EVALUATION OF LANDFILLS FOR THE NEW RIVER PROJECT

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Interoffice Memorandum

CMT. NO.	SUBJECT: New River specs	☐ FILE ☐ DESTROY

TO: Gary Shapiro
Via
Ed Raleigh

FROM: Cateshy

DATE: 4-9-92

I have made the suggested revisions and after conferring with Elley, included some additional details necessary for the monitoring plan. Call me if I can be of further assistance.

6910-007 3-90

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

INTEROFFICE MEMO

SUBJECT: New River Landfill Specifications; Suggested Additions

TO: Ed Raleigh **FROM:** Catesby Moore **DATE:** 4/7/92
VIA: Don Park
CC: John Rodriguez

I have reviewed Sections 212 and 213 of New River Specifications, pertaining to Landfill Excavation and Disposal and Landfill Excavation Monitoring respectively. I have the following suggestions.

The suggested additions are noted in bold:

Section 103 -AWARD AND EXECUTION OF CONTRACT
103.6.1 Contractor's Insurance:
On all policies, the Flood Control District of Maricopa County **and Western Technologies** shall be named as additional insured.

212.2 Disposal
212.2.1 Construction debris, **other than non-inert, environmentally hazardous material** shall be placed in Fill Disposal Site "A"...

212.2.2 - Organic Material

Change the phone number for the Glendale Municipal Sanitary Landfill to 931-5588. This is the Direct line to the landfill and all calls regarding the landfill are referred to this number.

...it is not possible to dispose of certain materials including **friable asbestos**, hazardous chemicals or waste.

Add the following sections:
212.2.3 - Tires:
During the excavation of the landfill material and prior to it's disposal, the Contractor shall search for, remove and stockpile on-site tires contained in the landfill material. After completion of the excavation, the Contractor shall load, haul and dispose of the tires at an approved tire disposal site.

212.2.4 - Hazardous Wastes: Based on available information and from the analysis of the test pits, it is not anticipated that hazardous wastes will be encountered. However, the Contractor may encounter household chemical products and hazardous waste from small-quantity generators. Contractor's suspicion of potential hazardous wastes shall be immediately communicated to the Engineer. The Contractor shall stop working in the area as directed by the Engineer. The area with suspected hazardous wastes shall be barricaded by the Contractor. Should the presence of hazardous wastes be verified, the excavation and removal activities will be suspended and the necessary action taken to resolve the problem. The removal and disposal of any hazardous wastes and materials contaminated with hazardous waste will be performed in accordance with the approved Landfill Excavation Monitoring Plan. Payment for hazardous waste disposal shall be in accordance with section 213.3.

212.3 - Measurement

Payment for construction debris, organic waste, **and tire,** removal and disposal will be paid for using separate unit prices as indicated in the Bid Schedule.

212.4 - Payment

Tires shall be paid for at the Contract unit price per ton for Item 212-X in the Bid Schedule.

General Comments:
Section 213.3 states that no separate payment shall be made for providing monitoring of existing landfills. In order to assist in bid preparation, an example of an approved Monitoring Plan will be available at the Flood Control District for reveiw by prespective bidders. Additionally, because the exact quantity of "organic" material is unknown and is included in the bid schedule in an unit price per ton, the finger print testing for organic material should also be included as a unit price. An example of approved finger print testing procedure will be included in the approved Monitoring plan and will provide the perspective bidder with some means of estimating the unit price per test.

213.3 - LANDFILL EXCAVATION MONITORING ORGANIZATION

213.3.1 SYSTEM MANAGER.

The Contractor shall identify an individual, within his organization at the site of the work, who shall be responsible for overall management of Landfill Excavation Monitoring and have the authority to act in all monitoring matters for the Contractor. The System Manager shall be a certified Industrial Hygienist or Safety and Health Specialist. A Certified Industrial Hygienist shall have working experience in the chemical industry and/or chemical waste industry and will have a sound working knowledge of state and federal occupational and safety regulations and formal training in occupational safety and health. A Safety and Health Specialist will have a minimum of two years working experience in the chemical industry and/or chemical waste industry. The Safety and Health Specialist will have a sound working knowledge of State and Federal occupational safety and health regulations and formal training in occupational safety and health. This System Manager shall be approved by the Enginner.

213.2.4 PERSONNEL.

A staff shall be maintained under the direction of the system manager to perform all Landfill Excavation Monitoring activities. The actual strength of the staff during any specific work period may vary to cover work phase needs, shifts, and rates of placement. The personnel of this staff shall be fully qualified by experienced and technical training to perform their assigned responsibilities and shall be directly hired by and work for the Prime Contractor.

213.2.7 MONITORING.

Monitoring Procedure. The Contractor shall perform monitoring specified or required to verify that control measures are adequate to provide monitoring conforming to contract requirements. A list of activities which the Contractor understands he is to perform shall be furnished as a part of the Landfill Excavation Monitoring plan to the Enginner. The list shall give the specification paragraph containing the requirements and the personnel responsible for each activity. The Contractor shall perform the following activities:

(i) Verify that monitoring complies with contract requirements.

(ii) Verify that monitoring is adequate to provide immediate notification of the presence of hazardous waste.

(iii) Verify that recording forms have been prepared.

213.2.8 DOCUMENTATION.

The Contractor shall maintain correct records of Landfill Excavation Monitoring operation performed including the work of subcontractors. In addition, these records shall include factual evidence that the required activities have been performed, including but not limited to the following:

(i) Type and number of control activities involved.

(ii) Results of control activities.

(iii) Proposed remedial action.

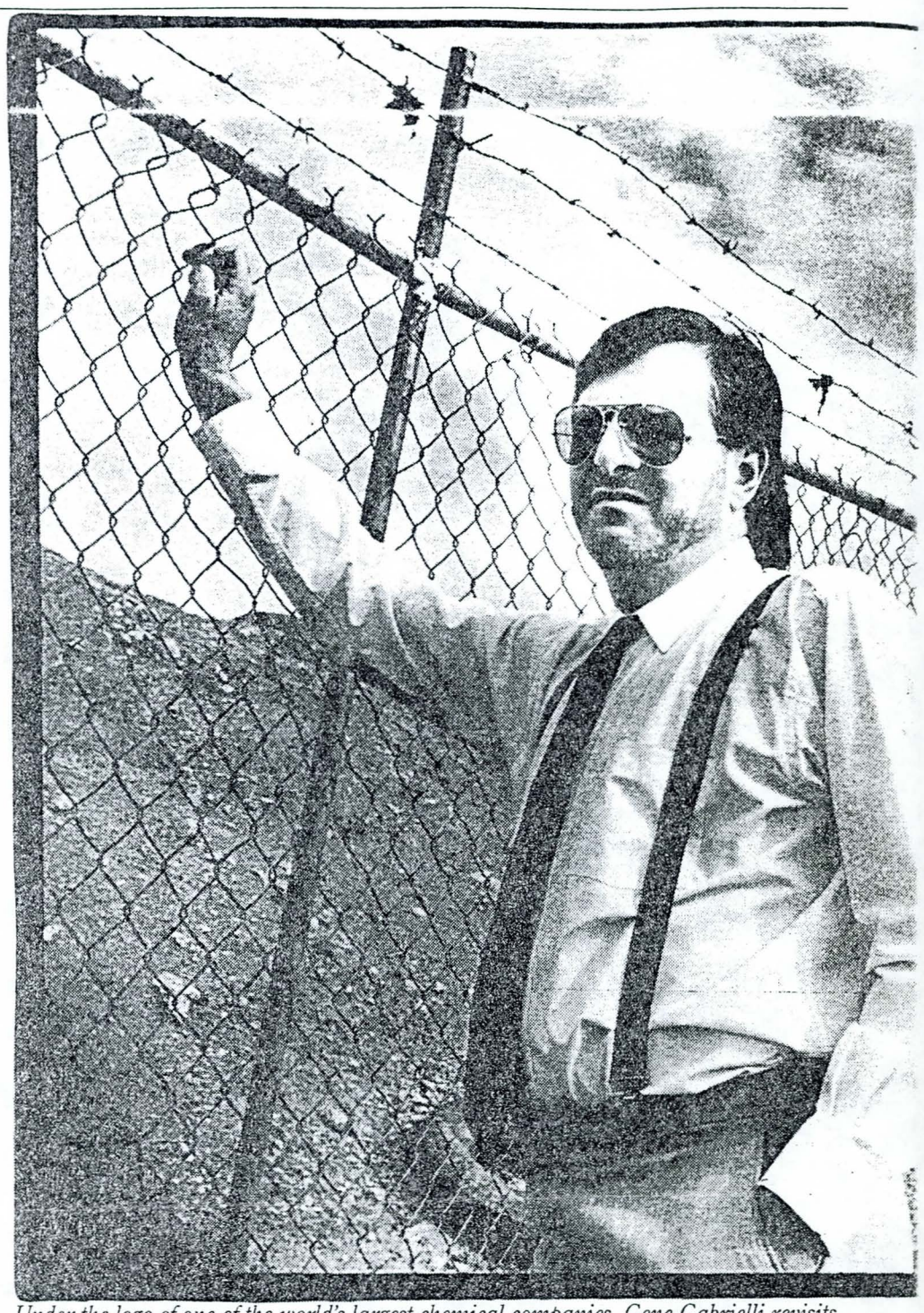
(iv) Corrective actions taken.

THE FRONT PAGE

YOUR TAX DOLLARS AT WORK

The Hohokam freeway put Gene Gabrielli on the road to ruin: A cautionary tale on how a recycling environmentalist got crossways with the state of Arizona and one of America's largest chemical companies.

BY PHILIP MARTIN



Under the logo of one of the world's largest chemical companies, Gene Gabrielli revisits the site where, for 16 years, he ran a thriving recycling business.

A RIBBON through bleakness, the latest installment of the Hohokam Expressway snakes up from the south; fording the Salt River. It gathers momentum, sending exit ramps diving for Sky Harbor International Airport and Washington Street, and seems to promise a shot at Camelback Mountain before merging into McDowell Road.

Like all freeways, the Hohokam focuses its travelers on the destination rather than the journey. It is unsafe and unnecessary to try to take in the scenery, and frankly, there is not much to see beyond the expressway's own sculpted, elevated shoulders. Looking down to the east, a little south of Washington Street, there are unsightly hills of dirt and a rusted husk of what once may have been a grain elevator. This nondescript plot of land is surrounded by a dull wire fence.

Gene Gabrielli used to own this land before the state took it from him to build the freeway. Though he denies it, Gabrielli thought he stood to make a little profit when he found out his business was in the path of the bulldozers.

Instead he has endured years of legal anguish and wrecked finances. Not only didn't he make a profit from the sale of his land, the state offered him roughly $100,000 less than he had paid for it six years before. Because of the difficulties in finding a proper site on which to relocate, he hasn't been able to operate his business for two years. And worst of all, Arizona authorities want to bill him for what could be more than $1 million to clean up a toxic-waste spill he did not create, one that probably would have never occurred had the state followed established guidelines for environmental assessments before it built the Hohokam Expressway.

Environmental hazards are a relatively new variable in the real estate business. Because of the vast amounts of pollution present in Arizona's real estate, however, it's a problem you're going to be hearing about more often. During the past 20 years or so, a body of laws and regulations has evolved to manage this new area of risks. One of the pro forma rituals of a modern land transaction is the performance of a study to determine whether, based on past use, a parcel is likely to become an environmental problem in the future. Ordinarily, these studies are conducted at the behest of a prospective buyer hoping to indemnify himself against cleanup liability. These studies may be as brief as a quick look-see on the land, or if an engineer suspects a lot's history, or if present use suggests the possible presence of nasty chemicals under the ground, then more complex research—core samples, hydrological studies—may be undertaken as a precaution.

In the case of Gene Gabrielli's land, the state ordered only a limited audit, a study as cursory as a walk around the property, and did not proceed to a more extensive examination until after a spill had been created.

Although the state admits it caused the spill, either through negligence or lack of foresight, Arizona claims that Gabrielli is liable for the cleanup. The cost is expected to climb to $1 million.

"There has never been a construction project like this in the history of the world," ADOT's Galvin says.

The Arizona Department of Transportation holds that what has happened to Gabrielli is just one of the unfortunate, unavoidable things that can happen when highways are built in haste.

And that's how we build them around here.

Roads like the Hohokam Expressway are a relatively new phenomenon to the Valley of the Sun. Local residents have been slow to embrace the advantages of clean, unencumbered paths through town. While cities in other parts of the country were girding themselves with beltways and outer loops, the Valley clung stubbornly to its stoplight-clogged arterial road system. In Arizona, freeways were seen as unnecessary, impersonal people-movers tracking through the country oblivious to any sense of place. Worse yet, they were seen as a threat to the quality of life enjoyed by Phoenicians who were determined not to turn their city into "another Los Angeles." Part of the reason some were attracted to Phoenix was its manageable scale and insulation from civilization; plenty of new Valley residents were willing to "shut the door behind them" after they settled in their arid homeland.

"Unfortunately, they forgot to tell the economic development guys," Dan Galvin of the Arizona Department of Transportation says. "They kept bringing in industry, and people follow the jobs."

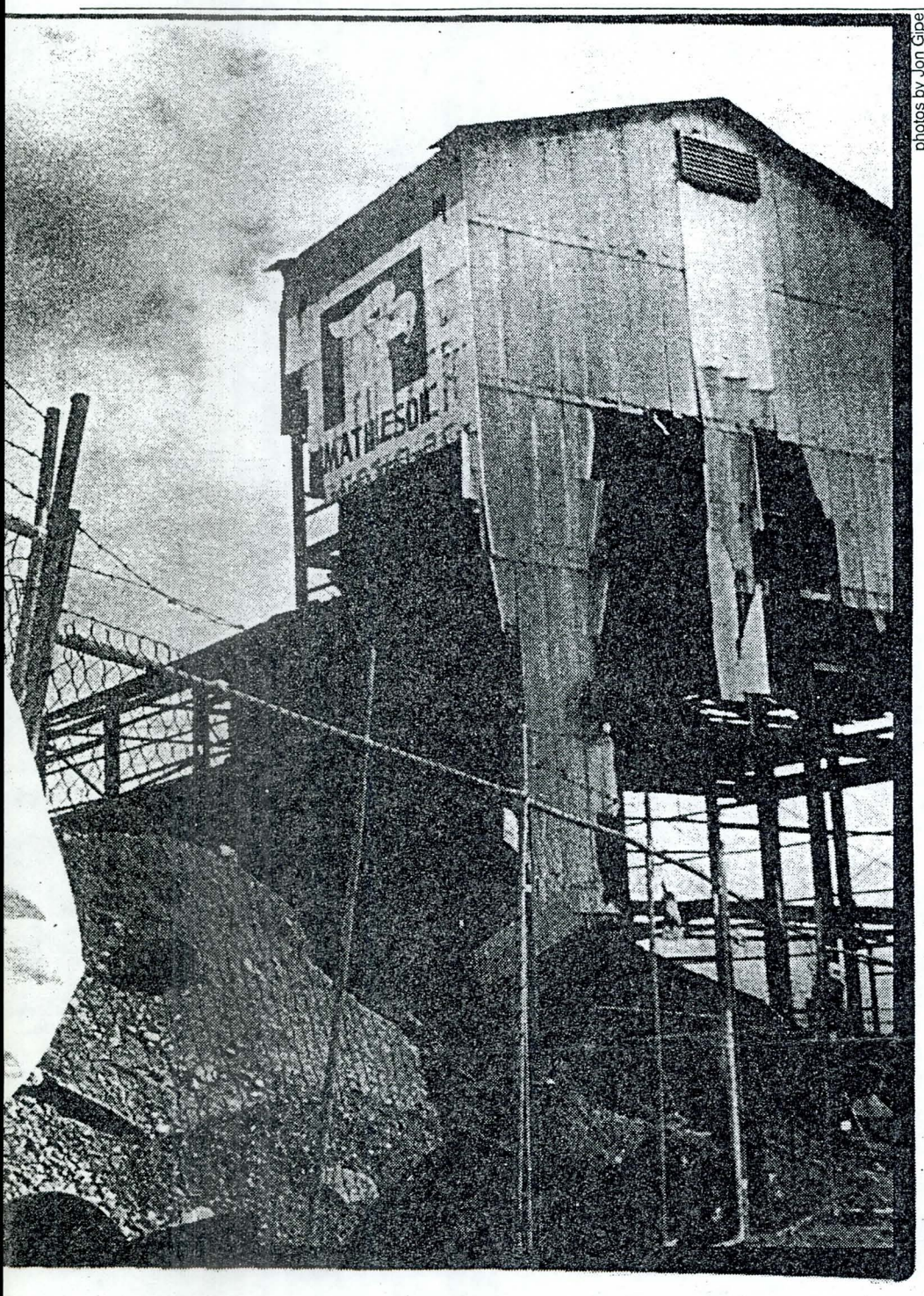
Galvin, ADOT's director of community relations, has the slightly clerical look of a young congressman's aide, the sort of earnest level gaze that inspires confidence in bartenders and police detectives. It falls to him to explain why it's so hard to get from one end of Maricopa County to the other.

"The concern was that we didn't want to become another big, ugly city," he begins. "Taxpayers voted down a number of issues that would have funded highway construction. . .in the mid-1970s the *Arizona Republic* was running editorials urging people to vote 'no' on [freeway proposals.] People just didn't want it."

Incredible population growth in the 1970s coupled with a political climate hostile to paying taxes to fund highway-construction projects have produced a unique set of circumstances for Phoenix and its surrounding communities. For the first time in history, highway planners are trying to retrofit a major metropolis with a freeway system. Instead of building roads through the boondocks and letting the city grow up around them, ADOT is frantically trying to stay ahead of gridlock by building highways through an urban environment.

It wasn't until 1985 when Maricopa County voters approved a half-cent sales-tax increase, designed to raise $5.8 billion over 20 years, that work on a 231-mile Valleywide freeway system began. Six years later, that system is about 10 percent complete and more than $1.2 billion over its projected budget. While voters will get a chance to add another half-cent dedicated to freeway construction in November and ADOT is exploring alternative methods of raising highway-building funds such as privatization and the use of toll roads, Galvin says that under current funding conditions, ADOT will be able to complete only about 50 more miles of highway before the year 2006.

"There probably has never been a construction project like this in the



photos by Jon Gipe

history of the world," Galvin says. "Certainly there's never been one like it in this country."

Building under construction schedule pressure through populated areas is an expensive proposition. And sometimes, it makes bad things happen. Everyone involved concedes that what happened when the Hohokam Expressway was extended northward, through a triangular, 6.5-acre parcel of land owned by Gene Gabrielli was an atrocity.

Galvin approaches the problem with disarming, fatalistic frankness. "That's the price of building freeways in a hurry," he says.

BARBED WIRE TOPS the rented fence that prevents the law-abiding from walking onto part of what ADOT employees call "the Gabrielli property." Attached to the fence are bilingual signs to warn the unauthorized away, and beyond them piles of excavated earth are partially covered by black plastic tarp. Between these mounds, a few sooty tires have settled into a fine silt that turns dusky pink in the fading sunlight.

Along the south end of what ADOT has designated Parcel No. 7-5925 rises a conspicuous structure of corrugated steel. It is a long building with a pitched roof, running 222 feet from east to west and 60 feet deep. In places, its ruffled skin has been peeled away to reveal a rusted skeleton and more dirt packed inside. For most of its length, the building is approximately two stories high, but its west-end supports an elevator visible from more than a mile away. On the tower is painted, in flat orange and white, an eagle's head in profile above the legend "Mathieson." You can't miss it.

All that dirt is, to some degree, soaked in pesticide. The dirt inside the building, sheltered from the rain, is thought to be the most severely contaminated. When the state Department of Environmental Quality sends out its workers to refit the plastic shroud, they are required to wear "moon suits," protective clothing that covers them from head to foot. It is costly to keep the dirt here, and it will be even more costly to move it. Recent tests indicate the dirt is not as contaminated as was first thought. That is good news. Instead of cleanup costs of more than $3 million, it may cost only $1 million to haul the dirt away.

This dirt was taken from directly beneath the overpass that supports the Hohokam a few yards away. When construction workers began building the expressway in September 1990, they removed a concrete pad that covered a sump in the expressway's path. Almost immediately, the air was saturated with the sweet-sick odor of DDT. A few workers became ill. Work stopped. Tom Sullivan, the hazardous material coordinator for ADOT's environmental planning divisions, was called in to do an assessment.

Everyone concedes that what happened to landowner Gene Gabrielli was an atrocity.

Sullivan is a burly, hirsute guy with a Brooklyn accent tempered by 35 years out West. He says that a week or so before the crew hit the sump, workers on a new crosscut canal just a few yards east of the freeway construction noticed a funny smell.

"We went out and—real scientific—sniffed it a couple of times," Sullivan says. "It smelled like the stuff I had in my garden."

But tests showed the concentrations of pesticides were so low that no action was required. Work continued on both projects on the Gabrielli land, though a safety officer from Tanner Construction, the contractor actually building the freeway, privately expressed his concerns to Sullivan.

"But when they ripped the cap off that sump, it was Katy-bar-the-door," Sullivan says. "It was immediately obvious that we were dealing with some high concentrations. So we roped it all off and backed off construction."

Subsequent core samples revealed dangerously high levels of four different pesticides in the path of the Hohokam, near the Grand Canal.

Here is where the faded eagle on the elevator becomes important. For more than 40 years, it has looked down from its perch, north across Washington Street. It is a trademark of Olin Mathieson, the giant chemical company that operated a pesticide and fertilizer formulation plant on the site from 1950 to 1972.

But nobody ordered a complete environmental impact study for Parcel No. 7-5925 before construction work started on that part of the Hohokam Expressway. Even though ADOT had a title search that went back to when the land was patented in the 19th century, which showed the chemical company had owned the land, the only environmental workup conducted before the state hit the sump was a "Phase I Environmental Audit." It was conducted by the environmental consulting firm of Scott, Allard and Bohannan, Inc., in November 1988.

This Phase I audit "was based on visual observation of soils, construction materials, and equipment" and amounted to little more than a stroll around the property.

"Observations were made at random to characterize the general conditions

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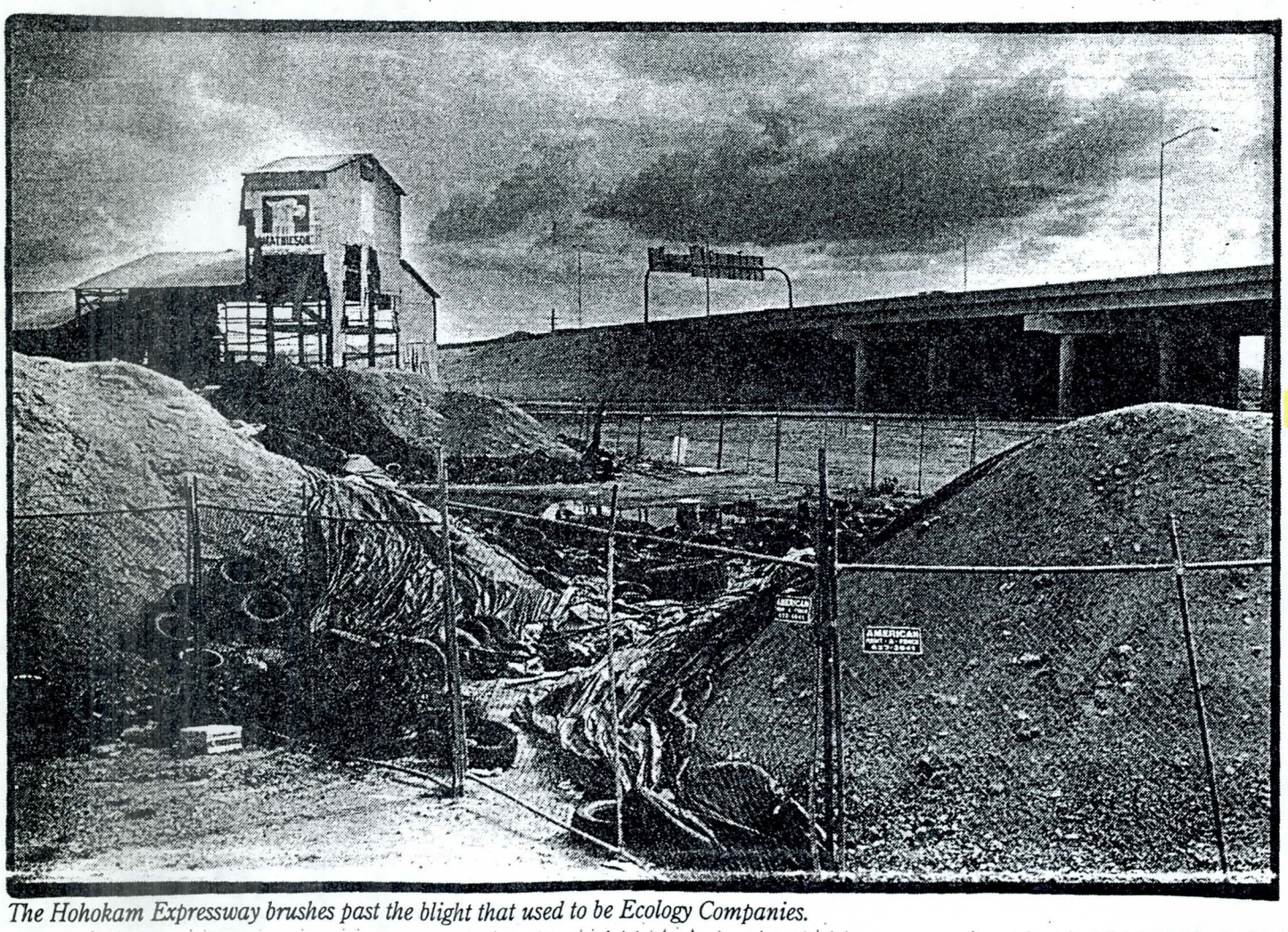

The Hohokam Expressway brushes past the blight that used to be Ecology Companies.

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and material use in an area, and do not represent complete observation of all materials," the report reads. "Concealed materials were not observed. Concrete slabs, soils or other construction details which may have concealed hazardous substances were not destructively removed to allow observation."

Although the assessment notes the presence of a concrete slab, a slab Gabrielli says he pointed out to the engineers examining the property and that was directly in the path of the proposed expressway, no one went further to check what lay beneath it. Gabrielli says he thought the slab might have been the foundation for an old building, but in any case, he assumed the environmental engineers knew what they were doing.

Not only did the state's experts ignore the sump, they ignored the history of the area which was long associated with cattle pens and feedlots. Two other environmental consultants contacted said the area around Gabrielli's property was "notorious" for environmental problems and that the nearby East Papago Freeway was changed from an "at grade" structure to an elevated freeway to minimize potential problems. A railroad spur that ran along the southern edge of the Gabrielli property should also have aroused some suspicions, these consultants said.

The 1988 report on the Gabrielli property further notes that "the limited scope of activity authorized under the Phase I scope of work did not include the investigation of subsurface soil or groundwater contamination."

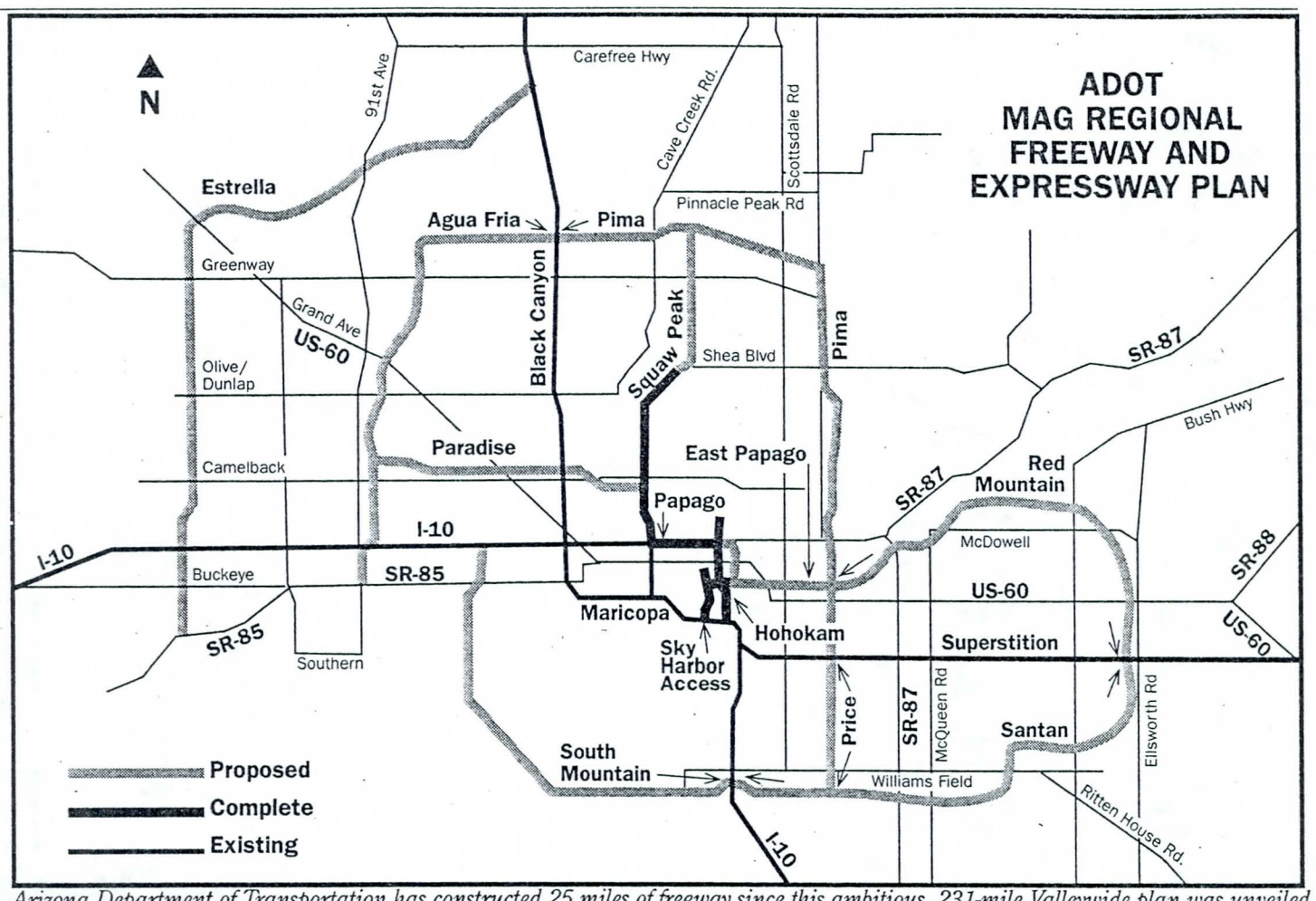
The state Department of Environmental Quality workers are required to wear "moon suits," protective clothing that covers them from head to foot.

So the state started freeway construction in the middle of a former chemical plant without first checking to see what might lie beneath the surface of the ground. This is a remarkable oversight given the state's own records which documented the 22-year presence of Olin Mathieson on the site.

This negligence is underscored by the large painted eagle on the Gabrielli building with the word "Mathieson" attached. The environmental experts assessing the land failed to recognize the logo of one of the world's largest chemical companies.

"It's likely that had we not been so driven by construction schedules, none of this stuff would have happened," Sullivan says. "If we'd done a Phase II audit and found this sump, we would have backed way off."

And a Phase II investigation should have been ordered. Several local and national environmental experts agreed that an essential part of a Phase I audit is a title search. Apparently, in this case, the environmental engineers who conducted the audit never examined the chain of possession of the property, or relied on a cursory document that only traced possession of the land back five years. Such a document would not have reflected Olin Mathieson's ownership of the parcel from 1950 until 1972.



Arizona Department of Transportation has constructed 25 miles of freeway since this ambitious, 231-mile Valleywide plan was unveiled in 1985. Under current funding levels, the agency says it will be able to complete 50 more miles before the year 2006.

Though there is no statutory requirement that a Phase I assessment include an examination of chain-of-title documents, a title search is standard operating procedure in the industry. One local consultant, who asked not to be identified because his firm regularly deals with ADOT, said that while many aspects of a Phase I survey are based on experience and opinion, any competent report would include an inspection of chain-of-title documents for at least the past 50 years. Similarly, guidelines established by the American Society for Testing and Materials require a "qualified inspector" to conduct a "50-year survey of property uses by deed search, interviews and aerial photographs." The Arizona Chamber of Commerce and the Consulting Engineers Council of Metropolitan Washington both suggest 50 years as a reasonable period for historic review.

If such a title search had been conducted, the presence of Olin Mathieson on the deed would have almost certainly alerted the consultants to the need to conduct a more intensive survey. It is unlikely the pesticide-laden sump could have escaped detection had the state gone to Phase II and taken core samples, especially since the toxic sump lay precisely in the path of the expressway.

Bruce Scott, of Scott, Allard and Bohannan, Inc., the environmental consulting firm that contracted with the state for both the initial environmental audit and the more intensive post-spill investigation, refused to answer questions. Scott referred all inquiries about the Gabrielli property to ADOT's Sullivan.

Sullivan admits mistakes were made. He has no explanation for why the environmental engineers apparently relied on a truncated title search.

Sullivan explains that the consultants only researched ownership back five years and theorizes that frenzied freeway building and intense pressure to meet construction schedules led to oversights. But he says there was nothing diabolical in the state's machinations. Sullivan says when the Phase I audit was conducted, the clues to the chemical company's occupation of the site were either overlooked or ignored.

In defense of the consultant, Sullivan says that when the audit was conducted, the lot was heaped with trash to be recycled, with piles of paper and barrels of glass. Aside from the portable building Gabrielli used as an office, the buildings were in disrepair. It looked like what it was—a place where people dumped garbage. And it had been 16 years since the chemical company had done business on the site. Still, Sullivan agrees the big eagle should have tipped off ADOT.

"Somebody should have caught that," Sullivan says. "In a Monday-morning-quarterbacking sense, we look real dumb."

GENE GABRIELLI knows his garbage; he is, after all, in the resource-recovery business. He says he can look at a garbage can and, given certain demographic clues about its owner, list its contents with about 90 percent confidence. When he talks about recycling, about "resource recovery," he becomes almost messianic, lifting his eyes and steepling his hands, unconsciously assuming the posture of the reflective minister.

"We went out and—real scientific—sniffed it a couple of times," Sullivan says.

He is not making a joke when he says he has trash in his blood. For him, there is something noble in scavenging worth from refuse, and he tends to describe his business as a grand, humanitarian crusade. While he admits his battles with ADOT have left him a bit shell-shocked and loopy, he talks about resource recovery with the matter-of-fact precision of an expert.

It's what he does, what his father did. Before ADOT condemned his land, he made a good living from it.

"When I first started in this business, we were doing nothing but newspapers, no magazines, no computer paper or anything," he says. "And we were getting about $10 a ton for it. And we were paying $5 or $6—boy, I was so stupid. Eventually it got up to $45 a ton, but we're not going to see those days again. Not for a long time. During World War II, they used to get $20 a ton for all this stuff, and here I was in 1973 I was getting $10."

By 1987, his business, Ecology Companies, was thriving, paying good wages to its employees and fair prices to the independent contractors who hauled the garbage in.

"It makes me feel good when I see someone who works for me driving a brand-new vehicle, to see someone who's happy in their work," Gabrielli says. "That's what drives me in this business, to help people, to see them do well. I'm a product of other people's waste. Other people's garbage is my treasure—I have to think like that in this business. I have to think that we're doing something to make the world a better place. I really believe that."

Though he is folded behind an executive's desk in a dark-paneled office, his natural milieu is out among the heaps of light cardboard and computer paper that have already begun to occupy his new lot off Grand Avenue. It has been nearly two years since Gabrielli has been able to fire up his prized machine, an eight-ton green-painted paper compactor and baler he calls "Crunch, the Magic Dragon." It has taken that long, he says, to find a suitable site on which to relocate, to move his equipment and get it back in working order. Though the state is paying him for his expenses, Gabrielli had to take bids on the moving, then pay the bills himself, submit them to the state and wait to be reimbursed. It has been a tough two years, and the litigation is just starting. There is a very real chance that when the smoke clears Gene Gabrielli will be a ruined man, but he sees no

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alternative.

In 1973, he located his Ecology Companies on the lot that had been occupied by Olin Mathieson. It prospered, more or less, for the next decade, growing into a more than $3 million-a-year business and allowing Gabrielli an annual income in the six figures.

Records show that in 1983 Gabrielli stopped renting and bought the land for $515,000. He says he planned to stay there, that when he bought the land he had no idea that the Hohokam Expressway was going to crash right through it. He says the parcel was ideally suited for his admittedly dirty business. He needed a lot of space to store the wastepaper and plastic and metal his company recycled, and he needed the railroad spur that charged along the property's southern boundary and rolled up to the back of the big warehouse.

It was in late 1986 that he first heard about the Hohokam. Though Gabrielli denies that he saw the project as a chance to make some quick money, he retained Louie Majors, a Phoenix businessman with a real estate background, to help him with the sale of the property. In a letter dated October 19, 1987, Gabrielli named Majors his agent in the sale of the property to ADOT and stipulated that Majors was to receive 10 percent of the gross selling price—"a minimum of $1.2 million to $1.9 million depending on mutually agreed upon terms of relocation costs of equipment and building." Around this time, Gabrielli sent a letter to ADOT that announced his intention to move his resource-recovery business to a "less valued property" because of the "rapidly increasing land values in the area, a continuous economic development of businesses and the proposed Papago Freeway extension adjacent to the property.

"In light of the above, it is no longer feasible for us to continue doing our type business in this area," Gabrielli wrote.

But as is often the case in such circumstances, Gabrielli's estimation of what his land was worth was considerably more than what ADOT offered. And it took a lot longer for the state to make an offer on the land than the six to nine months Gabrielli estimated it would take for the sale to be completed. On January 3, 1989, ADOT offered Gabrielli $130,000 to buy a small section of his land—just enough to build the Hohokam Expressway—

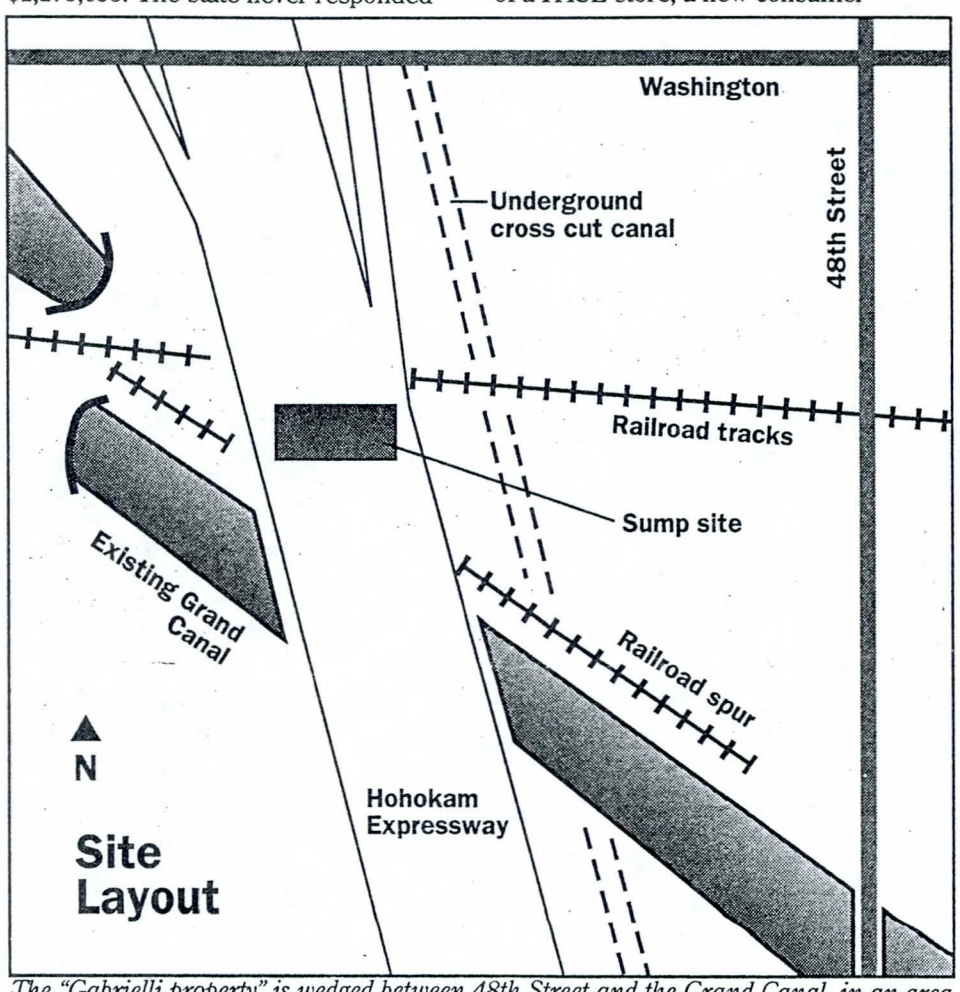
Sullivan says there was nothing diabolical in the state's machinations.

and suggested that Ecology Companies shift its operations slightly northward to accommodate the construction.

Six days later, Gabrielli responded with a counteroffer. He was unwilling to accept a partial sale—he insisted the state take all or nothing. He would accept $4,087,566 for his property, plus $1 million for the seven old buildings on it.

Basically, what Gabrielli was doing was playing an old game in condemnation cases. He acquired an optimistic evaluation of his property—about ten times more than he paid for it six years earlier—to try to make a little on the deal. Or a lot on the deal. The state on the other hand, while obligated to pay just compensation, almost always initially offers an amount significantly lower than what it eventually pays for the land. The discrepancy between Gabrielli's appraisal of the land and the state's appraisal is not unusual—there have been local condemnation cases where juries have awarded landowners 15 or even 20 times more than the state's final offer.

Usually these initial offers are merely the starting point for negotiations, and in a letter dated June 8, 1989, the state did revise its offer for the Gabrielli property. ADOT offered Gabrielli $411,500 for the entire parcel. On the same day as the offer, a letter from ADOT acquisition services manager Brian Rockwell was hand-delivered to Gabrielli that indicated the state was prepared to begin eminent-domain proceedings to acquire the property. On June 22, Gabrielli sent another letter to ADOT, offering to sell the property for $1,175,655. The state never responded



The "Gabrielli property" is wedged between 48th Street and the Grand Canal, in an area that has evolved from feedlots and cattle pens.

to that letter, and a condemnation hearing is scheduled to begin this July.

The state of Arizona acquired Gabrielli's land through a venerated legal precept known as eminent domain. This process allows government to acquire private land to make public improvements. Though the law requires that the state pay the disenfranchised landowner "just compensation" in exchange for the property, disputes often arise from the process. Often, landowners think their property is worth more than the state is willing to pay for it. If they refuse the state's offer, the matter is usually settled in the courts.

There is a legitimate question about how much the Gabrielli property was worth before the Hohokam Expressway was built. It seemed especially well-suited for a recycling business, and probably ill-suited for almost any other use. Situated near Tempe and only a few miles east of Phoenix's central business district, it was conveniently located. The farther you have to haul your garbage, the more it costs, and Gabrielli was close to a lot of garbage. There was a railroad spur on the property that made it easy to load processed waste products onto cars and ship them out. He had plenty of land on which to stack the raw material, and no neighbors to complain about the eyesore. And though the buildings that stood on the land were dilapidated and probably worthless to almost anybody else, they were adequate for Gabrielli's purposes—they kept the rain off his equipment and paper.

Even before the Hohokam was built, the area was beginning to shift away from the heavy industrial use for which it was zoned to lighter, brighter and presumably more profitable uses. The meat-packing plants and feedlots that once surrounded the former Gabrielli property began to disappear about a decade ago, until now only the Stockyards Restaurant and Tovrea Castle remain as reminders of the cattle trade. Now to the east, across 48th Street, cars jerk through the parking lot of a PACE store, a new consumer clubhouse. It's not hard to imagine a small office building or warehouse on the site.

But the condemnation process does not require the state to pay a landowner for a property's potential or the dreams of grandeur harbored by a developer. Just compensation is considered the value of the property at the moment it is appraised. The state's appraisers came onto Gabrielli's land and saw sand and trash, a few buildings worth less than the cost to drag them down. Gabrielli's appraiser, Quinn Hutchinson, saw "a special and unique purpose facility" that would be difficult to duplicate. Gabrielli says he didn't want to move, but his business couldn't survive the state's taking of the strip for the Hohokam. He says he needed more space than the partial taking would have allowed him. And if he had to move, the state should factor in the costs of finding a similar site, as well as moving his equipment.

"They appraised my land as dirt only," he says bitterly. "No buildings, they said they were valueless. I am so sick of listening to this bullshit. To me, it's like building a paper mill. The buildings aren't normal buildings, the receiving docks are not normal receiving docks, the discharge, the water effluence, all that stuff's different—I've got to go out and find a comparable site. In the meantime, I've got no income."

Gene Gabrielli, the green technocrat who made his money off other people's garbage, didn't see any other choice than to take his case to court. So he

"In a Monday-morning-quarterbacking sense, we look real dumb," Sullivan says.

hired a lawyer to argue that his property was worth more than what the state said it was worth. In Arizona, even if Gabrielli wins, he will have to bear his own legal fees. Under state law, the costs of defending a condemnation suit are not compensable. Gabrielli would have to pay his own lawyers.

(Foster Mori, Gabrielli's present lawyer, has taken the case on a contingency basis. If the jury in the condemnation trial awards Gabrielli more than the $411,500 offered by the state, Mori will receive a percentage of the award in excess of the offer.)

The state did agree to assist Gabrielli in finding a new location and pay part of the cost of moving his equipment. But he says the state couldn't find a suitable site. And that it has been extremely slow in reimbursing him for moving costs.

"My lawyers told me not to say this, but I don't give a shit," Gabrielli says. "Those people stretch you. It's beyond the imagination; these people are trying to kill me. They're not taking a gun to my head, they're not stabbing me, but they're running me dry, my family, all my work and everything—this is preposterous."

He says he believes the state will try to settle his case before it goes to trial, but even if he is awarded a figure closer to his estimate of his land's value than the state's estimate, he still may be held liable for the mounting cleanup costs. He could win, and still wind up in debt.

Gabrielli is now bankrupt, though he still has his gray-market Mercedes Benz and is planning a grand opening for the new location of Ecology Companies within a few weeks. He has cashed in his life insurance policy and borrowed money from family members to pay his attorneys. Even before things got complicated—before the workers broke into that pesticide-filled concrete sump—things were grim.

