Habitat suitable for the GCW exists on and in the vicinity of, FM 3407 right-of-way. This biological opinion will consider only the GCW. The other species will not be considered pursuant to our December 1, 2003, letter and determinations stated in the FHWA's February 4, 2004, letter.

a. GCW Description

The GCW was emergency listed as endangered on May 4, 1990, (55 FR 18844) due to the imminent and ongoing destruction of habitat and was federally listed as endangered without critical habitat on December 27, 1990 (55 FR 53160). The small, neotropical migrant is 4.5 to 5 inches (11.4 to 12.7 centimeters) long with a wingspan of 7.75 inches (19.7 centimeters). The male has a black back, throat, and cap and yellow cheeks with a black stripe through the eye. Females are similar, but less colorful. The lower breast and belly of both sexes are white with black stripes on the flanks. The GCW is probably derived from an ancestral form of the black-throated green warbler (*D. virens*) along with sibling species Townsend's warbler (*D. townsendi*), hermit warbler (*D. occidentalis*), and black-throated gray warbler (*D. nigrescens*), which breed in similar habitats in the northern and western United States and Canada (Axelrod 1958, Stein 1962, Mengel 1964).

b. GCW Life History

The GCW breeds only in the mixed Ashe juniper/deciduous woodlands of central Texas in the Hill Country west and north of the Balcones Fault (Figure 3). The GCW winters in the highland pine/oak woodlands of southern Mexico and northern Central America (Pulich 1976, U.S. Fish and Wildlife 1996, Ladd and Gass 1999). GCWs prefer a dense, mixed forest of Ashe juniper and a variable number of mostly deciduous tree species, such as Texas oak (*Quercus texana*), plateau live oak, shin oak (*Q. sinuata* var. *breviloba*), cedar elm (*Ulmus crassifolia*), American elm (*U. americana*), Lacey oak (*Q. glaucoides*), blackjack oak (*Q. marilandica*), Texas sugarberry (*Celtis laevigata*), Texas ash (*Fraxinus americana*), post oak (*Q. stellata*), little walnut (*Juglans microcarpa*), Arizona walnut (*J. major*), Mexican persimmon (*Diospyros texana*), big-tooth maple (*Acer grandidentatum*), and sycamore (*Platanus occidentalis*), with 50 percent to 100 percent canopy closure – the greater the canopy cover the better the habitat (Pulich 1976, Kroll 1980, Beardmore 1994, Wahl et al. 1990, Ladd 1985, U.S. Fish and Wildlife 1996, Dearborn and Sanchez 2001).

Male GCWs arrive in central Texas in early to mid March from their wintering grounds in Central America and Mexico and begin to establish breeding territories, which they defend against other males by singing from visible perches within their territories. Females arrive a few days later but are more difficult to detect in the dense woodland habitat (Pulich 1976, Ladd and Gass 1999). Pulich (1976) estimated territory size to range between 3.2 acres (1.3 hectares) and six acres (2.4 hectares). Kroll (1980) estimated territory size to be 11 to 21 acres (4.5 to 8.5 hectares).

During the first week of April, females begin constructing nests primarily with the shredding bark of mature Ashe junipers over 10 feet (3 meters). Ashe juniper is the most common nesting tree, but other species may occasionally be selected. The average nest height is 15 feet (4.6 meters) above ground, ranging from 5 to 32 feet (1.5 to 9.8 meters) (Pulich 1976). Usually three or four eggs are laid, which are generally incubated in April, and unless there is a second nesting attempt because of nest failure, nestlings fledge in May to early June (Bent

1953, Pulich 1976). By early August, they begin their migration back south (Pulich 1976).

GCWs forage for invertebrates in Ashe juniper and various deciduous tree species (Beardmore 1994). GCWs feed almost entirely on insects, such as lepidopteran larvae (caterpillars), neuropterans (green lacewings), homopterans (cicadas), orthopterans (katydids), phasmids (walking sticks), dipterans (flies), and adult lepidopterans (moths and small butterflies). GCWs also feed on arachnids (spiders). Most foraging occurs in the upper two-thirds of the tree (Pulich 1976) or above five feet (1.5 meters) (Sexton 1987, Beardmore 1994). GCWs forage disproportionately more in oaks than in junipers early in the breeding season apparently because of the abundance of soft-bodied lepidopteran larvae in deciduous trees at that time (Kroll 1980, Sexton 1987, Beardmore 1994).

c. GCW Population Dynamics

Existing estimations of population size have been based on assessments of suitable habitat and territory size. In 1974, Pulich (1976) estimated the total population at 15,000 to 17,000 adults. Wahl et al. (1990) estimated the population size to be 4,822 to 16,016 pairs. The Service corrected these estimates in 1990 to be about 13,800 territories [pairs] (U.S. Fish and Wildlife 1992). There have been no recent estimates of population size.

Studies at Fort Hood military reservation in Bell and Coryell counties have found fledging rates ranging from 0.75 to 1.74 per adult warbler over 10 years of observations (Anders 2000). At Fort Hood, about 87 percent of all territorial males are mated (T. Hayden, US Army-CERL, pers. comm.). A summary of survival rate estimates for GCWs is provided in Alldredge et al. (2002) (Appendix 2). Survival rates of GCWs in their first year (hatch year, = HY) were estimated at 30 to 42 percent. Survival rates of GCWs after their first year (after hatch year, = AHY) were estimated at 56 to 69 percent (unpublished data, Texas Nature Conservancy, Fort Hood project; Pulich 1976; unpublished data, Balcones Canyonlands National Wildlife Refuge). The dispersal distance of birds from their birth site to their first breeding site is not well known, but could possibly be as much as 124 miles (200 kilometers) (Robinson 1992). Adult GCWs, on the other hand, show high site fidelity (Holiman and Craft 2000, Anders 2000), and the return rate of banded birds at Fort Hood is considered to approximate the survival rate for adults (Alldredge et al. 2002).

Pease and Gingerich (1989) used theoretical models to determine viable population numbers for golden-cheeked warblers. They found 500-1,000 individuals are needed to avoid extinction through environmental and/or demographic stochasticity. However, their estimations were based on a large amount of uncertainties in the values of parameters due to lack of sufficient data on the warbler. Population viability analysis (assessments) (PVAs) have shown that the most sensitive factors affecting the continued existence of the species are population size per patch, fecundity (productivity or number of young per adult), and fledgling survival (U.S. Fish and Wildlife Service 1996, Alldredge et al. 2002). GCW occupancy of "small" patches of habitat and productivity of the species are considerably

lower than in larger patches (Coldren 1998, Maas 1998, D. Keddy-Hector, Austin Community College, pers. comm. 1998). The 1996 PVA found that a minimum population of 1,000 pairs would be necessary to avoid the risk of extinction in a breeding population in a single patch. At an average of 10.6 acres (4.3 hectares) per pair, based on Fort Hood data, 10,637 acres (4,305 hectares) of high quality habitat would be required. If the population shows characteristics of a metapopulation, as is likely, the size of the population per patch can be lower depending on dispersal and recolonization rates (Alldredge et al. 2002).

d. GCW Status and Distribution

The GCW's entire breeding range is found within the Edwards Plateau and the Lampasas Cut Plain (Figure 3). The species is known to occur in 26 counties and may possibly occur in another 12 counties. It no longer occurs in three counties within its historic range. However, many of the counties where it is known to occur, now or in the past, have only small amounts of suitable habitat (Pulich 1976, U.S. Fish and Wildlife Service 1996, Lasley et. al. 1997, C. Ladd pers. comm.). As of 1988, there were an estimated 814,220 acres (329,503 hectares) of potential GCW habitat available rangewide and 106,497 acres (43,098 hectares) in Travis County (from Wahl et. al. 1990). The Biological Advisory Team for the Austin regional habitat conservation plan (BAT 1990) estimated the total available GCW habitat in Travis County at 18,780 acres (7,600 hectares) based on the 1988 data. Later studies using Landsat data (Rowell et al. 1995, Diamond and True 1999 *a*) estimated a total of 1,271,236 acres (514,451 hectares) to 1,349,066 acres (545,948 hectares) of potential GCW habitat rangewide. However, because of the inherent errors in the necessarily gross estimates and lack of adequate ground truthing, these numbers cannot be translated into estimates of land use change or population size. Nevertheless, in all studies, Travis County ranked first or second in having the most habitat in the largest contiguous blocks. Adjacent Williamson, Hays, Blanco, and Burnet counties also contain GCW habitat, but it tends to be found in smaller, more fragmented blocks. Other large blocks of habitat occur on the Fort Hood military reservation in Bell and Coryell counties and in Real, Bandera, and Kerr counties. Comal and Bexar counties also have significant amounts of habitat. There is apparently little connectivity between the large habitat blocks in Travis County and other large blocks in adjacent recovery regions to the north and the south (Pulich 1976, Wahl et al. 1990, Rowell et al. 1995, Diamond and True 1999 *a*, Diamond and True 1999 *b*).

