Border Environment Cooperation Commission

Wastewater Collection System Rehabilitation and Improvements Project

Tijuana, Baja California

General Criteria

1. Project Type

The project consists of the rehabilitation of approximately 131,000 meters of wastewater collection lines, which represents approximately 7.5% of the total length of the city' s system.

2. Project Location

The project is located in the city of Tijuana in the state of Baja California. All the components of the project are located within the watershed of the Tijuana River, which flows into the United States and reaches the Pacific Ocean through the Tijuana Estuary. According to the 2000 Census, Tijuana has a population of 1,210,820. The *Consejo Estatal de Población* (CONEPO) has official population projections through the year 2010. It is expected that Tijuana will reach a population of 1,424,426 by that year. If the population growth rate of 2.1% per year utilized by CONEPO for the period 2005-2010 is extrapolated for the next decade, a population projection of 1,755,138 for the year 2020 is obtained.

3. Project Description and Tasks.

The proposed project is composed of 50 specific projects for the rehabilitation of sewer laterals, collectors and sub-collectors. Overall, 131,000 meters of sewer lines will be rehabilitated with lines varying in diameter from 20 to 122

cm. Of the 50 projects, 36 involve the rehabilitation of laterals, 7 the rehabilitation of collectors, 6 the rehabilitation of sub-collectors, and 1 the rehabilitation of an interceptor.

The following table summarizes all 50 proposed projects.

NUMBER	NAME	BENEFITED POPULATION (RESIDENTS)	DIAMETER (cm)	PARCIAL LENGTH (m)
1	Sub-colector Rampa Buena Vista	11,089	30	1310
2	Colector Central	-	38	941
			61	957
3	Laterals in Zona Este	6,024	20	609
			30	81
			38	70
4	Lateral in Zona Rio Oriente	1,380	20	540
			25	32
			30	26
5	Subcolector cjón. Serv. 2da. Oriente, Ciudad Industrial	1,500	30	682
6	Subcolector av. Alejandro Von Humbolt Modulo I Otay	12,069	38	668
7	Laterals in Calle Federico Gamboa Modulo I Otay	900	20	197
8	Laterals in Calle Gabriela Mistral Modulo IV Otay	675	20	155
9	Laterals in Av. Revolución en Zona Centro	770	20	462
10	Colector Oriente in Vía Rápida de la Zona Río	76,436	122	394
			61	167
11	Connection to subcolector Ejerc. Trigarante Fracc. La Joya	32,900	45	86
12	Lasterals in Zona Norte	450	20	500
13	Laterals in CalleMichoacan and Mutualismo Zona Norte	118	20	574
14	Lateral Calle Baja California Zona Norte	118	25	178
15	Colector Los Reyes,Los Venados	25,600	45	437
16	Laterals Av.Universidad Otay Universidad	212	20	276
17	Laterals calle Diplomáticos Otay Universidad	1,080	20	533
			30	262
18	Colector Venustiano Carranza	53,508	30	278
			38	147
19	Laterals Fracc. El Mirador	8,542	20	1013
20	Laterals Zona Centro	17,181	20	940
			25	777
21	Laterals Privada Tarahumaras Fracc. La Sierra	144	25	160
22	Laterals Cjón. " Z " (between 2da. and 3ra. Zona Centro)	118	25	155
23	Laterals Bulevar Agua Caliente Fracc. Hipodromo	2,000	20	395
24	Laterals calle Rio Amazonas Fracc. Capistrano	6,369	20	17
			30	78