"My wife and I were down to a hundred dollars once—we'd never ever been to that point," he says. "I had more money in my pocket when I started in 1973 than I did when they condemned my land."

NOBODY REALLY THINKS Gene Gabrielli is responsible for poisoning the land. As ADOT's Tom Sullivan says, "It doesn't take a rocket scientist to figure out that there was a chemical company there, and that's where it came from."

But the state is arguing that, as the landowner, Gabrielli is responsible for cleanup costs. Even though he didn't put the chemicals in the ground, and even though he didn't crack open the sump and let them leak out, he can be held responsible. Even though the state ignored the presence of Olin Mathieson on the land, even though there was no thorough environmental investigation undertaken until after the sump was broken, the state is holding the money it would have paid Gabrielli for the land

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in escrow, against the cleanup costs.

Of course, ADOT has also been in contact with the chemical company. Though no one at Olin Mathieson would comment because of the litigation swirling around the case, both the state and Gabrielli say the company has been helpful in sorting out the mess.

"They've been very cooperative," Sullivan says. "They know we've got a problem, and they're willing to work with us. It's in everybody's interest."

"I don't have a beef against Olin," Gabrielli says. "They did everything they were required to do in 1973, before all these [environmental protection] laws were passed. They rinsed their trucks out there, that's what they hit. [Olin Mathieson's] had people out with video cameras throughout the process—they feel like the state is a secondary generator of the pollution, that when they broke through the concrete they made everything a lot worse."

Sullivan says it's likely that had the sump been discovered before construction began, Olin Mathieson could have surgically removed the toxic waste at a fraction of what the cleanup will eventually cost.

And while Gene Gabrielli argues that he was an innocent purchaser of the land, that he knew nothing about the sump, that he complied with all the environmental regulations he was required to comply with—the law might still hold him liable for some or all of the cleanup costs.

"I think the law says that whoever is in possession of the land is responsible for anything that's there, that's how the state of Arizona is holding me liable for this," Gabrielli says. "When I bought the land, we knew that there was something underground but we thought it was all dried up. It was just a concrete slab there. We didn't know what this stuff was. We knew that it was a filled-in tank of some sort.

"Who would think that I would be such an evil person as to put DDT and DDE in the ground in such high concentrations that they would have to think that I was a garbage dump?" he asks. "We were doing our recycling. We were very busy, and planning to expand to state-of-the-art resource-recovery plant. We were doing paper, plastic, glass, aluminum, steel—the only thing we didn't recycle was chemicals. No liquids. We didn't take any liquids at all."

And Gabrielli says he relied on the state's Phase I audit. He thought that gave his property a clean bill of health. "I did all this stuff they recommended," he says. "They were concerned about some empty drums and containers—these held hydraulic stuff that we used in our trucks and everything; we didn't pour it into the ground. We had an underground storage tank, we put it in there and had a company come along and suck it out. We did what they wanted us to do. We cleaned up all that."

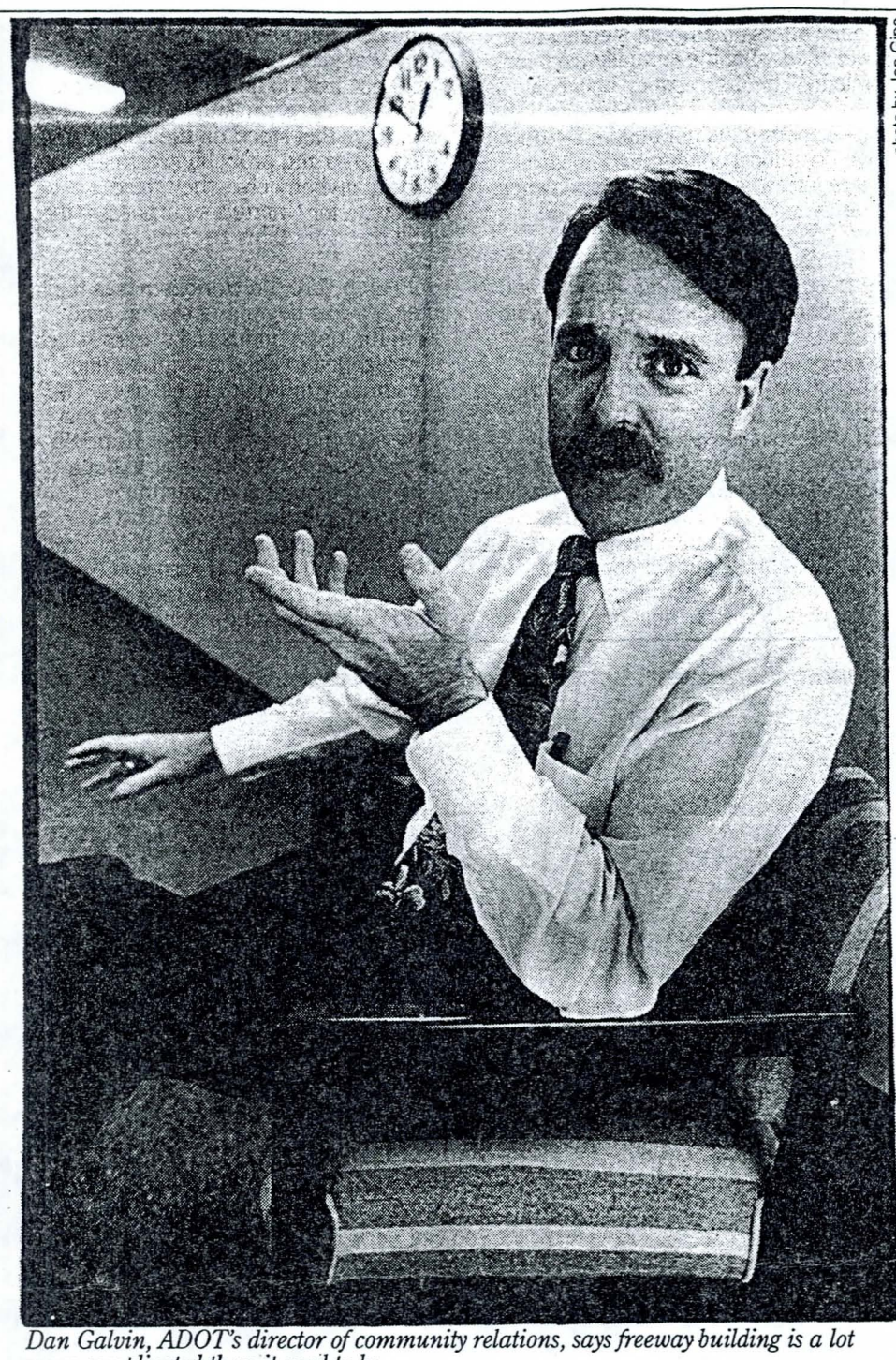

photo by Jon Gipe

Dan Galvin, ADOT's director of community relations, says freeway building is a lot more complicated than it used to be.

The ironic thing, Sullivan says, is that if Gabrielli had accepted ADOT's $411,500 offer for the land—$103,500 less than the price he paid—and not forced the condemnation proceedings, then the huge piles of dirt behind the temporary fences wouldn't be Gabrielli's problem. The state would be the current owner and on the hook for the cleanup costs.

"Gene was really one of the pioneers with recycling back in the 1970s," Sullivan says. "Unfortunately, it goes back on him because he didn't take the state's offer. Had he accepted it, had the state taken possession, he'd be in the clear."

PEOPLE AT ADOT have sympathy for Gene Gabrielli. And Gabrielli sometimes turns philosophical about his predicament. Weeks after he is interviewed, he calls back to say he isn't angry at anybody at ADOT, that there are wonderful people who work there, that the woman who gives him his checks for relocation expenses is always cheerful and glad to see him.

"She's glad to see me because she can give me a check," he says. "I've got a lot of friends over there, who are just doing their jobs."

But it's made it tough for Gabrielli. He says his ordeal has torn his family apart, and his litany of complaints against the bureaucrats who've swaddled his life in red tape is ever-growing. It has affected him, taken a piece of his soul.

"I'm a displaced person," he says. "Mentally this whole thing has set me back. I used to be very good at what I do. I have to reorganize my thoughts all the time; it just really put me in a state of mind where it wasn't worth it anymore."

Gabrielli has been working 16-hour days, trying to get his business up and running again. After nearly two years of negotiations and delay, he has moved his equipment. Now it all needs to be refurbished, repaired and realigned. Some of it sat rusting on the 48th Street property for almost two years, while Gabrielli tried to scrape up the money

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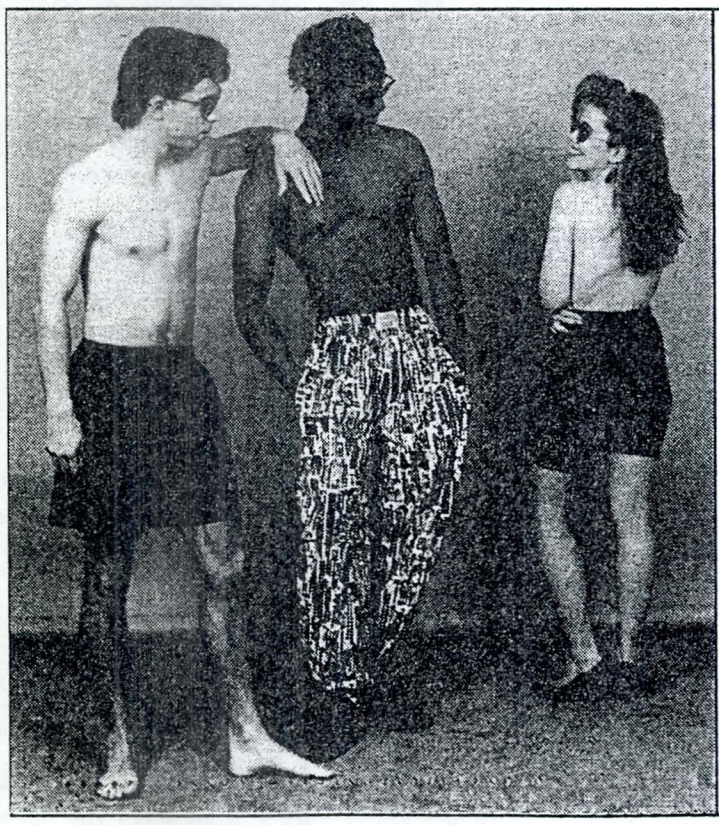

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to move it. ADOT has been reimbursing him for his expenses, but he says it is slow paying his claims.

"They don't relocate you when you want to be relocated," he says. "They relocate you when they want to relocate you. They couldn't even find this place for me; I found it myself. I think they just looked through a listings book. They couldn't find anything comparable to what we had—they admitted it."

Gabrielli is a large man, who often interrupts his own sentences to launch into another thought that eventually splits off again, losing himself inside a dense thicket of hard-earned paranoia and moral outrage. He thrashes inside this jungle maze, hurt and caught as a bear in a trap. It seems that not even he can always keep straight the various facts and issues of his circumstances as he flips pages and stirs up desk drawers looking for a pertinent fact or date.

He is at his best when he just works, banging on a large spool coiled with wire to wrap his bundles or fashioning a makeshift joint to heal his trusty "Crunch." Inside the building he is now leasing, as long as a football field and half again as wide, he can trace imaginary conveyor belts in the air, and talk of grading and sorting garbage automatically.

He is not a man who minds getting his hands dirty. "I used to work two or three days a week with my crew sorting garbage," he says. "I had to know what was coming in, where it came from, what time of the year, what kind of material was there, because I had to have that feeling of what's there."

Even if the court awards him an amount closer to his valuation of the land than the state's, even if he somehow escapes the liability for the cleanup costs, Gabrielli will have lost a couple of productive years. The state is not liable to pay him for income he might have earned—perhaps as much as $500,000—had his business not been interrupted by the Hohokam Expressway construction. He suspects that the state has maliciously delayed paying him for his relocation expenses, that it is aware of his limited resources and hopes he will eventually just give in.

He says he won't. He's come back from the dead before.

"I had polio as a child," he says. "I'm probably one of the only people alive today who had over 90 percent of their body affected—92 percent. At one point, I think I was clinically dead."

It was 1953. He was 5 years old.

"I remember that day, everything that went on," he says softly.

"My grandfather was very, very special to me, and in fact, I was with him when this happened. I was in the back seat of his car, and I remember, I said something like, 'Grandpa, I feel tired. I'm going to lie down.'"

Gabrielli's grandfather and parents took him to the family doctor, who ran a few tests on the boy's legs.

"The doctor said get this boy to the hospital before he dies, don't even wait for an ambulance," he says. "My parents ran me from Pomona to Children's Hospital in L.A. I personally feel I was dead in the car, because I don't remember the trip there. I remember going into a bright room and being put on a cool table, and they stuck these long thin needles all the way down. . . and for hours and hours and hours they pulled the fluid out of my spine. They couldn't put me to sleep because I would have died. And they had me strapped down, I remember these thick leather straps.

"While I was there, it was just me and my eyes and my mind. Really freaky."

For months after that Gabrielli was totally paralyzed. It was a couple of years before he learned how to walk.

Now he has a barely perceptible limp and a shelf of softball trophies. And a grand-opening date.

"I do believe things get better as long as we keep faith and everything," he says. "Now we're to this part of life where I'm a grown man and I'm real successful with what I do. I survive. I survived with my legs that hurt all the time. I'll survive this."

But there are times when he is less optimistic. He worries that he is not the same person he was before the state took his land. His confidence has been rattled. While he often strives to sound measured and confident, in his less-

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diplomatic moments, Gabrielli suspects that his office has been broken into, his files rifled, his telephone tapped. He thinks he's been set up.

He says he believes ADOT knew about the pesticides in the concrete sump and refused to settle his case in order to hold him responsible for the cleanup. He suggests that the state didn't order the Phase II audit because it knew the study would discover problems, and that the state offered him an outrageously low price for his land in order to force him into condemnation proceedings. While that litigation was dragging on, the state would begin construction of the freeway, and if an environmental problem arose, then Gabrielli would be exposed to liability for the cleanup.

"There was intent there," he says. "I know we can't prove it, but there was intent there."

DAN GALVIN, the ADOT spokesman, has only been in Arizona since 1982, but he's looked back at the archives.

"I remember seeing a drawing of a proposed project from the late 1970s," he says. "It was an artist's conception of how I-10 should be completed. It was supposed to be elevated, a hundred feet in the air and zip through the middle of town. And it had all these circular on-ramps winding around themselves, I think they were called heli-coils—it looked like something someone dreamed up in the 1950s as 'The City of the Future.'"

Building freeways has changed a lot over the years. Once, you laid down an asphalt or concrete path, grading the land level as you went. These days, there are more and more complications, and ADOT is learning how to deal with them as it goes along, in a kind of haphazard, clumsy on-the-job training. Tom Sullivan says the department has become much more sophisticated in dealing with environmental problems since the workers broke into Gabrielli's sump.

"We know a lot more now than we did then," he says. "We're learning every day."

As ADOT threads the new highway system through populated areas, skirting pre-existing homes and schools and businesses, Galvin says the agency has a duty to make freeways more aesthetically appealing, less noisy, less dangerous. And all this makes them more expensive.

So ADOT tries to cut costs where it can. The agency is shorthanded in some areas; there are rumors among the staff that layoffs may be coming. In such a climate, it's not hard to understand that the agency might be trying to cut costs wherever possible. Like not conducting an expensive Phase II audit when a Phase I might suffice. Sullivan says if the concrete sump had not been directly in the path of freeway construction, the workers would have left it undisturbed. It's kind of fluky.

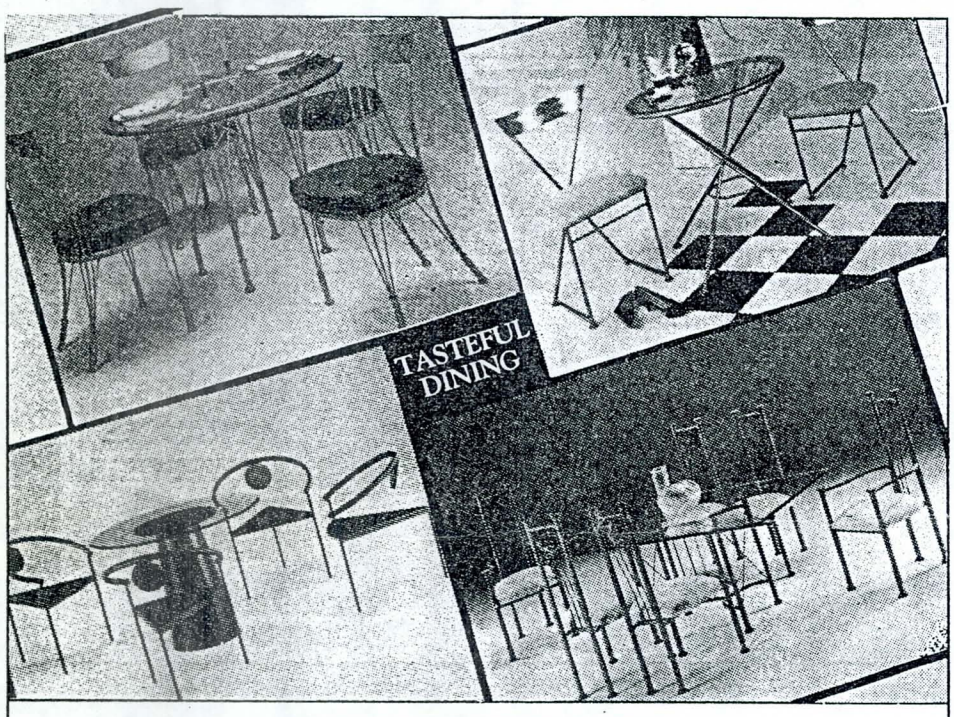
It's obvious that Sullivan feels badly for Gabrielli. The two men are casual friends; they've served on various environmental boards together. Gabrielli says Sullivan "will not lie for anyone." Similarly, Sullivan thinks Gabrielli is sincere, that the situation is "just one of those situations."

Sullivan is taking the heat for this one. He says ADOT should have ordered further testing. He agrees the sump could have been dealt with relatively cheaply had it been discovered earlier.

But someone will have to pay for the cleanup and the state doesn't want it to be the taxpayers. Olin Mathieson's position is that it didn't make the mess. Gene Gabrielli is the current landowner and that makes him liable. It's tough, but that's the current state of the law.

Though, as one ADOT employee says, the state isn't supposed to be in the business of screwing anyone. Maricopa County needs highways. It needs them now. And the county only has just so much money to spend to build them. In such circumstances, there will be collateral damage. Everyone's sorry for Gene Gabrielli; he's lost two years of income and he bought his land just before the bottom fell out of the real estate market. But the state's position is that the offer it made to him was just compensation.

The state's position is that Gabrielli should have taken what was offered him and gotten out of the way. □



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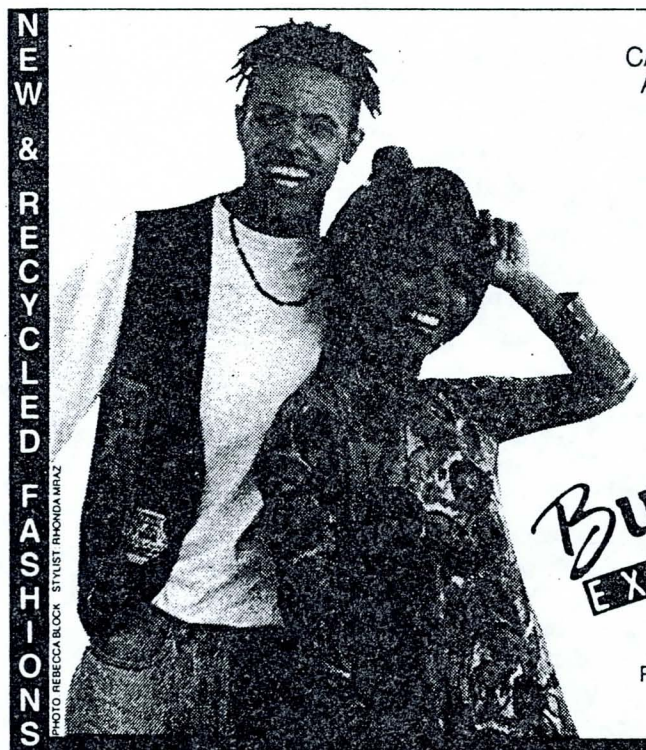
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EVALUATION OF LANDFILLS FOR THE NEW RIVER PROJECT COE & VAN LOO FLOOD CONTROL DISTRICT OF MARICOPA COUNTY PHOENIX, ARIZONA

JOB NO. 2178J440

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August 28, 1989

Coe & Van Loo
4550 North 12th Street
Phoenix, Arizona 85014-4291

Attn: Mr. Ash C. Patel, P.E., R.L.S.
Senior Vice President

RE: EVALUATION OF LANDFILLS FOR THE NEW RIVER PROJECT FLOOD CONTROL DISTRICT OF MARICOPA COUNTY, PHOENIX, ARIZONA. JOB NO. 2178J440.

Western Technologies Inc. (WTI) is pleased to present this report entitled "Evaluation of Landfills for the New River Project". This study was verbally requested and authorized by Mr. Ash C. Patel in a telephone conversation on December 1, 1988.

Five areas of the proposed New River Rechannelization were investigated for the presence of hazardous or toxic wastes. Three of these areas exhibited noxious odors during the geotechnical portion of this project. These areas were studied for the presence of volatile organic compounds (VOCs) by soil gas analysis. None of the areas showed the presence of VOCs. Additionally in two of these three areas, soil samples were obtained and analyzed for the presence of possible hazardous waste characteristics as defined by Arizona Administrative Code (A.A.C.) R9-8-1861.A (40 CFR Part 261).

Based on the limited number of samples obtained and analyzed, and the soil gas study, there does not appear to be any characteristic hazardous or toxic chemicals present in the areas studied. However, this does not imply that the suspect illegal landfills are free of hazardous or toxic waste. In WTI's opinion a safety plan should be developed for the removal and closure of the illegal landfills within the rechannelization at the New River Project.

Now in R18-8-

Coe & Van Loo
Job No. 2178J440

If you have any further questions, or if WTI may be of further assistance, please call us at your earliest convenience at (602) 437-3737.

Sincerely,

WESTERN TECHNOLOGIES INC.

Chris J. Christian
Project Manager
Environmental Engineering Services

Registered Professional Engineer (Mechanical)
CERTIFICATE NO. 12197
WESLEY A. SHOMERD
DATE SIGNED 8/31/89
Arizona U.S.A.

Wesley A. Shomerd, P.E.
Technical Manager
Environmental Engineering Services

/clp

Attachment

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EVALUATION OF LANDFILLS FOR THE NEW RIVER PROJECT
COE & VAN LOO
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
PHOENIX, ARIZONA

JOB NO. 2178J440

1.0 INTRODUCTION

1.1 BACKGROUND

This report presents the results of an investigation and evaluation of landfills identified by WTI during the geotechnical phase for the New River Rechannelization Project near west Phoenix, Arizona. The geotechnical report (Job No. 2128J068) dated November 9, 1988 listed areas which may contain hazardous or toxic materials.

1.2 PROJECT DESCRIPTION

The objective of this investigation is to further identify and characterize wastes of five landfill areas located in the existing New River channel. WTI understands that Coe & Van Loo is designing the rechannelization of the New River.

The landfills will be evaluated based on waste characterizations, testing, and operational records for the presence of hazardous or toxic wastes. The results of this evaluation will establish the criteria for removal and/or closure of the landfills.

The limited scope-of-services for the project included the following activities.

- Review WTI geotechnical report for past and present suspect landfill operations
- On-site reconnaissance
- Subsurface soil sampling
- Chemical analysis of soil samples

- Soil gas monitoring within suspect landfills which exhibited noxious odors
- Written report with recommendations and conclusions.

2.0 RECORDS REVIEW

A previous report prepared by WTI was reviewed for specific locations of illegal landfills and possible hazardous or toxic waste. Five areas were identified and are listed below.

- East bank near Station 210+00
- West bank near Station 205+00
- West bank near Station 120+00
- East bank near Station 125+00
- West bank between Station 60+00 and 75+00

Upon review of the report and conversations with the WTI field engineer, Mr. Enamul Hogue, P.E., the following investigative methodology was decided upon.

1) Survey all five areas for possible hazardous waste activities.
2) Use a backhoe to dig trenches at two locations where noxious odors and brown fill material were present during drilling operations. Obtain samples within the trenches.
3) Submit samples to WTI's chemistry laboratory for analysis of hazardous/toxic wastes.
4) Perform soil gas surveys in vicinity of noxious odors discovered during geotechnical operations.

3.0 ON-SITE RECONNAISSANCE

3.1 GENERAL

The portion of the New River which will be channelized is located about 15 miles northwest of the City of Phoenix (see Figure 1). The area is a gently sloping broad alluvial valley typical of the Basin and Range Province. For simplicity, the project has been divided into three sections (see Figure 2). The three sections are: Olive Avenue to Northern Avenue, Northern Avenue to Glendale Avenue, and Glendale Avenue to Bethany Home Road. The site conditions within each section are as follows.

3.1.1 Olive Avenue to Northern Avenue

Abandoned illegal landfills appear to exist between Olive Avenue and 99th Avenue on both the east and west banks of the channel. These areas were discovered during the drilling operations of the geotechnical phase of this project. No evidence of these landfills are present due to surface cover in the area (see Figure 3 and Photograph 5).

South of 99th Avenue, the west bank contains uncontrolled rubble fill. The east bank appears relatively free of debris.

No evidence of hazardous waste generation or disposal activities were observed in this section.

3.1.2 Northern Avenue to Glendale Avenue

North of Glendale Avenue uncontrolled fill was observed on the east and west channel banks. Along the east bank, a large 25-foot deep pit exists. This pit contains abandoned automobiles, construction debris and household rubble. Additionally, piles of households rubble and abandoned automobiles exist in an area approximately 1,200-feet x 800-feet just north of Glendale Avenue (see Photograph No. 7). No

evidence of hazardous waste generation or disposal activities were observed in this section.

3.1.3 Glendale Avenue to Bethany Home Road

Glendale Airport is located west of, and parallel to, the New River channel. Approximately one-quarter mile south of Glendale Avenue, between the airport and the channel, are a sandblasting operation and a trucking company. Between the businesses assorted construction debris (concrete, asphalt, etc.), junk automobiles and junk trailers are located (see Photograph No. 9). Three pits are located east of the businesses. These pits also contain construction debris. The center pit appears to be a current dumping place for the trucking company. The newer appearing materials being placed in this pit were also construction debris and soil (see Photograph 8). The northernmost pit has 3 empty, rusted 55-gallon drums in it.

4.0 SUBSTANCE MATERIAL SAMPLING

4.1 GENERAL

During the geotechnical phase of this project, drilling operations were halted due to unidentified noxious odors emanating from boring holes at three locations. Two of these locations were investigated for the presence of hazardous and/or toxic substances by subsurface material sampling (see Figure 3). The first exploration trench (Trench No. 1) is located at boring B-2W along the west bank near Station 205+00. Trench No. 2 is located at boring B-1E along the east bank near Station 210+00.

4.2 EXCAVATION

A Case Model 680 backhoe was used to dig a trench at each boring location. The trenches were approximately 30-inches wide, 12-feet long, and 6-feet deep.

In Trench No. 1, the first 2 to 4 feet of material removed consisted of general construction debris which included concrete, asphalt and wood pieces. At a depth of approximately 4-feet, dark brown material was removed which was emanating noxious odors (see Photograph No. 2). The debris appeared to be domestic waste which consisted of newspapers, glass, grass and tree clippings and other household identified by field methods. However, negative readings were observed on both the HNU photoionization meter and combustible gas meter which indicate volatile organics (hazardous) and methane. The odors do appear to be the result of biodegradation of organic matter from the waste material.

Trench No. 2 was much the same as Trench No. 1. The material from 0 to 3 feet appeared to be a soil cap. Construction debris was encountered at depths of 3 to 6 feet. Noxious odors emanated from materials starting at a depth of 6-feet (see Photograph Nos. 3 and 4). This debris was similar to the material encountered at 4-feet in Trench No. 1. Again, negative readings were observed on the combustible gas meter and HNU photoionization meters.

4.3 SAMPLING AND ANALYSIS

One soil sample was obtained from each trench when excavation revealed the material with noxious odors. Each sample was collected using an aluminum soil scoop and placed in a 500-gram wide mouth jar with a teflon lid. The jar was then sealed, labeled, and placed in an ice chest. The samples were then transported, under Chain-of-custody, to WTI's chemistry laboratory analysis.

Both samples were analyzed for the following parameters: pH, flash point, physical description, reactivity (water, sulfides), total cyanide, EP toxicity metals, and GC/MS solvent screen.

All samples were collected and analyzed in general accordance with US EPA Document SW-846 "Test Methods for Evaluating Solid Waste". All laboratory data was reported (see Appendix B).

5.0 SOIL GAS ANALYSES

5.1 GENERAL

Three areas where noxious odors were present during drilling of the geotechnical phase of this project were investigated with gas probes for the presence of volatile and combustible gases. The areas investigated were: the west bank of the channel near Station 205+00, the east bank of the channel near Station 210+00, and the west bank of the channel near Station 120+00.

Attempts to drive the probes into the ground with a hammer were ineffective because of the sand and cobble cover over the waste fill. Next, a pilot hole for the probe was attempted using a two-man gas powered auger. This also proved ineffective because of the sand and cobble cover. FInally, a Case 580 backhoe was used to dig a hole to the appropriate depth. At each area four 4.5-foot sections of one-half inch copper tubing was placed in the ground to a depth of approximately 4-feet. The tubing was placed in the hole. The hole was backfilled and allowed to remain until ambient soil gas levels stabilized. After several days, WTI returned and made measurements of gases at each location. Figures 3 and 4 show sampling identifications and locations.

5.2 OBSERVATIONS DURING EXCAVATION OF TEST HOLES

5.2.1 Station 205W

All four test holes encountered the same type of debris which was previously observed in Trench No. 1 at approximately the same depth

(see Figure 3). All four copper tubes were placed, such that, the bottom end of the tube was within the area of decomposing matter.

5.2.2 Station 210E

Test holes 1 through 3 encountered the same types of debris at approximately the same depth as Trench No. 2 (see Figure 3). Test Hole No. 4 encountered only construction rubble to a depth of 5-feet where the digging was stopped. All four tubes were placed with the bottom of the tubing at 4 feet below the surface. However, this was just above the top of the decomposing material.

5.2.3 Station 120W

None of the four test holes encountered decomposing material. Sand, gravel, and cobbles were encountered to a depth of approximately 3.5-feet. Below that depth construction debris was unearthed at all locations. Excavation was terminated five feet below the surface.

5.3 TESTING AND RESULTS

An HNU Model PI 101 photoionization meter and combustible gas meter were used to measure volatile aromatic (hazardous) and flammable gases, respectively, at each sampling location. Both instruments were placed in the top of each sampling tube and allowed to operate for two minutes. Measurements were then recorded for both instruments at each sampling location. Table I lists the results of the testing.

6.0 ESTIMATION OF VOLUME AT LANDFILL

Calculations on the estimation of foreign material in the investigated areas are presented below. Due to the limited scope of WTI's investigation, some assumptions were made as to the depths and widths of material to be removed.

Assumptions:

- All areas are uniform in the amount of debris throughout the depth, width and height.
- Length of area is based on visual observations of surface debris and, in some cases where subsurface excavations took place, subsurface debris height.
- Width of area is based on visual observations and is assumed to be between 40 to 60 feet.

Calculations are as follows:

Length (ft) x Width (ft) x Height (ft) x .0370 (yard3/feet3) = Volume

Station 205W

1/27

700 X 44 X 8 X .0370 = 9117. yds3 estimated

Station 210 E

1200 X 44 X 8 X .0370 = 15360. yds3 estimated

Station 125 E

600 X 50 X 8 X .0370 = 11840. yds3 estimated

Station 120W

1000 X 10 X 40 X .0370 = 14800. yd3 estimated

Station 60-75W

2400 X 60 X 10 X .0370 = 53280. yds3 estimated

TOTAL VOLUME = 104700. yds3 ESTIMATED

7.0 CONCLUSIONS

The following conclusions are based on WTI records review and on-site and off-site evaluations.

- Construction debris (concrete, asphalt, wood, etc.) is present at all five areas investigated.

- The east and west banks of the channel near stations 210+00 to 205+00 also contain material which appears to be decomposing household waste. This material was tested for possible hazardous and toxic waste characteristics. Based on the limited number of samples taken, the waste may be classified as non-hazardous as defined by the Arizona Administrative Code (A.A.C.) R9-8-1861.A (40 CFR Part 261) and disposed in a municipal landfill.

- Based on observations of the areas investigated, estimations of the volume of material which may need to be removed for the rechannelization of the New River is approximately 100,000 cubic yards. This estimated volume is based on having to totally remove all materials.

8.0 RECOMMENDATIONS

Based on the results of our studies and evaluations, WTI recommends that the material found in the abandoned landfills be disposed in municipal landfills. This does not imply that all areas are free of hazardous or toxic waste. In WTI's opinion, a safety plan should be developed and implemented during the rechannelization of the New River. This safety plan should include, but not be limited to, the following:

- An outline of procedures to be used during the removal of the landfills. This should include on-site monitoring of all materials removed by an on-site safety officer during excavation.

- Hazardous waste handling procedures should such material be found during excavation of the landfills.

- Job site safety and health requirements for the removal process.

Coe & Van Loo
Job No. 2178J440

TABLE I

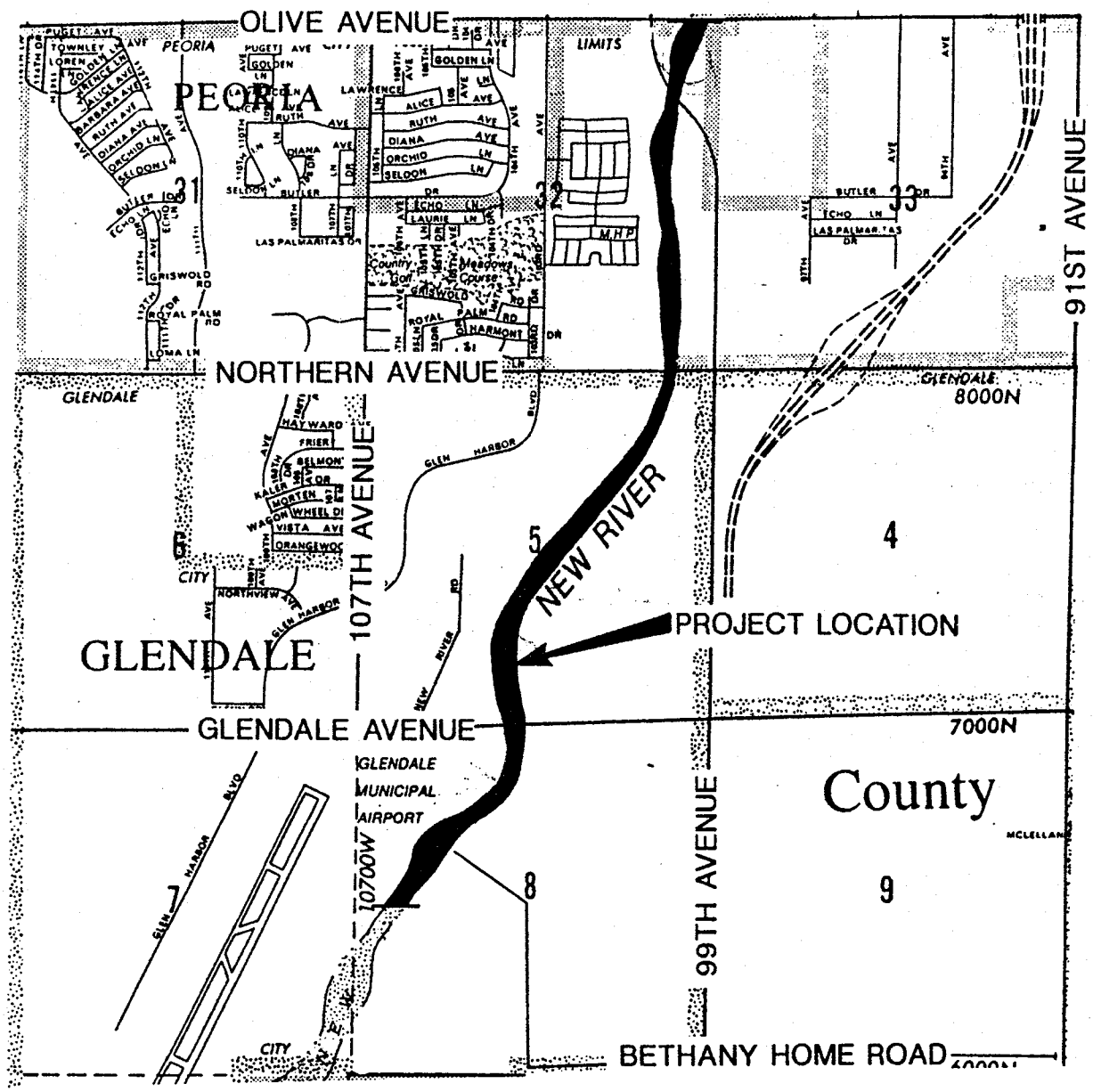
Sample ID	HNU meter (ppm as benzene)	Combustible Gas Meter (% Natural Gas)
205W-1	<1	ND
205W-2	<1	ND
205W-3	<1 (tr)	ND
205W-4	<1 (tr)	ND
210E-1	<1	ND
210E-2	<1	ND
210E-3	<1	ND
210E-4	<1	ND
120W-1	<1	ND
120W-2	<1	ND
120W-3	<1	ND
120W-4	<1	ND

ND = None Detected

tr = trace

Coe & Van Loo

Vicinity Map
Figure 1



JOB NO. 2178J440

REVIEWED	W. SHONERD, P.E.
PREPARED	MAXWELL

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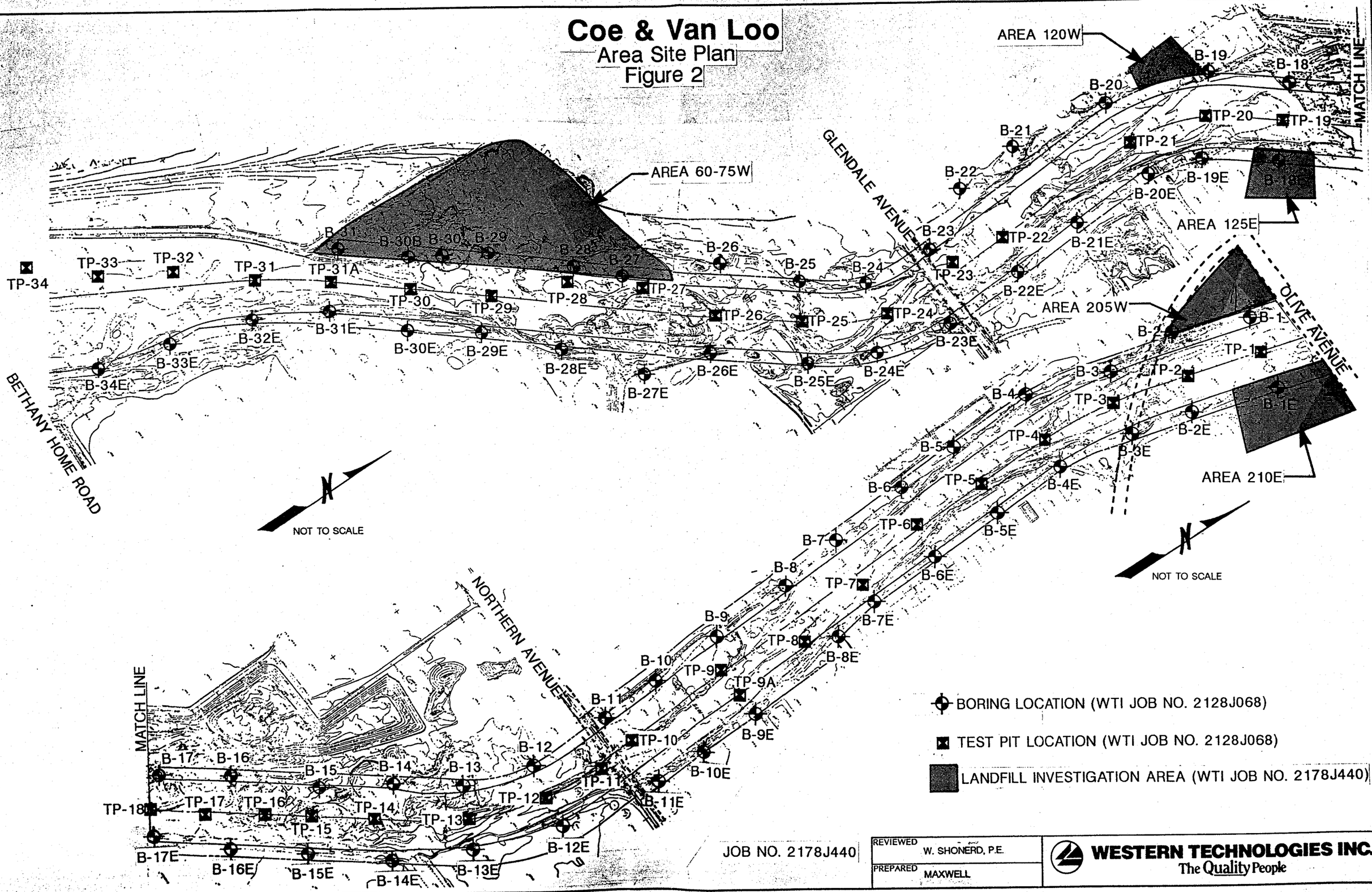
Coe & Van Loo

Area Site Plan

Figure 2



JOB NO. 2178J440

REVIEWED	W. SHONERD, P.E.
PREPARED	MAXWELL

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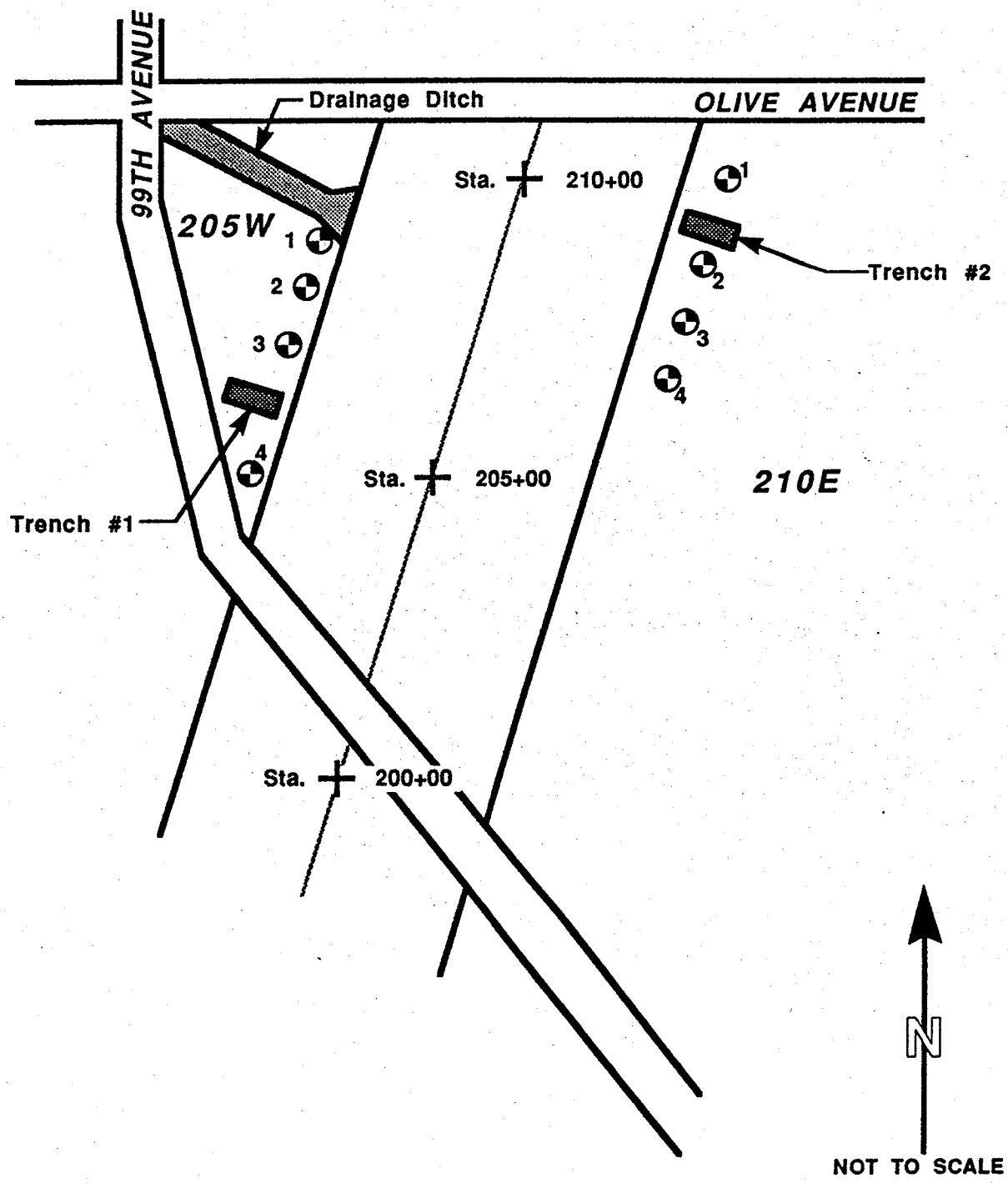
Coe & Van Loo