The greatest threats to GCWs are loss of habitat and urban encroachment. Human activities have eliminated much GCW habitat within the central and northern parts of the GCW's range. Before 1974, the primary reason for habitat loss was clearing for livestock grazing (Pulich 1976). Since then, habitat loss has continued as suburban developments spread into prime GCW habitat along the Balcones Escarpment, especially in the growth corridor from the Austin metropolitan area (including Williamson County) to San Antonio (BAT 1990, Wahl et al. 1990, Engels 1995, Coldren 1998). Diamond and True (1999 *b*) did not detect a significant overall change in potential habitat between 1986 and 1996/97, but stressed that the analyzed data were not comparable and that changes particularly in urbanizing areas

could be better detected by comparing the raw data on a local level. However, no comprehensive study of potential habitat loss has been conducted to date. Threats to the winter habitats include forest clearing for agriculture, including grazing pastures (Rappole et al. 2000).

Populations of GCW and other neotropical migrants are less stable in small habitat patches surrounded by urbanization (Coldren 1998, Engels 1995, Arnold et al. 1996, Bolger et al. 1997, Moses 1996). The abundance of several bird species, including the GCW, has been shown to be reduced within 656-1640 feet (200-500 meters) of an urban edge (Engels 1995, Arnold et al. 1996, Bolger et al. 1997, Coldren 1998). Coldren (1998) reported that GCW occupancy declined with increasing residential development and roadway width.

Other factors that threaten the GCW are the loss of deciduous oaks, on which the warblers forage, to oak wilt (U.S. Fish and Wildlife Service 1996); nest parasitism by brown-headed cowbirds (*Molothrus ater)*, which are attracted to livestock operations (Pulich 1976); and predation and competition by blue jays (*Cyanocitta cristata*) and other urban-tolerant birds (Engels and Sexton 1994, Engels 1995, U.S. Fish and Wildlife Service 1996).

The recovery strategy outlined in the Golden-cheeked Warbler Recovery Plan (U.S. Fish and Wildlife Service 1992) divides the range of the GCW into eight recovery regions (regions) (Figure 4). The recovery plan calls for the protections of sufficient habitat to support at least one self-sustaining population in each region. The regions described in the recovery plan place Hays County in Region 5 (with Travis County and parts of Williamson, Burnet and Blanco counties). PVA modeling indicates that a self-sustaining population would need 3,000 breeding pairs or more (U.S. Fish and Wildlife Service 1996, Alldredge et al. 2002). In Region 3, there is one large protected GCW population: Fort Hood Military Reservation in Coryell and Bell counties (Weinberg 1995, Jetté et al. 1998). Currently, in Region 5, there are only two large GCW populations receiving some degree of protection: (1) the Balcones Canyonlands Preserve (BCP) [a regional habitat conservation plan PRT-788841] in Travis County, and (2) the nearby Balcones Canyonlands National Wildlife Refuge (BCNWR) in Travis, Burnet, and Williamson counties. Outside of the BCP and the BCNWR in Region 5, few large blocks of habitat remain in adjacent areas of southern Travis, Williamson, Hays, and Burnet counties. Other important areas receiving some protection include Government Canyon State Natural Area and Camp Bullis in Bexar County, Kerr Wildlife Management Area in Kerr County (Region 6); and Lost Maples State Park in Bandera County (Region 8).

Annual reports from Fort Hood and the BCP indicate that the species currently appears to be relatively stable (City of Austin and Travis County 2003, Holiman and Craft 2000, Anders 2000), but urban development is continuing in GCW habitat. The BCP has now acquired or protected 26,727 acres (10,816 hectares), most of which is GCW habitat, with a goal of protecting 30,428 acres (12,314 hectares) in seven habitat blocks of 482 to 8,111 acres (195 to 3,282 hectares).

To date, 116 incidental take permits and eight formal biological opinions for the GCW have been issued in the Travis/Williamson/Hays counties area. These permits cover about 20,006 acres (8,096 hectares), about 25 percent of which was GCW habitat. Most of the permitted area is included within the 633,000-acre area (256,166 hectares) in Travis County covered by the BCP regional 10(a)(1)(B) permit. Potential GCW habitat within the permit area outside of the preserve acquisition areas (called macrosites), estimated at 26,753 acres (10,826 hectares) or 71 percent of GCW habitat in Travis County, is permitted for development. There are currently four active incidental take permit applications for take of GCWs being considered by the Service in the Austin area, mostly in Burnet and Hays counties. These applications or pre-application consultations cover in excess of 3,687 acres (1,492 hectares), a portion of which is suitable GCW habitat; 363 acres (147 hectares) are within the BCP preserve acquisition area.

e. Analysis of the GCW Likely to be Affected

Because of the relatively extensive range of the GCW and the lack of data, it is not possible to determine the overall status of the species. However, the GCW is restricted to habitat that is threatened by commercial and residential developments and only a small portion of its range is protected. Therefore, the existence of the GCW continues to be at risk.

III. Environmental Baseline

a. Status of the GCW within the Action Area

The Service considers the action area to include: (1) the parts of San Marcos affected by traffic changes, (2) Edwards aquifer (Balcones Fault Zone), (3) San Marcos Springs, (4) Johnson's Well, (5) Primer's Well (Fissure), and (6) Ezell's Cave. Diamond and True (1999 *a*) defined core habitat patches as areas classified as oak-juniper woodlands more than 2 pixels (57 meters) from any edge formed by non-habitat). Figure 5 shows the core woodlands in the area that we consider the action area. The draft EA describes the majority of project area vegetation as live oak–Ashe juniper woodlands and live oak–Ashe juniper parks vegetation types following McMahan et al. (1984). Hays County, Texas, which includes the FM 3407 project, is estimated to have more than 4,741 acres (1,918 hectares) of live oak–Ashe juniper woodland core areas as defined by Diamond and True (1999 *a*). The City of San Marcos has acquired land near the FM 3407 project for its Purgatory Creek Park 473 acres (191 hectares). Texas State University–San Marcos owns and operates the Freeman Ranch, about 4204 acres (1701 hectares). About one third of the ranch is enclosed in pastures. The vegetation of the ranch is described as plateau live oak-Ashe juniper savannas that grade into closed-canopy woodlands in lowlands and draws. The woodlands of the Freeman Ranch represent a significant fraction of the live oak–Ashe juniper woodland in Hays County.

The FM 3407 site consists of a mosaic of grasslands and oak/juniper woodlands of various

densities. Golden-cheeked warbler surveys found a single male in the spring of 2001 in the project corridor. No surveys were conducted for the 2003 breeding season.

b. Factors Affecting GCW Habitat within the Action Area

The site is situated on the southwestern edge of the City of San Marcos. Land use in the right-of-way has involved cattle and goat grazing. The project area lies within a formerly rural portion of Hays County undergoing development with extensive conversion of agricultural to commercial and residential land uses. Based on surveys by Eric Huebner, several patches of oak-juniper woodlands with adequate canopy closure to provide GCW habitat still exist in and near the right-of-way. Purgatory Creek Park development plans may include roads through oak-juniper woodlands.

IV. Effects of the Action

a. Factors to be Considered

The proposed development would degrade about 22.24 acres (9.0 hectares) of known GCW habitat outside of the breeding season (during the time the birds are not present). The habitat will be replaced by a controlled access highway and includes right-of-way (ROW) utilities.

b. Analyses for Effects of the Action

About 9.47 acres (3.83 hectares) of GCW habitat would be permanently and directly modified by the development and removed from the GCW habitat block (Figure 6). In addition, about 12.77 acres (5.17 hectares) of suitable habitat both on-site and off-site would be impacted by indirect effects of development, such as habitat fragmentation, increased numbers of competitive, predatory, or parasitic urban birds, increased noise levels, predation by free-roaming pets, invasion of exotic species, and human intrusion (Engels 1995; Gass 1996; Moses 1996; Coldren 1998; and, Ladd and Gass 1999). Therefore, a total of about 22.24 acres (9.0 hectares) of GCW habitat may be adversely affected by the development. The direct and indirect effects would eliminate or render the habitat less suitable for GCWs following completion of the proposed development, thus harming the birds.

c. GCW's Response to the Proposed Action

GCWs are sensitive to the effects of habitat fragmentation/urbanization and are not usually found in close proximity to human developments (Engels 1995; Gass 1996; Moses 1996; Coldren 1998; and, Ladd and Gass 1999). Resident GCWs would likely be unable to find suitable nesting sites or displace other GCWs in remaining habitat nearby, resulting in the loss of reproductive potential. This is expected to take in the form of harassment, or to adversely impact up to two GCW territories. One of the territories is expected to be lost due to direct effects of the project and one territory is expected to be lost due to indirect effects.