25	Laterals Otay Nueva Tijuana, Modulo I Y II (1ra. Parte)	7,535	20	10629
			25	800
26	Laterals Aviación	1,837	20	351
27	Laterals Zona Río (1ra. A)	-	20	6704
			25	397
			30	238
			38	160
			61	239
28	Subcolector Cañón Guerrero	8,938	Amp. a 25	757
29	Laterals Col. Hipódromo	1485.21	20	1102
30	Laterals Modulos III y IV Otay	6,570	20	8739
			25	285
			30	785
31	Colector Industrial	68,000	45	237
32	Subcolector Cañón González Bocanegra	11,017	20	234
			25	197
			30	391
33	Laterals Col. Guillen	1,380	20	2176
34	Laterals Col. Leos Montoya	344.00	20	1214
35	Laterals Zona Río (1ra. B)	-	20	10056
			25	595
			30	357
			38	239
			61	359
36	Laterals col. Angélica	1,020	20	2012
37	Laterals Zona Este (inicio-1ra. Parte)	6,024	20	5561
			25	330
			30	300
			38	650
38	Laterals Otay Constituyentes	340	20	500
39	Laterals Zona Central (1ra. A)	12,026	20	6000
			25	2000
			30	472
40	Laterals Fracc. Soler	6,789	20	10409
			25	701
			30	670
41	Laterals Zona Norte (Inicio 1ra. Parte)	-	20	6899
			25	363
42	Laterals Col. Santa Rosa	918	20	968
43	Laterals Zona Central (1ra. B)	12,026	20	9000
			25	3000
			30	708
44	Laterals col. Reforma	390	20	275
45	Interceptor Poniente (Arboledas-Los Venados)	81,804	76	1000
46	Colector Pasteje	27,035	38	53
47	Colector Padre Kino	44,944	61	1684
			76	543

48	Laterals Zona Río (2da. A)	-	20	6704
			25	397
			38	238
			25	356
			61	534
49	Laterals Zona Río (2da. B)	-	20	4469
			25	264
			38	159
			25	237
			61	356
50	Laterals Zona Central (2da. A)	5,155	20	1066
			25	247
			30	221
			45	86
				TOTAL=

All the proposed projects are located in previously developed areas with water, wastewater collection, and wastewater treatment service. For the most part, the lines will be replaced with the same diameter pipe, although in a few cases the diameteres will be slightly increased to account for past population growth.

The preferred rehabilitation method is slip lining, which will minimize traffic disruption by minimizing the amount of excavation needed. Additionally, dust generation, and nuisance to residents and commercial establishments will be reduced. Finally, the proposed method will be more cost-effective than conventional excavation methods.

It must be noted that slip-lining may not be possible in some areas, which will be rehabilitated using conventional excavation methods. It is assumed as a contingency that approximately 20% of the rehabilitated length will be done with excavation methods.

4. Compliance with International Treaties

The project will benefit environmental and human health conditions on both sides of the border. The rehabilitation will reduce the risk of wastewater overflows to the environment.

The proposed works were prioritized by CESPT in close coordination with BECC, EPA, and the State of California. Prioritization criteria included structural condition of the lines; overflow, complaints and repair records; wastewater volume that could potentially be surcharged; and proximity to the Tijuana River and the border.

Human Health and Environment

1. Environmental and Human Health Need

The objective of this project is to improve environmental and human health conditions in the city of Tijuana, as well as in areas in the cities of San Diego and Imperial in the United States near the border, the Tijuana Estuary and the Pacific Ocean.

Tijuana has a long history of sanitation problems as a result of the conditions of some sewer lines, the existence of inhabited areas that lack water and sewer service, and insufficient wastewater treatment capacity. Currently, CESPT is undertaking a series of sanitation programs aimed at reducing these problems. Through the Parallel Works project Tijuana will increase its wastewater conveyance and treatment at the San Antonio de los Buenos plant. Additionally, an extensive construction program for sewer systems in currently unserved areas is being implemented. The proposed project will be an additional contribution towards solving the sanitation problems of the city.

The rehabilitation of sewers will reduce storm and ground water infiltration into the sewer system, which will in turn reduce wastewater inflow to the treatment plants, thus increasing the effective treatment capacity. Furthermore, the potential for the pollution of aquifers and surface waters will be decreased.

Finally, the project will help relieve the system of current flows generated from infiltration and overflows to the environment and the Tijuana River.

2. Environmental Assessment

In order to gain access to EPA's Border Environment Infrastructure Fund (BEIF) monies, the project must comply with the National Environmental Policy Act (NEPA) requirements. On June 25, 2001 EPA issued a "Categorical Exclusion" (CATEX), in which the EPA Regional Administrator determined that the proposed project will not have significant adverse impacts. The NEPA process is completed with this CATEX. A copy of the CATEX determination and the supporting rationale can be found here CATEX .

3. Compliance with Applicable Environmental and Cultural Resources Laws and Regulations

The proposed rehabilitation will take place in previously disturbed areas and no biological, archaeological or cultural resources will be impacted. As previously indicated, the rehabilitation method will minimize the need for excavation. All work will be performed along existing lines.