Soil Gas Location Diagram

Figure 3



SOIL GAS LOCATION

JOB NO. 2178J440

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PREPARED	MAXWELL

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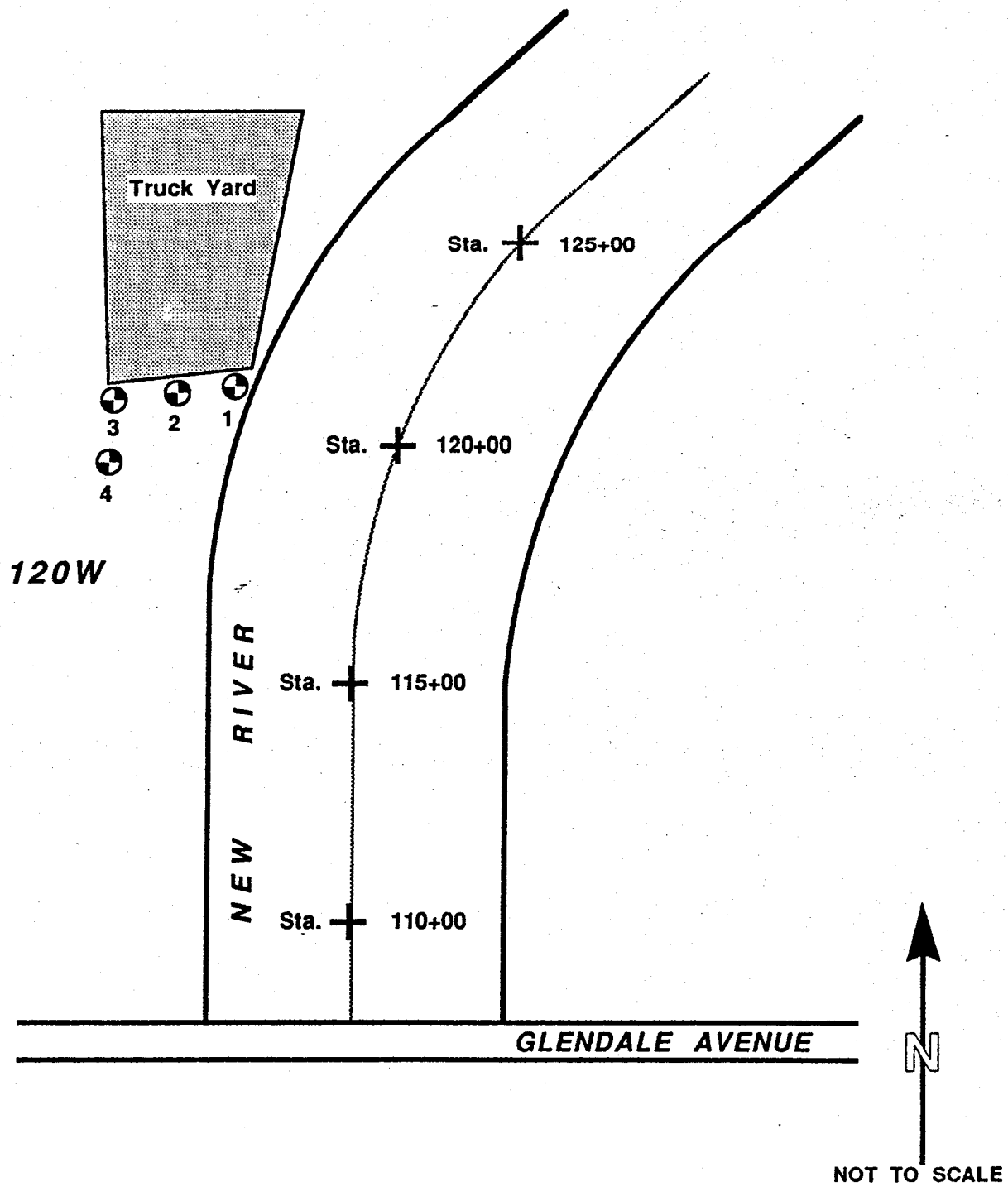
Coe & Van Loo

Soil Gas Location Diagram

Figure 4



SOIL GAS LOCATION

JOB NO. 2178J440

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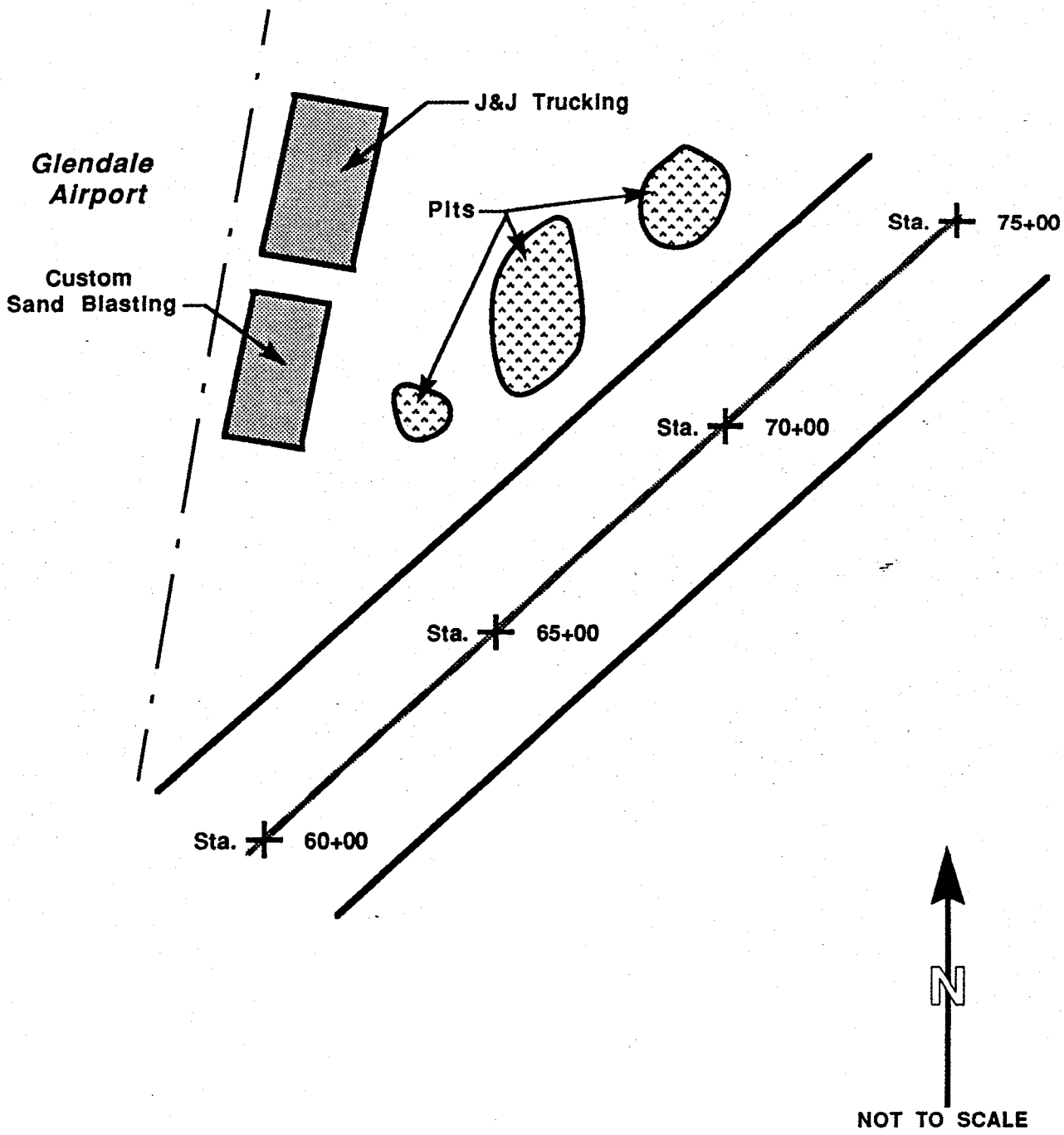
Coe & Van Loo
Investigation Area
Figure 5



JOB NO. 2178J440

REVIEWED	W. SHONERD, P.E.
PREPARED	MAXWELL

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WESTERN TECHNOLOGIES INC.
3737 East Broadway Road
P.O. Box 21387
Phoenix, Arizona 85036
(602) 437-3737

LABORATORY REPORT

CLIENT Coe & Van Loo
4550 N. 12th Street
Phoenix, AZ 85014

SAMPLE NO. : 8820915
INVOICE NO.: 2178W440
DATE : 12-30-88
REVIEWED BY:
PAGE : 1 OF 2

CLIENT SAMPLE ID : #1
SAMPLE TYPE .....: Soil
SAMPLE SOURCE ...: --
SAMPLED BY .....: WTI/C. Christian
SUBMITTED BY ....: WTI/C. Christian

AUTHORIZED BY: C&VL/Personnel
CLIENT P.O. : --

SAMPLE DATE .: 12-09-88
SUBMITTED ON : 12-12-88

REMARKS -

*PHYSICAL DESCRIPTION:

Odor:	Petroleum
Color:	Dark Brown
Viscosity:	N/A
Physical State:	Solid
Number of Layers:	One
Percent Layers:	N/A

*WATER MIX:

Reactive:	Negative
Soluble:	Partially Soluble
Heavier/Lighter:	N/A
Emulsifies:	No
Precipitates:	No

**SULFIDE (Reactive)

****
* DATA TABLE *
****

[---------- PARAMETER --------]	[- RESULT -]	[- UNIT -]
pH .....:	7.7	S.U.
Water and Acid Reactivity .....:	*	
Flash Point .....:	>200.	Fahrenheit
Physical Description .....:	*	
EP-Tox Arsenic .....:	<0.5	mg/L
EP-Tox Barium .....:	<1.	mg/L
EP-Tox Cadmium .....:	<0.1	mg/L
EP-Tox Chromium .....:	<0.1	mg/L
EP-Tox Lead .....:	<0.5	mg/L
EP-Tox Mercury .....:	0.03	mg/L
Ep-Tox Selenium .....:	<0.5	mg/L
EP-Tox Silver .....:	<0.1	mg/L
Cyanide, Total (Distillation) .....:	0.05	mg/kg

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LABORATORY REPORT

CLIENT Coe & Van Loo
4550 N. 12th Street
Phoenix, AZ 85014

SAMPLE NO. : 8820915
INVOICE NO.: 2178W440
DATE : 12-30-88
REVIEWED BY:
PAGE : 2 OF 2

****
* D A T A T A B L E (Cont.) *
****

[---------- PARAMETER --------]	[- RESULT -]	[- UNIT -]
Sulfide .....:	**5.	mg/kg

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CLIENT Coe & Van Loo
4550 N. 12th Street
Phoenix, AZ 85014

SAMPLE NO. : 8820915
INVOICE NO.: 2178W440
DATE : 12-30-88
REVIEWED BY: FJK
PAGE : 1 OF 2

CLIENT SAMPLE ID : #1
SAMPLE TYPE .....: Soil
SAMPLE SOURCE ...: --
SAMPLED BY .....: WTI/C. Christian
SUBMITTED BY ....: WTI/C. Christian

AUTHORIZED BY: C&VL/Personnel
CLIENT P.O. : --

SAMPLE DATE .: 12-09-88
SUBMITTED ON : 12-12-88

REMARKS -

GC/MS SOLVENT SCREEN

****
* DATA TABLE *
****

PARAMETER	RESULT	UNIT
Benzene	<10.	mg/kg
1-Butanol (N-Butyl Alcohol)	<10.	mg/kg
2-Butanone (Methyl Ethyl Ketone)	<10.	mg/kg
2-Butoxyethanol (Butyl Cellosolve)	<10.	mg/kg
2-(2-Butoxyethanol) Ethanol (Butyl Carbitol)	<10.	mg/kg
Butyl Ester Acetic Acid (Butyl Acetate)	<10.	mg/kg
Carbon Tetrachloride	<10.	mg/kg
1,1-Dichloroethane(1,1-DCA)	<10.	mg/kg
1,2-Dichloroethane(1,2-DCA)	<10.	mg/kg
1,1-Dichloroethene(1,1-DCE)	<10.	mg/kg
1,2-Dichloroethene(1,2-DCE)	<10.	mg/kg
Dichloromethane(Methylene Chloride)	<10.	mg/kg
Dimethylbenzene(Xylene)	<10.	mg/kg
1,4-Diethylene Dioxide(Dioxane)	<10.	mg/kg
1,2-Ethanidiol(Ethylene Glycol)	<10.	mg/kg
Ethanol(Ethyl Alcohol)	<10.	mg/kg
2-Ethoxyethanol(Cellosolve)	<10.	mg/kg
2-Ethoxyethyl Acetate (Cellosolve Acetate)	<10.	mg/kg
Ethylbenzene	<10.	mg/kg
Ethyl Ester Acetic Acid (Ethyl Acetate)	<10.	mg/kg
2-Methoxyethanol(Methyl Cellosolve)	<10.	mg/kg
Methylbenzene(Toluene)	<10.	mg/kg

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Phoenix, AZ 85014

SAMPLE NO. : 8820915
INVOICE NO.: 2178W440
DATE : 12-30-88
REVIEWED BY: FJK

****
* D A T A T A B L E (Cont.) *
****

PARAMETER	RESULT	UNIT
Methyl Ester Acetic Acid (Methyl Acetate)	<10.	mg/kg
2-Methyl-1-Propanol (Isobutyl Alcohol)	<10.	mg/kg
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone)	<10.	mg/kg
1-Propanol(Propyl Alcohol)	<10.	mg/kg
2-Propanol(Iso Propyl Alcohol)	<10.	mg/kg
2-Propanone(Acetone)	<10.	mg/kg
1,1,2,2-Tetrachloroethane	<10.	mg/kg
Tetrachloroethane	<10.	mg/kg
Tetrahydrofuran	<10.	mg/kg
1,1,1-Trichloroethane	<10.	mg/kg
1,1,2-Trichloroethane	<10.	mg/kg
Trichloroethene	<10.	mg/kg
Trichloromethane	<10.	mg/kg
1,1,2-Trichloro-1,2,2-Trifluoro-ethane(Freon 113)	<10.	mg/kg
Trimethylbenzene	<10.	mg/kg

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LABORATORY REPORT

CLIENT Coe & Van Loo
4550 N. 12th Street
Phoenix, AZ 85014

SAMPLE NO. : 8820916
INVOICE NO.: 2178W440
DATE : 12-30-88
REVIEWED BY:
PAGE : 1 OF 2

CLIENT SAMPLE ID : #2
SAMPLE TYPE .....: Soil
SAMPLE SOURCE ...: --
SAMPLED BY .....: WTI/C. Christian
SUBMITTED BY ....: WTI/C. Christian

AUTHORIZED BY: C&VL/Personnel
CLIENT P.O. : --

SAMPLE DATE .: 12-09-88
SUBMITTED ON : 12-12-88

REMARKS -

*PHYSICAL DESCRIPTION:	Odor:	Soil
	Color:	Brown
	Viscosity:	N/A
	Physical State:	Solid
	Number of Layers:	One
	Percent Layers:	N/A
*WATER MIX:	Reactive:	Negative
	Soluble:	Partially Soluble
	Heavier/Lighter:	N/A
	Emulsifies:	No
	Precipitates:	No

**SULFIDE (Reactive)

****
* D A T A T A B L E *
****

[---------- PARAMETER --------]	[- RESULT -]	[- UNIT -]
pH .....:	7.9	S.U.
Water and Acid Reactivity .....:	*	
Flash Point .....:	>200.	Fahrenheit
Physical Description .....:	*	
EP-Tox Arsenic .....:	<0.5	mg/L
EP-Tox Barium .....:	1.	mg/L
EP-Tox Cadmium .....:	<0.1	mg/L
EP-Tox Chromium .....:	<0.1	mg/L
EP-Tox Lead .....:	<0.5	mg/L
EP-Tox Mercury .....:	<0.01	mg/L
Ep-Tox Selenium .....:	<0.5	mg/L
EP-Tox Silver .....:	<0.1	mg/L
Cyanide, Total (Distillation) .....:	0.11	mg/kg

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4550 N. 12th Street
Phoenix, AZ 85014

SAMPLE NO. : 8820916
INVOICE NO.: 2178W440
DATE : 12-30-88
REVIEWED BY:
PAGE : 2 OF 2

****
* D A T A T A B L E (Cont.) *
****

[---------- PARAMETER --------]	[- RESULT -]	[- UNIT -]
Sulfide .....:	**5.	mg/kg

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LABORATORY REPORT

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4550 N. 12th Street
Phoenix, AZ 85014

SAMPLE NO. : 8820916
INVOICE NO.: 2178W440
DATE : 12-30-88
REVIEWED BY: FJK
PAGE : 1 OF 2

CLIENT SAMPLE ID : #2
SAMPLE TYPE .....: Soil
SAMPLE SOURCE ...: --
SAMPLED BY .....: WTI/C. Christian
SUBMITTED BY ....: WTI/C. Christian

AUTHORIZED BY: C&VL/Personnel
CLIENT P.O. : --

SAMPLE DATE .: 12-09-88
SUBMITTED ON : 12-12-88

REMARKS -

GC/MS SOLVENT SCREEN

****
* DATA TABLE *
****

PARAMETER	RESULT	UNIT
Benzene	<10.	mg/kg
1-Butanol (N-Butyl Alcohol)	<10.	mg/kg
2-Butanone (Methyl Ethyl Ketone)	<10.	mg/kg
2-Butoxyethanol (Butyl Cellosolve)	<10.	mg/kg
2-(2-Butoxyethanol) Ethanol (Butyl Carbitol)	<10.	mg/kg
Butyl Ester Acetic Acid (Butyl Acetate)	<10.	mg/kg
Carbon Tetrachloride	<10.	mg/kg
1,1-Dichloroethane(1,1-DCA)	<10.	mg/kg
1,2-Dichloroethane(1,2-DCA)	<10.	mg/kg
1,1-Dichloroethene(1,1-DCE)	<10.	mg/kg
1,2-Dichloroethene(1,2-DCE)	<10.	mg/kg
Dichloromethane(Methylene Chloride)	<10.	mg/kg
Dimethylbenzene(Xylene)	<10.	mg/kg
1,4-Diethylene Dioxide(Dioxane)	<10.	mg/kg
1,2-Ethanidiol(Ethylene Glycol)	<10.	mg/kg
Ethanol(Ethyl Alcohol)	<10.	mg/kg
2-Ethoxyethanol(Cellosolve)	<10.	mg/kg
2-Ethoxyethyl Acetate (Cellosolve Acetate)	<10.	mg/kg
Ethylbenzene	<10.	mg/kg
Ethyl Ester Acetic Acid (Ethyl Acetate)	<10.	mg/kg
2-Methoxyethanol(Methyl Cellosolve)	<10.	mg/kg
Methylbenzene(Toluene)	<10.	mg/kg

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Phoenix, Arizona 85036
(602) 437-3737

LABORATORY REPORT

CLIENT Coe & Van Loo
4550 N. 12th Street
Phoenix, AZ 85014

SAMPLE NO. : 8820916
INVOICE NO.: 2178W440
DATE : 12-30-88
REVIEWED BY:

****
* D A T A T A B L E (Cont.) *
****

PARAMETER	RESULT	UNIT
Methyl Ester Acetic Acid (Methyl Acetate)	<10.	mg/kg
2-Methyl-1-Propanol (Isobutyl Alcohol)	<10.	mg/kg
4-Methyl-2-Pentanone (Methyl Isobutyl Ketone)	<10.	mg/kg
1-Propanol(Propyl Alcohol)	<10.	mg/kg
2-Propanol(Iso Propyl Alcohol)	<10.	mg/kg
2-Propanone(Acetone)	<10.	mg/kg
1,1,2,2-Tetrachloroethane	<10.	mg/kg
Tetrachloroethane	<10.	mg/kg
Tetrahydrofuran	<10.	mg/kg
1,1,1-Trichloroethane	<10.	mg/kg
1,1,2-Trichloroethane	<10.	mg/kg
Trichloroethene	<10.	mg/kg
Trichloromethane	<10.	mg/kg
1,1,2-Trichloro-1,2,2-Trifluoro-ethane(Freon 113)	<10.	mg/kg
Trimethylbenzene	<10.	mg/kg

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180

CHAIN OF CUSTODY RECORD

№ 708

JOB NO. 2178J440

PROJECT NAME Coe + Van Loo

SAMPLERS: (SIGNATURE) [signature]

SAMPLE IDENTIFICATION	DATE	TIME	COMP.	CRAB	SAMPLE LOCATION	NUMBER OF CONTAINERS	VACSAM	SOIL SCOOP	SOIL AUGAR	SPLIT-SPOON			REMARKS (PHYSICAL APPEARANCE, etc.)	LABORATORY IDENTIFICATION
#1	12-9	9:30		X	B-2W @ ~ 4'	1		X						8820915
#2	12-9	10:00		X	B-1E @ ~ 6'	1		X						8820916

RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)
[signature]	12-12-88	10:00					
RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)
			[signature]				
RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED FOR LABORATORY BY (SIGNATURE)	DATE	TIME	REMARKS	
			[signature]	12/12/88	10:00		

WESTERN TECHNOLOGIES INC.
3737 East Broadway Road
P.O. Box 21387
Phoenix, Arizona 85036
602 437-3737

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New River Channelization
Bethany Home Road to Olive Avenue
Phoenix, Arizona
for
Coe and Van Loo
Job No. 2128J068

WESTERN TECHNOLOGIES INC.
The Quality People

ARIZONA

Phoenix
3737 East Broadway Road
P.O. Box 21387
Phoenix, Arizona 85036
(602) 437-3737

Mesa
952 East Baseline Road, No. 104
Mesa, Arizona 85204
(602) 926-2113

Sun City
17200 North Dysart Road, No. 13
P.O. Box 2431
Sun City, Arizona 85372
(602) 975-2154

Flagstaff
2400 East Huntington Drive
Flagstaff, Arizona 86001
(602) 774-8708

Lakeside
Route 1, Box 1030
Lakeside, Arizona 85929
(602) 368-5568

Tucson
3480 South Dodge Boulevard
Tucson, Arizona 85713
(602) 748-2262

Sierra Vista
1827 South Paseo San Luis
Sierra Vista, Arizona 85635
(602) 458-0364

Laughlin / Bullhead City
1610 Riverview Drive, No. 5
Bullhead City, Arizona 86442
(602) 758-8378

NEW MEXICO

Albuquerque
8305 Washington Place, N.E.
Albuquerque, New Mexico 87113
(505) 823-4488

Farmington
400 South Lorena Avenue
Farmington, New Mexico 87401
(505) 327-4966

NEVADA

Las Vegas
3611 West Tompkins Avenue
Las Vegas, Nevada 89103
(702) 798-8050

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WESTERN TECHNOLOGIES INC.

3737 East Broadway Road
P.O. Box 21387
Phoenix, Arizona 85036
(602) 437-3737

Coe and Van Loo
4550 North 12th Street
Phoenix, Arizona 85014

November 9, 1988

Attn: Mr. Ashok Patel
Senior Vice President

Re: New River Channelization
Bethany Home Road to Olive Avenue
Phoenix, Arizona

Job No. 2128J068
Inv. No. 21280317

Gentlemen:

Western Technologies Inc. has completed the subsurface exploration for the proposed New River Channelization Project to be implemented between Bethany Home Road and Olive Avenue in the City of Peoria and City of Glendale, Arizona. This study was requested and authorized by Mr. Ashok C. Patel in general accordance with our proposal number 2128A008 dated February 8, 1988.

The results of our study, including the boring location diagram, laboratory test results, test boring records and the geotechnical recommendations needed to aid in the design and construction of the levees, embankments and other earth connected phases of this project are attached.

We have appreciated being of service to you in the subsurface exploration phase of this project and are prepared to assist you during the construction phases as well. If you have any questions concerning this report or any of our testing, inspection, design and consulting services, please do not hesitate to contact us.

Sincerely,
WESTERN TECHNOLOGIES INC.
Geotechnical Services

REGISTERED PROFESSIONAL ENGINEER (CIVIL)
CERTIFICATE NO. 20920
ENAMUL HOQUE
Date Signed 11/9/88
ARIZONA, U.S.A.

Enamul Hoque, P.E.

Reviewed by: Richard A. Bergquist, P.E.

sfp/768

Copies to: Addressee (3)

Coe and Van Loo
Job No. 2128J068

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Coe and Van Loo
Job No. 2128J068

Geotechnical Exploration
New River Channelization
Bethany Home Road to Olive Avenue
Phoenix, Arizona
November 1, 1988

INTRODUCTION

This report contains the results of our geotechnical exploration for the proposed New River Channelization Project to be implemented between Olive Avenue and Bethany Home Road. The purpose of these services is to provide information and recommendations relative to site preparation, levee construction, slope stability and embankment protection.

PROPOSED CONSTRUCTION

Project information has been provided by Mr. Ashok C. Patel of Coe and Van Loo. We have several drawings supplied by Coe and Van Loo. Based on this information, we understand that the project will consist of channelization of the existing New River between Olive Avenue and Bethany Home Road. The channelization will consist of levees on each bank approximately 20 feet above the proposed flow line. The levees will be constructed on 1:1 slope protected by a soil-cement face 4 to 8 feet in thickness. The soil-cement slope protection will extend approximately 15 feet below the flow line to be below the expected scour depth.

SITE CONDITIONS

General: The portion of the river which will be channelized is located about 15 miles northwest of the City of Phoenix. The area is a gently sloping broad alluvial valley typical of the Basin

and Range Province. For simplicity, we divided the project into three sections. The three sections are; Olive Avenue to Northern Avenue, Northern Avenue to Glendale Avenue, and Glendale Avenue to Bethany Home Road. The site conditions within each section are as follows:

- Olive Avenue to Northern Avenue: The river channel flows southward and the bottom contains a moderate growth of local bushes such as mesquite and creosote. An open drainage canal outfalls to the river on the west bank approximately 100 yards south of Olive Avenue. Uncontrolled fill exists on the channel faces between Olive and 99th Avenue.

  South of 99th Avenue, the west bank contains uncontrolled rubble fill. The east bank appears relatively free of debris.

  Evidence of an abandoned gravel mining operation was observed on the west bank north of Northern Avenue. The river channel narrows significantly in this area.

- Northern Avenue to Glendale Avenue: This section has one operating gravel mine on the west bank of the river within the first half mile south of Northern Avenue. Several large, deep open pit excavations associated with the mine exist within the western half of the channel. Some of these pits are approximately 90 feet deep. Several ponds of unknown depth, probably associated with the mining operation, exist in this area.

  North of Glendale Avenue uncontrolled fill was observed on the east and west channel banks. In this vicinity, immediately east of the probable project limits, a large 25 foot deep pit exists. This pit contains junk

automobiles, and construction, and household rubble. No research was done to determine if hazardous materials exist within the pit.

The river bed and channel bank contain a moderate growth of native brush and grass. A large open channel drainage structure empties into the river on the east bank within this section.

- Glendale Avenue to Bethany Home Road: Several, probably illegal, dump sites exist on the west channel bank.

  A storm drain enters the river channel on the east bank. An active gravel mining operation is also located on the east bank.

  Portions of the channel bottom and banks within this section contain a moderate to dense growth of native grasses, brush and trees.

  Location of Uncontrolled Dump Sites: During the field exploration, several areas containing uncontrolled fill material were observed. These dump sites contained construction debris, household rubble and decomposing vegetation. Following is a list of known locations. Other observed sites may also exist.

  - East bank between Station 240+00 and 200+00.
  - West bank between Station 240+00 and 150+00.
  - East bank between Station 150+00 and 100+00.
  - West bank between Station 150+00 and 100+00.

- West bank between Station 75+00 and 60+00.

Within the above listed areas hazardous materials may exist. At several locations, drilling was terminated due to noxious odors and personnel safety.

SCOPE OF SERVICES

Sixty-six borings and 35 test pits were drilled or excavated to depths of 2 to 27 feet. The borings were drilled along the east and west bank on top of the existing river channel banks near the proposed channelization levees. The test pits were excavated along the approximate centerline of the rechannelization. The borings were drilled using truck mounted drilling rig utilizing 7 inch diameter hollow stem auger. The test pits were excavated using large backhoe equipment. During exploration, subsoils were examined visually and sampled at selected intervals.

The following tests were performed on selected soil samples:

- Water content
- Dry density
- Shear strength
- Gradation
- Plasticity
- Permeability
- Soluable Sulfur

Test results were used in development of our recommendations. In addition, trial soil-cement mixtures were tested for appropriate parameters.

INTERPRETATION OF SUBSURFACE CONDITIONS

Exploration: As presented on the Logs of Test Pits, the riverbed materials, are predominantely gravelly sands and sandy gravels with cobbles. The cobbles have a maximum diameter of approximately 9 inches. The fines content varies vertically and laterally along the river bottom. In general, the deeper coarse grained soils are coated with reddish brown medium plasticity clay. Occasional thin layers of clay were encountered in some of the test pits.

As presented in the Logs of Borings, the near surface soils on the banks of the existing river consist predominantly of loose to medium dense gravelly sand fill with varying amounts of silt and clay. The native material below the fill consists of sand with varying amounts of silt and gravel. Below the sand and gravelly sand layer and extending to the full depth of exploration, the materials encountered were predominantly dense sandy gravel. All borings along the banks reached practical auger refusal within depths of 2 to 24 feet. A ground water table was not encountered during the time of our exploration.

Testing: Laboratory test results indicate angles of internal friction ranging from 29 degrees to 46 degrees. These values were determined on 2.5 inch diameter ring samples which eliminates coarse gravel and larger particles. Numerous gradation tests were performed on recovered samples. These tests indicate that in general the subsurface soils are predominantely sandy gravel to gravelly sand.

Permeability tests performed on undisturbed samples indicated a permeability of $2x10^{-5}$ cm/sec. Tests on remolded samples

indicated permeabilities ranging from $1x10^{-3}$ to $6x10^{-5}$ cm/sec. A summary of the laboratory test results is included in Appendix C of this report.

Groundwater: During this exploration, groundwater was not encountered in any of the borings or test pits. Review of well records and groundwater data published by the Arizona Department of Water Resources indicates that the groundwater table within the project area exists at a depth greater than 140 feet below the ground surface. Based on the present recharge and discharge rate, it is our judgement that construction will not be affected by the groundwater.

CONCLUSIONS AND RECOMMENDATIONS

General: Due to the unknown nature of the materials that may be uncovered during construction extreme caution must be exercised. If drums with suspicious odors or liquids are encountered, proper supervision should be obtained prior to continuation of the work.

Site Clearing: In general, rechannelization of the river will require removal of soil from the existing river bottom and banks to achieve the design flow elevation and channel alignment. The cut material will be selectively used to construct channel levees and soil cement slope protection.

Prior to grading the channel, strip and remove existing vegetation, debris and other deleterious material from the river bottom and existing banks. Any existing water-filled ponds should be pumped dry or otherwise drained and cleaned of organic or deleterious matter.

Site Preparation: Several open pit gravel mines and ponds exist within the project limits. These existing excavations will require

proper backfilling prior to construction of the levees, levee protection, and channel bottom. The backfill material should be clean, well graded granular soil, free of vegetation, organic matter, construction rubble and other deleterious material and meet the gradation specification presented in this report.

Backfill above the toe of the embankment protection structure, within the channel area, should meet the gradation requirements presented under the "Materials" section of this report.

All backfill should be placed in accordance with the recommendations presented in the "Placement and Compaction" section of this report.

Levee Construction: The proposed channel levees will either be cut from the existing river banks or constructed with engineered fill. The channel levees to be cut from existing river banks may be cut on a 1:1 slope. However, in some locations local shallow slope failures should be expected. Where these failures are experienced the soil-cement levee protection structure should be constructed to the natural slope angle of the bank soil on the bank side of the channel. If during preparation of cut levees, rubble or uncontrolled fill is encountered, we recommend that these materials be removed. The removal should extend landward from the proposed channel face to natural soil or 50 feet, whichever is least. The levee then should be constructed as recommended below.

Two different conditions exist where construction of the channel levees is required. These conditions are; levees constructed on native, undisturbed soil, and levees constructed on engineered fill.

Where levees are constructed on native undisturbed soil the surface should be cleared as recommended in the site clearing section of this report. The surface should be cut level, scarified to a depth of 10 inches and recompacted to 95 percent of ASTM D698.

Where levees are constructed on engineered fill scarification of the surface is not required.

The material used in the constructed levees should meet the requirement presented in the "Materials" section of the report. Placement and compaction recommendations are also presented in this report.

In some areas levees will be constructed adjacent to landward excavations. In this situation, miscellaneous backfill may be used outside the levee. The levee is defined as the zone between the new channel face and 50 feet landward.

Slope Stability: Stability of the proposed levees were analyzed using the computer program "SB-SLOPE" to determine the critical failure surface. The stability analyses were performed using a 1:1 levee slope, unprotected, and protected by a 4 foot thick and an 8-foot thick soil-cement structure. The stability analyses were based on the following minimum design assumptions:

a. Near surface sandy silt or silty sand material:

Dry unit weight = 115 16/ft^3
Moist unit weight = 124 lb/ft^3
Saturated unit weight = 126 lb/ft^3
Angle of internal friction = 30 degrees
Cohesion = 0
Coefficient of Permeability = 6×10^{-5} cm/sec

b. Levee material (sands with gravel)

Dry unit weight = 120 lb/ft^3
Moist unit weight = 130 lb/ft^3
Saturated unit weight = 136 lb/ft^3

Angle of internal friction = 36 degrees
Cohesion = 0
Coefficient of Permeability = $2x10^{-3}$ cm/sec

c. Levee foundation soil (sand, gravel and cobbles)

Dry unit weight = 130 lb/ft^3
Moist unit weight = 138 lb/ft^3
Saturated unit weight = 140 lb/ft^3
Angle of internal friction = 38 degrees
Cohesion = 0

d. Soil-cement slope protection structures:

Unit weight = 125 lb/ft^3
Unconfined compression strength = 750 psi
Coefficient of friction between soil and soil-cement = 0.3

e. Critical condition at end of construction.

Based on our analysis, the minimum factor of safety against slope failure occurs when the soil above the toe of the slope protection structure is removed by scour. The minimum factor of safety against failure for a 4 foot and 8 foot thick structure is 1.15, 1.28, respectively. The slope stability analysis on a 1:1 slope without soil-cement slope protection indicates shallow slope failures will probably occur in some places. Typical plots of the computer output are presented in Appendix of this report.

These safety factors do not include transient load due to earthquake. Earthquake loading reduces safety factors for such structures. It is our opinion, however, that the likelihood of significant earthquake loads occurring during periods of full scour

are remote. Further, it is our opinion, considering the consequences of failure and the associated construction cost, that designing for absolute worst conditions is not warranted.

Earthwork:

- General:

  1. The conclusions contained in this report for the proposed construction are contingent upon compliance with recommendations presented in this section.

  2. Although underground facilities such as septic tanks, cesspools, basements, utilities, and dry wells were not observed, such features might be encountered during construction.

- Excavation:

  1. We anticipate that excavations for the proposed construction can be accomplished with conventional equipment.

  2. On-site silty and or clayey (if any) soils may pump or become unworkable at high water contents. Workability may be improved by scarifying and drying. Overexcavation of wet zones and replacement with granular materials may be necessary. The use of lightweight excavation and compaction equipment may be required to minimize subgrade pumping.

- Foundation Preparation: Specialized treatment of existing soils within levee foundation areas is not required. If objectionable material such as loose fill or deleterious

material is encountered it should be removed and replaced with suitable, compacted material.

- Materials:

General: All fill and backfill material should be clean, free of construction debris, rubble and organic matter. The following gradation specifications are recommended:

1. Levee Foundation and Levee

Sieve No. or Size	Percent Passing by Weight
3"	100
No. 4	40 (min)
No. 200	5 (min)

2. Channel Fill and Backfill (not below levee)

Sieve No. or Size	Percent Passing by Weight
6"	100
8"	60-80
No. 4	20-40

3. Miscellaneous Fill and Backfill: Any clean material approved by the project engineer.

Placement and Compaction:

1. All fill and backfill should be placed and compacted in horizontal lifts using equipment and procedures that will

produce recommended densities and suitable water content throughout the lift. Uncompacted fill lifts should not exceed the following:

Description	Loose Lift Thickness (inches)
Levee and Levee Foundation	12
Channel Fill and Backfill	24
Miscellaneous	24

3. Materials should be compacted to the following:

Material	Minimum Percent Compaction (ASTM D698)
Levee & Levee Foundation	95
Channel fill and backfill	90*
Miscellaneous fill and backfill	80*

*Due to the size of the materials a performance specification may be required.

- Compliance: Our recommendations are predicated on proper observation and testing of the construction activities. To assess compliance, observation and testing should be performed under the direction of the geotechnical engineer.

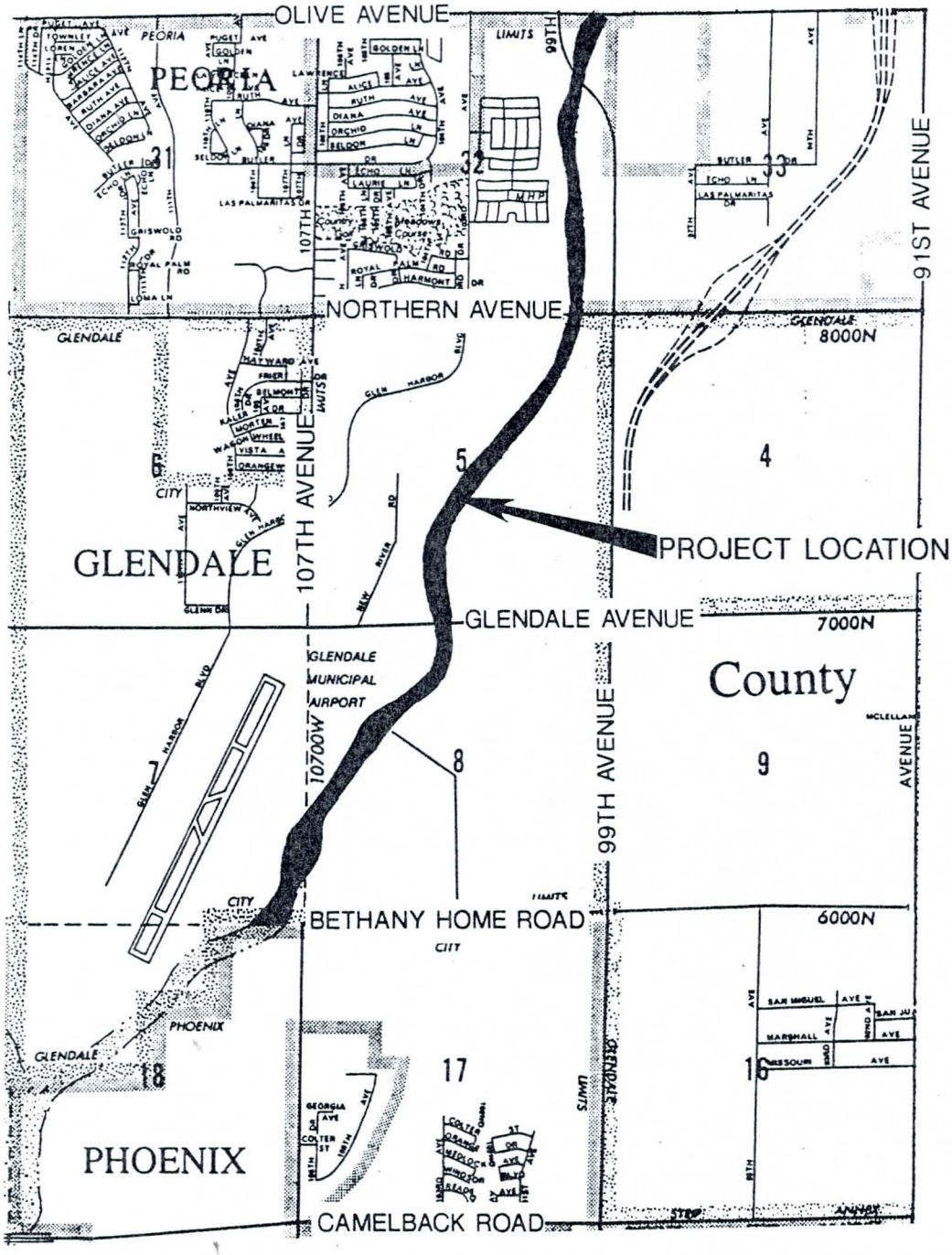
CLOSURE

Our conclusions and recommendations assume observation and testing of the earthwork and foundation preparations by a representative of the engineer. During construction, the engineer will have the responsibility of assuring that construction complies with our recommendations. The engineer also will be responsible for decisions/recommendations should unanticipated conditions occur.

If plans, specifications, or field applications deviate from our recommendations, we shall be relieved of responsibility unless our written concurrence has been obtained.

New River Channelization

From Bethany Home Road to Olive Avenue



NOT TO SCALE

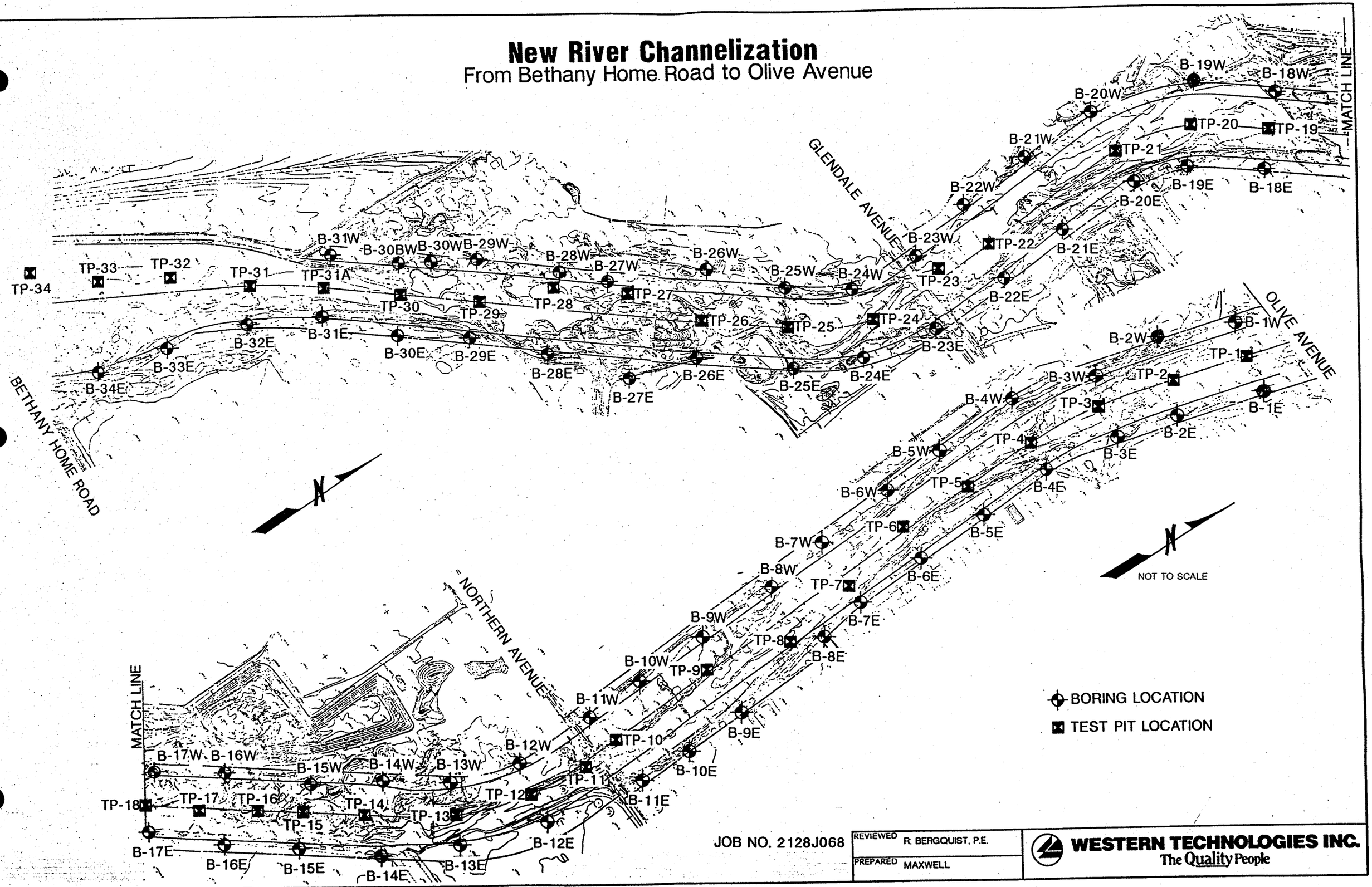
JOB NO. 2128J068

REVIEWED	R. BERGQUIST, P.E.
PREPARED	MAXWELL

WESTERN TECHNOLOGIES INC.
The Quality People

New River Channelization

From Bethany Home Road to Olive Avenue



JOB NO. 2128J068	REVIEWED R. BERGQUIST, P.E.
	PREPARED MAXWELL

WESTERN TECHNOLOGIES INC.
The Quality People

Coe and Van Loo
Job No. 2128J068

TEST PIT LOG NOTES

The number shown in "LOG OF TEST PIT." refers to the approximate location of the same number indicated on the "Site Plan" as positioned in the field by pacing from existing features.

"STA" refers to the approximate stationing of the test pit along the proposed New River Channelization alignment according to Coe and Van Loo.

"ELEVATION" refers to ground surface elevation at the test pit location relative to the indicated "DATUM" established by interpolation from contours on the "Site Plan".

"TYPE/SIZE PIT" refers to the exploratory equipment and size of the bucket used during the excavation.

"Sample Type" refers to the form of sample recovery, in which G = Grab sample.

"Unified Classification" refers to the soil type as defined by "Method of Soil Classification". The soils were classified visually in the field and, where appropriate, classifications were modified by visual examination of samples in the laboratory and/or by appropriate tests.

These notes and test pit are intended for use in conjunction with the purposes of our services defined in the text. Test pit data should not be construed as part of the construction plans nor as defining construction conditions.

Test pit depict our interpretations of subsurface conditions at the locations and on the date(s) noted. Variations in subsurface conditions and soil characteristics may occur between borings. Groundwater levels may fluctuate due to seasonal variations and other factors.

In general, terms and symbols on the test pit conform with "Standard Definitions of Terms and Symbols Relating to Soil and Rock Mechanics" (ASTM D653).