This loss of habitat represents less than one percent of the available habitat in the habitat block, and the take of two territories is less than one percent of the GCW breeding pairs potentially occupying the habitat block. The core woodlands (Diamond and True 1999) inside Ranch Road 12 and FM 3407 (about 180 acres, in orange in Figure 5) may become less suitable for GCWs due to habitat fragmentation and induced development along RR 12 near the terminus of FM 3407.

V. Cumulative Effects

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

The area in which the project is located is expected to continue to experience further land use changes and concomitantly fragmentation of oak - juniper woodlands remaining in Hays County is expected. The Austin-San Antonio corridor is among the fastest growing areas in Texas. The Census Bureau considers San Marcos part of the metropolitan statistical area of Austin.

VI. Conclusion

After reviewing the current status of the GCW, the environmental baseline for the action area, the effects of the proposed highway, and the cumulative effects, it is the Service's biological opinion that the construction of FM 3407, as proposed, is not likely to jeopardize the continued existence of the GCW. No critical habitat has been designated for this species, therefore, none will be affected.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7 (o)(2), taking that is incidental to, and not intended as part of, the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms

and conditions of this incidental take statement.

Amount or Extent of Take Anticipated

The Service anticipates up to two breeding pairs could be taken as a result of this proposed action. The incidental take is expected to be in the form of harm and harassment. The project will permanently and directly modify 9.47 acres (3.83 hectares) of GCW habitat would be permanently and directly modified by the development. In addition, about 12.77 acres (5.17 hectares) of suitable habitat both on-site and off-site would be impacted by indirect effects of construction and maintenance of FM 3407, such as habitat fragmentation and induced development. Therefore, a total of 22.24 acres (9.0 hectares) of GCW habitat may be adversely affected by the highway project, with associated birds harmed by the action.

Effect of the Take

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

The Service believes that no more than two breeding pairs of GCWs will be incidentally taken as a result of the proposed action. The reasonable and prudent measure, with its implementing term and condition, is designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided.

The Service will not refer the incidental take of any migratory bird or bald eagle for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 703-712), or the Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C. §§ 668-668d), if such take is in compliance with the term and condition specified herein.

REASONABLE AND PRUDENT MEASURE

The Service believes the following reasonable and prudent measure is necessary and appropriate to minimize impacts of incidental take of GCWs:

> The FHWA shall ensure compliance with this biological opinion to avoid and minimize the adverse impacts to the golden-cheeked warbler from the FM 3407 project in space and time.

The reasonable and prudent measure, with its implementing terms and conditions, is designed to minimize the impacts of incidental take that might otherwise result from the proposed actions. If during the course of the action this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measure.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the following non-discretionary terms and conditions, which implement the reasonable and prudent measure described above and outline required reporting/monitoring requirements, must be complied with:

1. The FHWA will ensure that TxDOT and its contractors do not disturb woodland habitats outside the right-of-way described for the proposed project.

2. The FHWA will ensure clearing within 300 feet of potential habitat shall not occur during the time GCW are in the area (March 1 through August 1). If clearing cannot be avoided from March 1 through August 1, then a biologist should survey for GCW nests within 300 feet on either side of the area to be cleared and consult with the Service further if a nest is found so that additional incidental take can be expeditiously authorized. Further consultation may provide for avoiding the GCW nest tree by first clearing other portions of the project. If all clearing of woody vegetation occurs outside the breeding season (between August 1 and March 1), construction may proceed during the breeding season (March 1 through August 1).

3. The FHWA will ensure clearing and construction by TxDOT and its contractors shall be consistent with the current practices recommended by the Texas Forest Service to prevent the spread of oak wilt.

Conservation Recommendations

Section 7(a)(1) of the Act directs Federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of threatened and endangered species. Conservation recommendations are discretionary agency activities to avoid or minimize adverse effects of a proposed action on listed species, critical habitats, or both, to help implement recovery plans, or to develop information. The following recommendation is provided for consideration by the FHWA:

1. The FHWA may work with TxDOT, the City of San Marcos, and Hays County to support: (1) delineation of GCW habitat (small scale maps and/or GIS) in Hays County, (2) a transportation strategy that avoids adverse impacts to GCW habitat, and

1. The FHWA may work with TxDOT, the City of San Marcos, and Hays County to support: (1) delineation of GCW habitat (small scale maps and/or GIS) in Hays County, (2) a transportation strategy that avoids adverse impacts to GCW habitat, and (3) surveying and monitoring of GCW occupation of municipal, county, State, and Federal highway-road right-of-way.

2. The FHWA should work with TxDOT, the City of San Marcos, Hays County, Edwards Aquifer Authority, and Texas State University – San Marcos to: (1) study the potential for pollutants to enter the Edwards Aquifer (Balcones Fault Zone) from FM 3407 stormwater, and (2) determine the environmental fate and biological significance of pollutants associated with highway runoff to sensitive species like the Texas blind salamander and fountain darter.

Reinitiation Notice

This concludes formal consultation on the action outlined in the request. As provided in 50 CFR section 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law), and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

Thank you for your interest in conserving our nation's natural resources.

Sincerely,

Robert T. Pine
Supervisor

cc: Wayne Lea, U.S. Army Corps of Engineers, Fort Worth, Texas

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List of Figures

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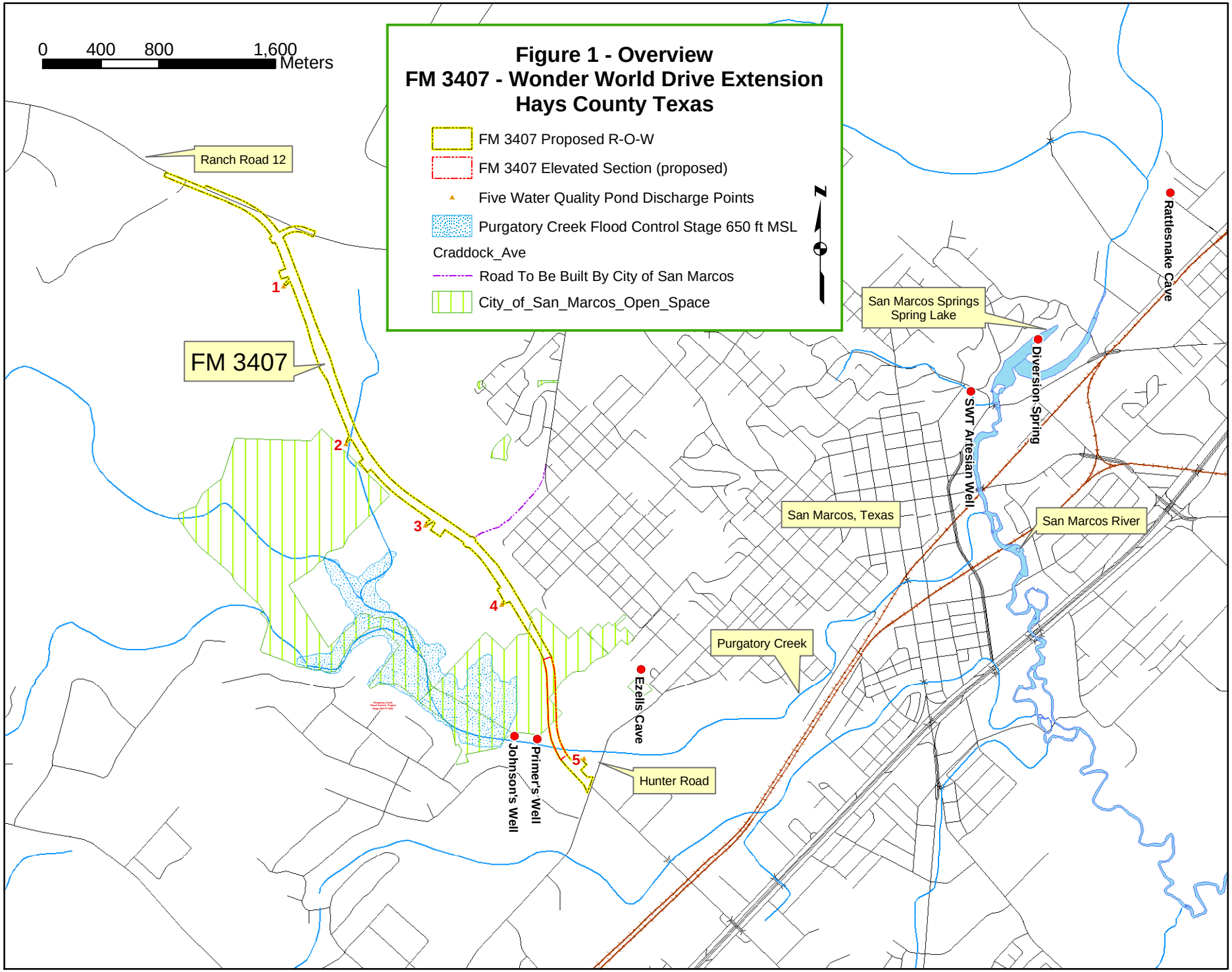
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Figure 1 - Overview
FM 3407 - Wonder World Drive Extension
Hays County Texas
FM 3407 Proposed R-O-W
FM 3407 Elevated Section (proposed)
Five Water Quality Pond Discharge Points
Purgatory Creek Flood Control Stage 650 ft MSL
Craddock_Ave
Road To Be Built By City of San Marcos
City_of_San_Marcos_Open_Space
N
Ranch Road 12
FM 3407
1
2
3
4
5
San Marcos Springs
Spring Lake
Diversion Spring
SWT Artesian Well
Rattlesnake Cave
San Marcos, Texas
San Marcos River
Purgatory Creek
Ezells Cave
Johnson's Well
Primer's Well
Hunter Road