Technical Feasibility

1. Appropriate technology

As previously indicated, lines will be rehabilitated for the most part by means of the lip-lining method. This technology will reduce excavation needs and the impact on traffic patterns and nuisance to residents. CESPT has experience in the use of this technology.

CESPT preformed an assessment of the lines to be rehabilitated, which consisted in an evaluation of overflow, repairs and complaints records; the inspection of all the manholes in each line; partial inspection by means of T.V. cameras; and based on the knowledge and experience of the operations staff. Additionally, hydraulic calculations were performed for each sewer segment.

CESPT developed the partial design (*anteproyecto*s) for each of the proposed projects, which include a map with the location of the lines and manholes and manhole and invert elevations. Additionally, the designs include detailed construction cost estimates. CESPT is in the process of completing the final design for all projects.

The sewer system will continue being operated in the same fashion. Wastewater will continue flowing to the International and San Antonio de los Buenos wastewater treatment plants.

The proposed technology is appropriate for the physical conditions of Tijuana and for the technical and institutional capacity of the operating agency. CESPT has operations and maintenance crews that perform line cleaning and repairs and have the appropriate equipment.

2. Operation and maintenance plan

The system will be operated by CESPT in the same fashion it is currently being operated. Nonetheless, operation and maintenance requirements will be decreased due to the reduction of structural problems.

CESPT has crews for the operation and maintenance of the sewer system.

3. Conformance with applicable deign norms and regulations

The partial designs were developed by CESPT in accordance with state and federal guidelines and regulations.

Financial Feasibility and Project Administration

1. Financial feasibility

The total estimated project cost is Mx$390,734,002, or assuming an exchange rate of Mx$9.30 = US$1.00, the total cost is US$38,392,477. . The following table summarizes the cost estimates for the proposed projects.

NUMBER	NAME	DIAMETER (cm.)	PARCIAL LENGTH (ml.)	TOTAL LENGTH (M.)
1	Subcolector Rampa Buena Vista	30	1,310	1,310
2	Colector Central	38	941	1,898
		61	957	
3	Laterals zona Este	20	609	760
		30	81	
		38	70	
4	Laterals Zona Rio Oriente	20	540	597
		25	32	
		30	26	
5	Subcolector cjón. Serv. 2da. Oriente, Ciudad Industrial	30	682	682
6	Subcolector av. Alejandro Von Humbolt Modulo I Otay	38	668	668
7	Laterals calle Federico Gamboa Modulo I Otay	20	197	197
8	Laterals calle Gabriela Mistral Modulo IV Otay	20	155	155
9	Laterals Av. Revolución en Zona Centro	20	462	462
10	Colector Oriente en Vía Rápida de la Zona Río	122	394	562
		61	167	
11	subcolector Ejerc. Trigarante Fracc. La Joya	45	86	86
12	Laterals Zona Norte	20	500	500
13	Laterals c. Michoacan y Mutualismo Zona Norte	20	574	574
14	Laterals c. Baja California Zona Norte	25	178	178
15	Colector Los Reyes,Los Venados	45	437	437
16	Laterals Av.Universidad Otay Universidad	20	276	276
17	Laterals calle Diplomáticos Otay Universidad	20	533	795
		30	262	
18	Colector Venustiano Carranza	30	278	425
		38	147	
19	Laterals Fracc. El Mirador	20	1,013	1,013
20	Laterals Zona Centro	20	940	1,717

		25	777	
21	Laterals Privada Tarahumaras Fracc. La Sierra	25	160	160
22	Laterals Cjón. " Z " entre 2da. Y 3ra. Zona Centro	25	155	155
23	Laterals Bulevar Agua Caliente Fracc. Hipodromo	20	395	395
24	Laterals calle Rio Amazonas Fracc. Capistrano	20	17	95
		30	78	
25	Laterals Otay Nueva Tijuana, Modulo I Y II (1ra. Parte)	20	10,629	11,429
		25	800	
26	Laterals Aviación	20	351	351
27	Laterals Zona Río (1ra. A)	20	6,704	7,738
		25	397	
		30	238	
		38	160	
		61	239	
28	Subcolector Cañón Guerrero	Amp. a 25	757	757
29	Laterals col. Hipódromo	20	1,102	1,102
30	Laterals Modulos III y IV Otay	20	8,739	9,882
		25	285	
		30	785	
31	Colector Industrial	45	237	237
32	Subcolector Cañón González Bocanegra	20	234	821
		25	197	
		30	391	
33	Laterals col. Guillen	20	2,176	2,176
34	Laterals col. Leos Montoya	20	1,214	1,214
35	Laterals Zona Río (1ra. B)	20	10,056	11,606
		25	595	
		30	357	
		38	239	
		61	359	
36	Laterals col. Angélica	20	2,012	2,012
37	Laterals Zona Este (inicio-1ra. Parte)	20	5,561	6,841
		25	330	
		30	300	
		38	650	
38	R Laterals Otay Constituyentes	20	500	500
39	Laterals Zona Central (1ra. A)	20	6,000	8,472
		25	2,000	
		30	472	
40	Laterals Fracc. Soler	20	10,409	11,780
		25	701	
		30	670	
41	Laterals Zona Norte (Inicio 1ra. Parte)	20	6,899	7,263
		25	363	
42	Laterals col. Santa Rosa	20	968	968