LOG OF TEST PIT NO. TP-1

Project New River Channelization (Sta. 210+00) Job No. 2128J068

Elevation 1079.0 Datum MEAN SEA LEVEL

Type/Size Boring Backhoe 24" Rig Type Ford 555

Groundwater Conditions None Encountered Date 4/28/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			B			GW	GRAVEL; with sand, with cobbles, trace fines, brown
			B			GP-GC	SANDY GRAVEL; with cobbles, some clay, brown
5			B				
							minor water seepage
10							
15							
20							
							Excavation stopped at 20 feet
25							
30							

LOG OF TEST PIT NO. TP-2

Project New River Channelization (Sta. 205+00) Job No. 2128J068

Elevation 1079.3 Datum MEAN SEA LEVEL

Type/Size Boring Backhoe 24" Rig Type Ford 555

Groundwater Conditions None Encountered Date 4/28/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
						GP	SANDY GRAVEL; with cobbles, trace fines, light brown
			B				
5							
						GP	SANDY GRAVEL; trace fines, reddish brown
			B				
10							
15							
20							Excavation stopped at 19 feet
25							
30							

LOG OF TEST PIT NO. TP-3

Project New River Channelization (Sta. 200+00) Job No. 2128J068

Elevation 1072.5 Datum MEAN SEA LEVEL

Type/Size Boring Backhoe 24" Rig Type Ford 555

Groundwater Conditions None Encountered Date 4/28/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
5						GP	SANDY GRAVEL; with cobbles, trace fines, brown
10			B			GP-GC	GRAVELLY SAND; with clay
15							
20							
25							Excavation stopped at 20 feet
30							

LOG OF TEST PIT NO. TP-4

Project New River Channelization (Sta. 195+00) Job No. 2128J068

Elevation 1073.0 Datum MEAN SEA LEVEL

Type/Size Boring Backhoe 24" Rig Type Ford 555

Groundwater Conditions None Encountered Date 4/28/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
						GP	SANDY GRAVEL; trace fines, brown
							reddish brown
5			B				
						GP-GM	GRAVEL AND SAND; some fines, reddish brown
			B				
10							
						GP	GRAVELS AND COBBLES; with sand, trace fines, brown
15			B				
20							
							Excavation stopped at 20 feet
25							
30							

LOG OF TEST PIT NO. TP-5

Project New River Channelization (Sta. 190+00) Job No. 2128J068

Elevation 1072.0 Datum MEAN SEA LEVEL

Type/Size Boring Backhoe 24" Rig Type Ford 555

Groundwater Conditions None Encountered Date 4/28/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			B			GP	GRAVEL AND SAND; trace to some fines, brown
5			B			GW	GRAVEL; with sand, some cobbles, trace fines, reddish brown
10							
15			B			GP	SANDY GRAVELS; some cobbles, trace clay, reddish brown
20							Excavation stopped at 18 feet
25							
30							

LOG OF TEST PIT NO. TP-6

Project New River Channelization (Sta. 185+00) Job No. 2128J068

Elevation 1071.0 Datum MEAN SEA LEVEL

Type/Size Boring Backhoe 24" Rig Type Ford 555

Groundwater Conditions None Encountered Date 4/28/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			B			SP	GRAVELLY SAND; trace fines, brown
			B			SC	SAND; with clay, some gravel, reddish brown
5			B			SP	GRAVELLY SAND; trace fines, brown
10							
15							
20							
							Excavation stopped at 20 feet
25							
30							

LOG OF TEST PIT NO. TP-7

Project New River Channelization (Sta. 180+00) Job No. 2128J068

Elevation 1070.0 Datum MEAN SEA LEVEL

Type/Size Boring Backhoe 24" Rig Type Ford 555

Groundwater Conditions None Encountered Date 4/29/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			B			SP	SAND AND GRAVEL; trace fines, brown
5							minor seepage
10							
			B			GP	GRAVEL; with cobbles, with sand, trace fines, reddish brown
15							
			B			SP-SM	SAND; with gravels, some fines, trace cobbles, reddish brown
20							
25							Excavation stopped at 24 feet
30							

LOG OF TEST PIT NO. TP-8

Project New River Channelization (Sta. 175+00) Job No. 2128J068

Elevation 1069.0 Datum MEAN SEA LEVEL

Type/Size Boring Backhoe 24" Rig Type Ford 555

Groundwater Conditions None Encountered Date 4/29/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			B			SP	SAND; with gravels, trace fines, greyish brown
			B				one foot thick layer of silt and sand (SM)
5							
10							
			B			GP	SANDY GRAVEL; with cobbles, trace fines, reddish brown
15							
20							
							Excavation stopped at 20 feet
25							
30							

LOG OF TEST PIT NO. TP-9

Project New River Channelization (Sta. 169+00) Job No. 2128J068

Elevation 1077.0 Datum MEAN SEA LEVEL

Type/Size Boring Backhoe 24" Rig Type Ford 555

Groundwater Conditions None Encountered Date 4/29/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			B			SP	SAND; trace fines, gray to brown
5			B			SM	SAND; with silt, gray to brown
10							
						GW	SANDY GRAVEL; with cobbles, trace to some fines, reddish brown
15							
			B				
							minor seepage
20							
25							Excavation stopped at 24 feet
30							

LOG OF TEST PIT NO. TP-9A

Project New River Channelization (Sta. 170+00) Job No. 2128J068

Elevation 1068.0 Datum MEAN SEA LEVEL

Type/Size Boring Backhoe 30" Rig Type Mitsubishi

Groundwater Conditions None Encountered Date 5/09/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
5			B			GP	SAND AND GRAVEL; some cobbles, trace fines, gray
10			B			GW	COBBLY GRAVEL; with sand, trace fines, reddish brown
15 20 25			B			GP	SANDY GRAVEL; some cobbles, trace fines, reddish brown
30							Excavation stopped at 28 feet

LOG OF TEST PIT NO. TP-10

Project New River Channelization (Sta. 162+00) Job No. 2128J068

Elevation 1075.0 Datum MEAN SEA LEVEL

Type/Size Boring Backhoe 30" Rig Type Mitsubishi

Groundwater Conditions None Encountered Date 5/09/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
						GP-GM	SANDY GRAVEL; some cobbles, some fines, grayish brown
			B				
5							
						GW	SANDY GRAVEL; some cobbles, trace fines, reddish brown
			B				
10							
15							
20							
25							
							Excavation stopped at 25 feet
30							

LOG OF TEST PIT NO. TP-11

Project New River Channelization (Sta. 159+00) Job No. 2128J068

Elevation 1063.0 Datum MEAN SEA LEVEL

Type/Size Boring Backhoe 30" Rig Type Mitsubishi

Groundwater Conditions None Encountered Date 5/09/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			B			SM	SILTY SAND; with gravel, brown
5			B			GP	COBBLY GRAVEL; with sand, trace fines, reddish brown
10							
15							
20			B			GW	GRAVELS AND COBBLES; with sand, trace fines, dark brown
25							
30							Excavation stopped at 25 feet

LOG OF TEST PIT NO. TP-12

Project New River Channelization (Sta. 155+00) Job No. 2128J068

Elevation 1062.0 Datum MEAN SEA LEVEL

Type/Size Boring Backhoe 24" Rig Type Ford 555

Groundwater Conditions None Encountered Date 5/02/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
						GW	SANDY GRAVEL; trace cobbles, trace fines
			B				
5							minor seepage
						GW	COBBLY-SANDY GRAVEL; trace fines, reddish brown
10							
			B				
15							
20							
							Excavation stopped at 20 feet
25							
30							

LOG OF TEST PIT NO. TP-13

Project New River Channelization (Sta. 150+00) Job No. 2128J068

Elevation 1066.5 Datum MEAN SEA LEVEL

Type/Size Boring Backhoe 30" Rig Type Mitsubishi

Groundwater Conditions None Encountered Date 5/09/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
						GP-GM	SANDY GRAVEL; some fines, reddish brown
			B				
5							
10							
						SP-SM	GRAVELLY SAND; some fines, reddish brown
15			B				
20							
						GW	SANDY GRAVEL; trace fines, brown
			B				
25							
							Excavation stopped at 27 feet
30							

LOG OF TEST PIT NO. TP-14

Project New River Channelization (Sta. 144+00) Job No. 2128J068

Elevation 1072.0 Datum MEAN SEA LEVEL

Type/Size Boring Backhoe 30" Rig Type Mitsubishi

Groundwater Conditions None Encountered Date 5/09/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
						GW	SANDY GRAVEL; with cobbles, trace fines, reddish brown
			B				
5							
						SP-SM	SAND AND GRAVEL; some fines, reddish brown
			B				
10							
15							
20							light cementation
25							
							Excavation stopped at 26 feet
30							

LOG OF TEST PIT NO. TP-15

Project: New River Channelization (Sta. 140+00) Job No. 2128J068

Elevation: 1056.0 Datum: MEAN SEA LEVEL

Type/Size Boring: Backhoe 30" Rig Type: Mitsubishi

Groundwater Conditions: None Encountered Date: 5/09/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
						GW-GM	SANDY GRAVEL; some cobbles, some fines, reddish brown
			B				
5							
10							
15							
20							
						GP-GM	SANDY GRAVEL; some fines, brown
25			B				
							Excavation stopped at 27 feet
30							

LOG OF TEST PIT NO. TP-16

Project New River Channelization (Sta. 137+00) Job No. 2128J068

Elevation 1055.0 Datum MEAN SEA LEVEL

Type/Size Boring Backhoe 24" Rig Type Ford 555

Groundwater Conditions None Encountered Date 5/02/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			B			GW	COBBLY GRAVEL; with sand, trace fines, brown
5			B			GW-GM	SANDY GRAVEL; some cobbles, some silts, reddish brown
10 15			B			SC	SAND; with clay, some gravel, reddish brown
			B			SP-SM	GRAVELLY SAND; with silt; brown
20						GW	GRAVELS AND COBBLES; with sand, trace fines, brown
25 30							Excavation stopped at 20 feet

LOG OF TEST PIT NO. TP-17

Project New River Channelization (Sta. 134+00) Job No. 2128J068

Elevation 1058.0 Datum MEAN SEA LEVEL

Type/Size Boring Backhoe 24" Rig Type Ford 555

Groundwater Conditions None Encountered Date 5/02/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			B			SP	SAND; with gravels, some cobbles at surface, trace fines, brown
5			B			SP-SM	SAND AND GRAVEL; some silts, reddish brown
10			B				more gravel, some cobbles
15			B			SP-SM	SAND; with gravels, some silts, reddish brown
20			B			GP	SANDY GRAVELS; with cobbles, trace fines, brown
25							Excavation stopped at 20 feet
30							

LOG OF TEST PIT NO. TP-18

Project New River Channelization (Sta. 130+00) Job No. 2128J068

Elevation 1057.5 Datum MEAN SEA LEVEL

Type/Size Boring Backhoe 30" Rig Type Mitsubishi

Groundwater Conditions None Encountered Date 5/09/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
						GP	SANDY GRAVEL; trace fines, brown
			B				
5							
10							
15						GW	SANDY GRAVEL; trace fines, brown
			B				
20							
25							
							Excavation stopped at 26 feet
30							

LOG OF TEST PIT NO. TP-19

Project New River Channelization (Sta. 125+00) Job No. 2128J068

Elevation 1060.0 Datum MEAN SEA LEVEL

Type/Size Boring Backhoe 30" Rig Type Mitsubishi

Groundwater Conditions None Encountered Date 5/10/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
5			B			SP	GRAVELLY SAND; some cobbles, trace fines, brown
10, 15			B			GP-GM	SANDY GRAVEL; some cobbles, some fines, reddish brown
20, 25			B			GP	SAND AND GRAVEL; trace fines, trace cobbles, brown
30							Excavation stopped at 25 feet

LOG OF TEST PIT NO. TP-20

Project New River Channelization (Sta. 120+00) Job No. 2128J068

Elevation 1057.0 Datum MEAN SEA LEVEL

Type/Size Boring Backhoe 30" Rig Type Mitsubishi

Groundwater Conditions None Encountered Date 5/10/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
						SP	GRAVELLY SAND; some cobbles, trace fines, brown
						GP	SANDY GRAVEL; some cobbles, trace fines, reddish brown
			B				
5							
10							
15							
20							
						SP-SM	SAND; some fines, some gravel, brown
			B				
25							
							Excavation stopped at 25 feet
30							

LOG OF TEST PIT NO. TP-21

Project New River Channelization (Sta. 115+00) Job No. 2128J068

Elevation 1054.2 Datum MEAN SEA LEVEL

Type/Size Boring Backhoe 30" Rig Type Mitsubishi

Groundwater Conditions None Encountered Date 5/10/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			B			GP	SAND AND GRAVEL; trace cobbles, trace fines, brown
5			B			GW-GM	SANDY GRAVELS; with cobbles, some fines, reddish brown
10							
15							
20							
25							
							Excavation stopped at 25 feet
30							

LOG OF TEST PIT NO. TP-22

Project New River Channelization (Sta. 106+00) Job No. 2128J068

Elevation 1048.0 Datum MEAN SEA LEVEL

Type/Size Boring Backhoe 24" Rig Type Ford 555

Groundwater Conditions None Encountered Date 5/02/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			B			GP	SAND AND GRAVEL; some cobbles, trace fines, brown
5			B			GP-GM	SAND AND GRAVEL; with cobbles, some fines, reddish brown
10							
			B				
15							
			B			SP	GRAVELLY SAND; trace fines, trace cobbles, grayish brown
20							
							Excavation stopped at 20 feet
25							
30							

LOG OF TEST PIT NO. TP-23

Project New River Channelization (Sta. 102+00) Job No. 2128J068

Elevation 1048.0 Datum MEAN SEA LEVEL

Type/Size Boring Backhoe 24" Rig Type Ford 555

Groundwater Conditions None Encountered Date 5/02/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
5, 10, 15			B			GP	SANDY GRAVEL; with cobbles, trace fines, reddish brown
20			B			GP-GC	SAND AND GRAVEL; some clay, some cobbles, reddish brown, trace to light cementation
25, 30							Excavation stopped at 20 feet

LOG OF TEST PIT NO. TP-24

Project New River Channelization (Sta. 96+00) Job No. 2128J068

Elevation 1043.0 Datum MEAN SEA LEVEL

Type/Size Boring Backhoe 30" Rig Type Mitsubishi

Groundwater Conditions None Encountered Date 5/10/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
						GP	GRAVELS AND COBBLES; with sand, trace fines, brown
			B				
5							
						GW	GRAVELS AND COBBLES; some sand, trace fines, reddish brown
10			B				
15							
20							
25							
30							Excavation stopped at 28 feet

LOG OF TEST PIT NO. TP-25

Project New River Channelization (Sta. 90+00) Job No. 2128J068

Elevation 1042.0 Datum MEAN SEA LEVEL

Type/Size Boring Backhoe 30" Rig Type Mitsubishi

Groundwater Conditions None Encountered Date 5/10/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			B			SP-SM	GRAVELLY SAND; some fines, brown
5			B			GP	SANDY GRAVEL; trace fines, reddish brown
10							
15							
			B			GW	SANDY GRAVEL; trace fines, reddish brown
20							
			B			GP-GM	SAND AND GRAVEL; with cobbles, some fines, reddish brown
25							
30							Excavation stopped at 27 feet

LOG OF TEST PIT NO. TP-26

Project New River Channelization (Sta. 85+00) Job No. 2128J068

Elevation 1051.5 Datum MEAN SEA LEVEL

Type/Size Boring Backhoe 30" Rig Type Mitsubishi

Groundwater Conditions None Encountered Date 5/10/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			B			SP	GRAVELLY SAND; with cobbles, trace fines, gray and brown
5			B			CL-ML	SANDY-SILTY CLAY; trace gravels, dark gray, with odor
10			B			SP-SM	GRAVELLY SAND; some fines, brown
15			B			GW	SANDY GRAVEL; some cobbles, trace fines, reddish brown
20							
25							
30							Excavation stopped at 27 feet

LOG OF TEST PIT NO. TP-27

Project New River Channelization (Sta. 80+00) Job No. 2128J068

Elevation 1036.0 Datum MEAN SEA LEVEL

Type/Size Boring Backhoe 24" Rig Type Ford 555

Groundwater Conditions None Encountered Date 5/03/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
						GW	SANDY GRAVEL; some cobbles, trace fines, reddish brown
			B				
5							
10							
15							
							no cobbles, less sand
			B				
20							
							Excavation stopped at 20 feet
25							
30							

LOG OF TEST PIT NO. TP-28

Project New River Channelization (Sta. 75+00) Job No. 2128J068

Elevation 1035.0 Datum MEAN SEA LEVEL

Type/Size Boring Backhoe 24" Rig Type Ford 555

Groundwater Conditions None Encountered Date 5/03/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			B			GP-GC	SANDY GRAVEL; some cobbles, some clay, grayish brown
5			B			GW	SANDY GRAVEL; trace fines, trace cobbles, reddish brown
10							
15			B			GP	SANDY-COBBLY GRAVEL; trace fines, reddish brown
20							
25							Excavation stopped at 20 feet
30							

LOG OF TEST PIT NO. TP-29

Project New River Channelization (Sta. 70+00) Job No. 2128J068

Elevation 1036.0 Datum MEAN SEA LEVEL

Type/Size Boring Backhoe 24" Rig Type Ford 555

Groundwater Conditions None Encountered Date 5/03/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
5			B			GP	SANDY GRAVEL; some cobbles, trace fines, reddish brown
10			B			SP-SM	SAND; with gravel, some fines, reddish brown
15 20						GP	SANDY GRAVEL; some cobbles, trace fines, reddish brown
25 30							Excavation stopped at 20 feet

LOG OF TEST PIT NO. TP-30

Project New River Channelization (Sta. 65+00) Job No. 2128J068

Elevation 1035.5 Datum MEAN SEA LEVEL

Type/Size Boring Backhoe 24" Rig Type Ford 555

Groundwater Conditions None Encountered Date 5/03/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			B			GP	COBBLY GRAVEL; with sand, trace fines, grayish brown
5			B			GW	SANDY GRAVEL; with cobbles, trace fines, reddish brown
10							
15							
20			B			GP	SANDY GRAVEL; some cobbles, trace fines, grayish brown
25							Excavation stopped at 23 feet
30							

LOG OF TEST PIT NO. TP-30A

Project New River Channelization (Sta. 60+00) Job No. 2128J068

Elevation 1036.6 Datum MEAN SEA LEVEL

Type/Size Boring Backhoe 30" Rig Type Mitsubishi

Groundwater Conditions None Encountered Date 5/11/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
						GP	SANDY GRAVEL; some cobbles, trace fines, brown
			B				
5							no cobbles, reddish brown
10							
15			B				
							construction debris at 18 feet (4" x 8" x 16" concrete block)
20							
25							
							Excavation stopped at 25 feet
30							

LOG OF TEST PIT NO. TP-31

Project New River Channelization (Sta. 55+00) Job No. 2128J068

Elevation 1036.5 Datum MEAN SEA LEVEL

Type/Size Boring Backhoe 30" Rig Type Mitsubishi

Groundwater Conditions None Encountered Date 5/11/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
						GW	GRAVEL; some cobbles, some sand, trace fines, brown
			B				
5							
							more sand, more cobbles, reddish brown
10							
			B				
15							
20							
						SP-SM	GRAVELLY SAND; some fines, some cobbles, brown
			B				
25							
							Excavation stopped at 25 feet
30							

LOG OF TEST PIT NO. TP-32

Project New River Channelization (Sta. 50+00) Job No. 2128J068

Elevation 1034.0 Datum MEAN SEA LEVEL

Type/Size Boring Backhoe 30" Rig Type Mitsubishi

Groundwater Conditions None Encountered Date 5/11/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
						SP	GRAVELLY SAND; some cobbles, trace fines, brown
5			B				
10							
						GP	SANDY GRAVEL; with cobbles, trace fines, reddish brown
15			B				
20							
25							
							Excavation stopped at 25 feet
30							

LOG OF TEST PIT NO. TP-33

Project New River Channelization (Sta. 45+00) Job No. 2128J068

Elevation 1033.6 Datum MEAN SEA LEVEL

Type/Size Boring Backhoe 30" Rig Type Mitsubishi

Groundwater Conditions None Encountered Date 5/11/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
						SP	GRAVELLY SAND; some cobbles, trace fines, brown
			B				
5							
10							
15						GP	SANDY-COBBLY GRAVEL; trace fines, reddish brown
			B				
20							
							Excavation stopped at 20 feet
25							
30							

LOG OF TEST PIT NO. TP-34

Project New River Channelization (Sta. 40+00) Job No. 2128J068

Elevation 1033.0 Datum MEAN SEA LEVEL

Type/Size Boring Backhoe 24" Rig Type Ford 555

Groundwater Conditions None Encountered Date 5/03/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			B			SP-SM	GRAVELLY SAND; some cobbles, some fines, grayish brown
5			B			SM	SILTY SAND; grayish brown
10			B			SP	GRAVELLY SAND; with cobbles, trace fines, brown
15			B			GP	COBBLY GRAVEL; with sand, trace fines, reddish brown
20							
25							Excavation stopped at 20 feet
30							

Coe and Van Loo
Job No. 2128J068

BORING LOG NOTES

The number shown in "LOG OF BORING NO." refers to the approximate location of the same number indicated on the "Site Plan" as positioned in the field by pacing from existing features.

"STA" refers to the approximate stationing of the boring along the proposed New River Channelization alignment according to Coe and Van Loo.

"ELEVATION" refers to ground surface elevation at the boring location relative to the indicated "DATUM" established by interpolation from contours on the "Site Plan".

"TYPE/SIZE BORING" refers to the exploratory equipment used in the boring wherein HSA = hollow-stem auger.

"N" in "Blows/Foot" refers to the number of blows of a 140-pound weight, dropped 30 inches, required to advance a two-inch-outside-diameter split-barrel sampler a distance of 1 foot, Standard Penetration Test (ASTM D1586). Refusal to penetration is defined as more than 100 blows per foot.

"R" in "Blows/Foot" refers to the number of blows of a 140-pound weight, dropped 30 inches, required to advance a 2.42-inch-inside-diameter ring sampler a distance of 1 foot. Refusal to penetration is considered more than 50 blows per foot.

"Sample Type" refers to the form of sample recovery, in which N = Split-barrel sample, R = Ring sample, G = Grab sample.

"Dry Density, pcf" refers to the laboratory-determined dry density in pounds per cubic foot. The symbol "NR" indicates that no sample was recovered. The symbol "*" indicates that determination of dry density was not possible.

"Water Content, %" refers to the laboratory-determined moisture content in percent (ASTM D2216).

"Unified Classification" refers to the soil type as defined by "Method of Soil Classification". The soils were classified visually in the field and, where appropriate, classifications were modified by visual examination of samples in the laboratory and/or by appropriate tests.

These notes and boring logs are intended for use in conjunction with the purposes of our services defined in the text. Boring log data should not be construed as part of the construction plans nor as defining construction conditions.

Coe and Van Loo
Job No. 2128J068

Boring logs depict our interpretations of subsurface conditions at the locations and on the date(s) noted. Variations in subsurface conditions and soil characteristics may occur between borings. Groundwater levels may fluctuate due to seasonal variations and other factors.

In general, terms and symbols on the boring logs conform with "Standard Definitions of Terms and Symbols Relating to Soil and Rock Mechanics" (ASTM D653).

LOG OF BORING NO. B-1E

Project New River Channelization (Sta. 210+00) Job No. 2128J068

Elevation 1081.0 Datum MEAN SEA LEVEL

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/10/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			SM-SC	GRAVELLY SAND FILL; with silt, some clay, brown
		34	N			GM	SANDY GRAVEL FILL; some silt, some cobbles, brown noxious odor
5							
							Boring stopped at 5 feet
10							
15							
20							
25							
30							

LOG OF BORING NO. B-2E

Project New River Channelization (Sta. 205+00) Job No. 2128J068

Elevation 1090.0 Datum MEAN SEA LEVEL

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/10/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			GM	SANDY GRAVEL FILL; some silt, brown
		19	N		2.6		less gravel, more sand some cobbles
5							Auger refusal at 4 feet
10							
15							
20							
25							
30							

LOG OF BORING NO. B-3E

Project New River Channelization (Sta. 200+00) Job No. 2128J068

Elevation 1080.0 Datum MEAN SEA LEVEL

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/10/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			SP	SANDY FILL; with gravel, trace silt, brown
		6	N		3.9	SM	SAND FILL; with silt, some gravel, brown
5		14	N		4.9		
						SP	SAND; with gravel, trace silt, brown
10		25/0"	N				some cobbles
							Auger refusal at 10½ feet
15							
20							
25							
30							

LOG OF BORING NO. B-4E

Project New River Channelization (Sta. 195+00) Job No. 2128J068

Elevation 1087.0 Datum MEAN SEA LEVEL

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/10/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			SM	SILTY SAND; trace gravel, brown
		16	R	NR		SW-SM	SAND; some silt, trace gravel, brown
		41	N		1.5		
5						GP	GRAVEL; with sand, some cobbles, trace silt, brown
		58	N		1.8		
							Auger refusal at 6½ feet
10							
15							
20							
25							
30							

LOG OF BORING NO. B-5E

Project New River Channelization (Sta. 190+00) Job No. 2128J068

Elevation 1086.5 Datum MEAN SEA LEVEL

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/10/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			ML	SILT AND SAND; with clay, trace gravel, brown
		16	R	104	3.6		
5						SP	SAND; trace silt, trace gravel, brown
		33	N			GP	GRAVEL; with sand, trace cobbles, trace silt, brown
10						SP	GRAVELLY SAND; trace silt, brown
		21	N		2.6		
15							
		50/3"	N			SC	GRAVELLY SAND; some clay, some cobbles, brown
20							Auger refusal at 17 feet
25							
30							

LOG OF BORING NO. B-6E

Project New River Channelization (Sta. 185+00) Job No. 2128J068

Elevation 1085.0 Datum MEAN SEA LEVEL

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/10/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			SM-SC	CLAYEY SAND; with silt, trace gravel, brown
		14	R				
5		11	N		4.6	SP	SAND; trace silt, trace gravel, brown
						GP	GRAVEL; with sand, some cobbles, trace silt, brown
10							Auger refusal at 9 feet
15							
20							
25							
30							

LOG OF BORING NO. B-7E

Project New River Channelization (Sta. 180+00) Job No. 2128J068

Elevation 1084.0 Datum MEAN SEA LEVEL

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/10/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			SM	SAND; with silt, trace gravel, brown
		9	R	107	3.3	SP	SAND; trace silt, trace gravel, brown
5		10	N				
						GP	GRAVEL; with sand, some cobbles, trace silt, brown
10							Auger refusal at 9 feet
15							
20							
25							
30							

LOG OF BORING NO. B-8E

Project New River Channelization (Sta. 176+00) Job No. 2128J068

Elevation 1082.0 Datum MEAN SEA LEVEL

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/10/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			SM	SILTY SAND; trace clay, trace gravel, brown
		12	R	102	5.4	SP	SAND; some gravel, trace silt, brown
5						GP	GRAVEL; with sand, some cobbles, trace silt, brown
							Auger refusal at 5 feet
10							
15							
20							
25							
30							

LOG OF BORING NO. B-9E

Project New River Channelization (Sta. 170+00) Job No. 2128J068

Elevation 1080.0 Datum MEAN SEA LEVEL

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/10/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			SM	SILTY SAND; some clay, brown
		13	R				with silt
5							
		10	R			SP	SAND; trace silt, trace gravel, brown
10							
		59	N				
						GP	GRAVEL; with sand, some cobbles, trace clay, brown
							Auger refusal at 13 feet
15							
20							
25							
30							

LOG OF BORING NO. B-10E

Project New River Channelization (Sta. 165+00) Job No. 2128J068

Elevation 1078.0 Datum MEAN SEA LEVEL

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/10/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			SP	SAND; trace gravel, trace silt, brown
		23	R	110	7.7		interbedded layer of silty sand
5							interbedded layer of gravelly sand
		32	N		3.9		
						GP	GRAVEL; with sand, some cobbles, trace silt, brown
							Auger refusal at 8 feet
10							
15							
20							
25							
30							

LOG OF BORING NO. B-11E

Project New River Channelization (Sta. 161+00) Job No. 2128J068

Elevation 1077.5 Datum MEAN SEA LEVEL

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/10/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
						SP	SAND; with gravel, trace silt, brown
			G				
		13	N		3.8		trace gravel
5							
		12	R				
						GP	GRAVEL; with sand, some cobbles, trace silt, brown
10							Auger refusal at 9½ feet
15							
20							
25							
30							

LOG OF BORING NO. B-12E

Project New River Channelization (Sta. 155+00) Job No. 2128J068

Elevation 1073.0 Datum MEAN SEA LEVEL

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/11/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			GP	SANDY GRAVEL FILL; trace cobbles, trace silt, brown
		25/0"	N				
5							Auger refusal at 3½ feet
10							
15							
20							
25							
30							

LOG OF BORING NO. B-13E

Project New River Channelization (Sta. 150+00) Job No. 2128J068

Elevation 1070.0 Datum MEAN SEA LEVEL

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/11/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			SM	SILTY SAND; trace clay, trace gravel, brown
		20	N			SP	SAND; with gravel, trace silt, brown
5							
		18	N		3.7	SP-SM	GRAVELLY SAND; some silt, brown
							interbedded layers of SP
10							
		50/3"	N	NR			some cobbles, trace clay
							Auger refusal at 11 feet
15							
20							
25							
30							

LOG OF BORING NO. B-14E

Project New River Channelization (Sta. 145+00) Job No. 2128J068

Elevation 1070.0 Datum MEAN SEA LEVEL

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/10/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			SM	SAND; some silt, trace gravel, brown
		12	R	96	6.5	SP	SAND; some gravel, trace silt, brown
5		14	R				
						GP	GRAVEL; with sand, some cobbles, trace silt, brown
							Auger refusal at 7 feet
10							
15							
20							
25							
30							

LOG OF BORING NO. B-15E

Project New River Channelization (Sta. 140+00) Job No. 2128J068

Elevation 1070.0 Datum MEAN SEA LEVEL

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/10/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			SM	SAND; some silt, trace gravel, brown
		9	N		2.4	SP-SM	SAND; some gravel, some silt, brown
5		9	R	99	2.0		
						GP	GRAVEL; with sand, some cobbles, trace silt, brown
10		26	N				
						SP-SM	SAND; with gravel, some silt, brown
15		56	N			GP	GRAVEL; with sand, trace clay, brown some cobbles
20							Auger refusal at 17 feet
25							
30							

LOG OF BORING NO. B-16E

Project New River Channelization (Sta. 135+00) Job No. 2128J068

Elevation 1069.0 Datum MEAN SEA LEVEL

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/09/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			SP	SAND; trace silt, trace gravel, brown
		6	N				interbedded layer of silty sand
5							
		5	N		2.2		
10							
		44	N			GP	GRAVEL; with sand, some cobbles, brown
							Auger refusal at 12 feet
15							
20							
25							
30							

LOG OF BORING NO. B-17E

Project New River Channelization (Sta. 130+00) Job No. 2128J068

Elevation 1068.0 Datum MEAN SEA LEVEL

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/09/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			SM	SAND; with silt, trace gravel, brown
		9	N		2.5		
5						SP-SM	SAND; some silt, trace gravel, brown
		8	N		2.3		
							Auger refusal at 6 feet
10							
15							
20							
25							
30							

LOG OF BORING NO. B-18E

Project New River Channelization (Sta. 125+00) Job No. 2128J068

Elevation 1065.0 Datum MEAN SEA LEVEL

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/09/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			SP	SAND; some gravel, trace silt, brown
		7	N				
5							
		13	N			SM	SAND; with silt, some gravel, brown
10						SP	SAND; with gravel, trace silt, brown some cobbles
		40	N				
							Auger refusal at 11½ feet
15							
20							
25							
30							

LOG OF BORING NO. B-19E

Project New River Channelization (Sta. 120+00) Job No. 2128J068

Elevation 1068.0 Datum MEAN SEA LEVEL

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/09/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			SP	SAND; with gravel, trace silt, brown
		9	N		2.5		trace gravel
5							
		47	N		1.1	SP-SM	SAND; some silt, with gravel, brown
10							
		52	N		2.7		interbedded layer of sandy gravel some cobbles
							Auger refusal at 13 feet
15							
20							
25							
30							

LOG OF BORING NO. B-19E

Project New River Channelization (Sta. 115+00) Job No. 2128J068

Elevation 1068.0 Datum MEAN SEA LEVEL

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/09/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			SP	SAND; with gravel, trace silt, brown
		9	N		2.5		trace gravel
5							
		47	N		1.1	SP-SM	SAND; some silts, with gravel, brown
10							
		52	N		2.7		interbedded layer of sandy gravel some cobbles
15							Auger refusal at 13 feet
20							
25							
30							

LOG OF BORING NO. B-20E

Project New River Channelization (Sta. 110+00) Job No. 2128J068

Elevation 1062.5 Datum MEAN SEA LEVEL

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/09/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			SP	SAND; some gravel, trace silt, brown
		6	N		1.0		trace gravel
5		7	N		1.1		
						GP	GRAVEL; with sand, some cobbles, trace silt, brown
10		50/3½"	N				
							Auger refusal at 10½ feet
15							
20							
25							
30							

LOG OF BORING NO. B-21E

Project New River Channelization (Sta. 105+00) Job No. 2128J068

Elevation 1060.0 Datum MEAN SEA LEVEL

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/09/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			SP	SAND; some gravel, trace silt, brown
		7	N				
5		4	N				
						GP	GRAVEL; with sand, some cobbles, trace silt, brown
10							Auger refusal at 9½ feet
15							
20							
25							
30							

LOG OF BORING NO. B-22E

Project New River Channelization (Sta. 105+00) Job No. 2128J068

Elevation 1057.0 Datum MEAN SEA LEVEL

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/09/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			SP	SAND; trace silt, trace gravel, brown
		32	N				
5		38	N			SP-SM	SAND AND GRAVEL; some silt, brown interbedded layer of sand (SP)
10							Auger refusal at 9 feet
15							
20							
25							
30							

LOG OF BORING NO. B-23E

Project New River Channelization (Sta. 99+00) Job No. 2128J068

Elevation 1057.0 Datum MEAN SEA LEVEL

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/09/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			SM	SILTY SAND; some gravel, trace clay, brown
		30	R	*			
						GP	GRAVEL; with sand, some cobbles, trace silt, brown
5							Auger refusal at 4½ feet
10							
15							
20							
25							
30							

LOG OF BORING NO. B-24E

Project New River Channelization (Sta. 95+00) Job No. 2128J068

Elevation 1056.0 Datum MEAN SEA LEVEL

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/09/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			GP	SANDY GRAVEL FILL; trace silts, brown, sample contains wood, concrete and metal debris
		19	N				
5							wood debris
		22	N				concrete debris
							wire
10							
		48	N		2.0	GP	GRAVEL; with sand, some cobbles, trace silt, brown
							Auger refusal at 11½ feet
15							
20							
25							
30							

LOG OF BORING NO. B-27E

Project New River Channelization (Sta. 80+00) Job No. 2128J068

Elevation 1052.0 Datum MEAN SEA LEVEL

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/11/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
		9	G R	105	9.2	SC-SM	CLAYEY SAND-SILTY SAND; trace gravel, brown
5		11	R			SP	SAND; some gravel, trace silt, brown interbedded layers of gravel
10		37	N		2.8	SW-SM	GRAVELLY SAND; trace cobbles, some silt, brown
15 20 25 30							Auger refusal at 11½ feet

LOG OF BORING NO. B-28E

Project New River Channelization (Sta. 75+00) Job No. 2128J068

Elevation 1050.0 Datum MEAN SEA LEVEL

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/11/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			SM	GRAVELLY SAND FILL; with silt, trace clay, brown
		10	N		4.9		sample contained wood, asphalt and concrete debris
5							
		65/8"	N		1.8	GP	SANDY GRAVEL; some cobbles, trace silt, brown
							Auger refusal at 7 feet
10							
15							
20							
25							
30							

LOG OF BORING NO. B-29E

Project New River Channelization (Sta. 70+00) Job No. 2128J068

Elevation 1047.0 Datum Mean Sea Level

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/06/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			SP-SM	SAND; some gravel, some silt, brown
		19	N		1.3		interbedded layer of gravels
5		47	N		1.2		
10						GP	SANDY GRAVEL; some cobbles, trace silt, brown
		67	N		1.2	SW-SM	GRAVELLY SAND; some silt, trace cobbles
15							Auger refusal at 13 feet
20							
25							
30							

LOG OF BORING NO. B-30E

Project New River Channelization (Sta. 65+00) Job No. 2128J068

Elevation 1046.0 Datum Mean Sea Level

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/06/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			SP-SM	SAND; trace gravel, some silt, brown
		13	N		1.2		
5							interbedded layer of gravel (thin)
		47	N		1.3		
						GP	SANDY GRAVEL; some cobbles
10						SP-SM	SAND AND GRAVEL; some silt, brown
		75	N		1.0		
							Auger refusal at 12 feet
15							
20							
25							
30							

LOG OF BORING NO. B-31E

Project New River Channelization (Sta. 60+00) Job No. 2128J068

Elevation 1048.0 Datum Mean Sea Level

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/06/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
						SP	SAND; trace gravel, trace silt, brown
			G				
		17	N		2.7		
5							
		37	N				
							interbedded layer of gravel
10							
		52	N				small thin layer of gravel
							some cobbles
15							Auger refusal at 14½ feet
20							
25							
30							

LOG OF BORING NO. B-32E

Project New River Channelization (Sta. 55+00) Job No. 2128J068

Elevation 1041.0 Datum Mean Sea Level

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/11/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			SP	GRAVELLY SAND; trace silt, brown
		11	N		3.5		with gravel, interbedded layer of silty sand
5		44	N				
						GP	SANDY GRAVEL; some cobbles, trace silt, brown
10		25/0"	N				
							Auger refusal at 10½ feet
15							
20							
25							
30							

LOG OF BORING NO. B-33E

Project New River Channelization (Sta. 50+00) Job No. 2128J068

Elevation 1039.5 Datum Mean Sea Level

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/11/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
						SP	SAND; trace gravel, trace silt, brown
			G				
		28	N		2.2		
							GRAVELLY SAND; with cobbles, trace silt
5							
		25/0"	N	NR			
							trace cobbles
10		78	N		2.2		
							Auger refusal at 10½ feet
15							
20							
25							
30							

LOG OF BORING NO. B-34E

Project New River Channelization (Sta. 45+00) Job No. 2128J068

Elevation 1040.0 Datum Mean Sea Level

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/11/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			SP-SM	GRAVELLY SAND; some silt, brown
		22	N		2.5		interbedded layer of gravel
5		61	N				
10		25/0"	N	NR			
							Boring stopped at 10½ feet
15							
20							
25							
30							

LOG OF BORING NO. B-1W

Project New River Channelization (Sta. 210+00) Job No. 2128J068

Elevation 1081.0 Datum Mean Sea Level

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/02/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			B			SM	SILTY SAND; with gravels, brown
		40	N			GP-GM	SANDY GRAVEL; some fines, brown
5		92/8"	N				some clay
			B				
10		50/3"	N	NR		GW	SAND AND GRAVEL; with cobbles, trace fines, brown
15		50/1"	N	NR			
		89	N			SP-SC	GRAVELLY SAND; some clay, mottled red, brown, and dark gray
							thin lenses of brown clayey sand (SC)
						GC	SAND AND GRAVEL; with clay
20		78	N				
			B				
		10/0"	N				
							Boring stopped at 22½ feet
25							
30							

LOG OF BORING NO. B-2W

Project New River Channelization (Sta. 205+00) Job No. 2128J068

Elevation 1094.0 Datum Mean Sea Level

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/02/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
						SW-SC	GRAVELLY SAND FILL; some clay, brown
		26	N				dark gray, some organics, rotten odor
5		27	N				Boring stopped at 4 feet due to possible hazardous material
10							
15							
20							
25							
30							

LOG OF BORING NO. B-3W

Project New River Channelization (Sta. 200+00) Job No. 2128J068

Elevation 1083.0 Datum Mean Sea Level

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/02/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			B			SP-SM	GRAVELLY SAND; some fines, brown
		12	N	NR		SP	GRAVELLY SAND; trace fines, brown
5		48	N				
							Auger refusal at 6 feet
10							
15							
20							
25							
30							

LOG OF BORING NO. B-4W

Project New River Channelization (Sta. 195+00) Job No. 2128J068

Elevation 1093.0 Datum Mean Sea Level

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/02/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			B			SM	GRAVELLY SAND FILL; with silt, brown
							reddish brown
		26	N				more gravel
5		23	N				
						GP-GM	SANDY GRAVEL FILL; some cobbles, some fines, brown
10		35	N				more sand
							less sand
15		50/5"	N				
							ball point pen and brick piece came with soil
							Auger refusal at 18 feet
20							
25							
30							

LOG OF BORING NO. B-5W

Project New River Channelization (Sta. 190+00) Job No. 2128J068

Elevation 1091.0 Datum Mean Sea Level

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/02/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			B			SW-SC	GRAVELLY SAND; some clay, brown
		50/9"	R	*	4.6		
5		90/3"	N	NR			
						GC/SC	SAND AND GRAVEL; with clay, brown
10		77	N		3.3		
						GW-GC	SANDY GRAVEL; some clay, brown
15		37	N		5.3	SP-SM	SAND; with silt and clay, brown
20		37	N		3.6		
		25/0"	N	NR		GW	GRAVEL; with sand, some cobbles, trace silt, brown
25							Auger refusal at 24 feet
30							

LOG OF BORING NO. B-6 W

Project New River Channelization (Sta. 185+00) Job No. 2128J068

Elevation 1088.0 Datum Mean Sea Level

Type/Size Boring 7" HSA Rig Type CME 75

Groundwater Conditions None Encountered Date 5/03/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
						SC	GRAVELLY SAND FILL; some clay, brown
			G			SM	SILTY SAND; some clay, brown
		6	N		6.8		
5		9	R	96	5.5		trace clay
							interbedded layers of sandy gravel
10		45	R		1.5		
						SP	GRAVELLY SAND; trace silt
15		45	N		2.1		
							some cobbles
							Auger refusal at 18 feet
20							
25							
30							

LOG OF BORING NO. B-7W

Project New River Channelization (Sta. 180+00) Job No. 2128J068

Elevation 1086.5 Datum Mean Sea Level

Type/Size Boring 7" HSA Rig Type CME 75

Groundwater Conditions None Encountered Date 5/07/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			SC	CLAYEY SAND FILL; with gravel, brown
		30	R	102	6.8		light to moderate cementation
						SP	SAND; some silt, trace clay, brown
5		17	N		4.3		interbedded layers of gravel
						GP	SANDY GRAVEL; trace silt, brown
10		17	N		1.1		trace cobbles
15		63	N		2.2		
							Boring stopped at 17 feet
20							
25							
30							

LOG OF BORING NO. B-8W

Project New River Channelization (Sta. 175+50) Job No. 2128J068

Elevation 1082.0 Datum Mean Sea Level

Type/Size Boring 7" HSA Rig Type CME 75

Groundwater Conditions None Encountered Date 5/03/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			GP	SANDY GRAVEL FILL; with cobbles, trace fines, brown
						SP	SAND; some silt, trace clay, brown
		30	R	NR			some gravel
5							
		14	R	106	2.0		
							GRAVELLY SAND; trace silt
							some cobbles
10							
		10	N		2.2		
15							Auger refusal at 14 feet
20							
25							
30							

LOG OF BORING NO. B-9W

Project New River Channelization (Sta. 170+00) Job No. 2128J068

Elevation 1079.0 Datum Mean Sea Level

Type/Size Boring 7" HSA Rig Type CME 75

Groundwater Conditions None Encountered Date 5/03/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			GP	SANDY GRAVEL FILL; trace silt, brown
		30	N		2.1	SP	SAND; some gravel, trace silt, trace clay, brown
5		33	R	119	2.1		interbedded layers of GP
10		66/6"	N		2.1		some cobbles
15							Auger refusal at 13½ feet
20							
25							
30							

LOG OF BORING NO. B-10W

Project New River Channelization (Sta. 165+00) Job No. 2128J068

Elevation 1078.0 Datum Mean Sea Level

Type/Size Boring 7" HSA Rig Type CME 75

Groundwater Conditions None Encountered Date 5/03/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			SP	GRAVELLY SAND FILL; trace fines, brown
		33	N		3.2	SP	SAND; some gravel, trace silt, brown
5							interbedded layers of gravels
		8	N		2.7		
10							
		25/0"	R	NR			
15							Auger refusal at 13½ feet
20							
25							
30							

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LOG OF BORING NO. B-11W

Project New River Channelization (Sta. 161+00) Job No. 2128J068

Elevation 1078.0 Datum Mean Sea Level

Type/Size Boring 7" HSA Rig Type CME 75

Groundwater Conditions None Encountered Date 5/03/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
						GP	SANDY GRAVEL FILL; trace silt, brown
			G			GP	SANDY GRAVEL; trace silt, brown
		46	N		2.3		
5							
		29	N		2.7		
						SP	SAND; some gravel, trace silt, brown
10		25/0"	N	NR			
							Auger refusal at 10 feet
15							
20							
25							
30							

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LOG OF BORING NO. B-12 W

Project New River Channelization (Sta. 155+00) Job No. 2128J068

Elevation 1076.0 Datum Mean Sea Level

Type/Size Boring 7" HSA Rig Type CME 75

Groundwater Conditions None Encountered Date 5/04/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
		17	G R	85	7.8	SC-SM	SAND; with clay, with silt, trace gravel, brown
5		12	G R	103	5.6	SP	SAND; trace silt, trace gravel, brown
							interbedded layers of gravel
10		15	N		2.2		
15							
		17	R		3.5	GP	SANDY GRAVEL; some cobbles, trace silt, brown
20							
							Auger refusal at 20 feet
25							
30							

LOG OF BORING NO. B-13 W

Project New River Channelization (Sta. 150+00) Job No. 2128J068

Elevation 1040.0 Datum Mean Sea Level

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/04/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			GP	SANDY GRAVEL; some cobbles, trace silt, brown
							Auger refusal at 2 feet
5							
10							
15							
20							
25							
30							

LOG OF BORING NO. B-14 W

Project New River Channelization (Sta. 145+00) Job No. 2128J068

Elevation 1036.8 Datum Mean Sea Level

Type/Size Boring 7" HSA Rig Type CME 75

Groundwater Conditions None Encountered Date 5/04/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			GP	SANDY GRAVEL; some cobbles, trace silt, brown
							Auger refusal at 2 feet
5							
10							
15							
20							
25							
30							

LOG OF BORING NO. B-15W

Project New River Channelization (Sta 140+00) Job No. 2128J068

Elevation 1063.0 Datum Mean Sea Level

Type/Size Boring 7" HSA Rig Type CME 75

Groundwater Conditions None Encountered Date 5/04/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			GP	SANDY GRAVEL; trace silt, trace cobbles, brown
		50/3½"	N		2.6		
5							Auger refusal at 3½ feet
10							
15							
20							
25							
30							

LOG OF BORING NO. B-16 W

Project New River Channelization (Sta. 135+00) Job No. 2128J068

Elevation 1038.0 Datum Mean Sea Level

Type/Size Boring 7" HSA Rig Type CME 75

Groundwater Conditions None Encountered Date 5/04/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			GP-GC	SANDY GRAVEL; some clay, brown trace cobbles
							Auger refusal at 2 feet
5							
10							
15							
20							
25							
30							