Figure 2. Typical Cross Section FM 3407

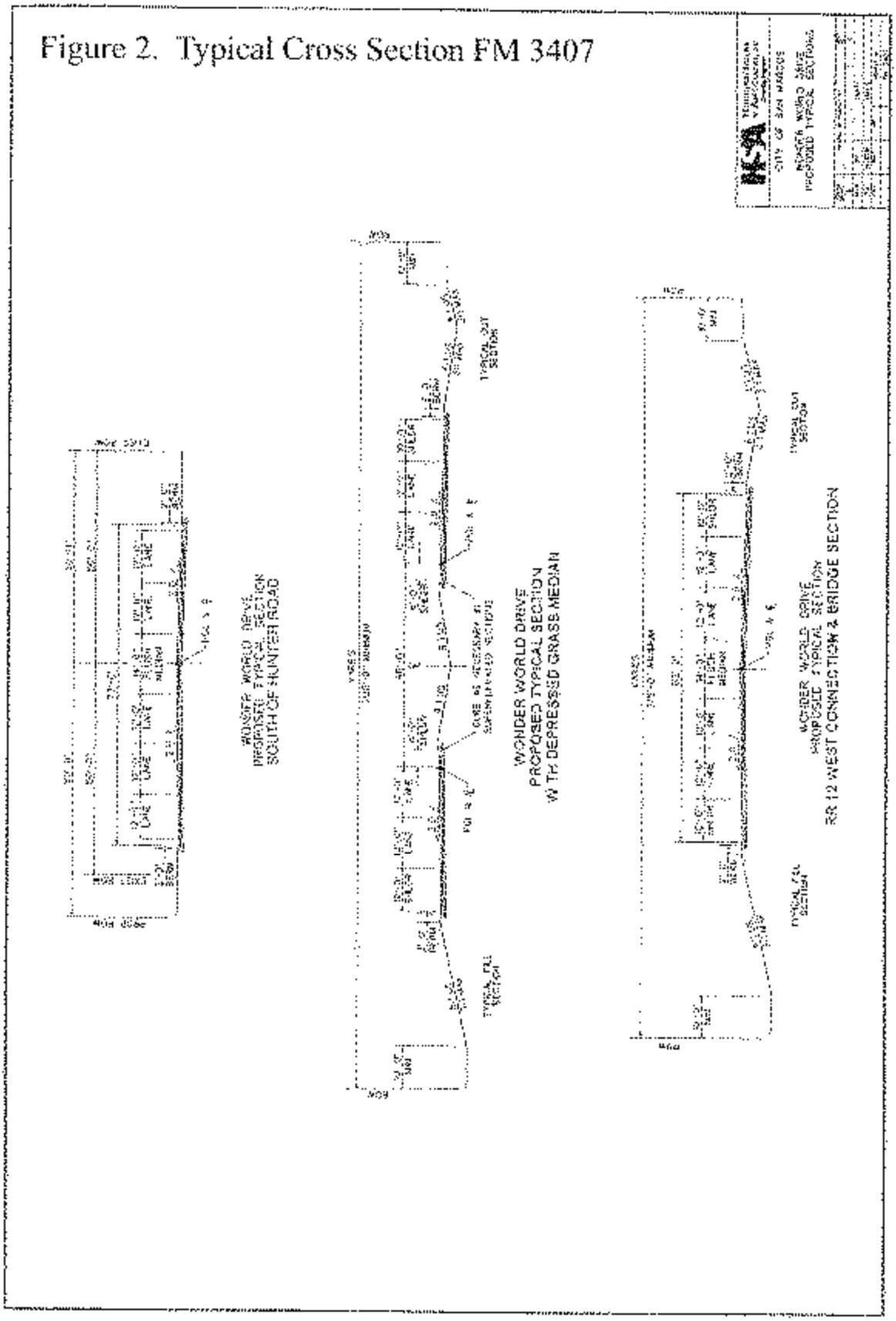
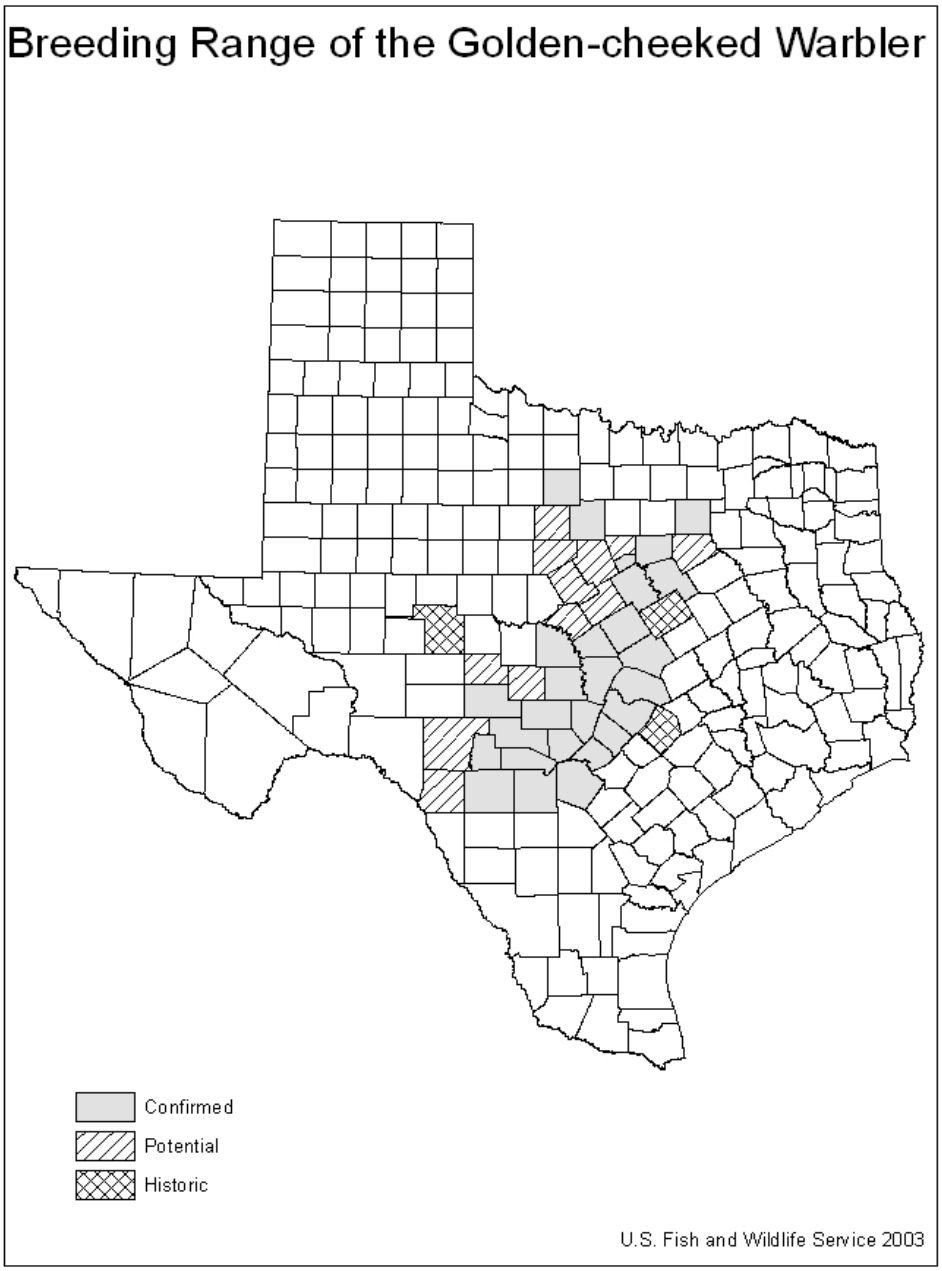
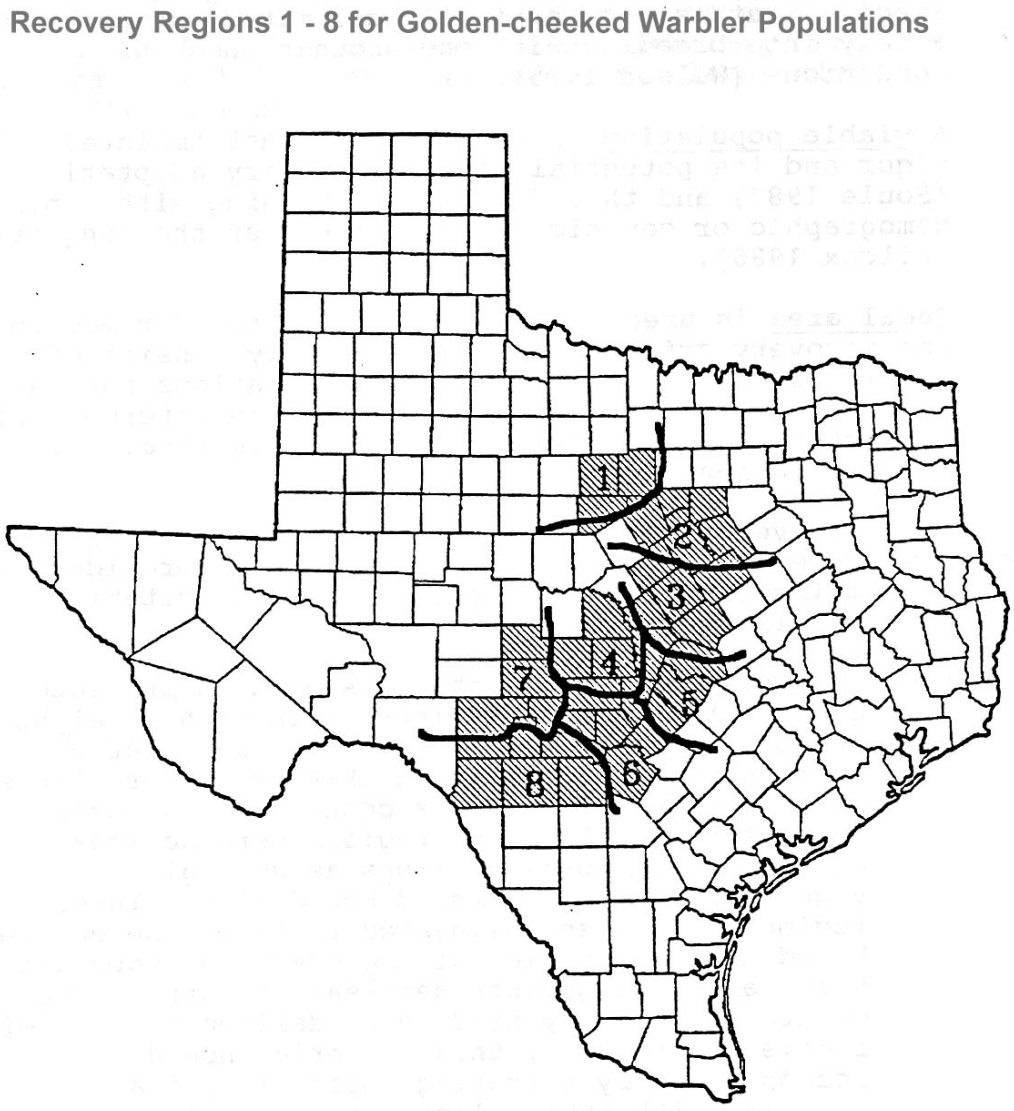