43	Laterals Zona Central (1ra. B)	20	9,000	12,708
		25	3,000	
		30	708	
44	Laterals col. Reforma	20	275	275
45	Interceptor Poniente (Arboledas-Los Venados)	76	1,000	1,000
46	Colector Pasteje	38	53	53
47	Colector Padre Kino	61	1,684	2,227
		76	543	
48	Laterals Zona Río (2da. A)	20	6,704	8,228
		25	397	
		38	238	
		25	356	
		61	534	
49	Laterals Zona Río (2da. B)	20	4,469	5,485
		25	264	
		38	159	
		25	237	
		61	356	
50	Laterals Zona Central (2da. A)	20	1,066	1,620
		25	247	
		30	221	
		45	86	
TOTAL =			***130,843***	
SUTOTAL CONSTRUCCION =		***Mx$306,217,870***		
Imprevistos de diseño (10%)= Mx$30,621,787				
Supervision (6%) = Mx$18,373,072				
SUB-TOTAL		***Mx$355,212,729***		
V.A.T. (10%) =Mx$35,521,273				
GRAN TOTAL = MX$390,734,002				

The North American Development Bank (NADB) developed a financial evaluation that took into consideration the costs of the project, the debt capacity of the operating agency, the availability of CESPT' s resources, and the availability and eligibility for grant funding. The following table presents the financial structure recommended by NADB for this project, assuming an exchange rate of Mx$9.30=US$1.00.

Available funding	Amount (dollars)	% del Total
Capital		
CESPT' s contribution	18,007,204	43
Capital Sub-total	**18,007,204**	***43***

Loans		
NADB loan	6,000,000	14
Loans Sub-total	***6,000,000***	***14***
Grants		
BDAN (BEIF)	18,007,204	43
Grants Sub-total	***18,007,204***	***43***
TOTAL	**42,014,409**	**100.0**

2. Rate study

The financial evaluation developed by NADB includes a rate study. The financial evaluation does not recommend an increase in rates in real terms. An inflationary adjustment is recommended.

It is important to point out that CESPT has a commitment already in place to increase rates 3% in real terms by the year 2002. This increase will elevate the CESPT' s average cost per cubic meter of potable water to Mx$11.64 to cover debt obligations arising from the Parallel Works project.

At this time the average water bill is Mx$98.36.

3. Project administration

The project will be administered by CESPT, which is in charge of the operation and maintenance of the water and sewer systems. The implementation of this project will not affect the way in which CESPT operated the system. CESPT' s Construction Department will supervise the construction.

Public Participation

1. **Initiation of the public participation process:** The process began on November 9, 2000 when BECC delivered to Luis Torres, CESPT' s planning under-director a copy of the public participation guidelines, as well as other sample documents.
2. **Steering Committee:** The steering committee was created on February 8, 2001, in a meeting held at CESPT' s office. A board was elected and was formed as follows:

   - President: José Galicot Behar.
   - Secretary: Héctor Lutteroth Camou

- Speakers: Arq. Guillermo Caballero, C. Gustavo Beister, C. Julián Palombo y C. Salvador López.
- Technical Secretary: Sara H. Leal Partida, CESPT.