LOG OF BORING NO. B-17 W

Project New River Channelization (Sta. 130+00) Job No. 2128J068

Elevation 1048.0 Datum Mean Sea Level

Type/Size Boring 7" HSA Rig Type CME 75

Groundwater Conditions None Encountered Date 5/04/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			GP	SANDY GRAVEL; some cobbles, trace clay, brown
							Auger refusal at 2 feet
5							
10							
15							
20							
25							
30							

LOG OF BORING NO. B-18 W

Project New River Channelization (Sta. 125+00) Job No. 2128J068

Elevation 1056.0 Datum Mean Sea Level

Type/Size Boring 7" HSA Rig Type CME 75

Groundwater Conditions None Encountered Date 5/04/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			GP	SAND AND GRAVEL; with cobbles, trace silt, brown
							Auger refusal at 2 feet
5							
10							
15							
20							
25							
30							

LOG OF BORING NO. B-19 W

Project New River Channelization (Sta. 120+00) Job No. 2128J068

Elevation 1073.0 Datum Mean Sea Level

Type/Size Boring 7" HSA Rig Type CME 75

Groundwater Conditions None Encountered Date 5/04/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			GP-GC	SANDY GRAVEL FILL; some clay, trace cobbles, brown
		52	N		10.1	SM	GRAVELLY SAND FILL; some fines, brown
5		58	N		7.8		dark gray, with asphalt debris
10		28	N		2.8		
15							noxious odor
							Boring stopped at 15 feet
20							
25							
30							

LOG OF BORING NO. B-20 W

Project New River Channelization (Sta. 115+00) Job No. 2128J068

Elevation 1070.0 Datum Mean Sea Level

Type/Size Boring 7" HSA Rig Type CME 75

Groundwater Conditions None Encountered Date 5/04/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			SC	CLAYEY SAND FILL; with gravel, brown
		7	R	108	10.2	SC-SM	CLAYEY SAND-SILTY SAND FILL; some gravel, brown
5		2	N		14.1		with asphalt and concrete debris
10		31	N		3.4		
15		16	N		2.7		
20		90	N		2.6		
						GP	SANDY GRAVEL; trace clay, brown
25							Auger refusal at 24 feet
30							

LOG OF BORING NO. B-21W

Project New River Channelization (Sta. 110+00) Job No. 2128J068

Elevation 1061.0 Datum Mean Sea Level

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/05/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			SC	GRAVELLY SAND FILL; with clay, brown
		17	R			SP-SM	GRAVELLY SAND; trace silt, brown
			G				
5		15	N		2.9		interbedded layers of gravel
10		29	N		2.0		
							some cobbles
							Auger refusal at 12 feet
15							
20							
25							
30							

LOG OF BORING NO. B-22W

Project New River Channelization (Sta. 105+00) Job No. 2128J068

Elevation 1060.0 Datum Mean Sea Level

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/05/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			SC	CLAYEY SAND; some gravel, brown
		10	R	98	6.2		
5		18	R	105	5.9		
			G			GP	SANDY GRAVEL; some cobbles, trace silt, brown
10		49	N	NR			
15		50/5"	N		11.9		
							Auger refusal at 16 feet
20							
25							
30							

LOG OF BORING NO. B-23W

Project New River Channelization (Sta. 100+00) Job No. 2128J068

Elevation 1057.5 Datum Mean Sea Level

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/05/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			SP	SAND; trace gravel, trace silt, brown
		16	N		2.8		some gravel
5		24	N		1.7		
						GP	SANDY GRAVEL; some cobbles, trace silt, brown
10		95/10"	N		1.2		
							Auger refusal at 10½ feet
15							
20							
25							
30							

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LOG OF BORING NO. B-24W

Project New River Channelization (Sta. 95+00) Job No. 2128J068

Elevation 1055.0 Datum Mean Sea Level

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/05/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			SP-SM	SAND; some gravel, some silt, brown
		12	N		2.1		
5		14	N		2.8		
						GP	SANDY GRAVEL; some cobbles, trace silt, brown
10		92/11"	N		1.8		
							Auger refusal at 11 feet
15							
20							
25							
30							

LOG OF BORING NO. B-25 W

Project New River Channelization (Sta. 90+00) Job No. 2128J068

Elevation 1051.5 Datum Mean Sea Level

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/05/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
						CL	SANDY CLAY; trace gravel, brown
		17	R	84	8.4	SC	CLAYEY SAND; trace gravel, brown
5		13	N		4.4		
							less clay
							interbedded layers of gravel
10		12	N		1.1		
							trace cobbles
							Auger refusal at 11 feet
15							
20							
25							
30							

LOG OF BORING NO. B-26.W

Project New River Channelization (Sta. 85+00) Job No. 2128J068

Elevation 1049.0 Datum Mean Sea Level

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/05/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
						SC	GRAVELLY SAND FILL; with clay, brown
		16	N		5.5	SC	GRAVELLY SAND FILL; with clay, brown
5		11	N		6.9		
10		12	N		8.5		
					-	GC	SANDY GRAVEL; some clay, brown
							some cobbles
15		35	N		4.7		
							Auger refusal at 16 feet
20							
25							
30							

LOG OF BORING NO. B-27 W

Project New River Channelization (Sta. 79+00) Job No. 2128J068

Elevation 1035.0 Datum Mean Sea Level

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/11/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			GP	SANDY GRAVEL; some cobbles, trace silt, brown
		25/0"	N	NR			Auger refusal at 2½ feet
5							
10							
15							
20							
25							
30							

LOG OF BORING NO. B-28 W

Project New River Channelization (Sta. 75+00) Job No. 2128J068

Elevation 1038.0 Datum Mean Sea Level

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/11/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			GP	GRAVEL; with cobbles, some sand, trace silt, brown
		25/0"	N	NR			Auger refusal at 2 feet
5							
10							
15							
20							
25							
30							

LOG OF BORING NO. B-29 W

Project New River Channelization (Sta. 70+00) Job No. 2128J068

Elevation 1046.0 Datum Mean Sea Level

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/06/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			GP	GRAVEL FILL; with cobbles, with sand, trace silt, brown
							Auger refusal at 2 feet
5							
10							
15							
20							
25							
30							

LOG OF BORING NO. B-30 W

Project New River Channelization (Sta. 67+00) Job No. 2128J068

Elevation 1037.0 Datum Mean Sea Level

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/06/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			SC	SAND FILL; with gravel, with clay
		10	R	70	11.6		with wood debris
5							concrete debris
		25/0"	N				
							Auger refusal at 6 feet
10							
15							
20							
25							
30							

LOG OF BORING NO. B-30B

Project: New River Channelization (Sta. 65+00) Job No. 2128J068

Elevation: 1047.0 Datum: Mean Sea Level

Type/Size Boring: 7" HSA Rig Type: CME 45

Groundwater Conditions: None Encountered Date: 5/06/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
						SP	SAND; trace gravel, trace silt, brown
			G				
		16	N				
5							
		12	N				
10							
		25/0"	N			GP	GRAVEL; with cobbles, with sand, trace silt, brown
							Auger refusal at 11 feet
15							
20							
25							
30							

LOG OF BORING NO. B-31W

Project New River Channelization (Sta. 60+00) Job No. 2128J068

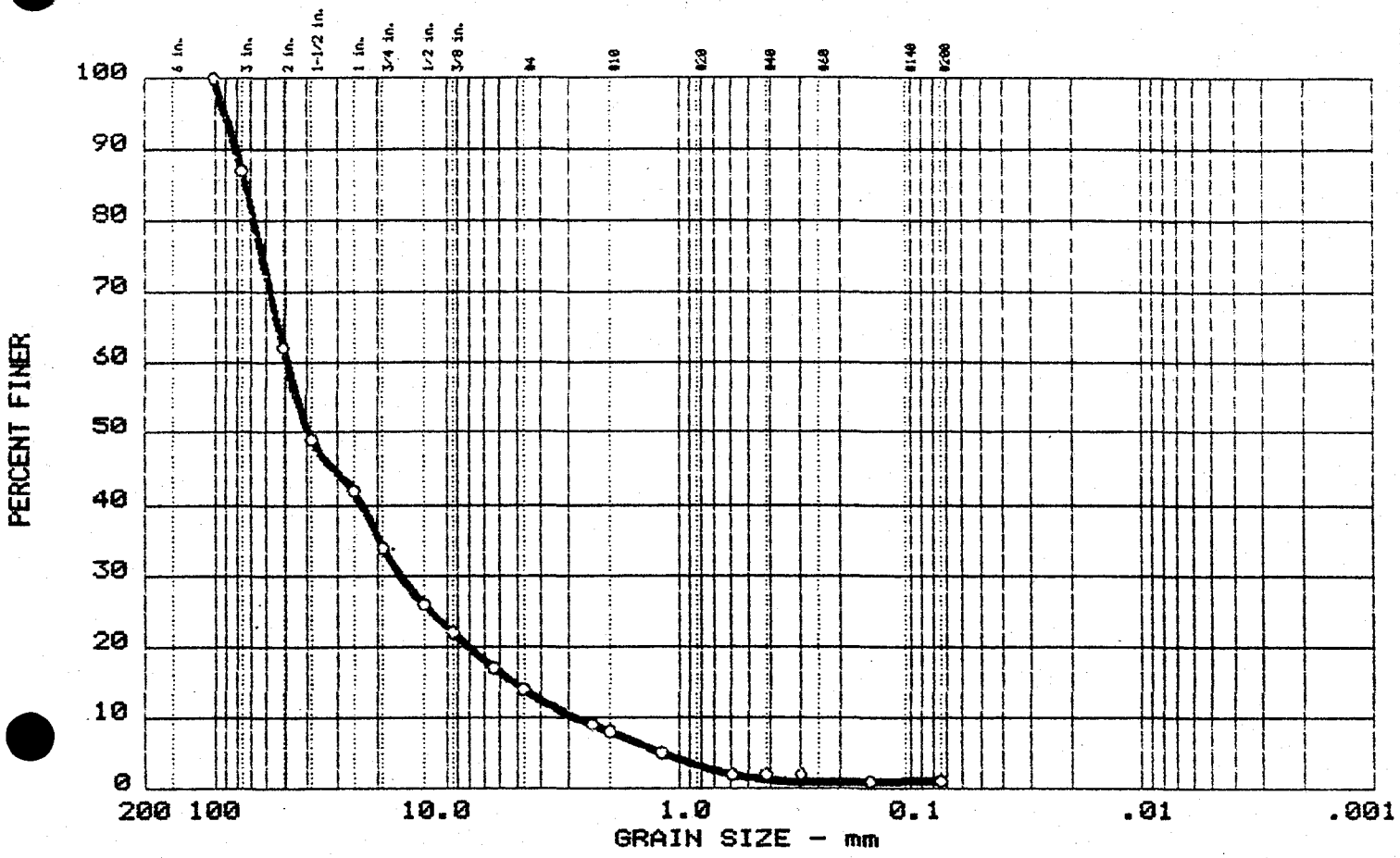
Elevation 1046.5 Datum Mean Sea Level

Type/Size Boring 7" HSA Rig Type CME 45

Groundwater Conditions None Encountered Date 5/06/88

Depth, feet	Blows/Foot C	Blows/Foot N/R	Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
			G			CL-ML	SANDY CLAY-SANDY SILT; brown
		11	R	80	7.9		
5							
		12	R	101	3.8	SC	CLAYEY SAND; trace gravel, brown
10		14	R	NR			
		30/0"	N			GP	GRAVEL; with cobbles, with sand, brown
15							Auger refusal at 11½ feet
20							
25							
30							

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	9	13.0	73.0	14.0	0.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	0	NP	73.28	48.98	39.31	16.014	5.2420	2.7829	1.88	17.6

MATERIAL DESCRIPTION	USCS	AASHTO
○ GRAVEL; some cobbles, some sand	GW	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TEST PIT, TP-1 (0 - 2)

Date: 5/8/88

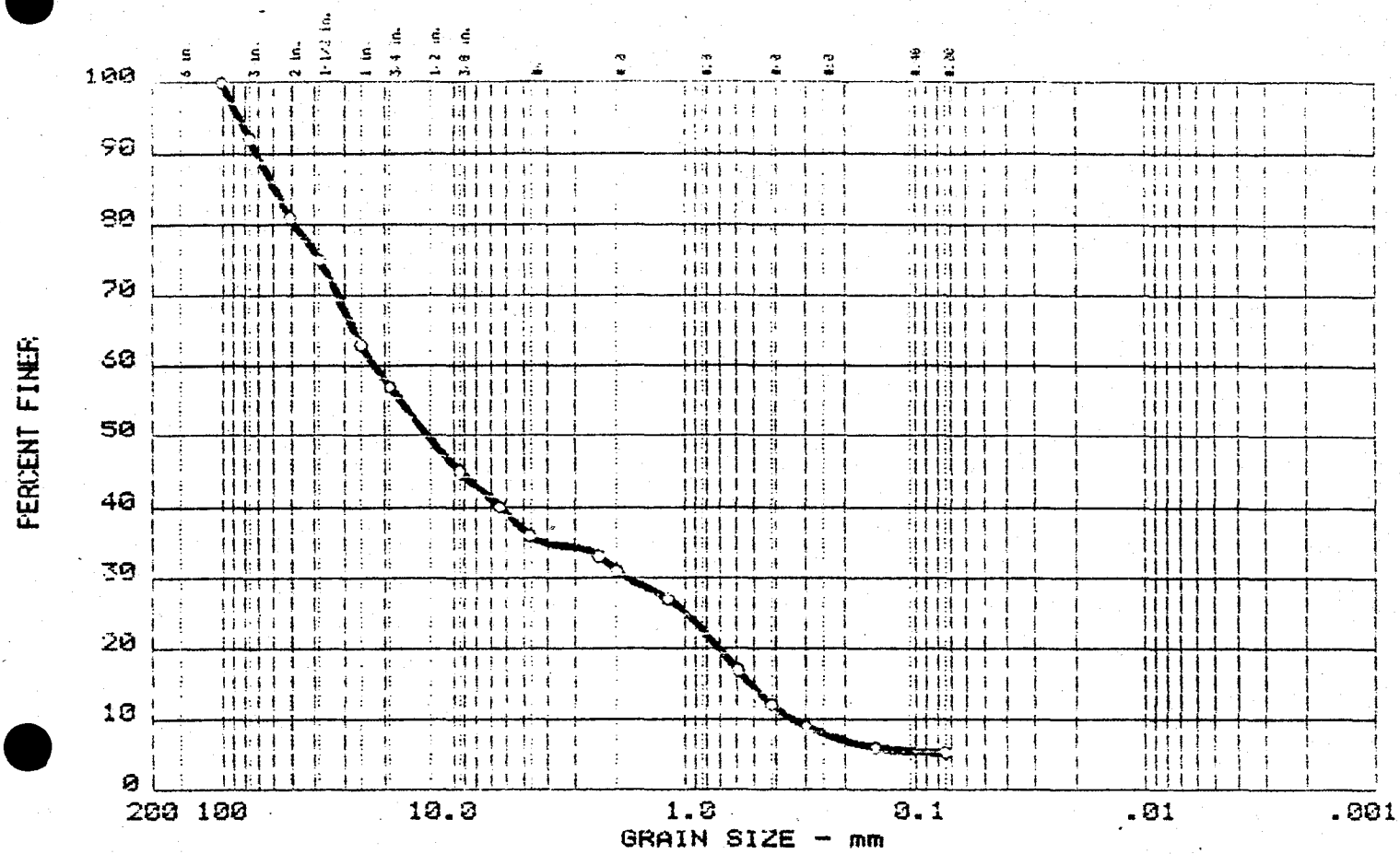
Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT

WESTERN TECHNOLOGIES INC.

Fig. No. 1

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	13	8.0	56.0	30.7	5.3	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			59.57	22.13	13.83	1.778	0.5188	0.3388	0.42	65.3

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY GRAVEL; some cobbles, trace fines	GP-GM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 1 (6 - 7)

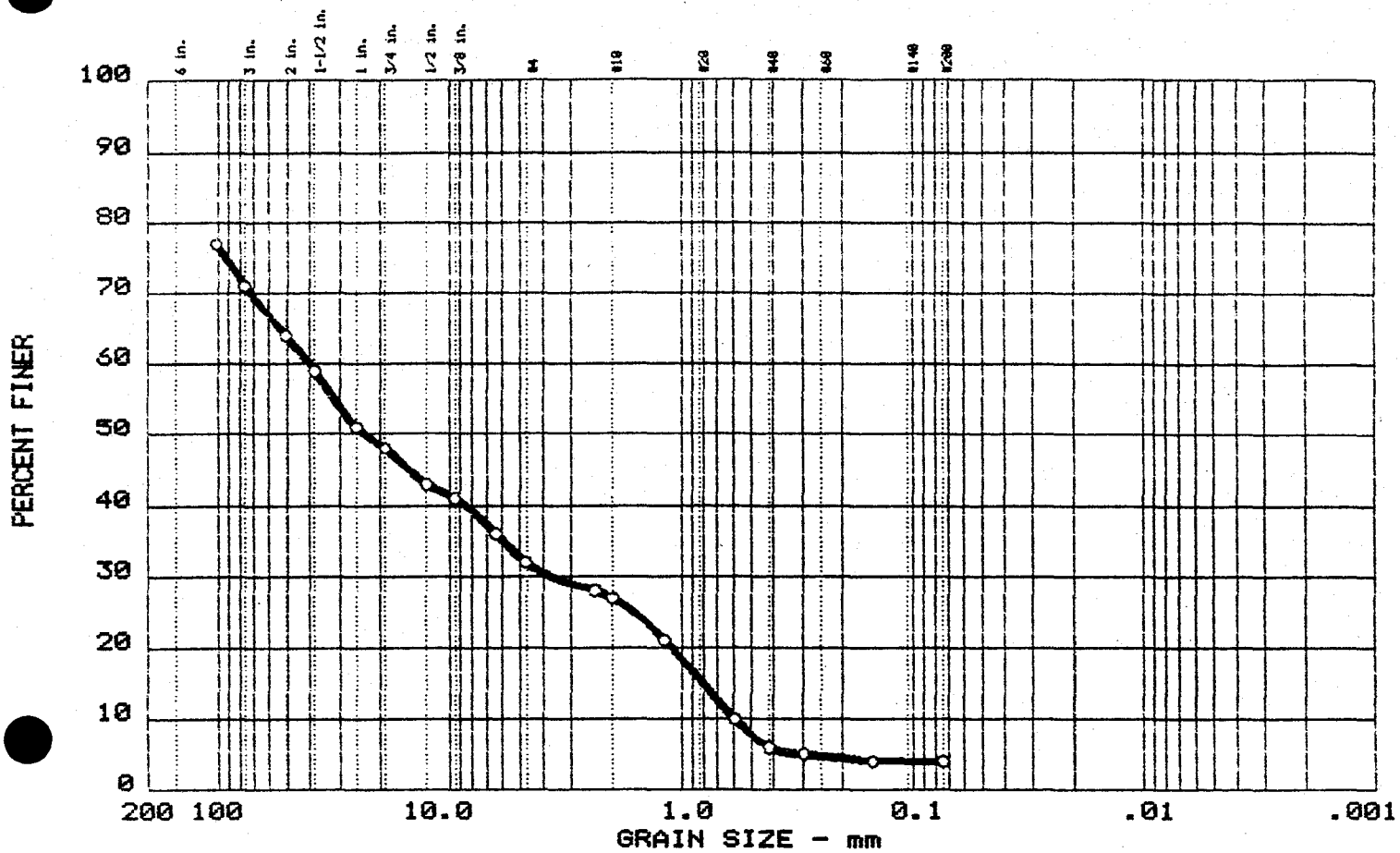
Date: 5/25/88

Remarks:
ASTM D 4221

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 2

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	10	29.0	39.0	32.0	0.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	48	28	101.60	39.98	23.28	3.732	0.8070	0.5846	0.60	68.4

MATERIAL DESCRIPTION	USCS	AASHTO
○ GRAVEL; with sand, with cobbles	GP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 1 (2 - 3)

Date: 5/8/88

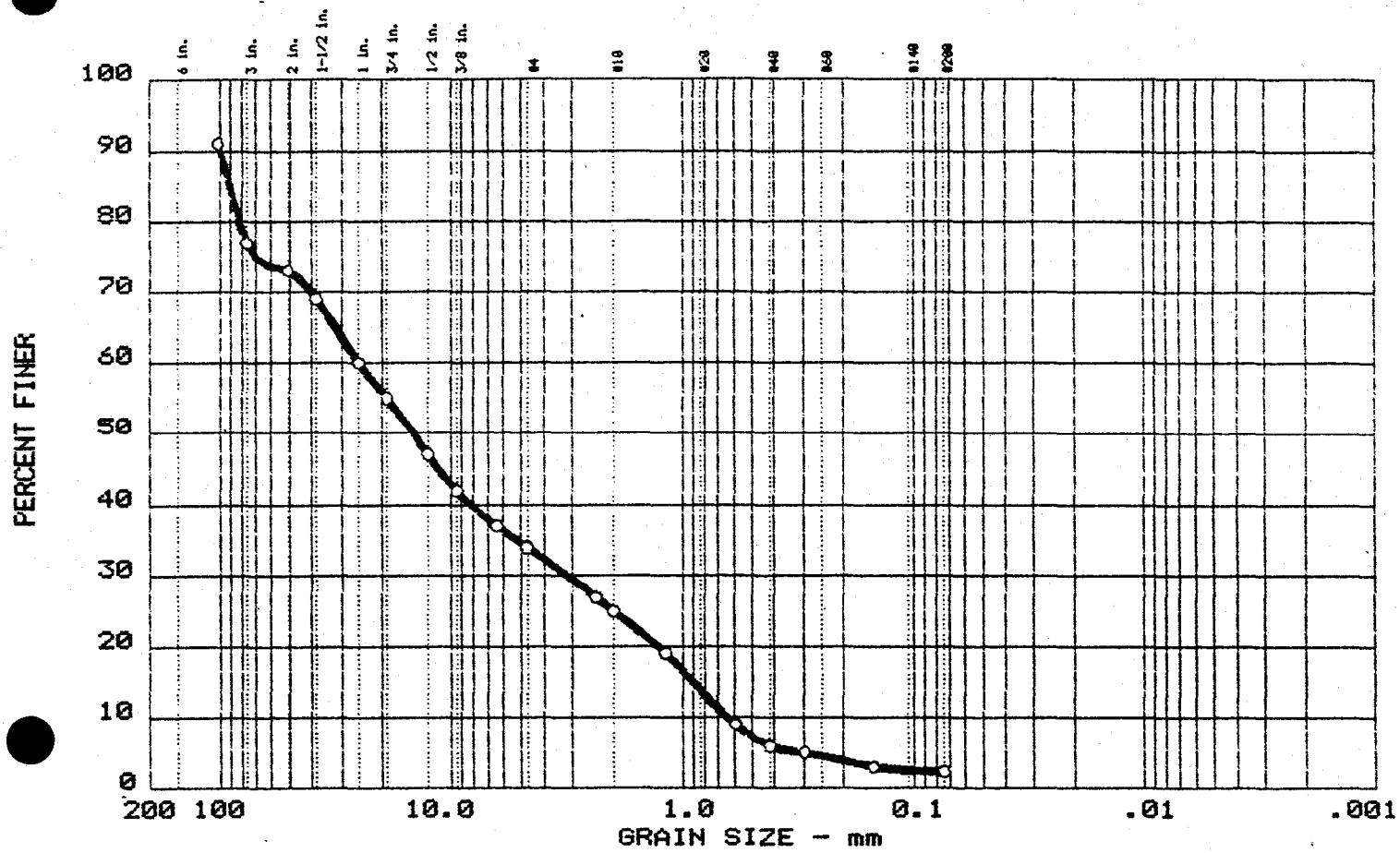
Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT

WESTERN TECHNOLOGIES INC.

Fig. No. 3

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	11	23.0	43.0	31.7	2.3	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○		NP	91.20	25.38	14.60	3.159	0.9005	0.6375	0.62	39.8

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY GRAVEL; with cobbles	GP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 2 (2 - 3)

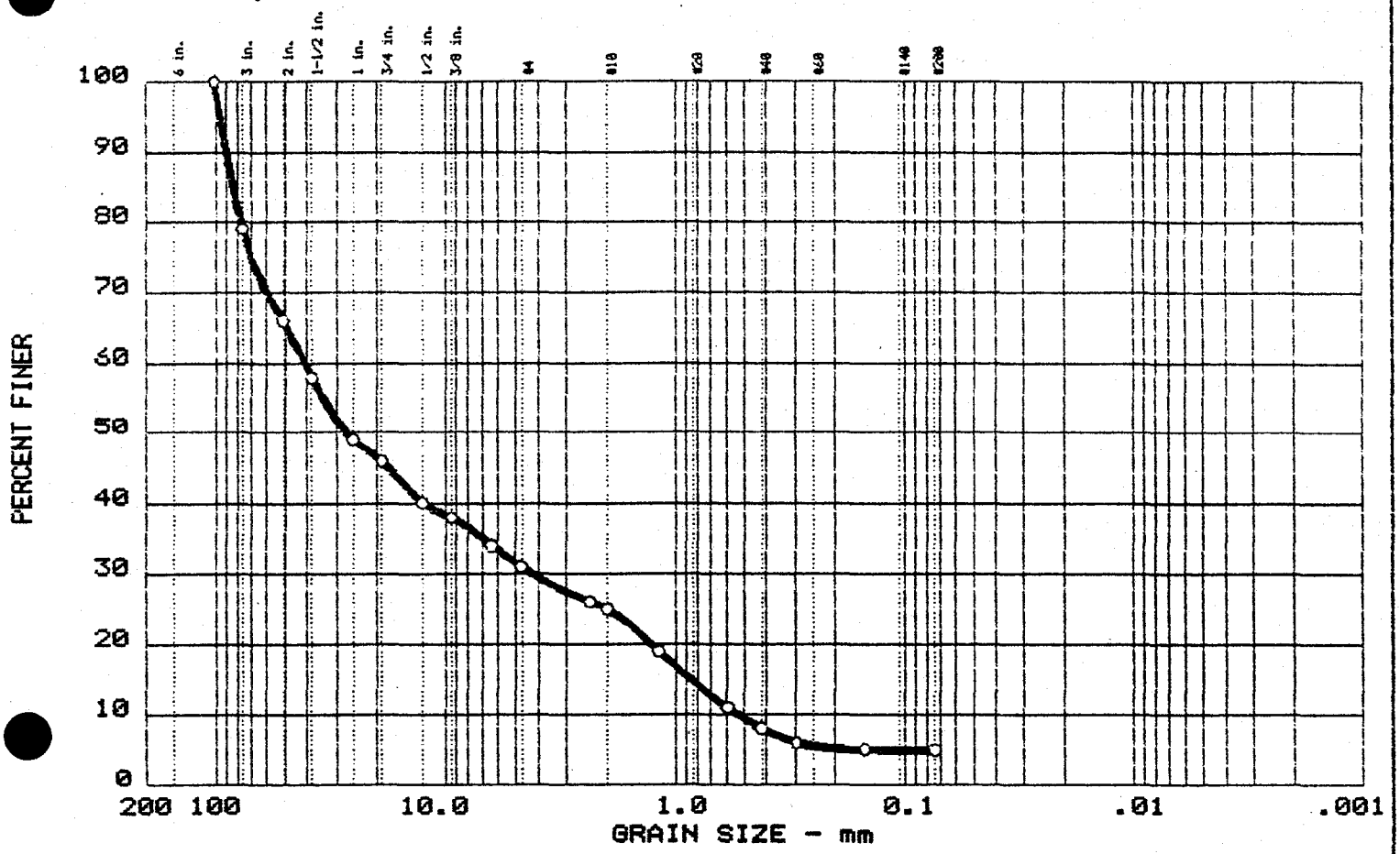
Date: 5/8/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 4

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	12	21.0	48.0	26.1	4.9	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	42	21	83.75	40.83	26.98	4.227	0.8531	0.5260	0.83	77.6

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY GRAVEL; with cobbles	GP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 2(6 - 7)

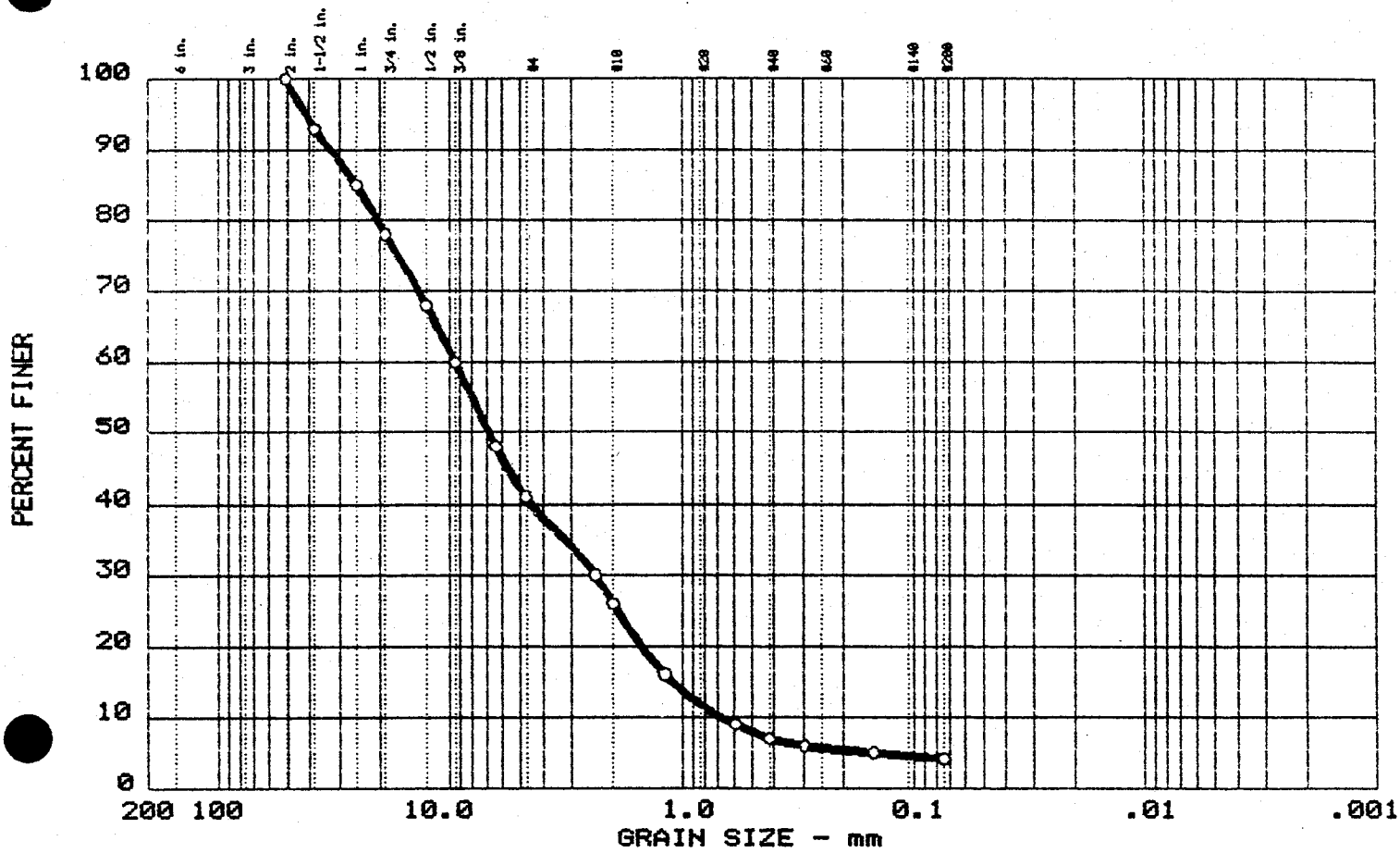
Date: 5/8/22

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 5

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	13	0.0	59.0	36.8	4.2	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	54	24	25.38	9.52	6.81	2.360	1.1041	0.6730	0.87	14.1

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY GRAVEL ; trace clay	GP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 4 (5 - 6)

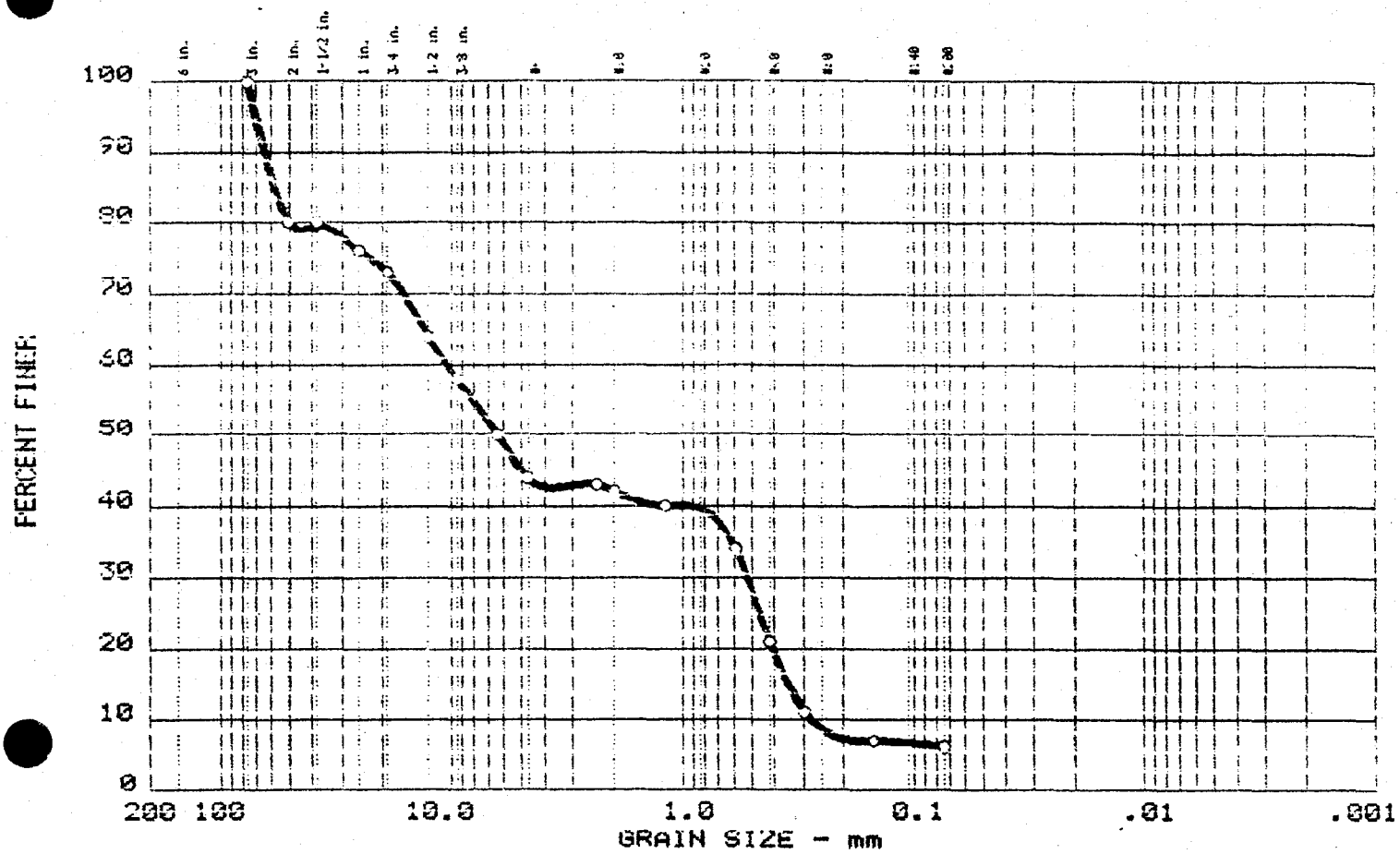
Date: 5/8/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 6

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	14	0.0	56.0	37.8	6.2	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	26	6	58.82	10.46	6.30	0.524	0.3503	0.2783	0.09	37.6

MATERIAL DESCRIPTION	USCS	AASHTO
○ SAND AND GRAVEL; some fines	GP-GM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 4 (8 - 9)

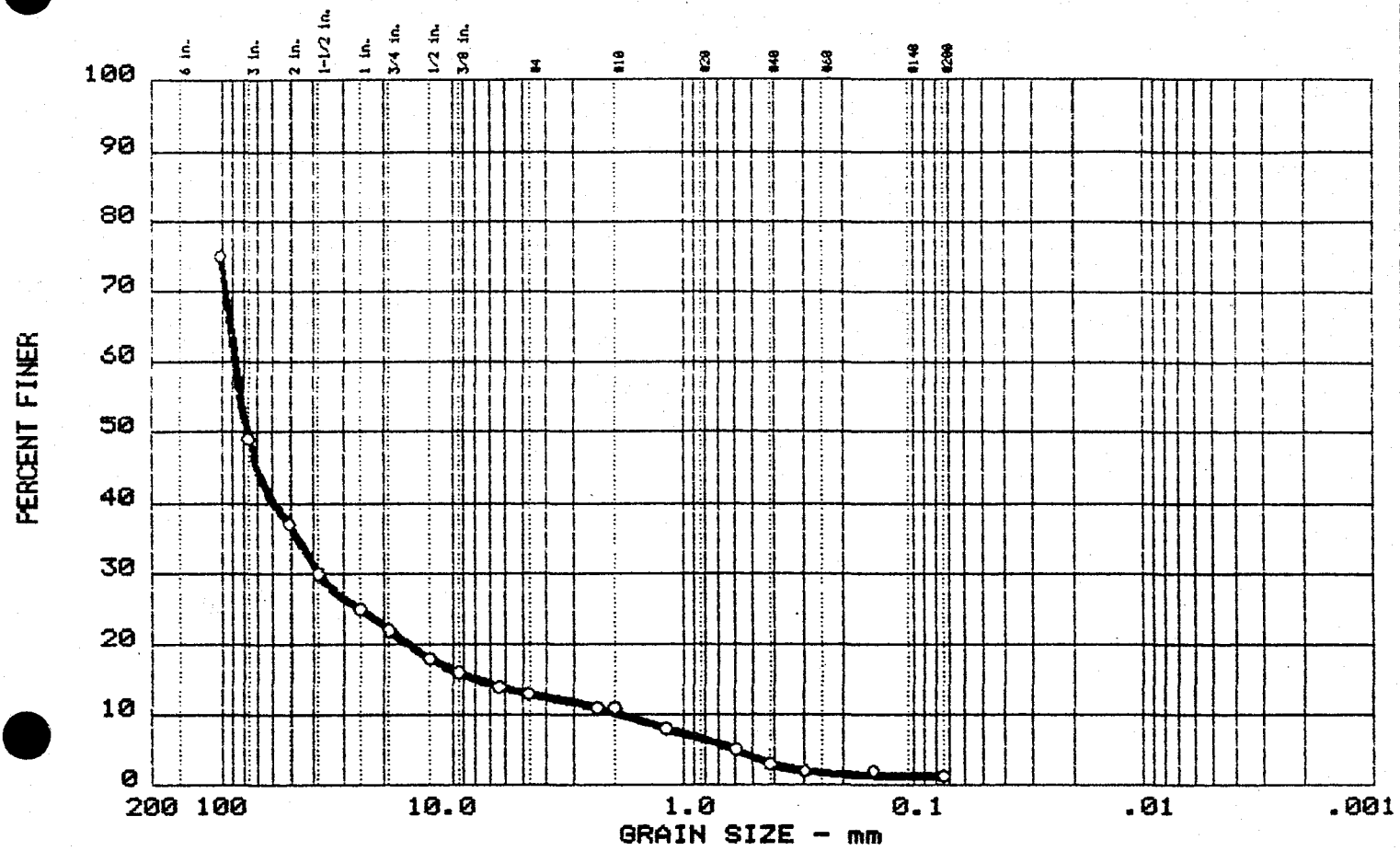
Date: 5/25/88

Remarks:
ASTM D 4221

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 7

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	14	51.0	36.0	11.7	1.3	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			101.60	87.48	77.34	37.878	7.9139	1.8552	8.84	47.2

MATERIAL DESCRIPTION	USCS	AASHTO
○ GRAVELLY COBBLES; some sand	GP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 4 (14 - 16)

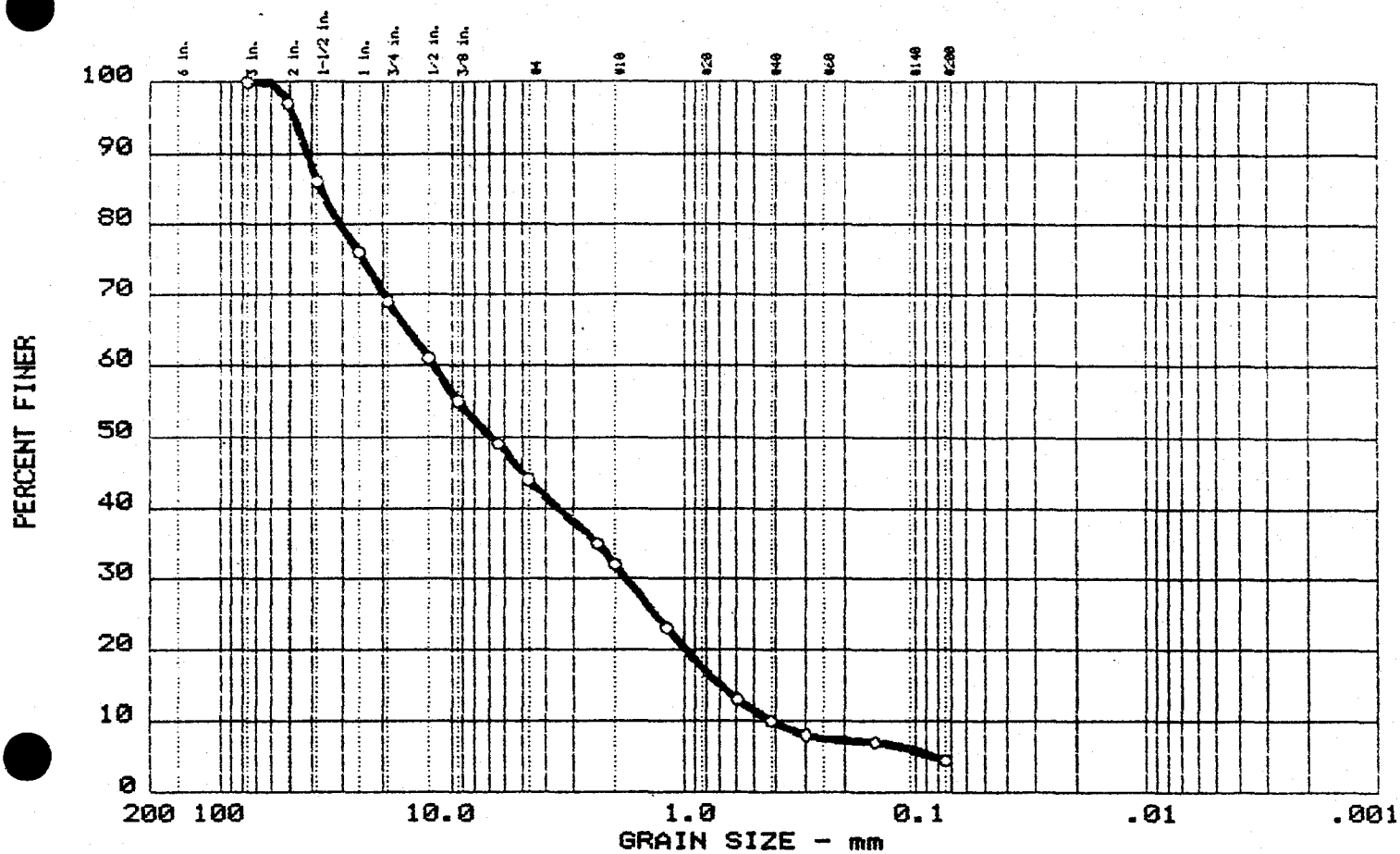
Date: 5/8/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 8

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	8	0.0	56.0	39.5	4.5	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○		NP	36.98	12.11	6.73	1.770	0.6966	0.4198	0.62	28.8

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY GRAVEL; trace fines	GP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP -5(0 - 1)

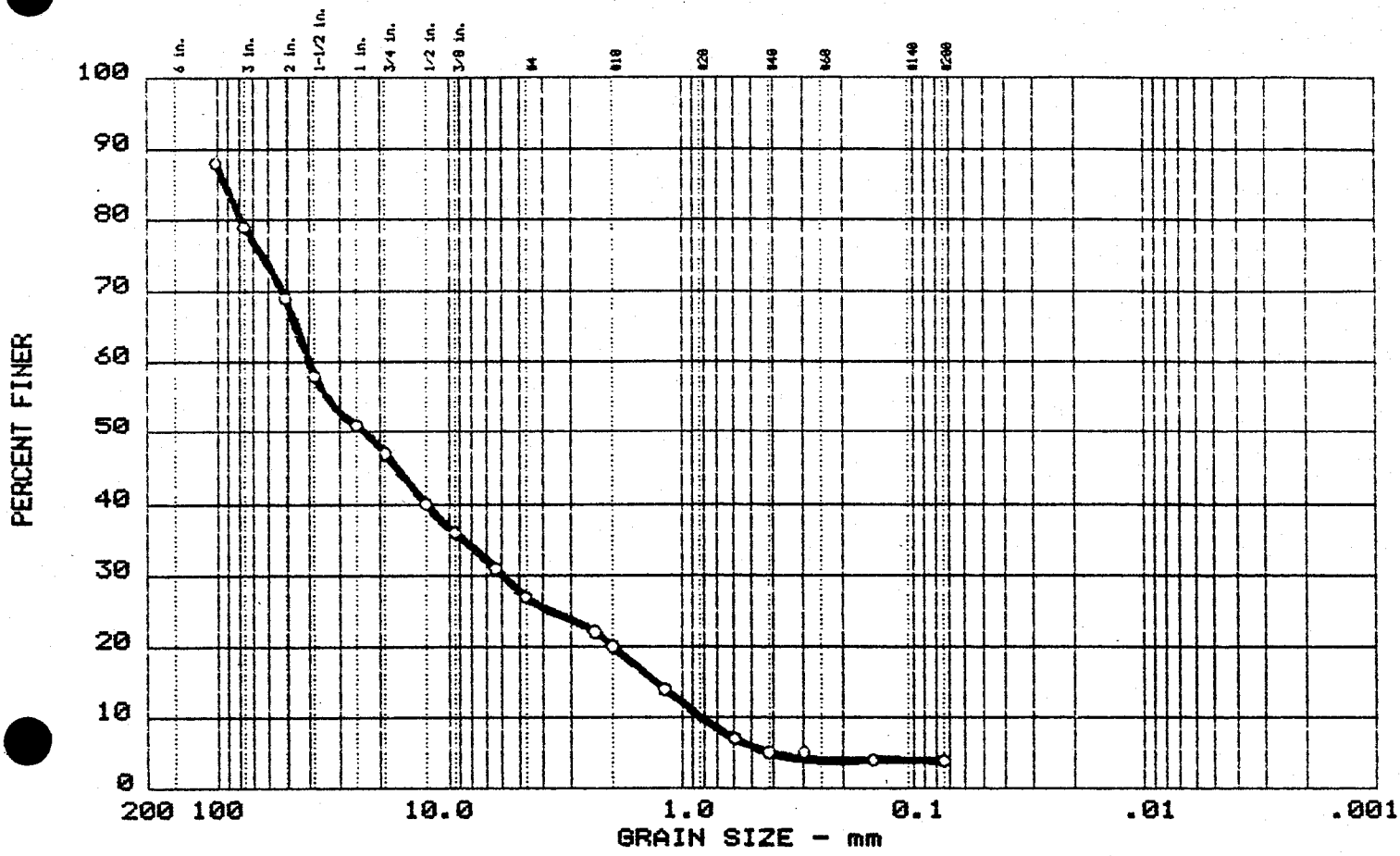
Date: 5/8/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 9