Figure 3. Golden-cheeked warbler breeding range



(Pulich 1976, U.S. Fish an Wildlife Service 1996, Lasley et. al 1997, Espey, Huston & Assoc. 1997)

Figure 4. Recovery Regions for Golden-cheeked Warbler from Recovery Plan



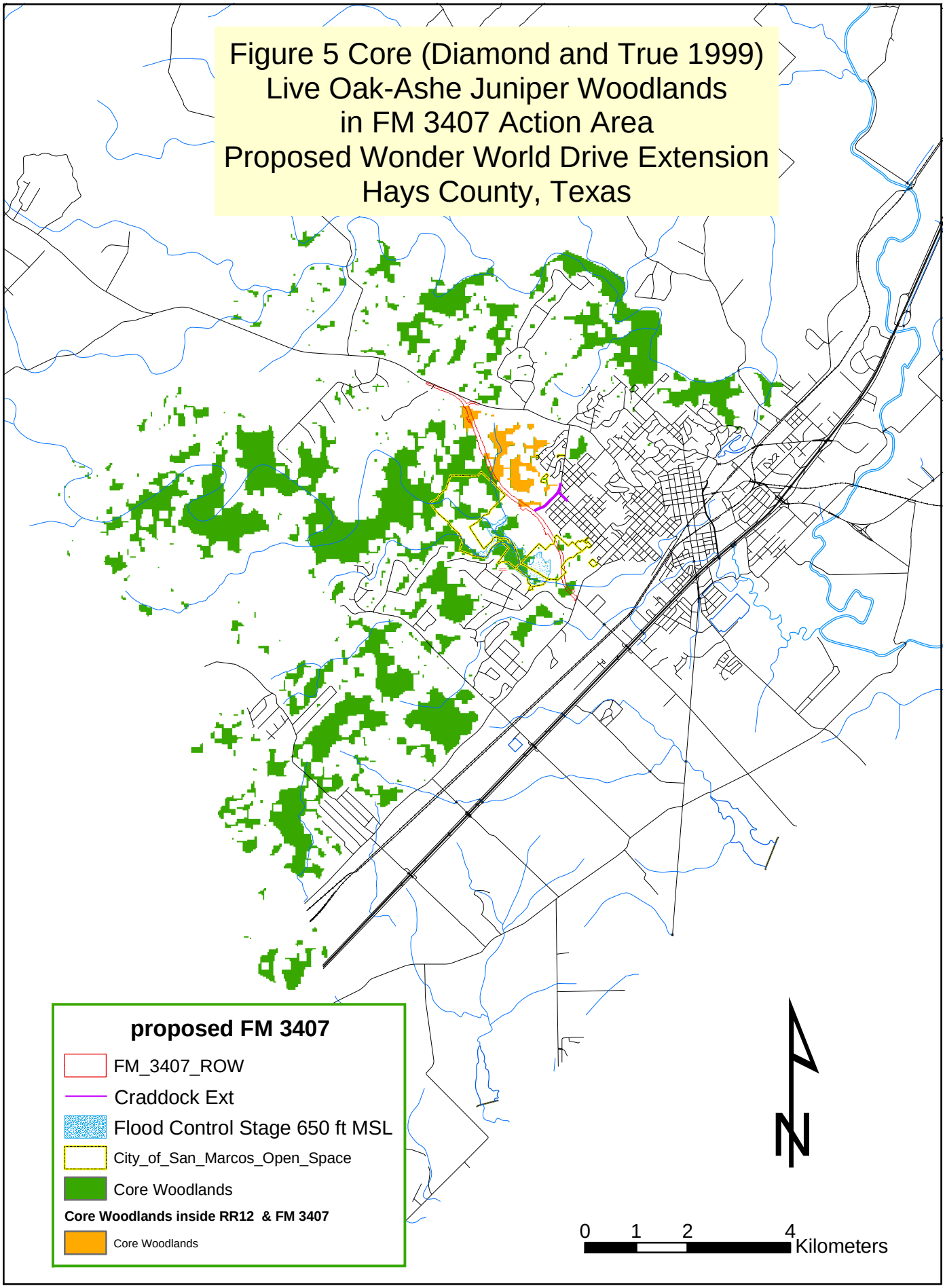


Figure 5 Core (Diamond and True 1999)
Live Oak-Ashe Juniper Woodlands
in FM 3407 Action Area
Proposed Wonder World Drive Extension
Hays County, Texas
proposed FM 3407
FM_3407_ROW
Craddock Ext
Flood Control Stage 650 ft MSL
City_of_San_Marcos_Open_Space
Core Woodlands
Core Woodlands inside RR12 & FM 3407
Core Woodlands
N
0 1 2 4
Kilometers