3. **Public Participation Plan:** The Steering Committee submitted to BECC a Public Participation Plan dated March 8, 2001. The Plan was approved by BECC on March 12, 2001.
4. **Local Organizations:** The Steering Committee has representatives from 37 local organizations, by which it guarantees representation of the public at large. Among these organizations are: representatives from different neighborhoods (low income), professional organizations, business chambers, social service clubs, representatives from the media, academic institutions, etc.
5. **Public Information:** Project information has been accessible to the community at the CESPT' s offices. Additionally, over 50 public meetings have taken place in neighborhoods and schools; flyers have been distributed; radio shows; radio spots; and meetings with cambers and clubs.
6. **Public meetings**:

   1st Public Meeting: this meeting was held on April 7, 2001 at the facilities of Parque Municipal Morelos, in Tijuana, BC. Approximately 500 people attended the meeting. Technical aspects of the project were presented, as well as cost estimates. An exit survey was conducted to gauge understanding of and support of the project. 95% of those surveyed responded that they support the project. Of these 71% were women.

   2nd Public Meeting: This meeting will be held on July 20 at the Centro Cultural Tijuana (CECUT). The financial components of the project will be presented, including cost estimates, the financial structure, and any potential rate impacts. Another survey will be applied at the end of the meeting to gauge support for the project.

Sustainable Development

1. Definition and Principles

Sustainable Development is defined as conservation oriented social and economic development that emphasizes the protection and sustainable use of resources, while addressing both current and future needs, and present and future impacts of human actions, as defined in the Border XXI environmental program developed by U.S. and Mexican authorities.

According to the above definition of sustainable development, the Improvements and Rehabilitation of the Sewer System of Tijuana, B.C., meets the principle of conservation

oriented social and economic development that emphasizes the protection and sustainable use of natural resources, addressing current needs without compromising the ability of future generations to meet their own needs.

Principle 1 establishes that human beings are at the center of concerns for sustainable development and are entitled to a healthy and productive life in harmony with nature. This principle will be met because the project will promote a reduction in the number of diseases that directly relate to potential wastewater infiltration into soil and ground water, as well as, raw sewage spills during the rain season.

Principle 2 states the right to development so as to equitably meet developmental and environmental needs of present and future generations. This principle is met by this project in that it ensures sewer services for current and future residents, ensuring thus environmental protection for future generations.

Principle 3 is fulfilled with the reduction of potential soil and ground water contamination due to wastewater leaks from pipes in poor condition, as well as the pollution of the Tijuana River as the result of sewage spills.

Principle 4 discusses the interest of stakeholders in any activity related to this wastewater project. This principle has been met by implementing the aforesaid community participation program.

b. Institutional and Human Capacity Building.

Actions considered by the project will help Tijuana' s Municipal Government to strengthen its capacity in the following areas.

- The revamping of installed collecting capacity with the rehabilitation of approximately 131,000 meters of sewer lines.
- The rehabilitation of sewer lines will help to reduce potential infiltration of storm waters and/or ground water, reducing the flows that wastewater treatment plants receive, extending the lifetime capacity of the existing and future facilities.

c. Conformance with Applicable Local and Regional Conservation and Development Plans.

The project meets guidelines established by the following federal, state and local plans:

Tijuana' s Master Plan for the Improvement of Water, Wastewater, and Sanitation services. The project supplement the goals for consolidation and expansion of the Tijuana Water Utility services, considered in the Master Plan that in currently under development.

Water, Sewer, and Sanitation Program. This program was implemented by the Federal government in 1990 and has an objective: to meet existing deficiencies and demands arising for population growth in the areas of potable water, wastewater collection, institutional development at the municipal, state and federal level to promote environmental protection by reducing wastewater pollution.

1996-2001 Baja California State Urban Development Plan, Secretariat of Human
Settlements and Public Works

This document states the need to build and to consolidate infrastructure for wastewater collection and treatment in the five municipalities and in the state's regional centers.

Comprehensive Environmental Program for the Northern Border (PIAF)

Based on guidelines established by the **National Development Plan** and corresponding Sector Programs. Addresses guidelines established to clean up the country's Northern Border.

d. Natural Resource Conservation.

Improving wastewater collection infrastructure will in turn improve environmental quality, especially soils, groundwater, and surface water, as is the case of the Tijuana River.

e. Community Development.

If sewer lines are not rehabilitated, several environmental and human health threats will continue being present. Lines will continue deteriorating. Leak repairs will impact traffic and the use of valuable resources towards that end. Additionally, during the wet season wastewater overflows will continue, creating a human health and environmental problem.

Solving the problems previously mentioned will improve the quality of life.