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	15	21.0	52.0	23.1	3.9	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	52	29	92.90	40.32	23.20	5.895	1.2897	0.8138	1.06	49.5

MATERIAL DESCRIPTION	USCS	AASHTO
○ GRAVEL; with sand, with cobbles, trace fines	GW	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 5(5 - 6)

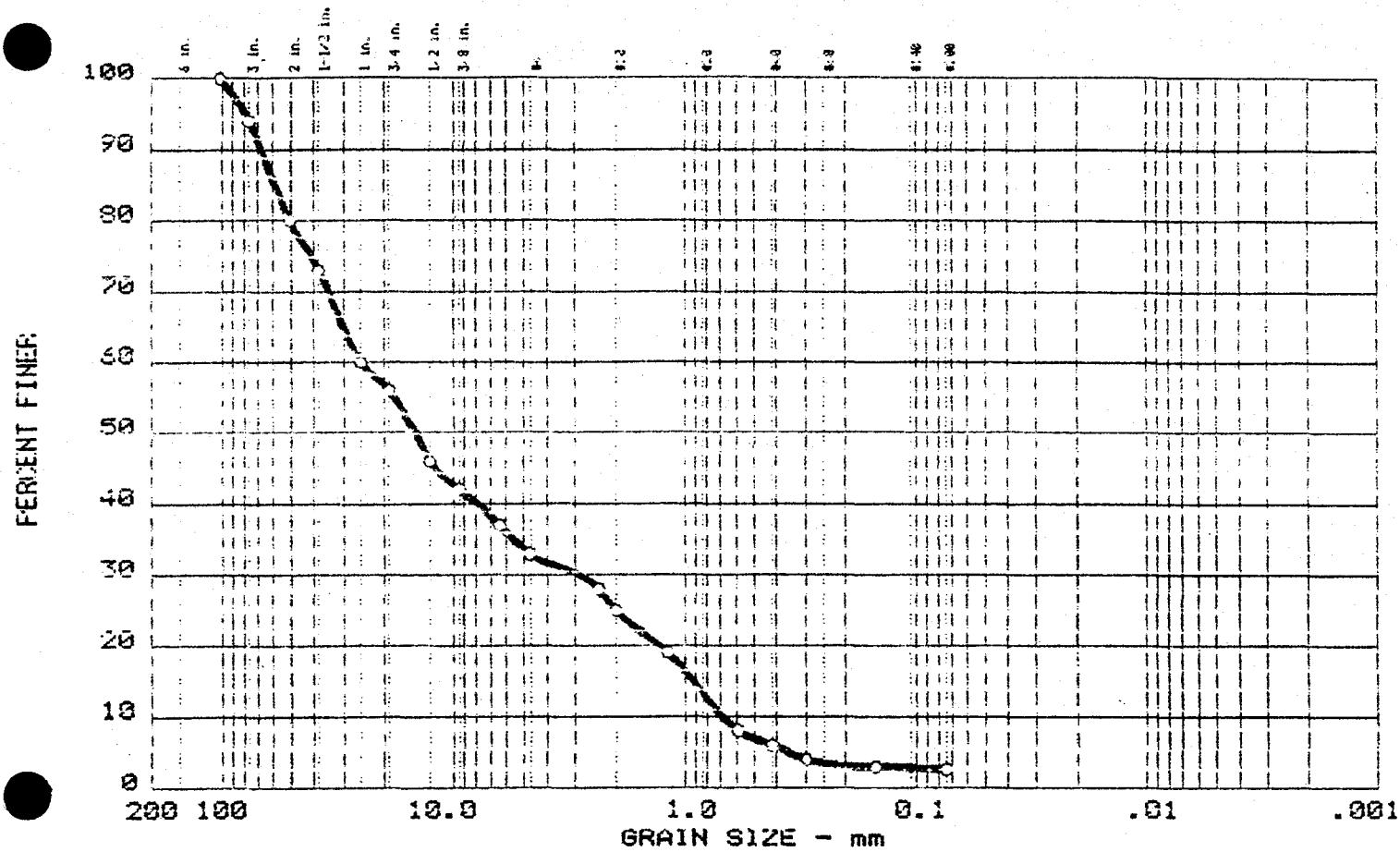
Date: 5/8/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 10

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	8	6.0	61.0	30.4	2.6	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	45	20	58.88	25.38	14.89	2.938	0.9193	0.6887	0.46	36.9

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY GRAVEL; some cobbles, trace fines	GP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 5 (17 - 18)

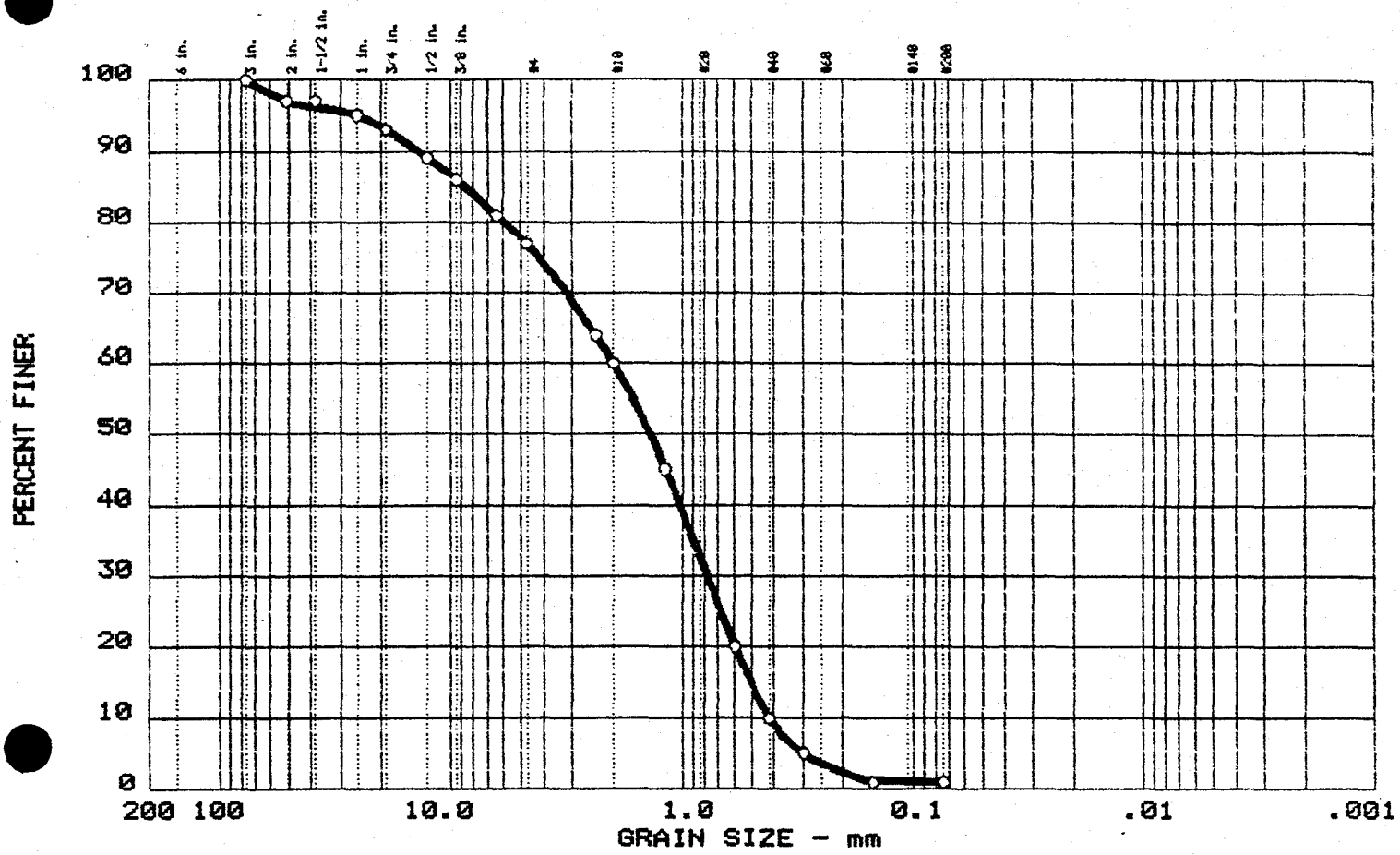
Date: 5/9/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 11

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	9	0.0	23.0	77.0	0.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○		NP	8.71	2.00	1.39	0.781	0.5041	0.4193	0.73	4.8

MATERIAL DESCRIPTION	USCS	AASHTO
○ SAND; with gravel, trace fines	SP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 6(0 - 1)

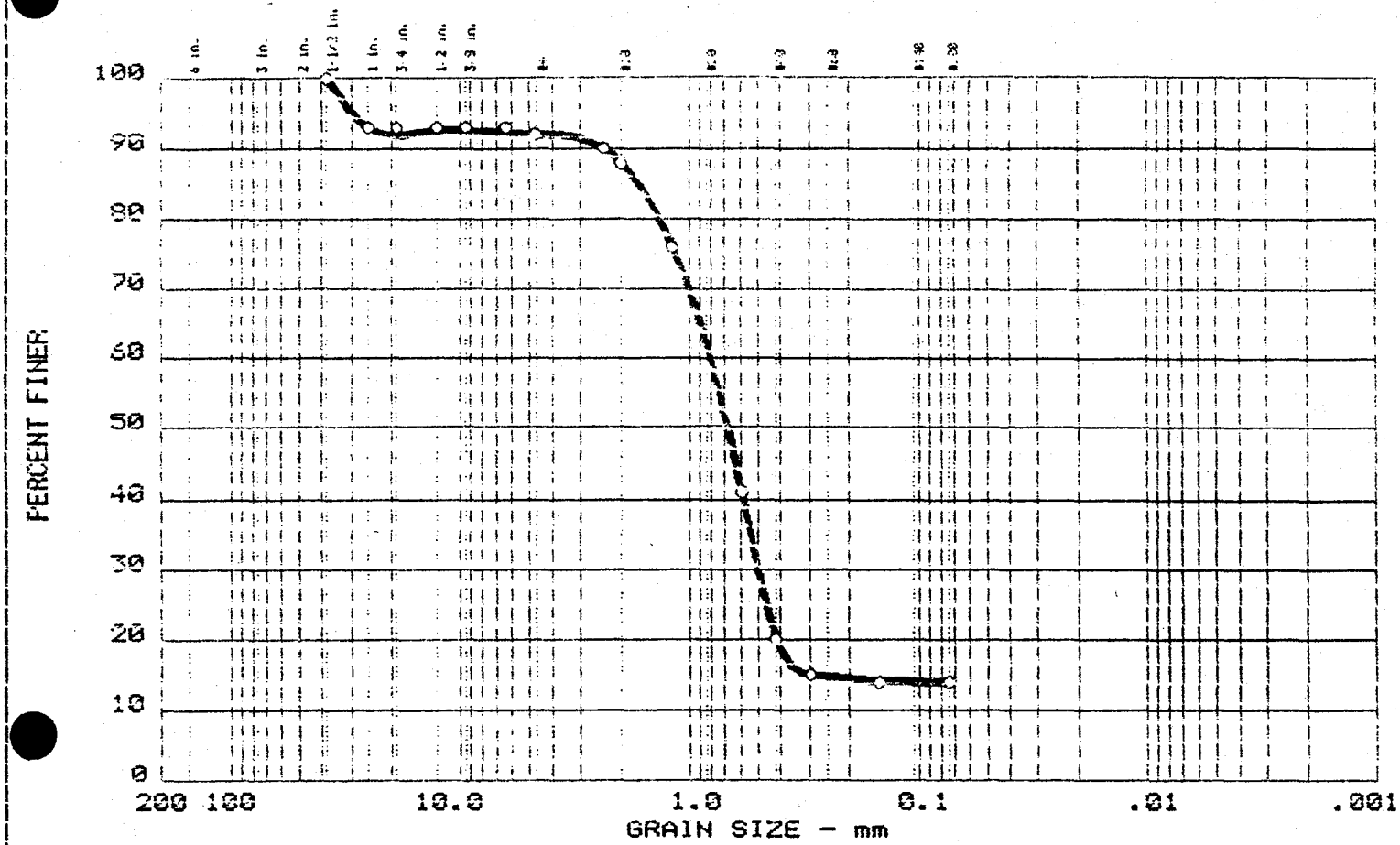
Date: 5/8/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 12

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	15	0.0	8.0	92.0	0.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	62	37	1.66	0.81	0.68	0.503	0.2961			

MATERIAL DESCRIPTION	USCS	AASHTO
○ SAND; some clay, some gravel	SC	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 6(2.5 - 5)

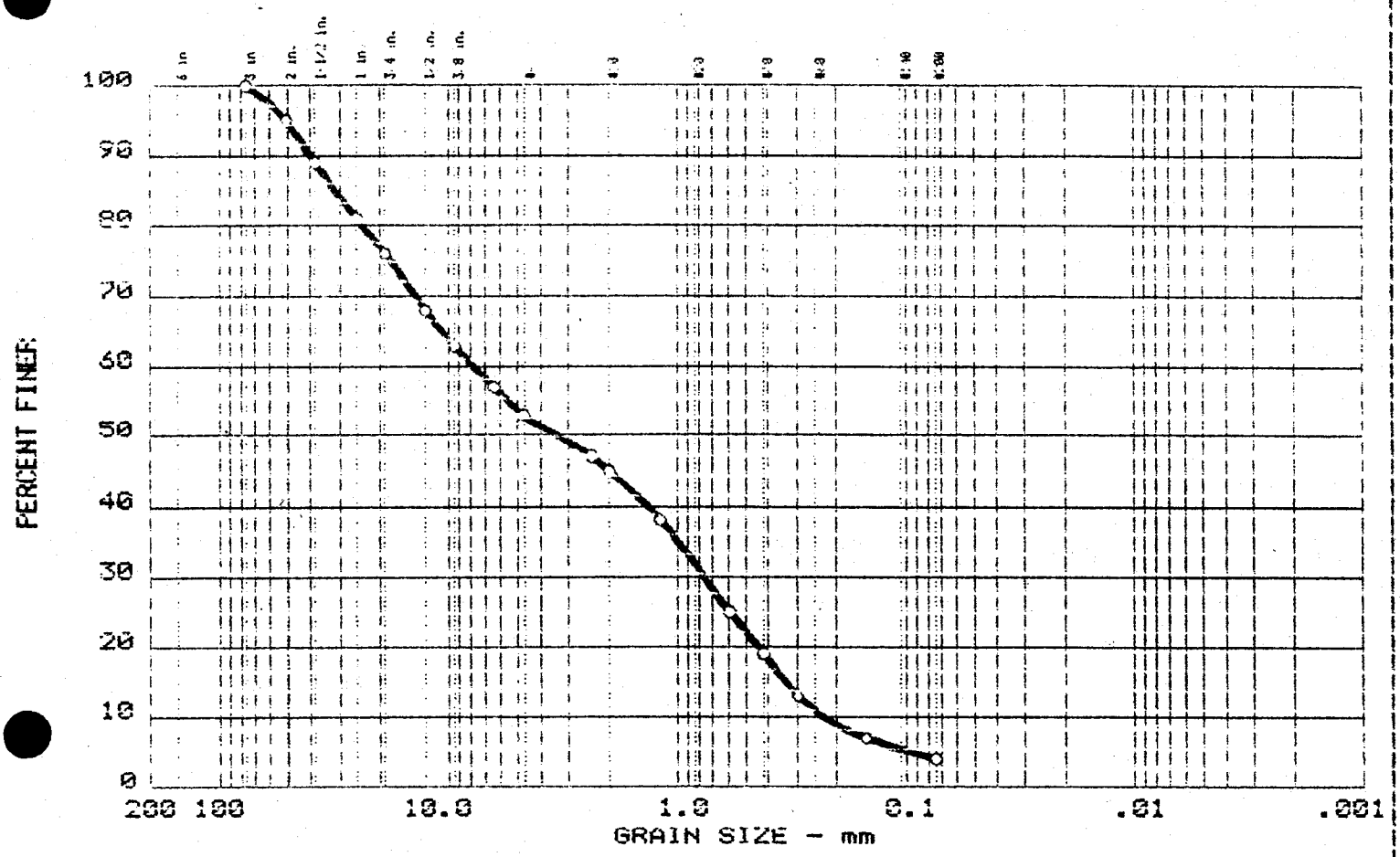
Date: 5/25/88

Remarks:
ASTM D 4221

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 13

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	9	0.0	47.0	49.0	4.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○		NP	31.26	7.76	3.35	0.767	0.3350	0.2291	0.33	33.9

MATERIAL DESCRIPTION	USCS	AASHTO
○ GRAVELLY SAND; trace fines	SP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 7(1 - 2)

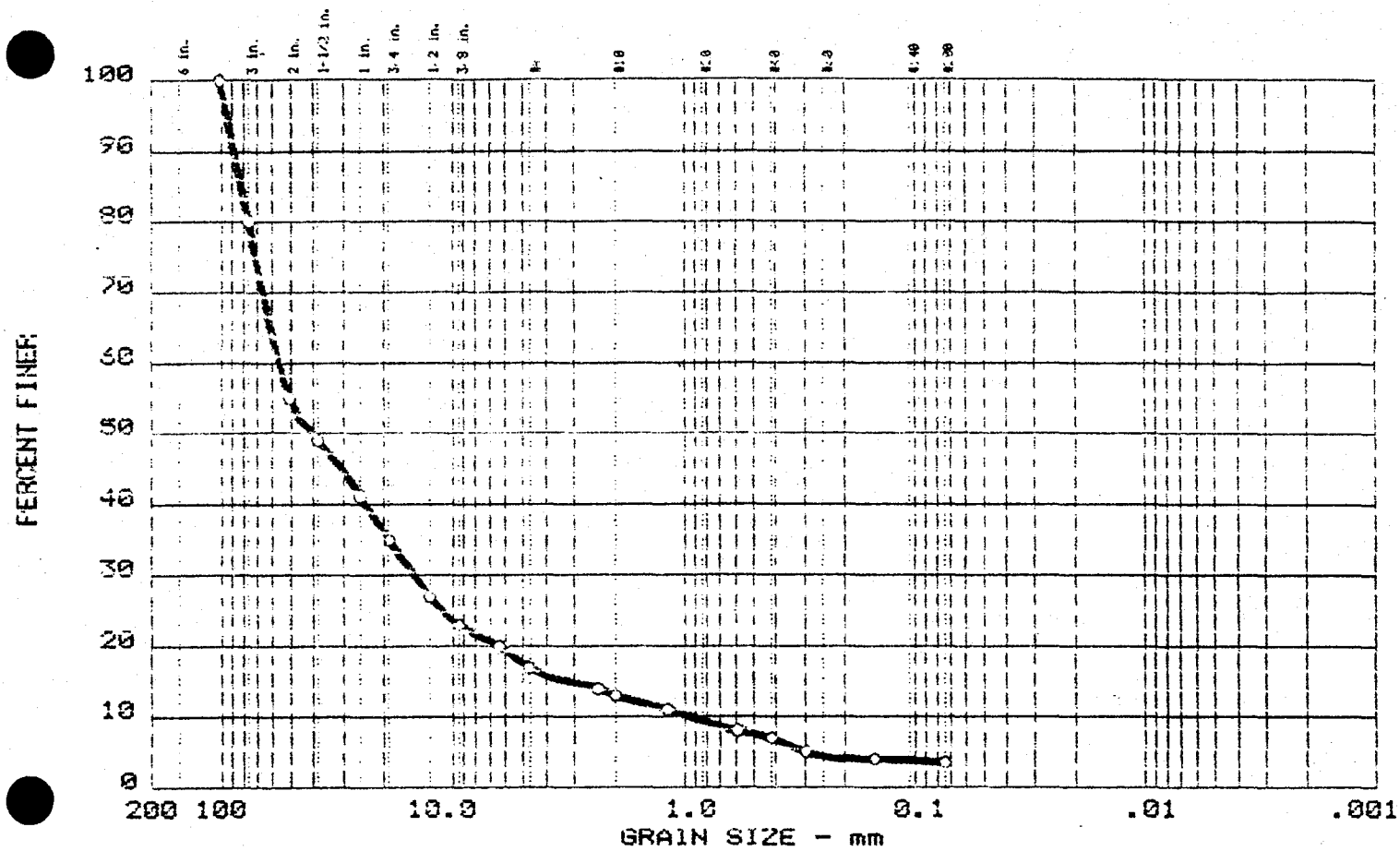
Date: 5/9/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 14

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	10	20.0	63.0	13.5	3.5	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			81.75	56.49	48.46	14.859	2.9992	0.9376	4.17	60.3

MATERIAL DESCRIPTION	USCS	AASHTO
○ GRAVEL;with sand, with cobbles, trace fines	GP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 7(10 - 12)

Date: 5/9/88

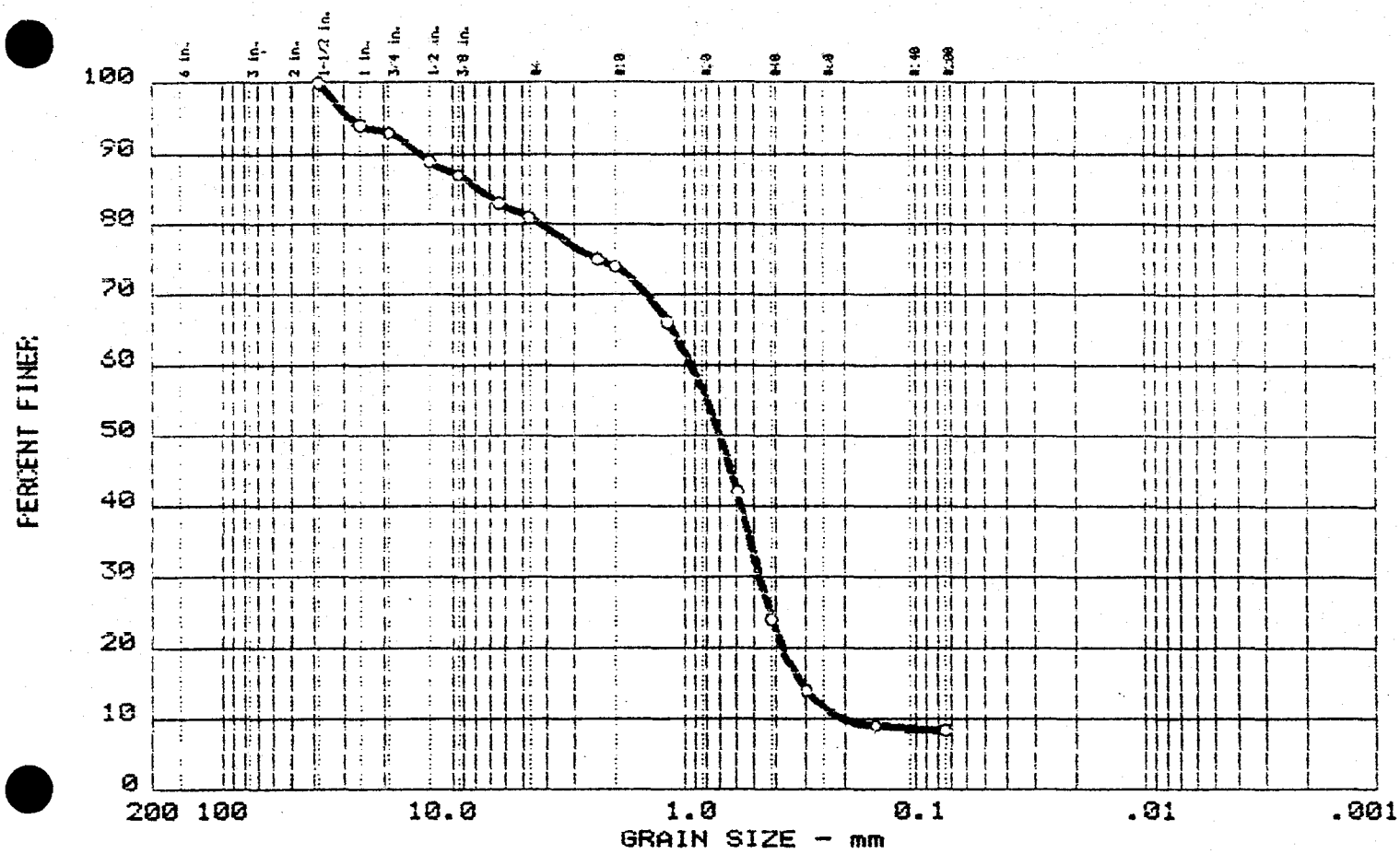
Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT

WESTERN TECHNOLOGIES INC.

Fig. No. 15

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	17	0.0	19.0	72.6	8.4	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			7.67	0.93	0.70	0.473	0.3126	0.2042	1.17	4.6

MATERIAL DESCRIPTION	USCS	AASHTO
○ SAND;with gravel, some fines	SP-SM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 7(18 - 20)

Date: 5/9/88

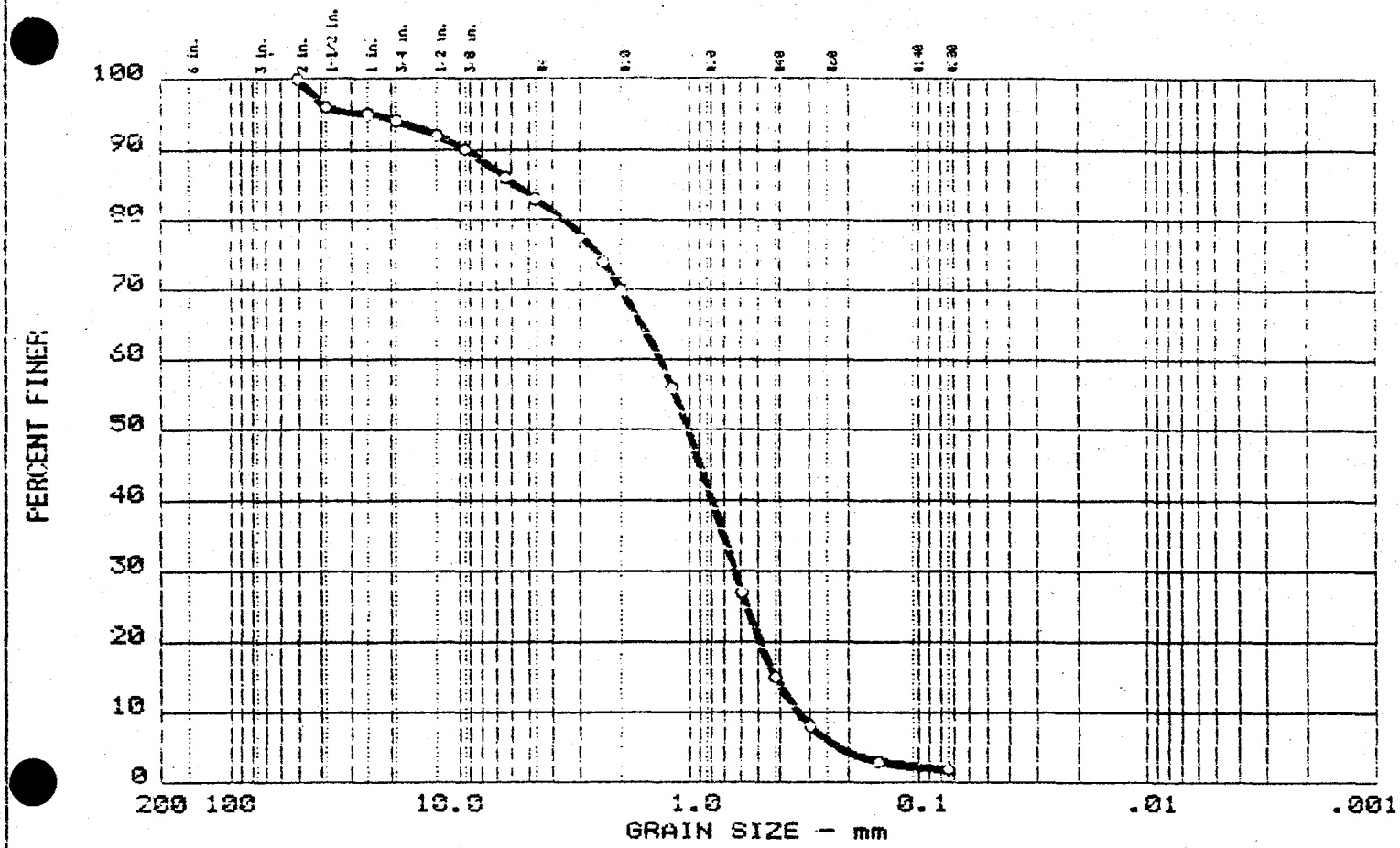
Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT

WESTERN TECHNOLOGIES INC.

Fig. No. 16

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	11	0.0	17.0	81.1	1.9	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	-	NP	5.75	1.35	1.01	0.634	0.4188	0.3365	0.89	4.0

MATERIAL DESCRIPTION	USCS	AASHTO
○ SAND; some gravel, trace fines	SP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 8(0 - 2)

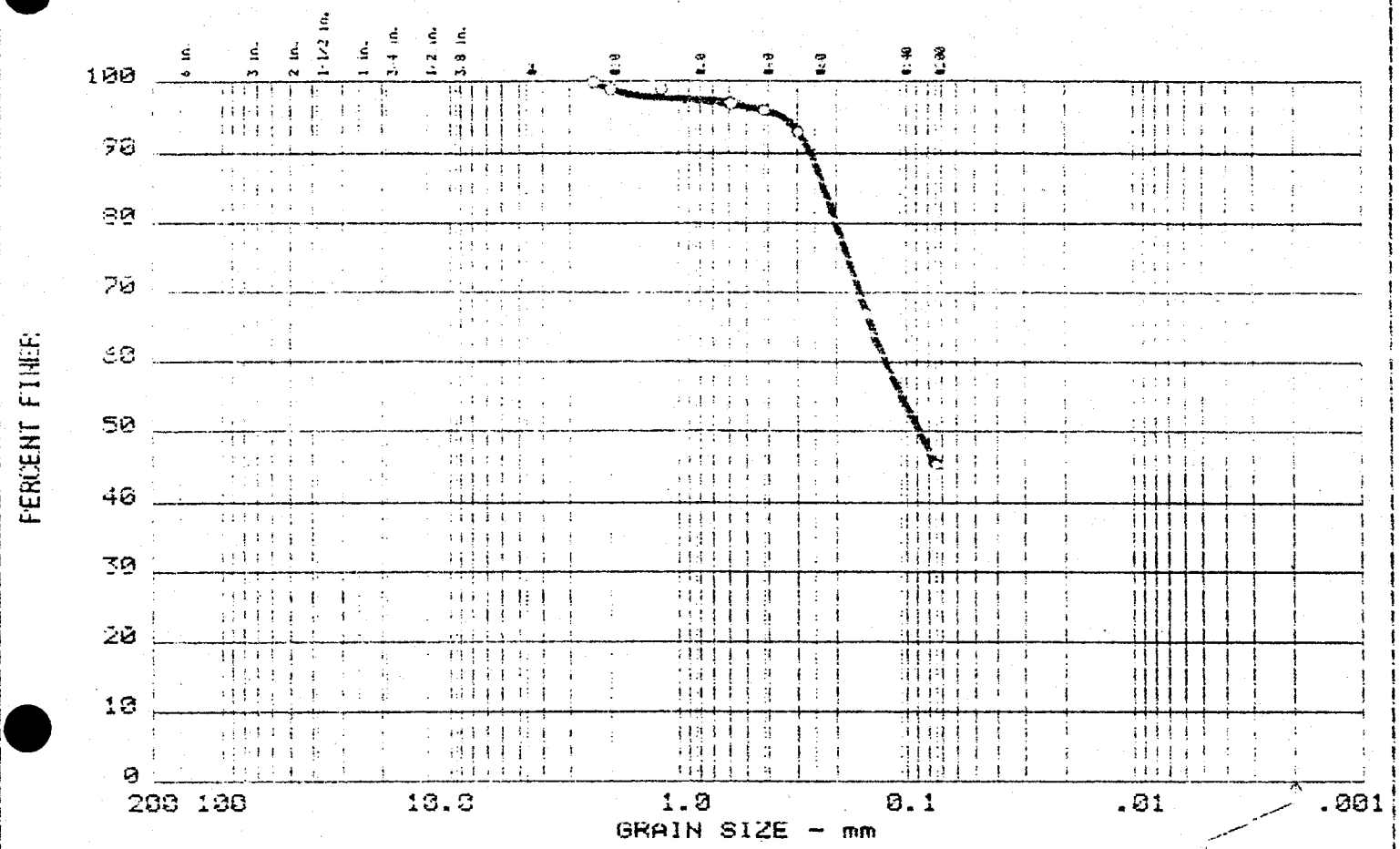
Date: 5/9/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 17

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	5	0.0	0.0	54.6	45.4	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○		NP	0.23	0.12	0.09					

MATERIAL DESCRIPTION	USCS	AASHTO
○ SILT AND SAND; some clay	SM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 8(2 - 3)

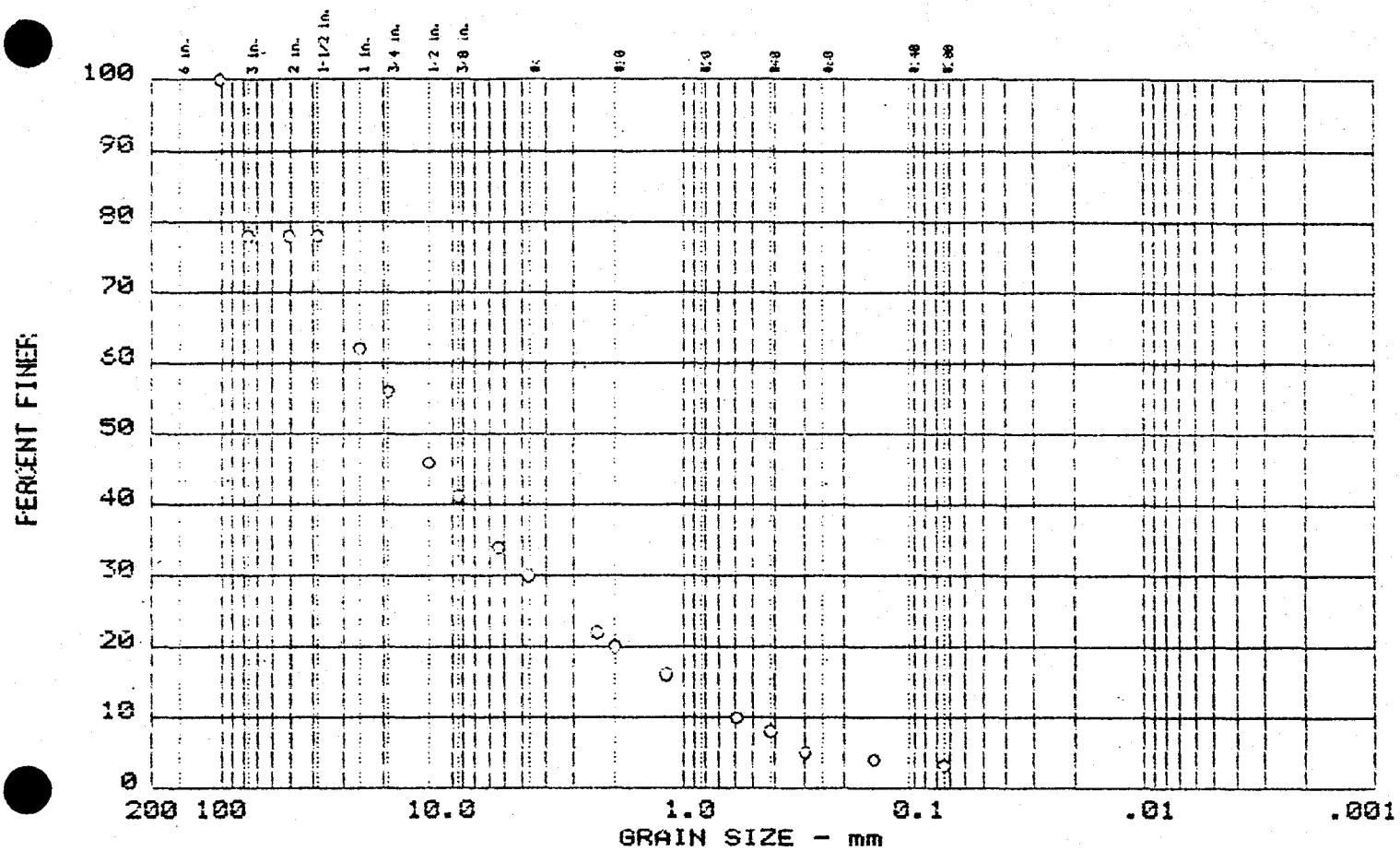
Date: 5/31/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 18

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	12					

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○										

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY GRAVEL; with cobbles, trace fines	GP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 8(10 - 12)

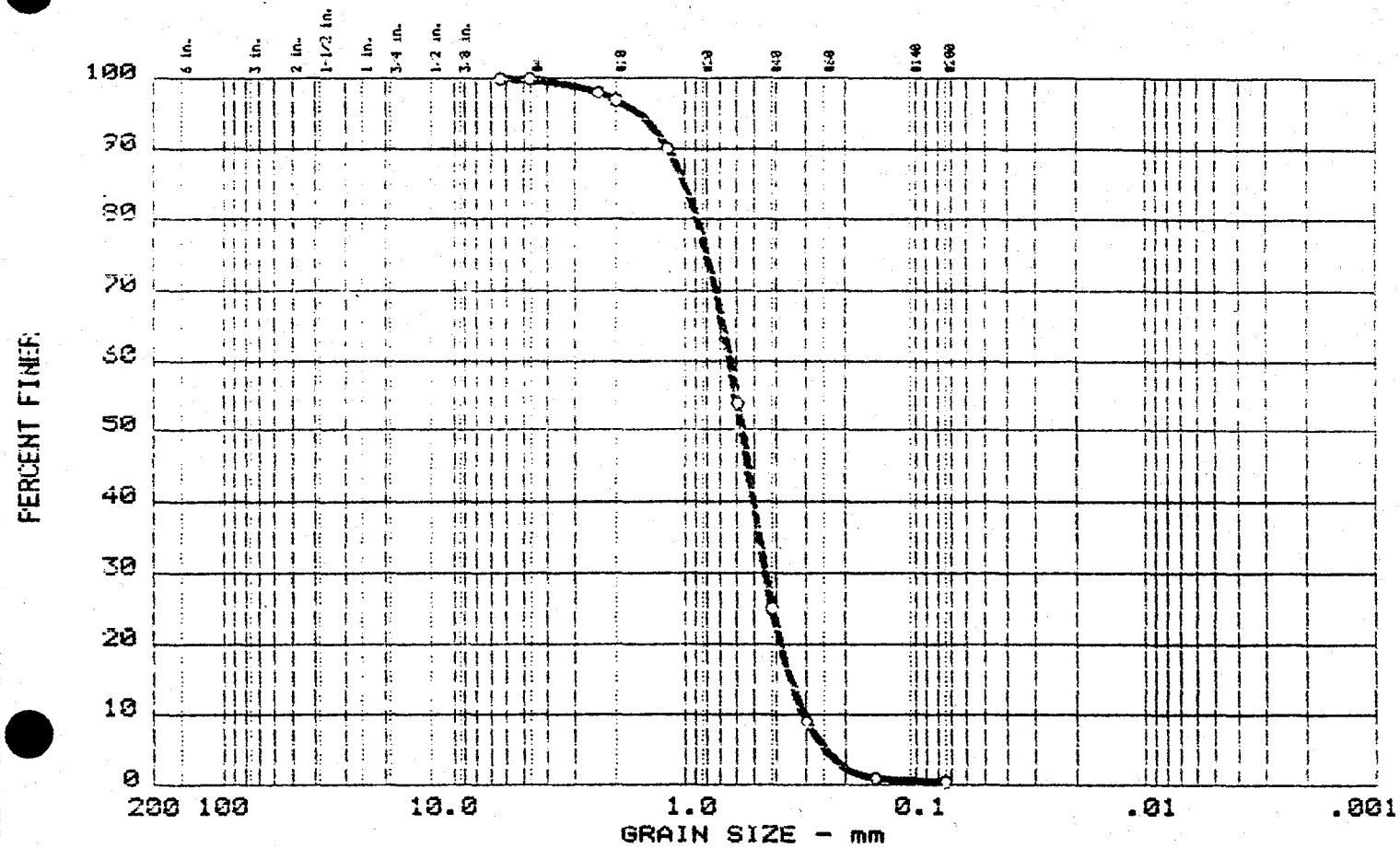
Date: 5/9/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 19

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	16	0.0	0.2	99.3	0.5	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○		NP	1.01	0.64	0.56	0.448	0.3520	0.3065	1.03	2.1

MATERIAL DESCRIPTION	USCS	AASHTO
○ SAND; trace gravels,trace fines	SP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 9(0 - 3)

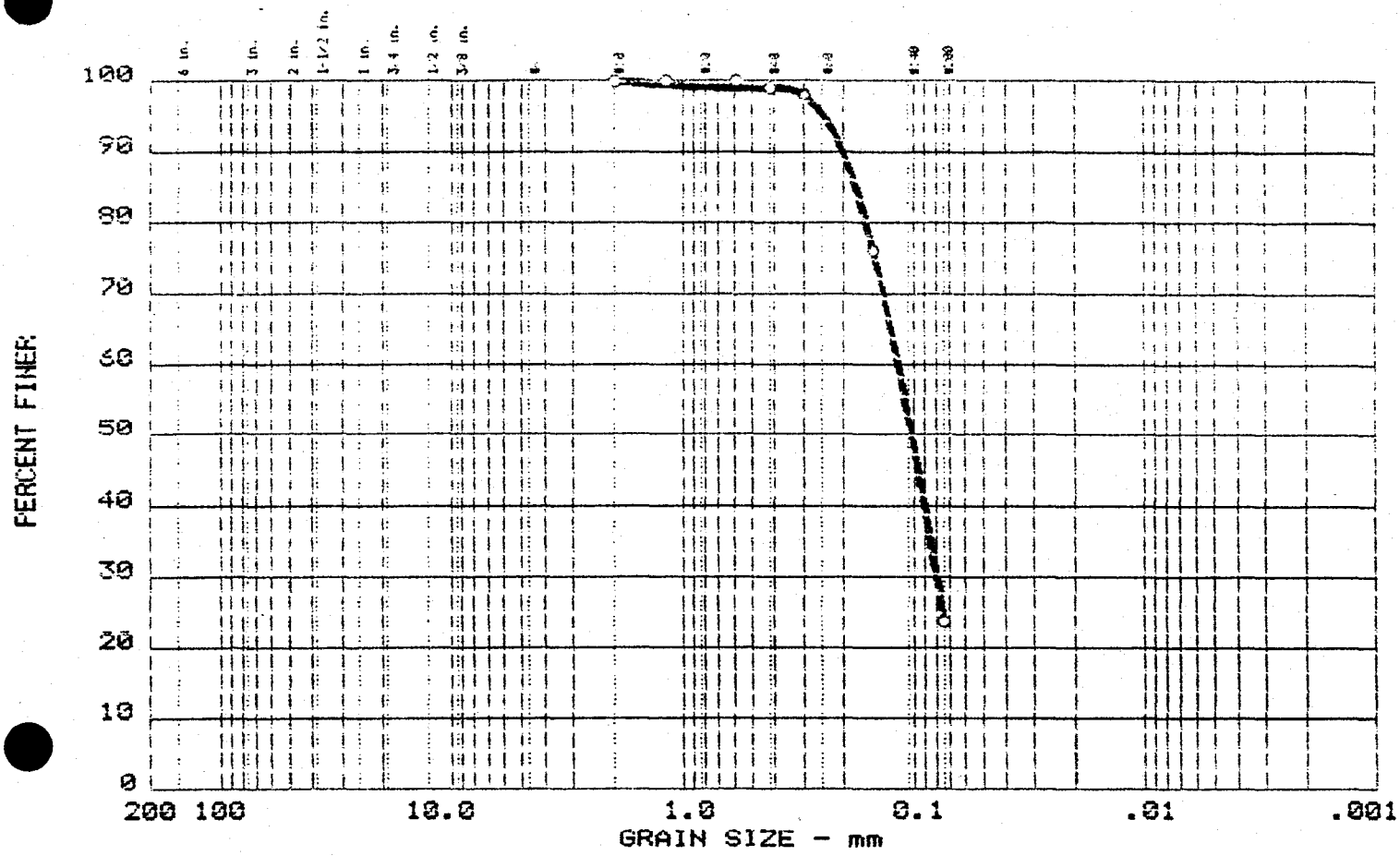
Date: 5/25/88

Remarks:
ASTM D 4221

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 20

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	17	0.0	0.0	76.3	23.7	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○		NP	0.18	0.12	0.10	0.080				

MATERIAL DESCRIPTION	USCS	AASHTO
○ SAND; with silt	SM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 9(4 - 5)