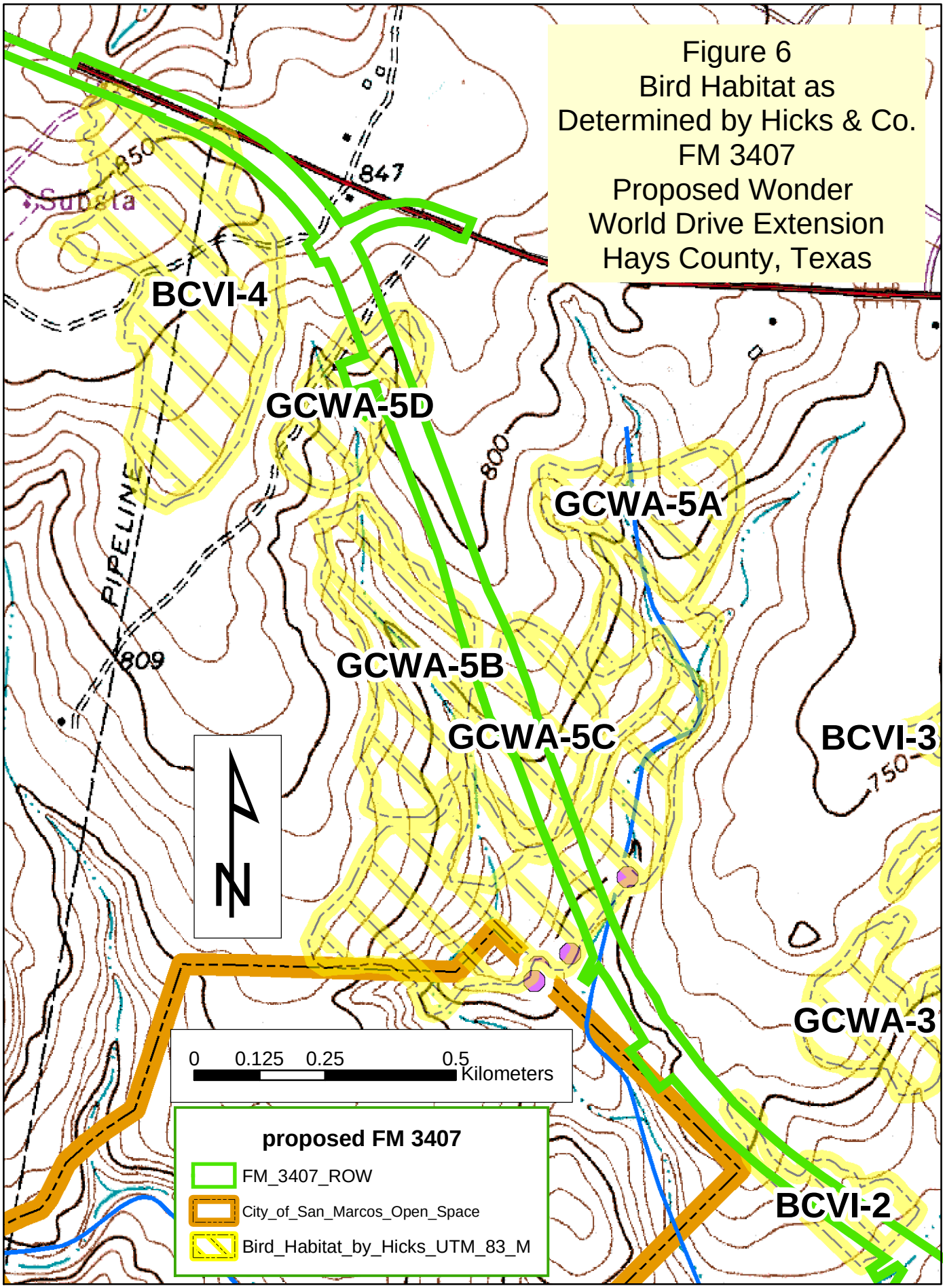
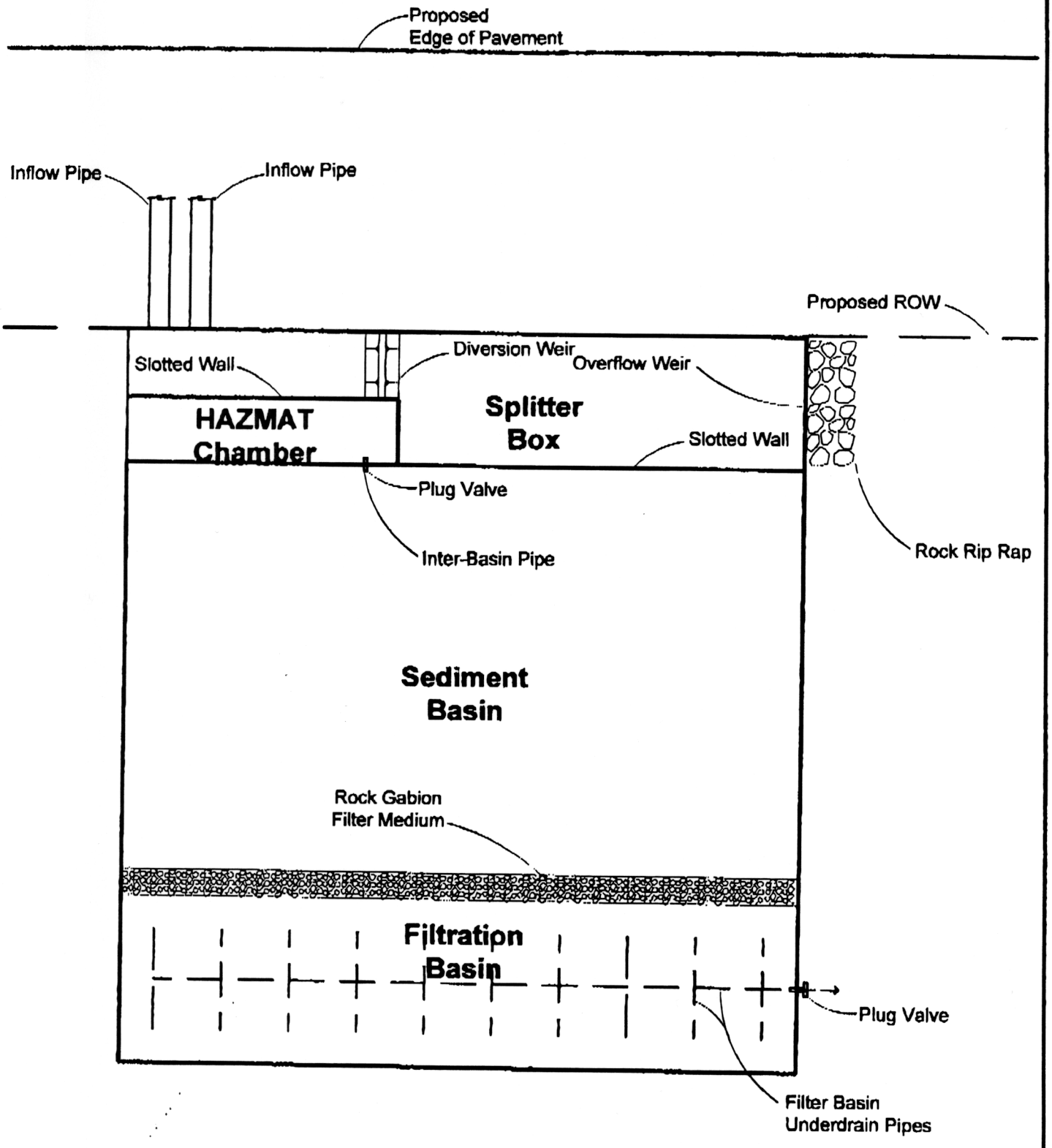


Figure 6
Bird Habitat as
Determined by Hicks & Co.
FM 3407
Proposed Wonder
World Drive Extension
Hays County, Texas
BCVI-4
GCWA-5D
GCWA-5A
GCWA-5B
GCWA-5C
BCVI-3
GCWA-3
BCVI-2
PIPELINE
850
847
800
809
750
N
0 0.125 0.25 0.5
Kilometers
proposed FM 3407
FM_3407_ROW
City_of_San_Marcos_Open_Space
Bird_Habitat_by_Hicks_UTM_83_M



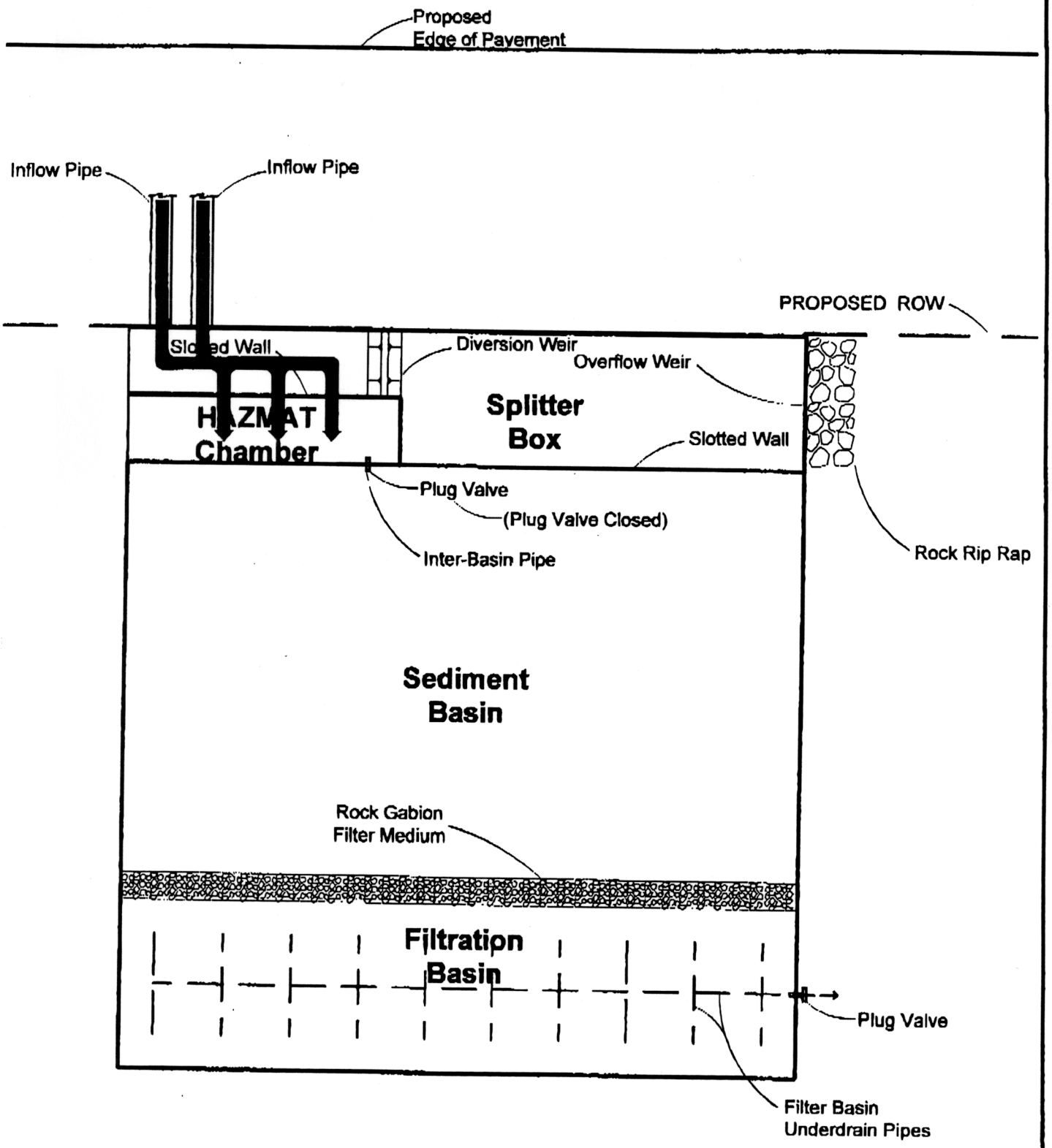
NOT TO SCALE

Espey Consultants, Inc.
Environmental & Engineering Services

EXHIBIT # 1
Sedimentation/Filtration Pond
Typical Layout
Wonder World Drive

10/11/01

PROJECT # 2000-34



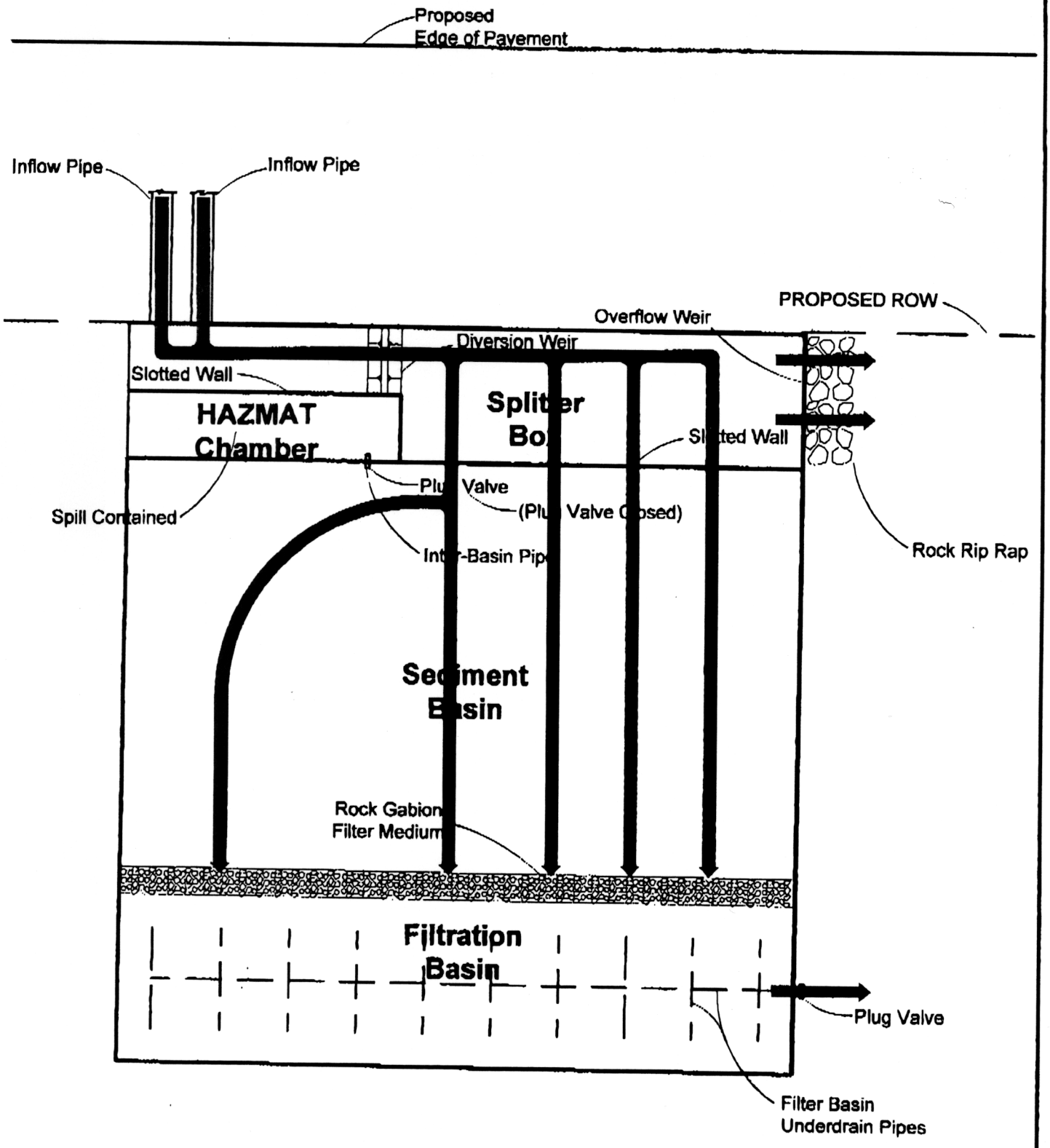
NOT TO SCALE

Espey Consultants, Inc.
Environmental & Engineering Services

EXHIBIT # 2
Sedimentation/Filtration Pond
Dry Weather Spill Containment Flow Path
Wonder World Drive