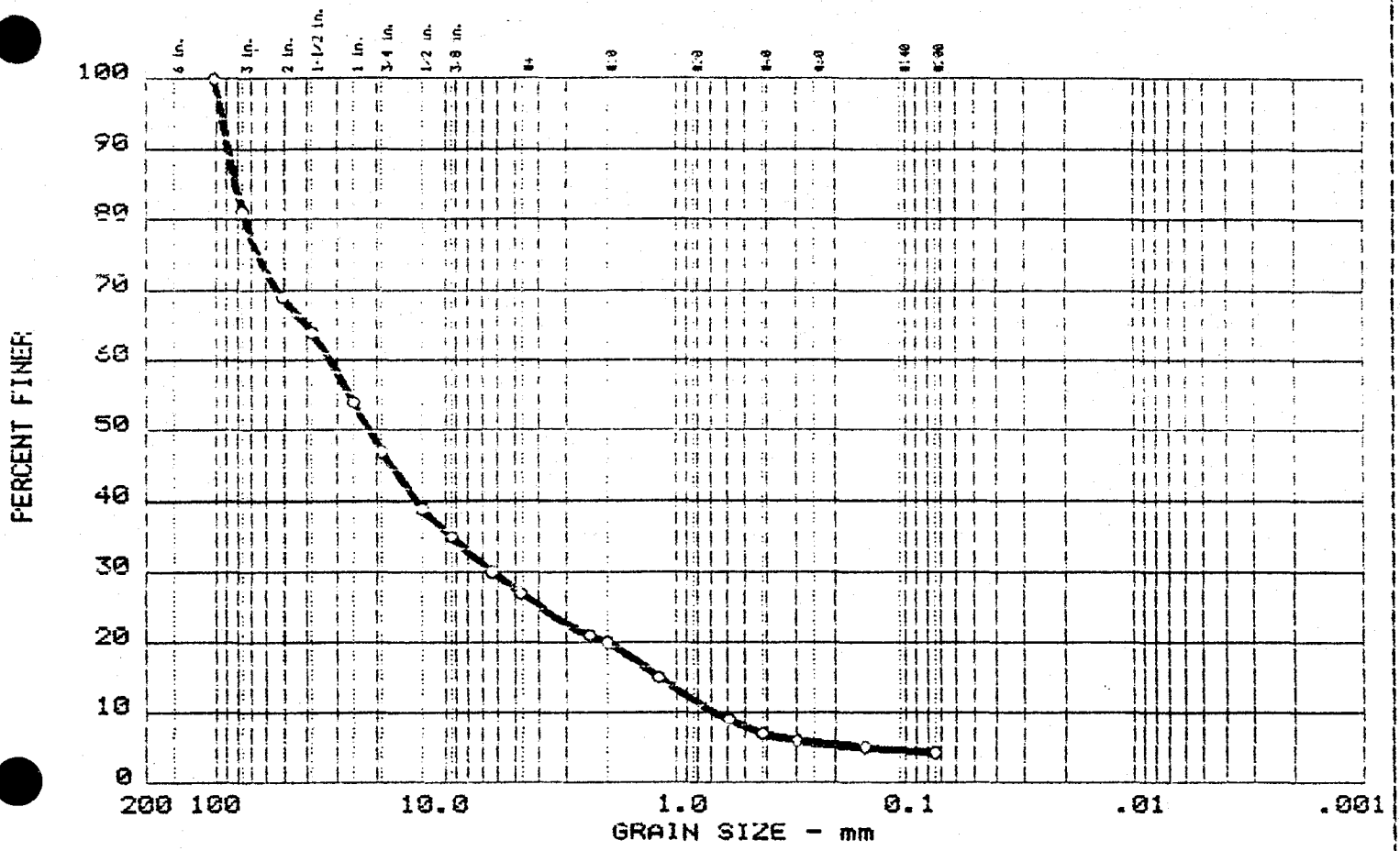
Date: 5/25/88

Remarks:
ASTM D 4221

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 21

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	13	19.0	54.0	22.7	4.3	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			81.75	31.81	21.50	6.346	1.1817	0.6645	1.91	47.9

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY GRAVEL; some cobbles, trace fines	GW	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 9(15 - 16)

Date: 5/9/88

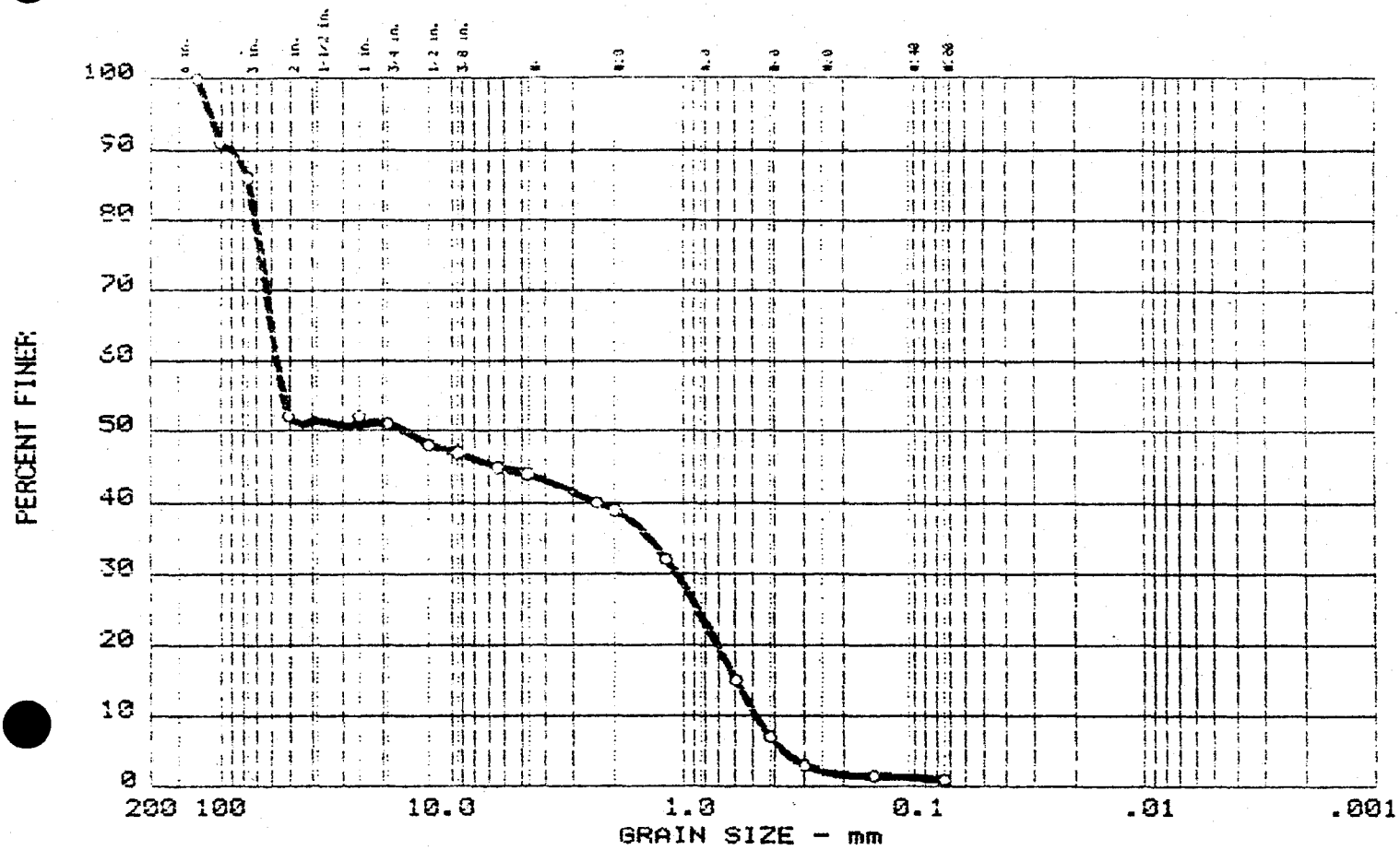
Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT

WESTERN TECHNOLOGIES INC.

Fig. No. 22

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	4	14.0	42.0	43.0	1.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			74.82	57.15	16.11	1.076	0.5895	0.4842	0.04	118.0

MATERIAL DESCRIPTION	USCS	AASHTO
○ SAND AND GRAVEL; some cobbles, trace fines	GP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 9A(1 - 3)

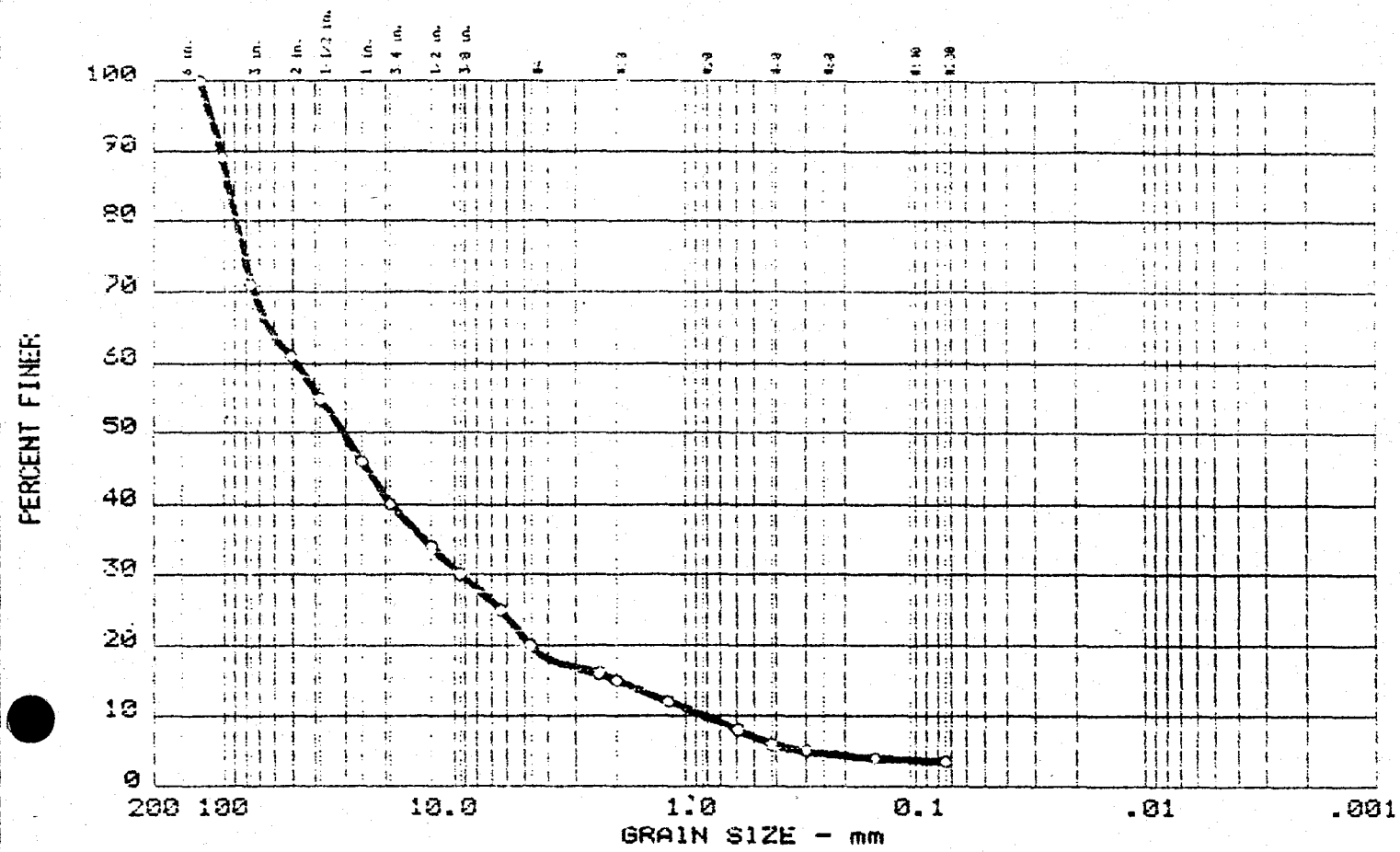
Date: 5/26/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 23

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	5	29.0	51.0	16.5	3.5	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			95.28	47.75	38.44	9.517	1.9884	0.8194	2.31	58.3

MATERIAL DESCRIPTION	USCS	AASHTO
○ COBBLY GRAVEL; with sand, trace fines	GW	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 9A(6 - 7)

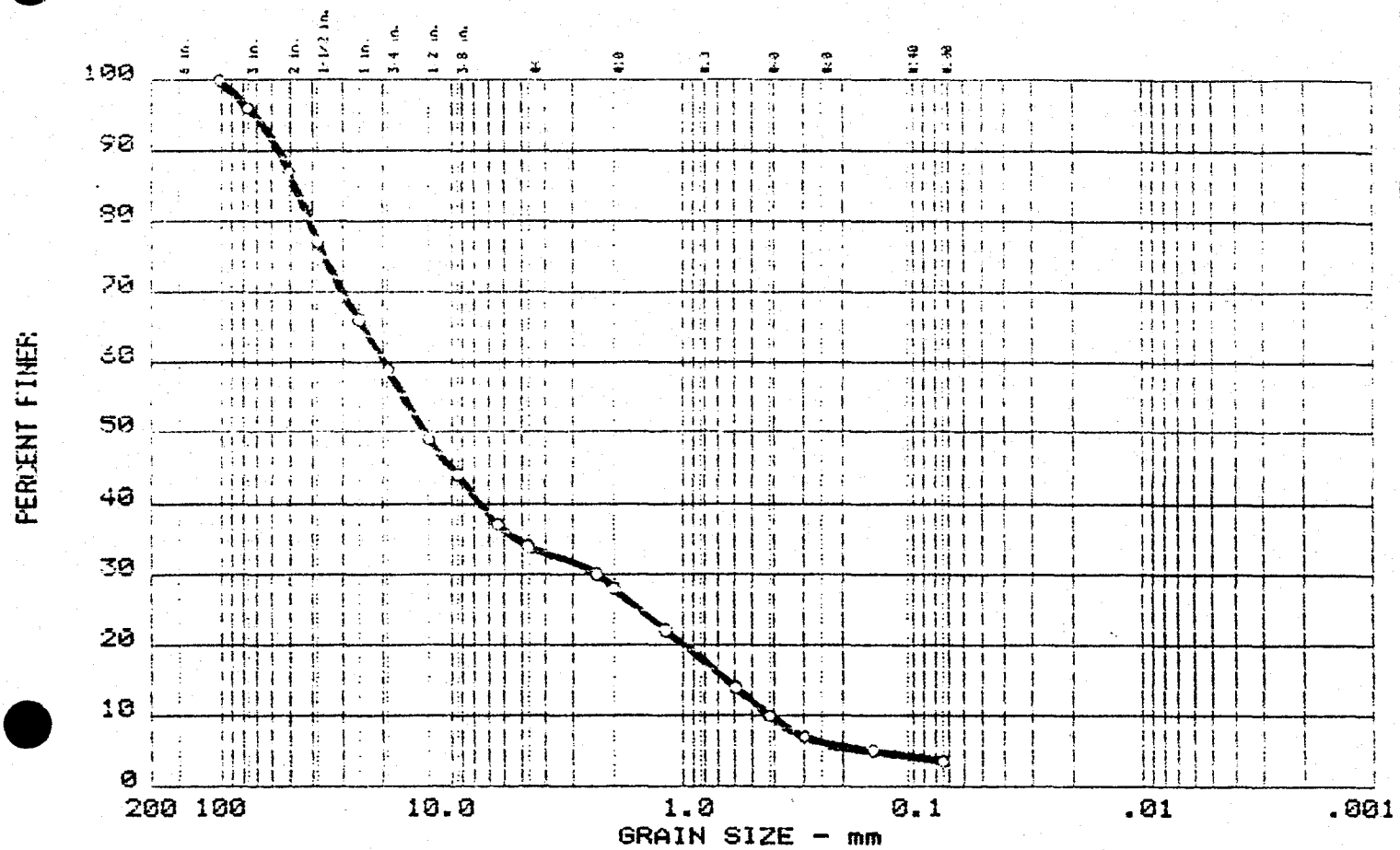
Date: 5/26/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 24

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	6	4.0	62.0	30.5	3.5	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			47.75	19.68	13.38	2.366	0.6368	0.4159	0.68	47.3

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY GRAVEL; some cobbles, trace fines	GP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 9A(15 - 17)

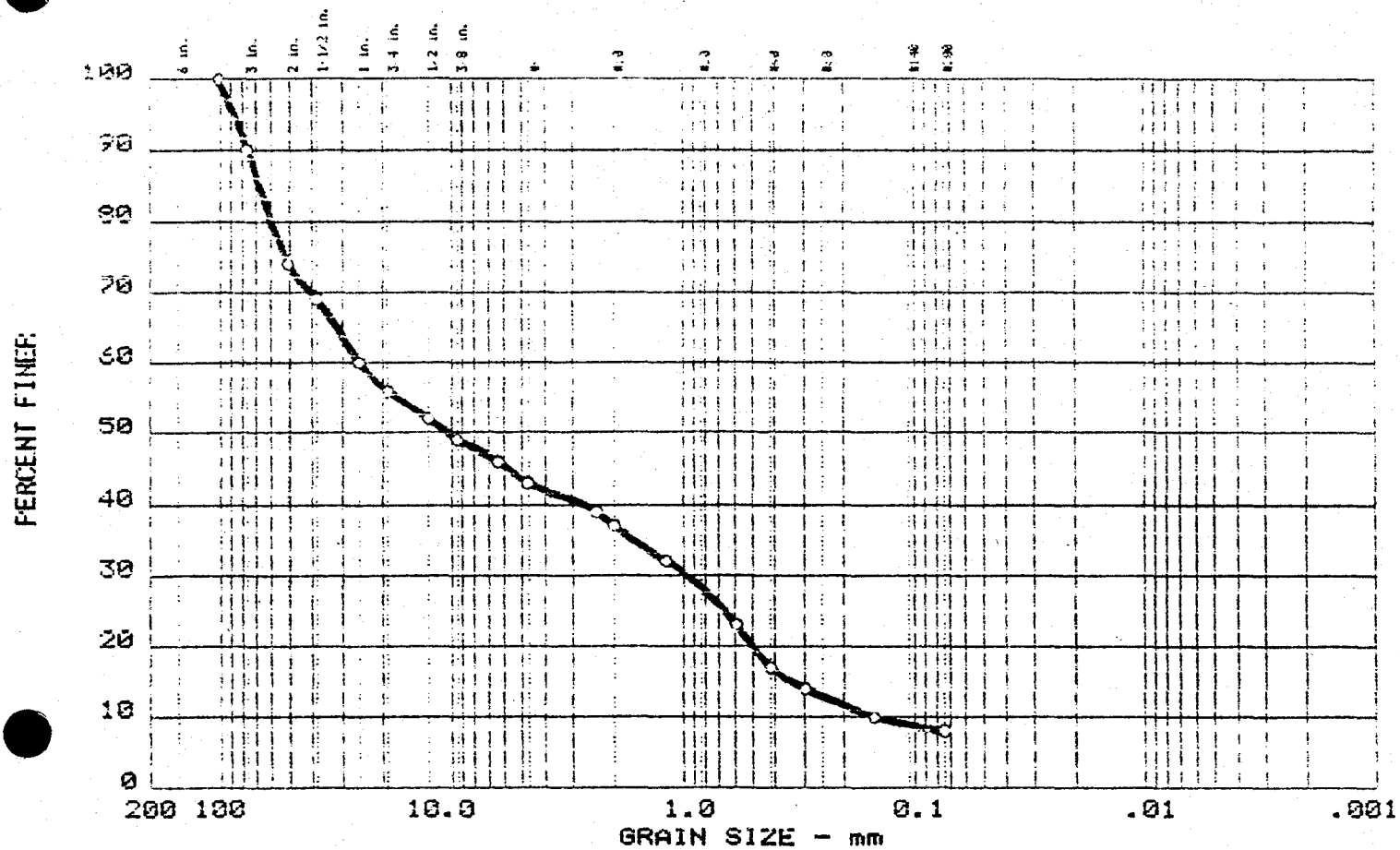
Date: 5/26/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 25

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	1	10.0	47.0	35.0	8.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			67.61	25.38	18.46	0.965	0.3424	0.1477	0.25	171.8

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY GRAVEL; some cobbles, some fines	GP-GM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 18(2 - 3)

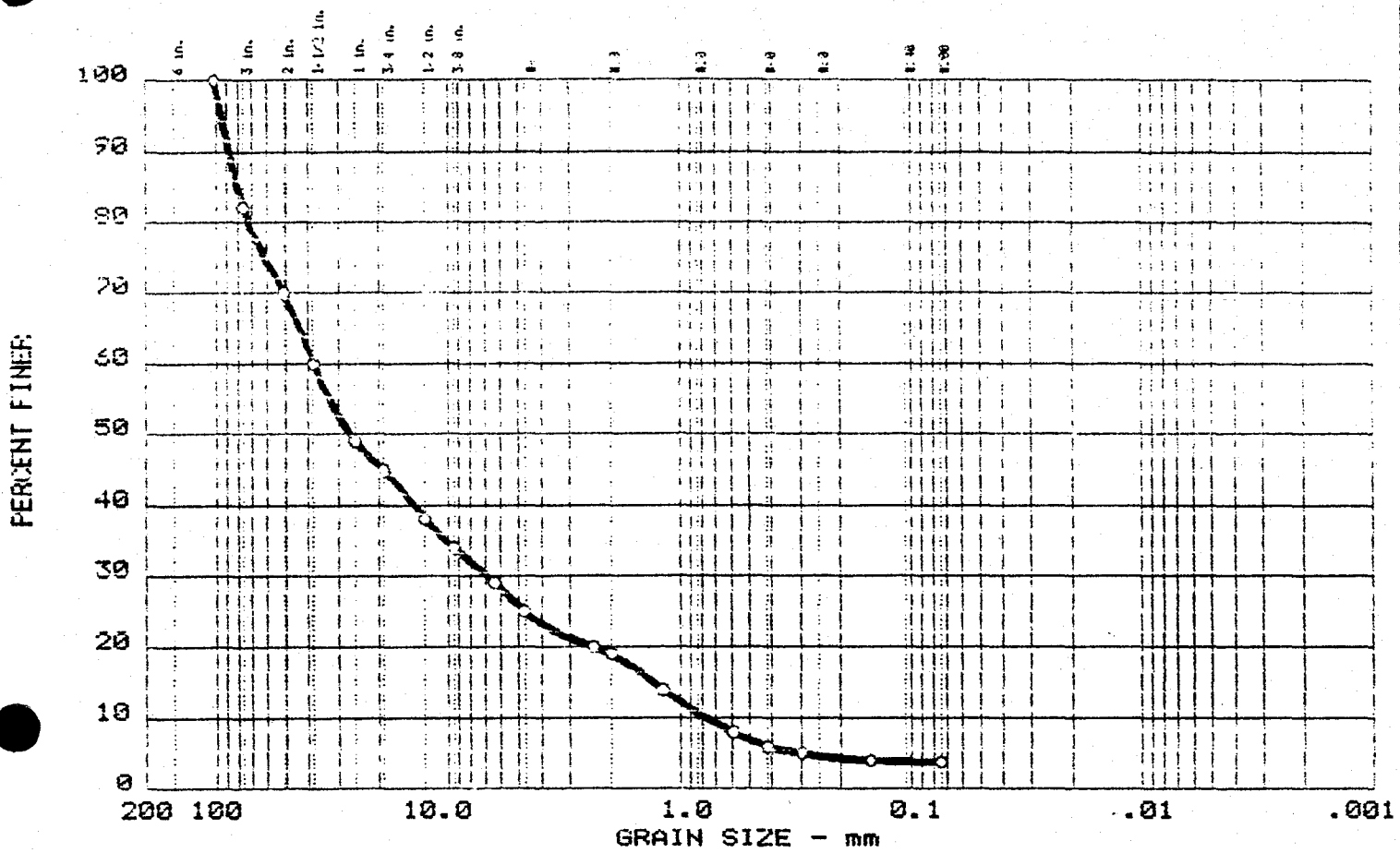
Date: 5/26/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 26

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	2	18.0	57.0	21.2	3.8	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			80.72	38.06	26.64	6.847	1.3047	0.7508	1.64	50.7

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY GRAVEL; some cobbles, trace fines	GW	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 10(7 - 8)

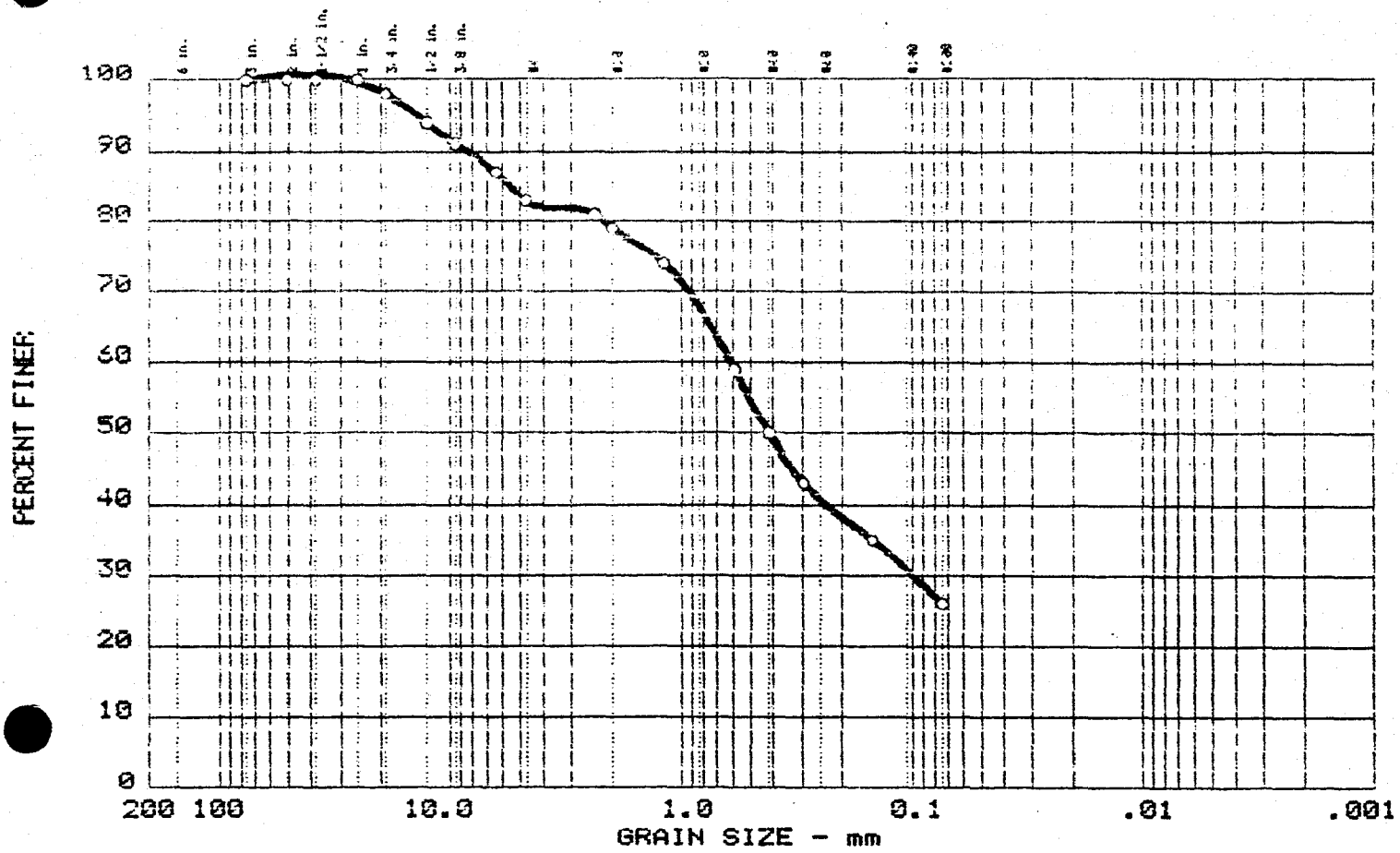
Date: 5/26/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 27

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	20	0.0	17.0	57.0	26.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			5.50	0.61	0.42	0.099				

MATERIAL DESCRIPTION	USCS	AASHTO
○ SILTY SAND; with gravel	SM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 11(1 - 2)

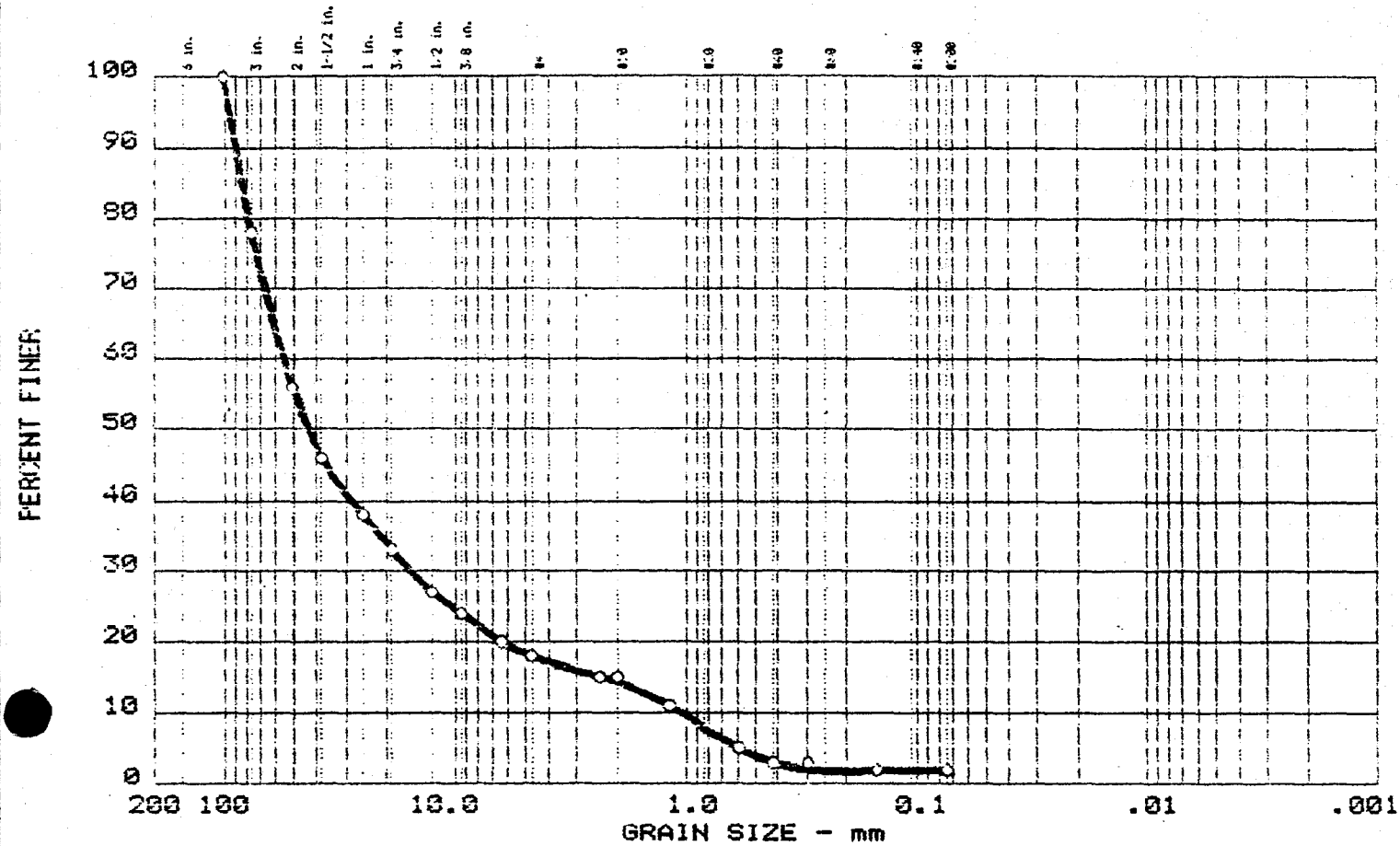
Date: 5/26/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 28

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	2	22.0	60.0	18.0	0.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			83.95	55.46	43.40	15.759	2.3578	1.0532	4.25	52.7

MATERIAL DESCRIPTION	USCS	AASHTO
○ COBBLY GRAVEL; with sand, trace fines	GP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 11(6 - 7)

Date: 5/26/88

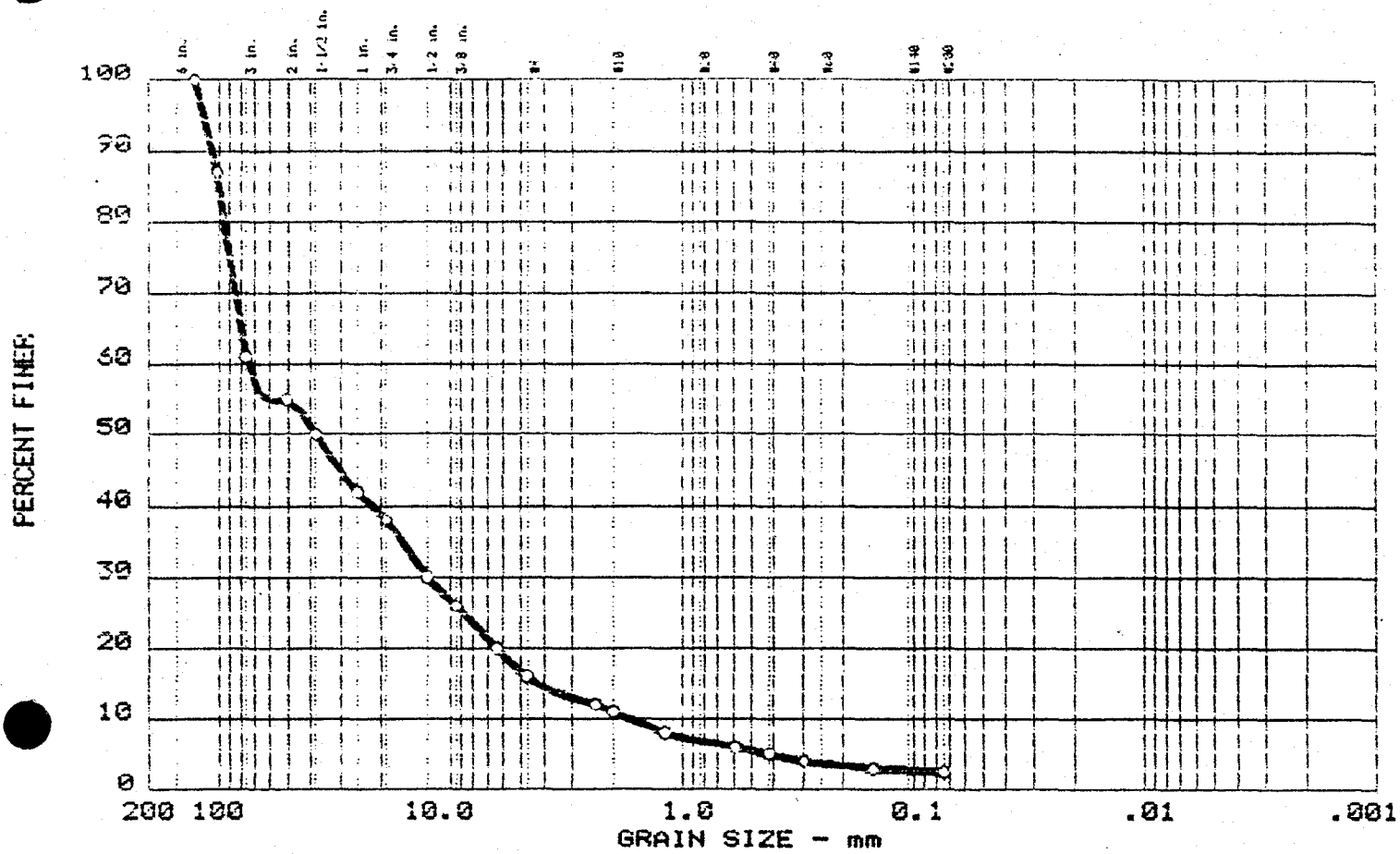
Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT

WESTERN TECHNOLOGIES INC.

Fig. No. 29

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	3	39.0	45.0	13.5	2.5	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			99.20	74.90	37.98	12.575	4.2121	1.6963	1.24	44.2

MATERIAL DESCRIPTION	USCS	AASHTO
○ GRAVELS AND COBBLES; with sand, trace fines	GW	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 11(18 - 19)

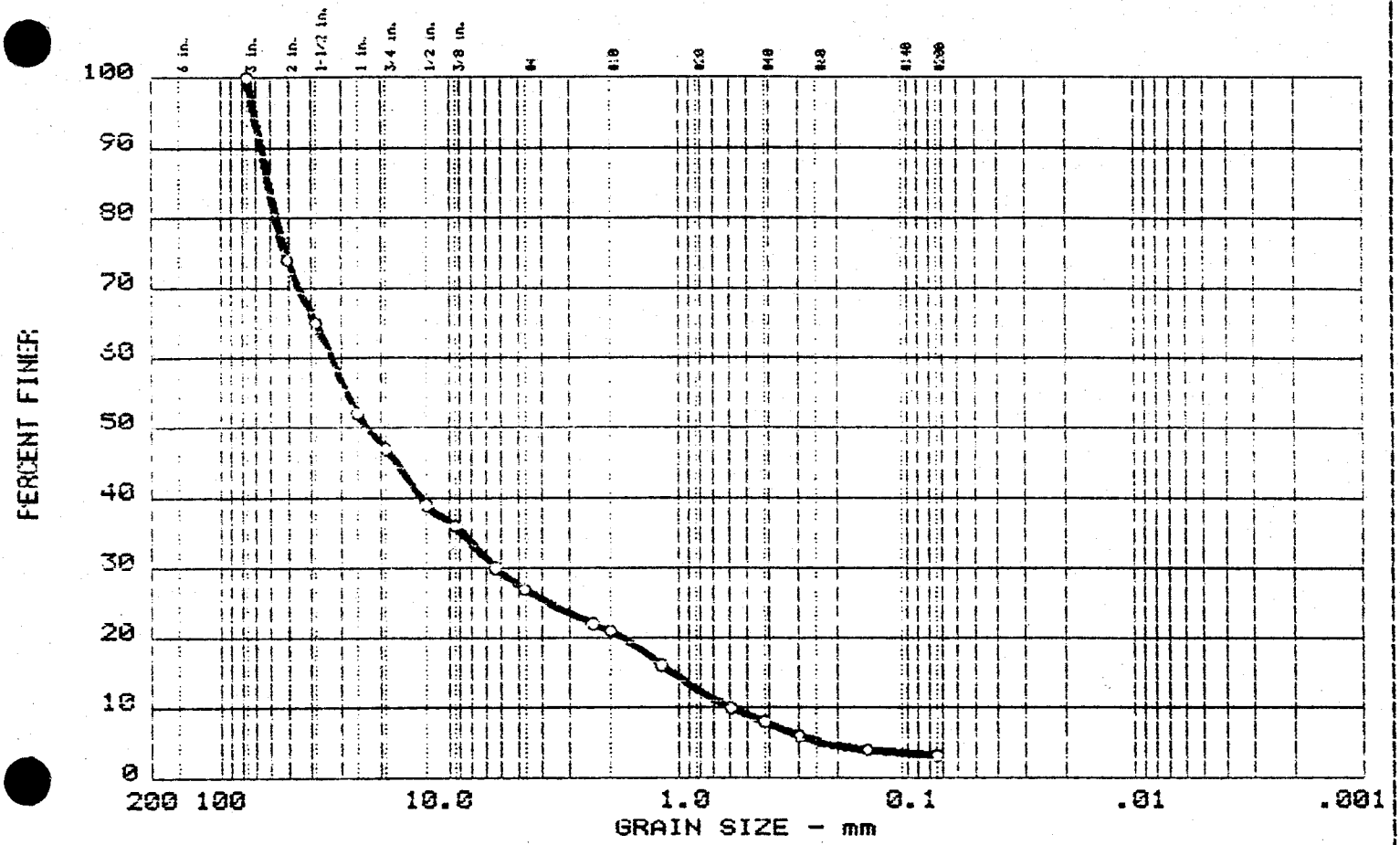
Date: 5/26/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 30

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	14	0.0	73.0	23.8	3.2	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			61.66	32.73	22.91	6.310	1.0593	0.5888	2.07	55.6

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY GRAVEL; trace fines	GW	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 12(2 - 4)

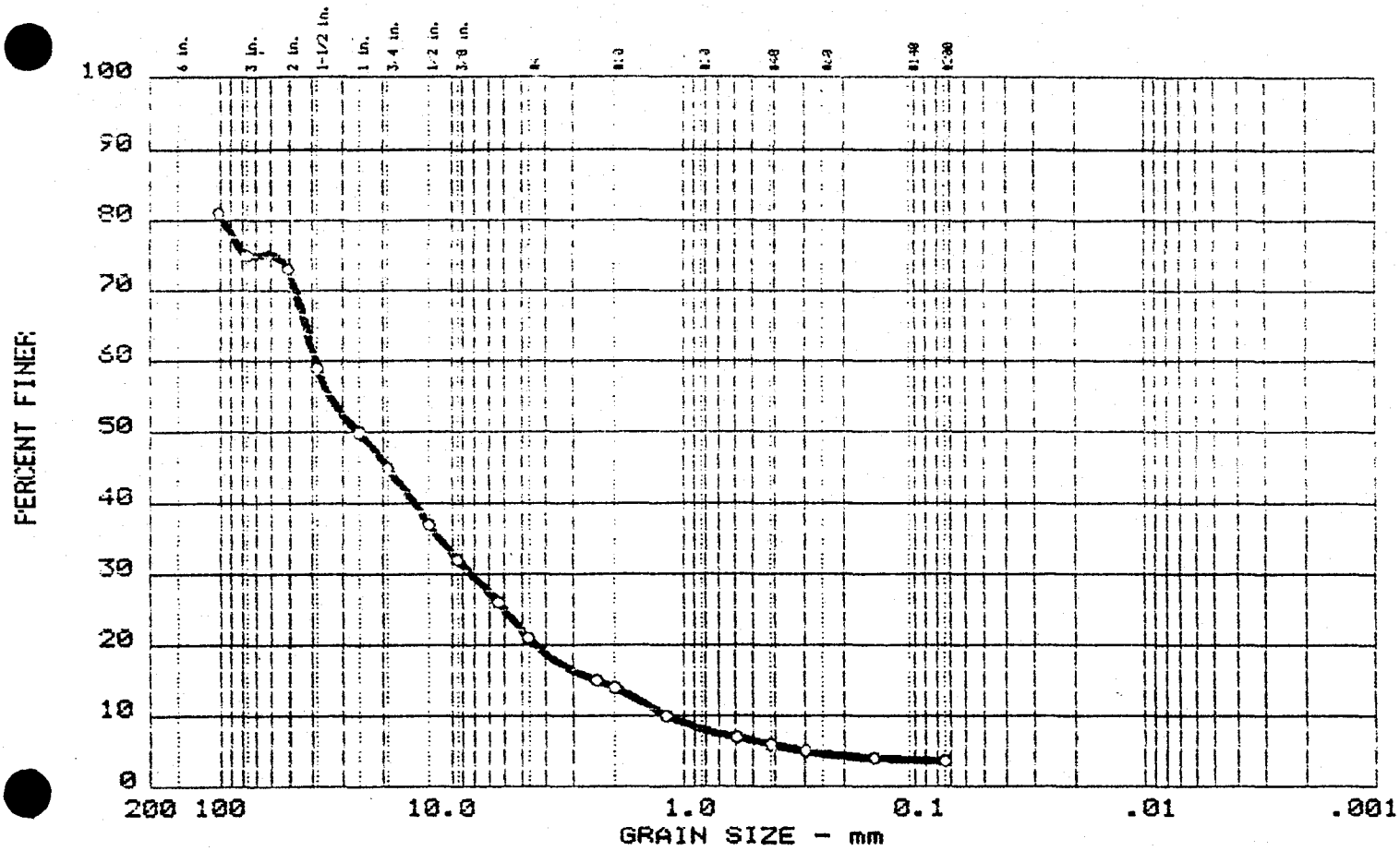
Date: 5/9/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 31

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	15	25.0	54.0	17.4	3.6	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			101.60	38.89	25.11	8.220	2.3708	1.1882	1.46	32.7

MATERIAL DESCRIPTION	USCS	AASHTO
○ GRAVEL; with cobbles;with sand;trace fines	GW	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 12(11 - 13)

Date: 5/9/88

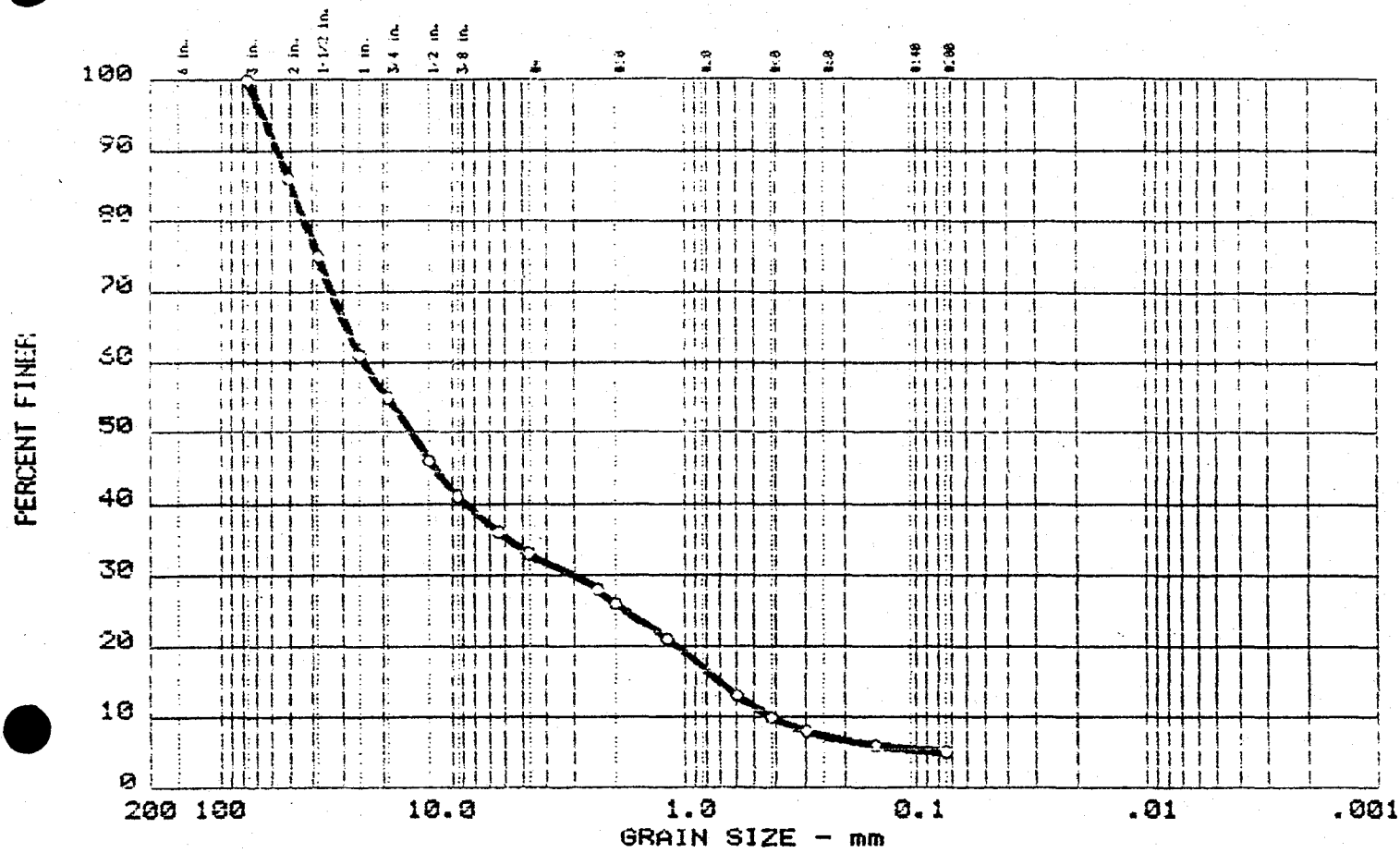
Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT

WESTERN TECHNOLOGIES INC.