10/11/01

PROJECT # 2000-34



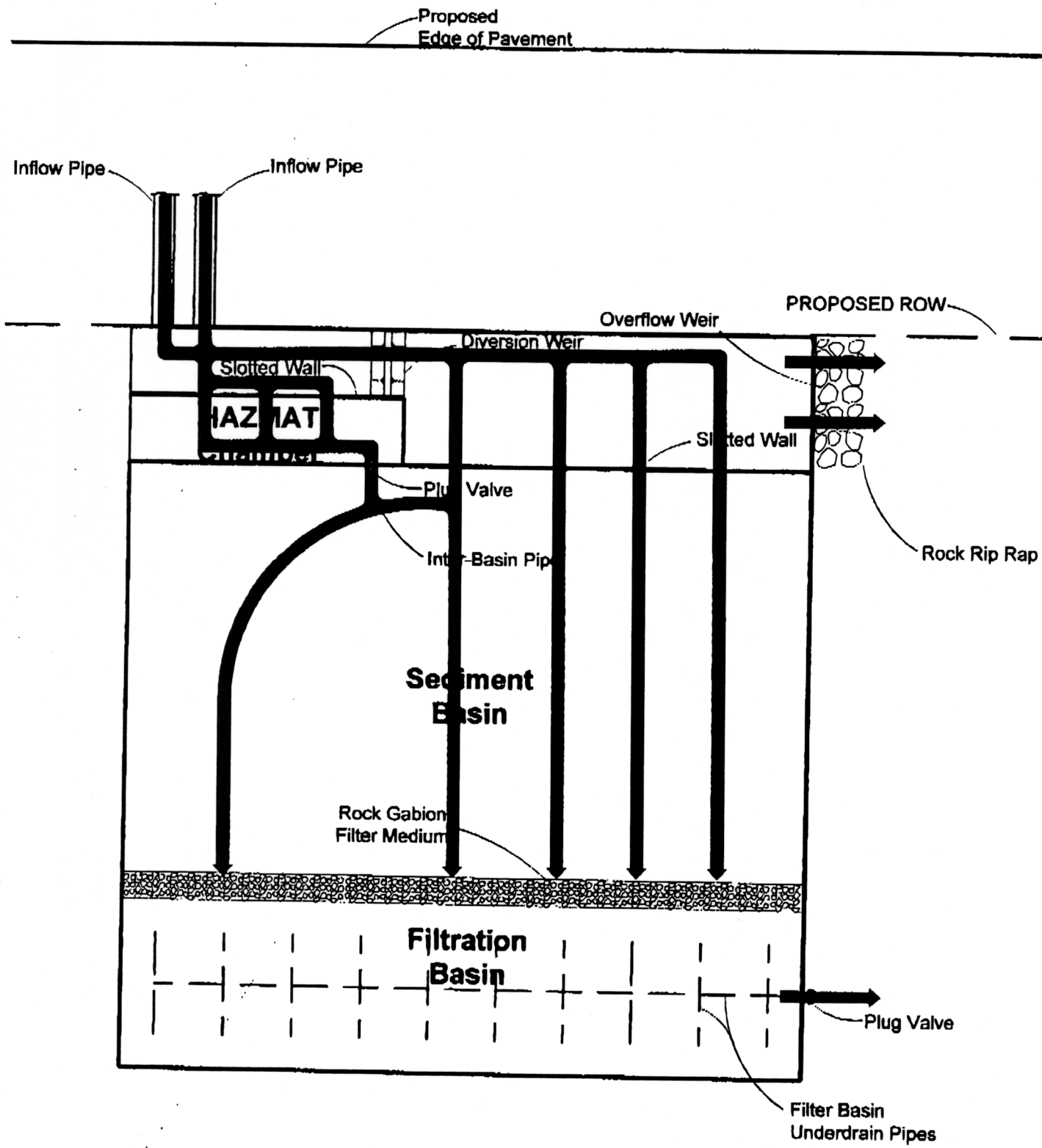
NOT TO SCALE

Espey Consultants, Inc.
Environmental & Engineering Services

EXHIBIT # 3
Sedimentation/Filtration Pond
Wet Weather Post Spill Containment Flow Path
Wonder World Drive

10/11/01

PROJECT # 2000-34



NOT TO SCALE

Espey Consultants, Inc.
Environmental & Engineering Services

EXHIBIT # 4
Sedimentation/Filtration Pond
Wet Weather Normal Conditions Flow Path
Wonder World Drive

10/11/01

PROJECT # 2000-34

Espey Consultants, Inc.

Environmental & Engineering Services

October 22, 2001

Mr. Jeff Seiler, P.E.
Huggins/Seiler & Associates
600 Round Rock West Dr, Suite 602
Round Rock, Texas 78681

Re: Wonder World Drive
Conceptual Water Quality Pond Design
EC Project No. 2000-34

Dear Mr. Seiler:

Espey Consultants (EC) has analyzed the proposed layout of Wonder World Drive, and has determined that six water quality ponds are needed to capture and treat the roadway runoff. The proposed extension of Wonder World Drive includes approximately 3 miles of roadway from Ranch Road 12 to Hunter Road west of San Marcos, Texas. The following letter describes the engineering principles and criteria which are used to size the water quality ponds for Wonder World Drive, and how these water quality ponds are intended to function. All of these water quality ponds are sedimentation/filtration ponds, with an additional 10,000 gallon hazardous material (HAZMAT) chamber. Due to the fact that the project lies over the Edwards Aquifer, the water quality ponds are sized and will function according to the rules which went into effect June 1, 1999 (30 TAC Chapter 213). These rules are found under publication number 348 and are known as "Complying with the Edwards Aquifer Rules: Technical Guidance on Best Management Practices".

Runoff from the proposed roadway will enter the proposed water quality ponds thru a splitter box which will be placed at low points of the roadway. These splitter boxes will divert the water into various chambers. The first 10,000 gallons will flow into the HAZMAT chamber. This chamber is connected to the water quality pond thru an inter-basin pipe which will have a shut off valve to be closed should a hazardous spill occur. Once this HAZMAT chamber is filled runoff will overflow a splitter weir and flow into the sediment chamber of the water quality pond. This chamber will allow for the sedimentation of larger sediments and debris. This water will then pass thru a rock gabion wall and enter a filtration chamber. The filter chamber will filter the water thru a sand bed, thus removing smaller sediments. Runoff in excess of the capture volume will be diverted downstream. Exhibit 1 illustrates the basic layout.

All six water quality ponds are sized using the formulas found in Chapter 3.3 of the publication mentioned above. These formulas are based on the assumption that the water quality pond will remove 80% of the increase in Total Suspended Solids (TSS) load resulting from the development. The water quality pond sizing calculations included three basic steps:

1. Load Calculations: This step involves calculating the TSS loads for the pre-developed land and the TSS loads for the post developed land.
2. Required Removal: After the pre-developed and post developed loads are calculated, a calculation is done which gives the required amount of TSS which will be removed to achieve 80% removal rates.

Mr. Jeff Seiler
Wonder World Drive

October 22, 2001

3. Volume Calculations: Using the required TSS removal loads and a TSS removal efficiency of 89% for sedimentation/filtration ponds, a calculation is done which produces the required pond volume. This volume is increased by 20% to allow for sediment accumulation in the pond. The capture depth for the water quality ponds is 1.8 inches

Included with this letter you will find a typical sketch of a sedimentation/filtration pond, which includes the HAZMAT chamber. Should you have any questions or require additional information, please contact us at any time.

Sincerely,

Brian K Reis, P. E.
Managing Engineer - Civil Design

Sincerely,

Rustin J. Roussel, E.I.
Engineering Staff

Attachments

P:\active\2000-34 Wonder World Dr\letters\011010JSeiler.doc