Fig. No. 32

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	19	0.0	67.0	28.0	5.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			49.43	24.21	15.10	2.979	0.7063	0.4159	0.88	58.2

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY GRAVEL; some fines	GP-GM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 13(2 - 3)

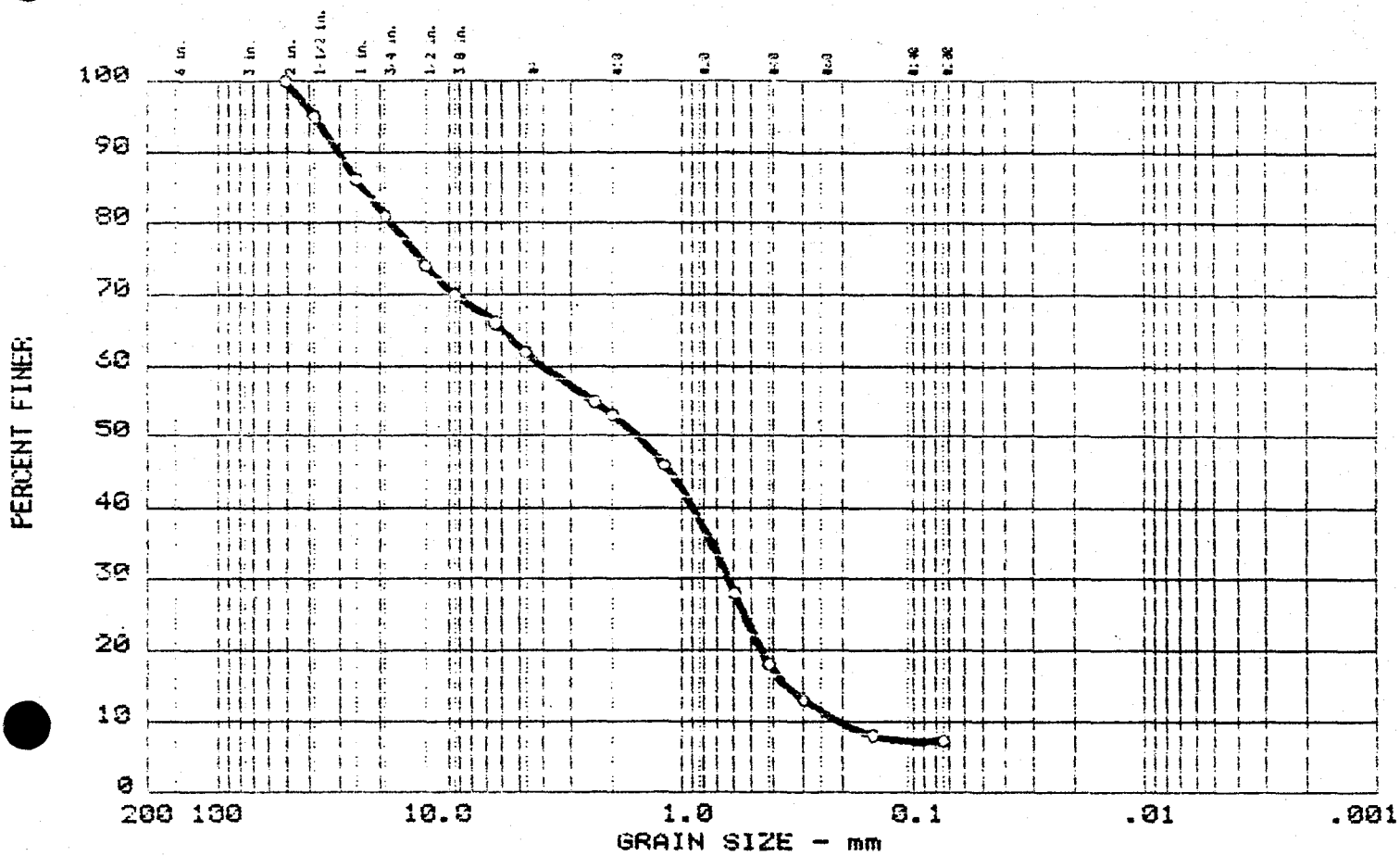
Date: 5/26/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 33

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	13	0.0	38.0	54.7	7.3	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			23.99	3.98	1.55	0.629	0.3536	0.2082	0.48	19.1

MATERIAL DESCRIPTION	USCS	AASHTO
○ GRAVELLY SAND; some fines	SP-SM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 13(14 - 15)

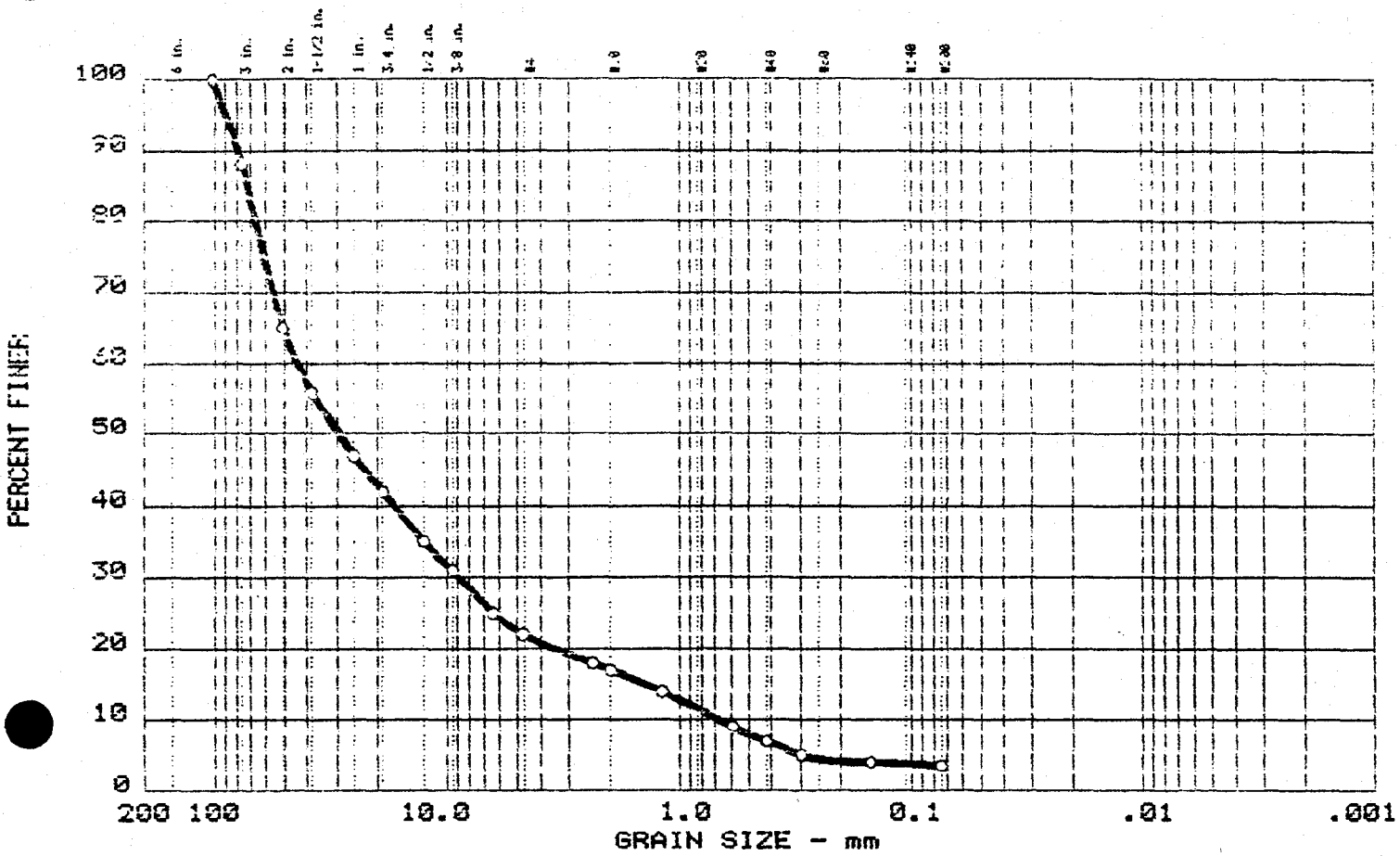
Date: 5/27/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 34

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	13	12.0	66.0	18.5	3.5	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			72.11	44.31	29.28	8.841	1.3852	0.6784	2.60	65.3

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY GRAVEL; with cobbles, trace fines	GW	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 14(2 - 3)

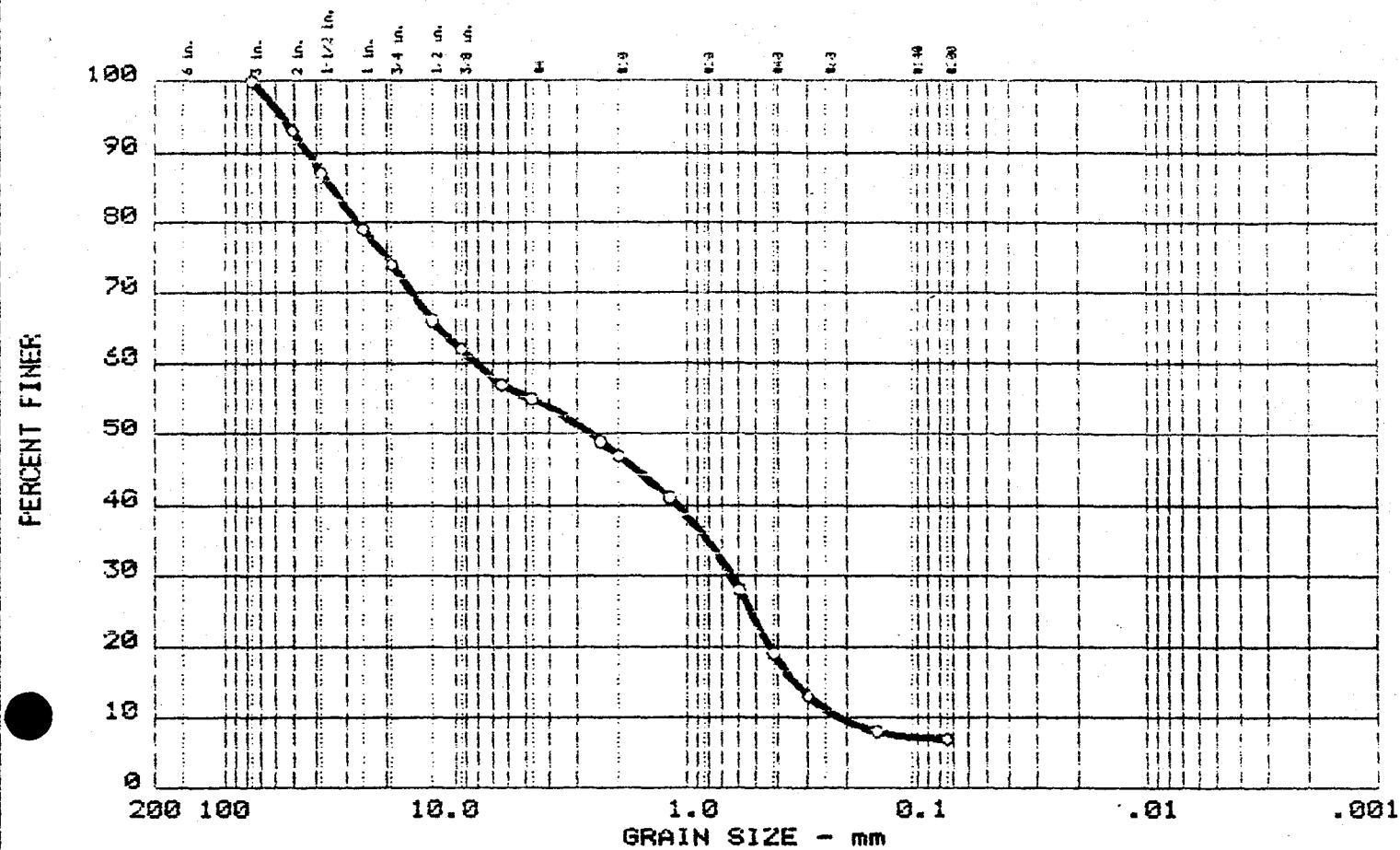
Date: 5/27/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 36

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	17	0.0	45.0	48.0	7.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			34.63	8.12	2.60	0.638	0.3385	0.2185	0.23	37.2

MATERIAL DESCRIPTION	USCS	AASHTO
○ SAND AND GRAVELS; some fines	SP-SM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP -14(9 - 10)

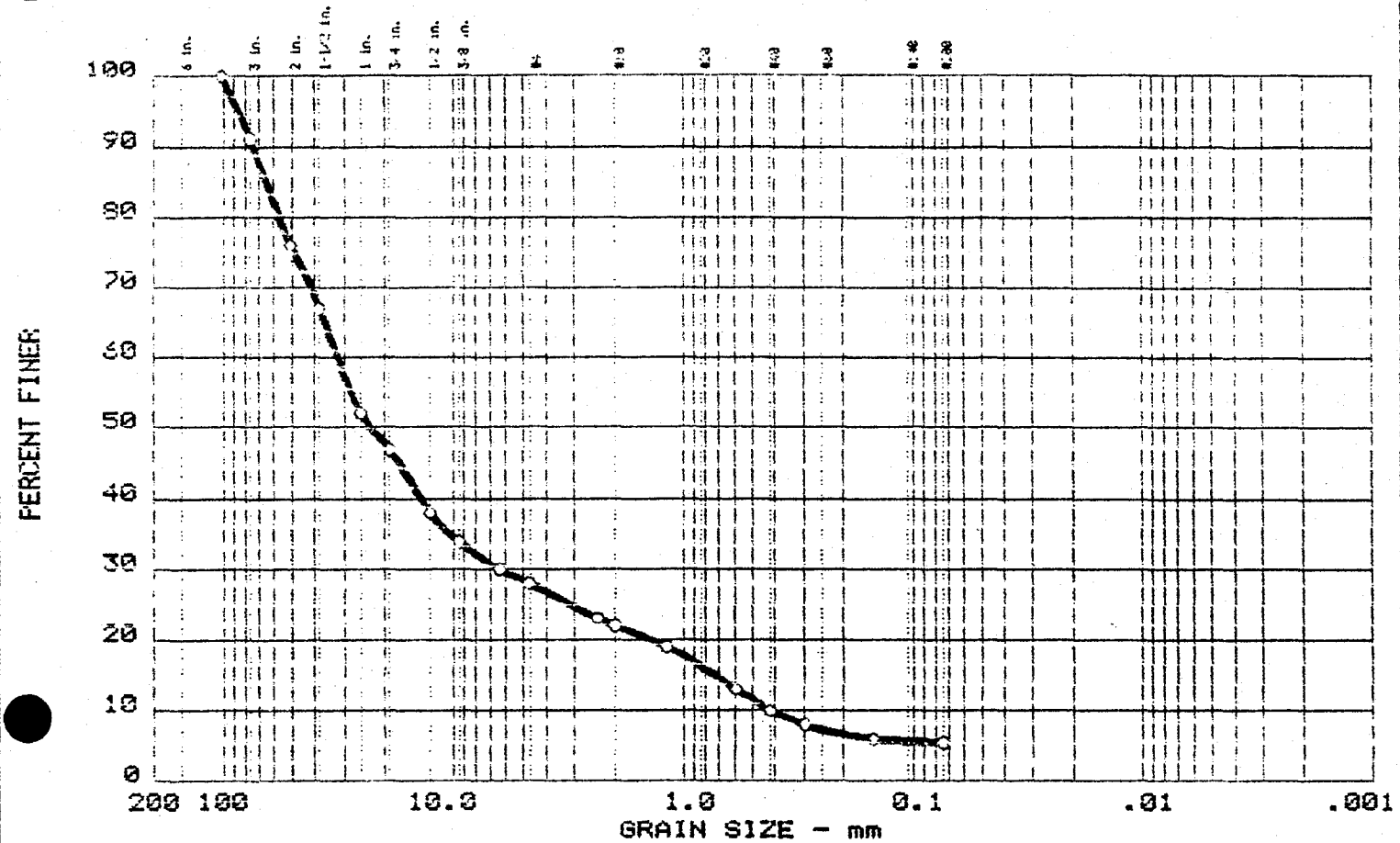
Date: 5/26/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 37

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	18	9.0	63.0	22.5	5.5	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			64.57	31.88	23.09	6.288	0.7303	0.4154	2.99	76.7

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY GRAVEL; some cobbles, some fines	GW-GM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 15(3 - 4)

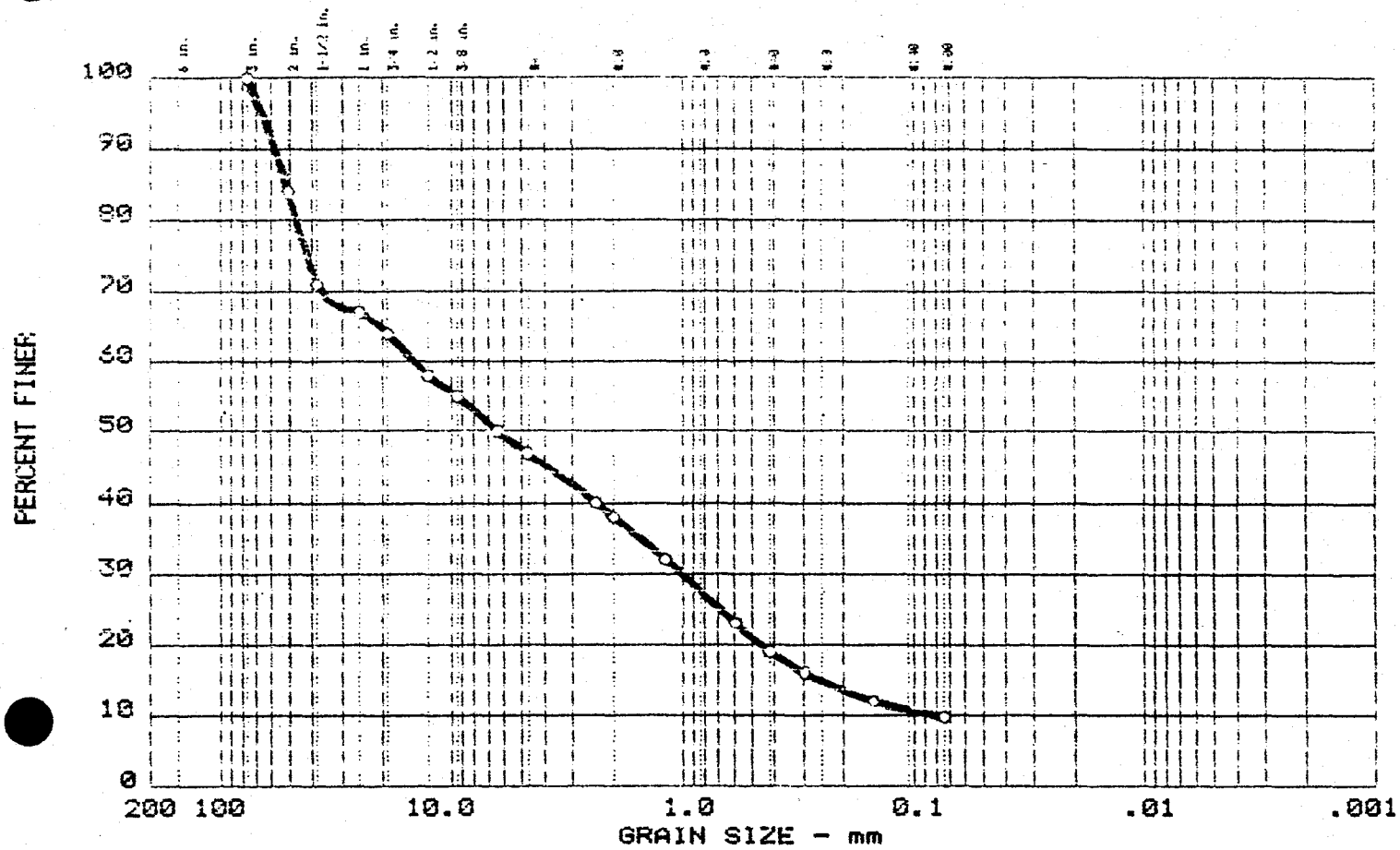
Date: 5/26/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 38

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	20	0.0	53.0	37.2	9.8	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			51.88	14.62	6.31	1.012	0.2570	0.0741	0.94	197.2

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY GRAVEL; some fines	GP-GM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 15(23 - 24)

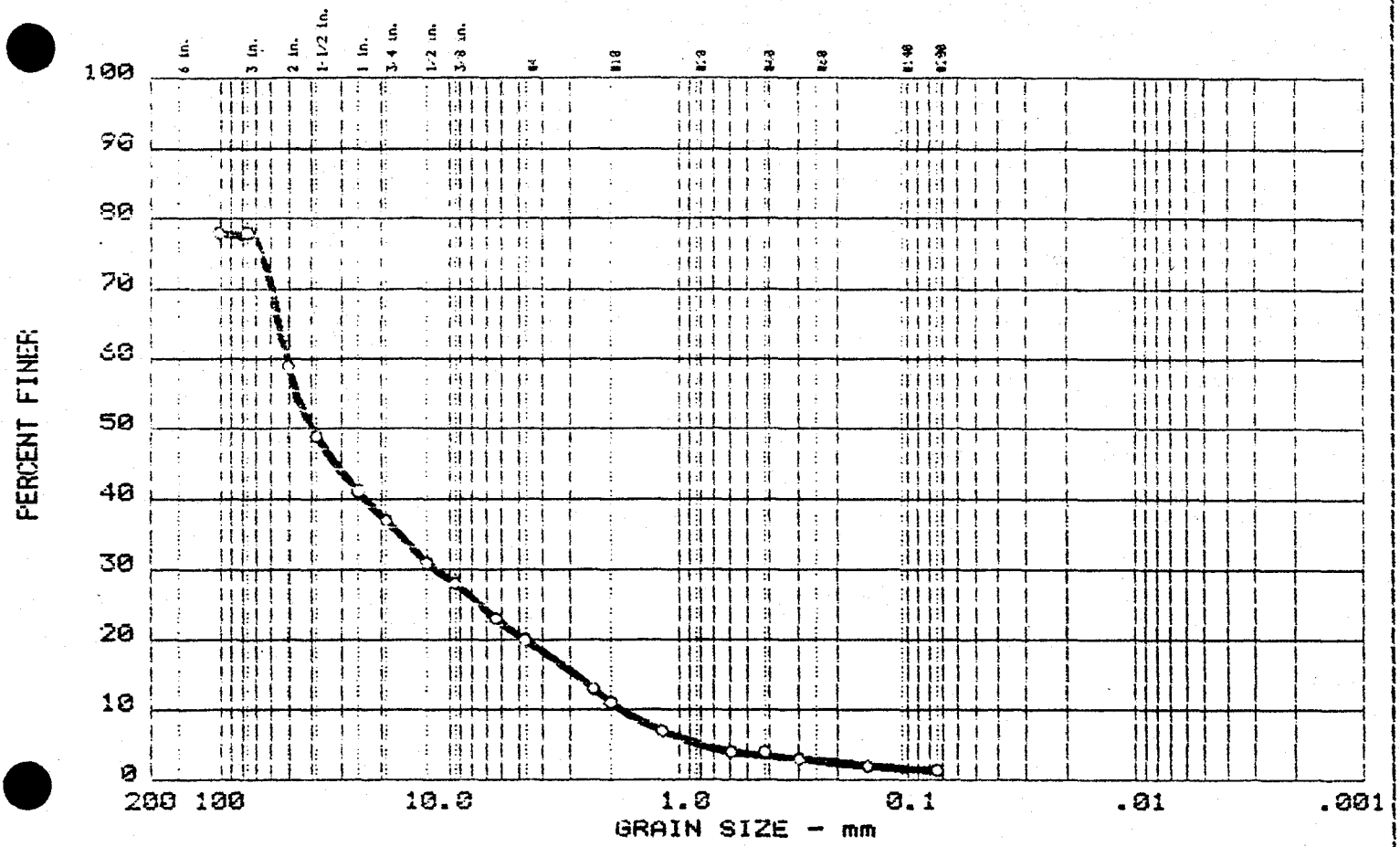
Date: 5/26/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 39

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	16	22.0	58.0	18.6	1.4	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			101.60	51.51	39.53	11.532	2.8307	1.8067	1.43	28.5

MATERIAL DESCRIPTION	USCS	AASHTO
○ GRAVEL;with sand, with cobbles,trace fines	GW	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 16(1 - 2)

Date: 5/9/88

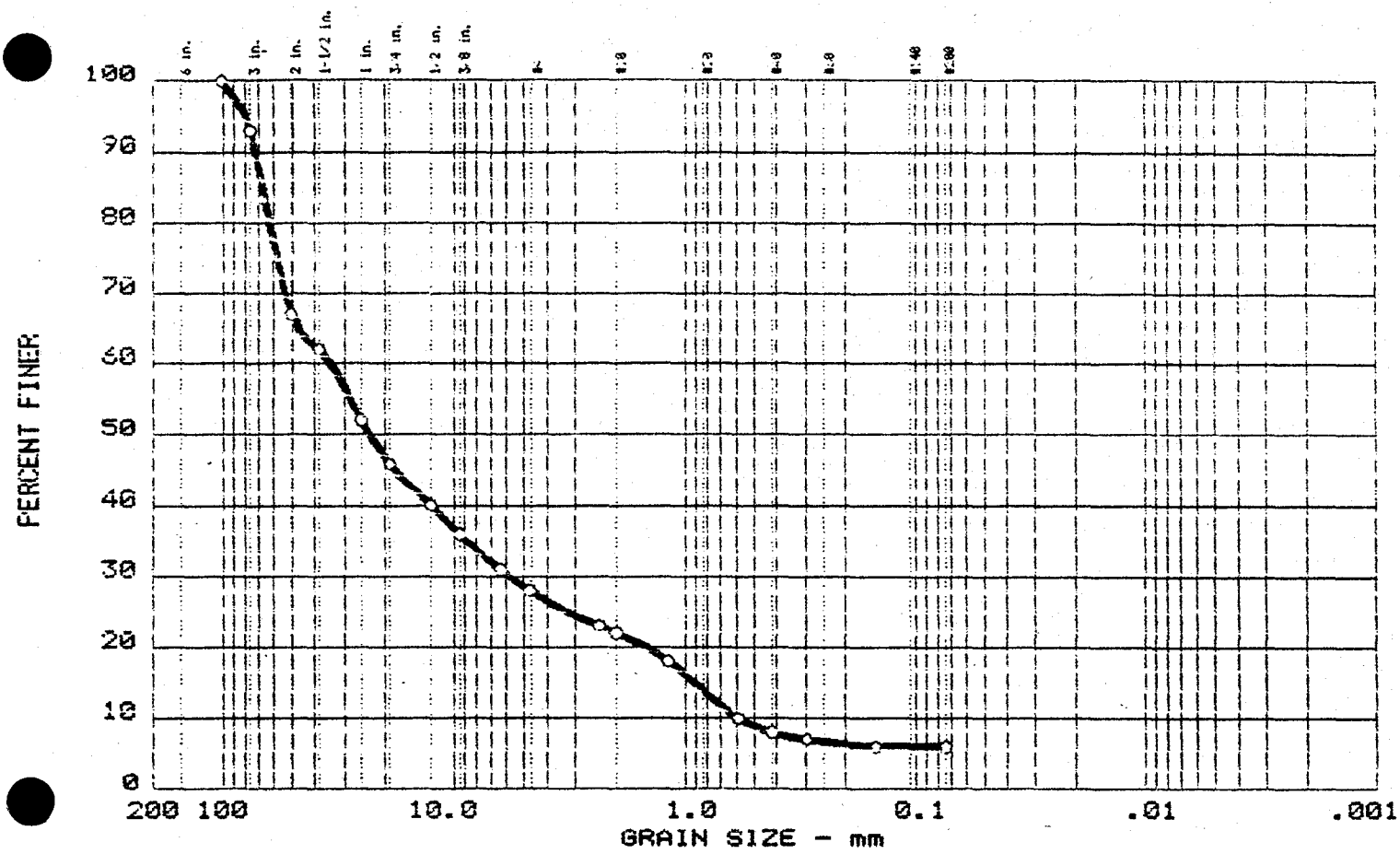
Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT

WESTERN TECHNOLOGIES INC.

Fig. No. 40

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	18	7.0	65.0	28.0	0.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			66.83	33.88	23.36	5.735	0.9194	0.5868	1.65	57.7

MATERIAL DESCRIPTION	USCS	AASHTO
○ GRAVEL; with sand;some cobbles;some fines	GW-GM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 16(4 - 5)

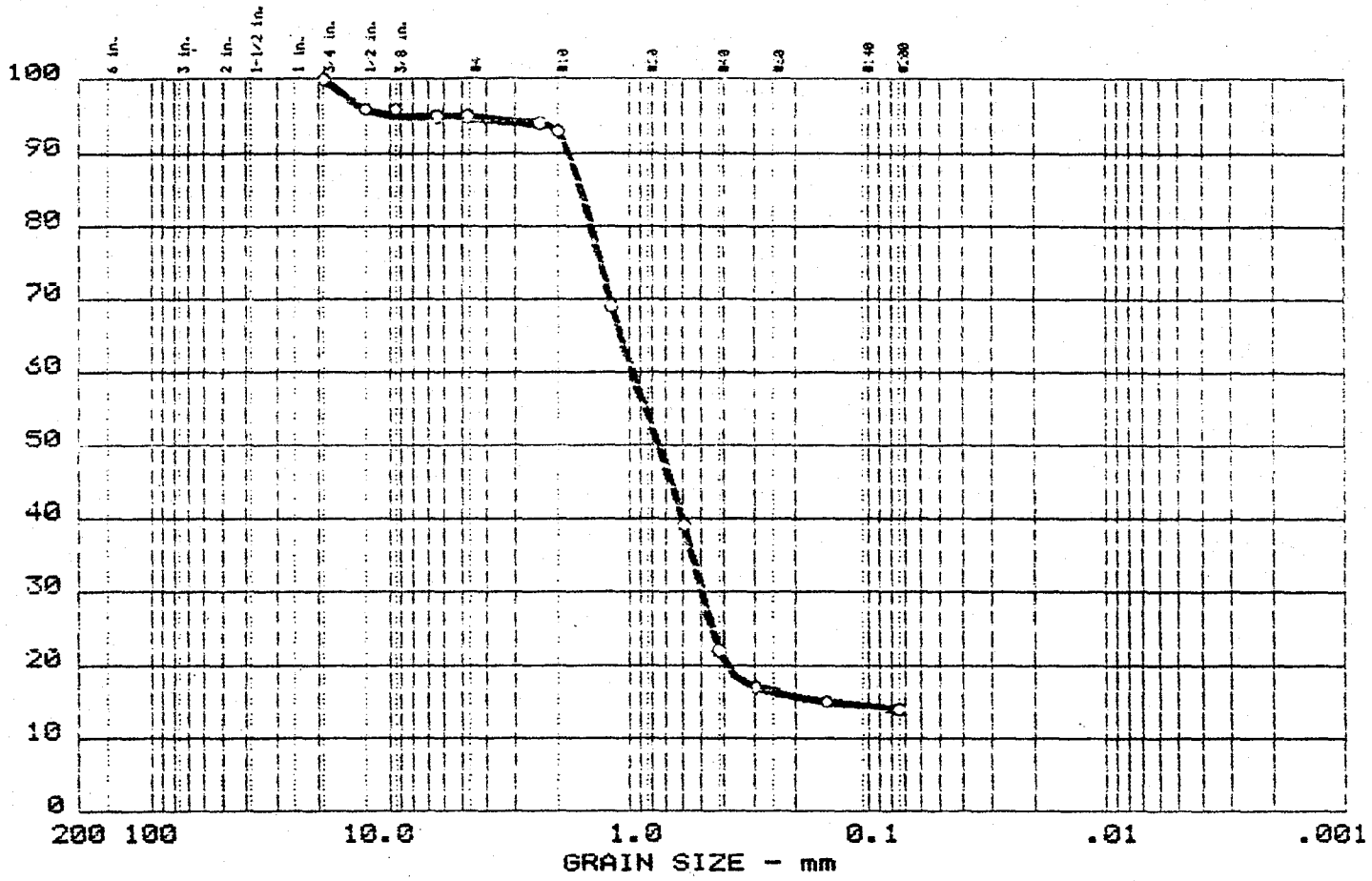
Date: 5/9/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 41

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	19	0.0	5.2	80.8	14.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			1.60	0.97	0.76	0.499	0.1489			

MATERIAL DESCRIPTION	USCS	AASHTO
○ SAND;some fines,trace gravels	SM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 16(9 - 10)

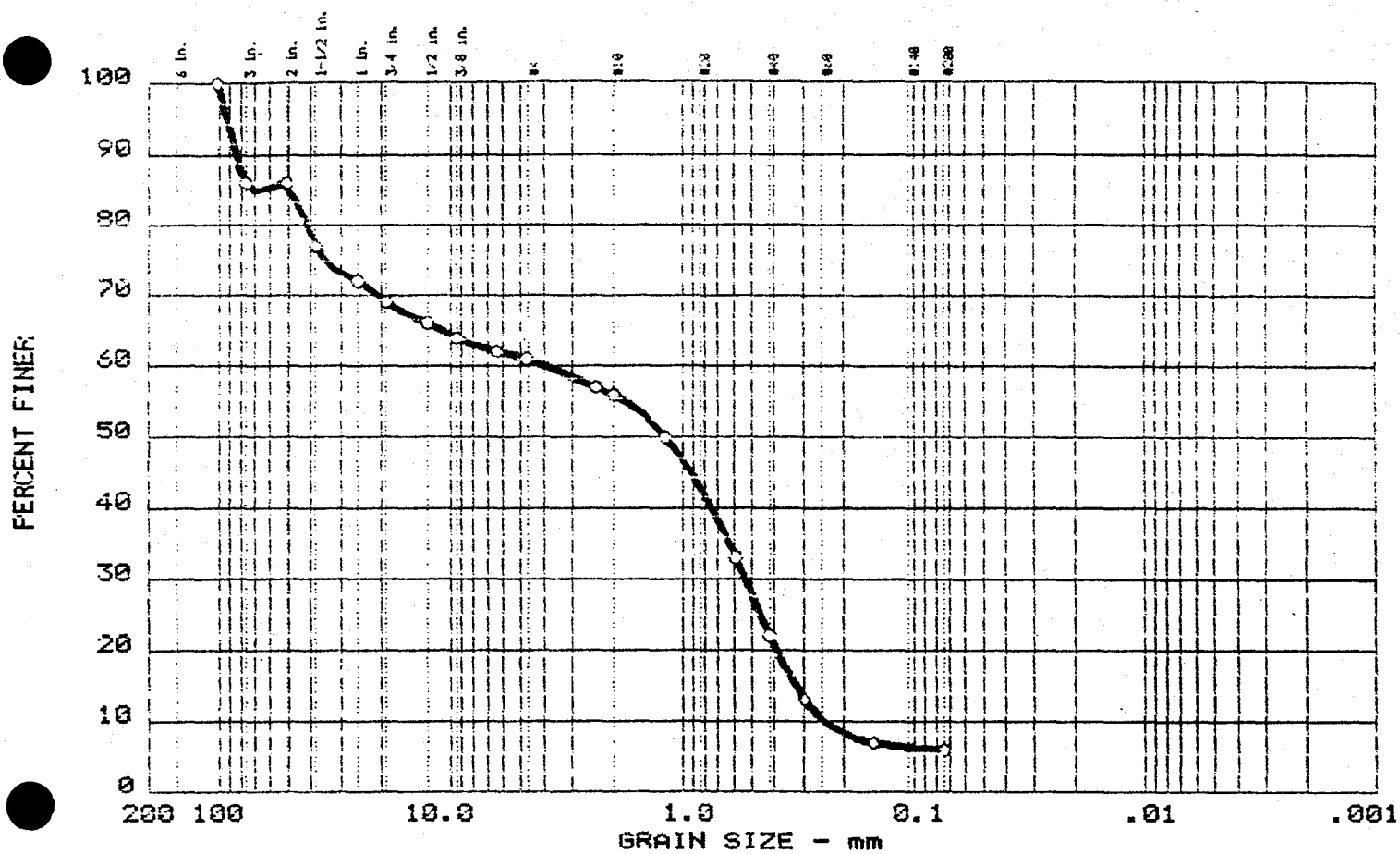
Date: 5/9/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 42

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	20	14.0	25.0	55.0	6.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			67.61	3.89	1.19	0.537	0.3236	0.2427	0.31	16.0

MATERIAL DESCRIPTION	USCS	AASHTO
○ GRAVELLY SAND; some cobbles, some fines	SP-SM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 16(16 - 18)

Date: 5/9/88

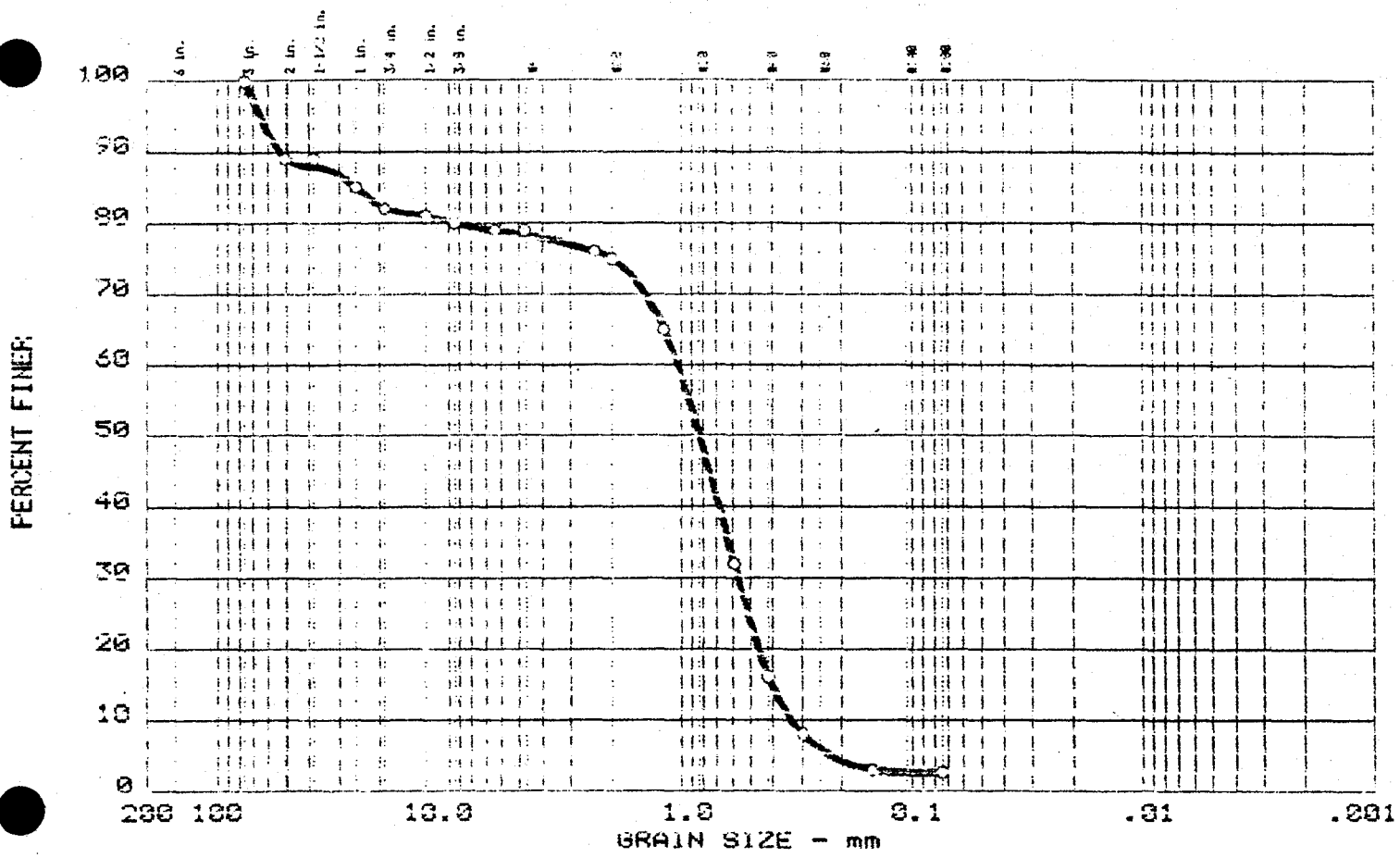
Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT

WESTERN TECHNOLOGIES INC.

Fig. No. 43

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	5	0.0	21.6	75.7	2.7	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			25.12	1.04	0.83	0.568	0.4064	0.3342	0.93	3.1

MATERIAL DESCRIPTION	USCS	AASHTO
○ SAND; with gravel, trace fines	SP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 17(1 - 2)

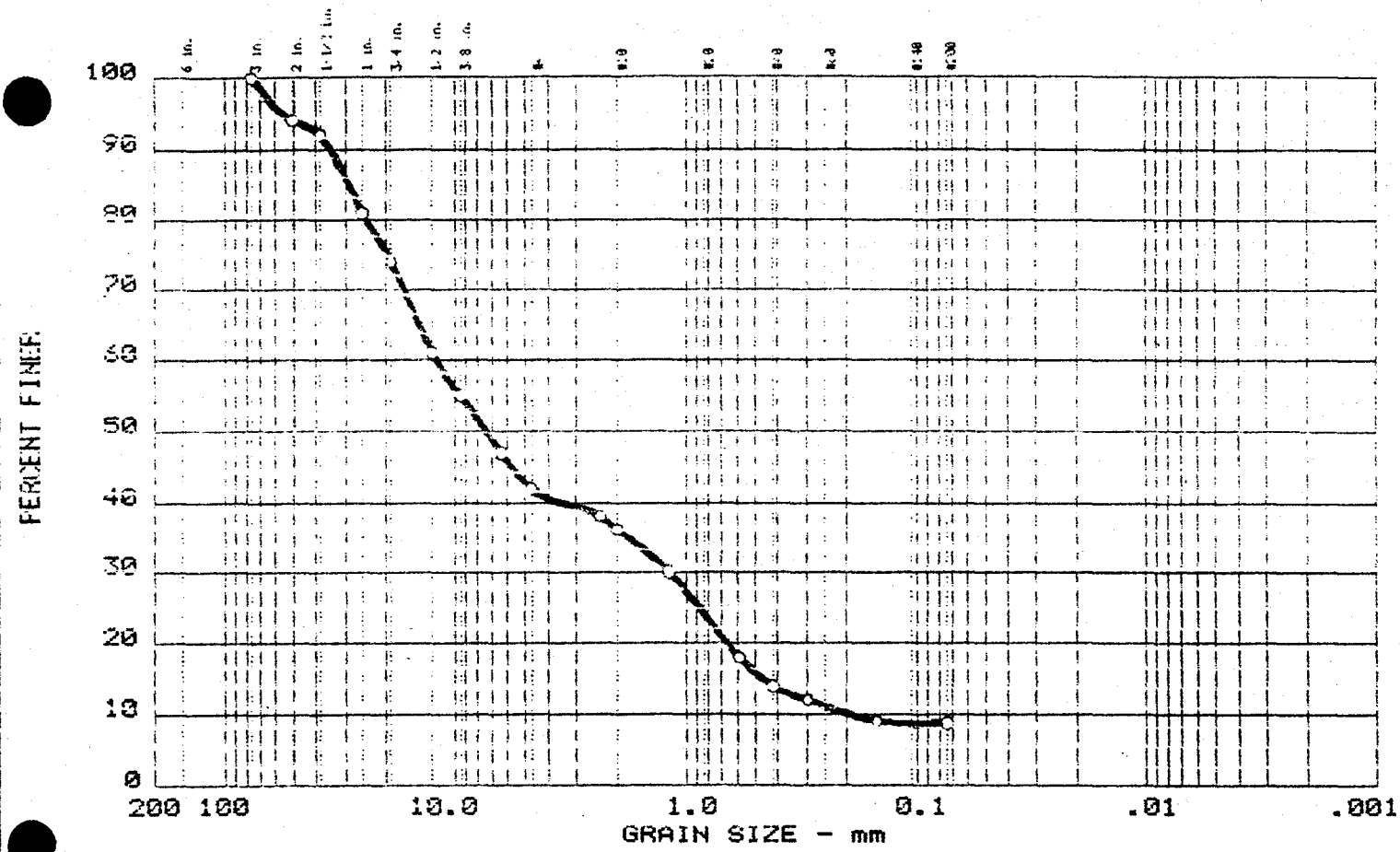
Date: 5/10/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 44

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	13	0.0	58.0	33.2	8.8	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			29.04	12.20	7.35	1.179	0.4640	0.1957	0.58	62.4

MATERIAL DESCRIPTION	USCS	AASHTO
○ GRAVEL AND SAND; some fines	GP-GM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 17(5 - 6)

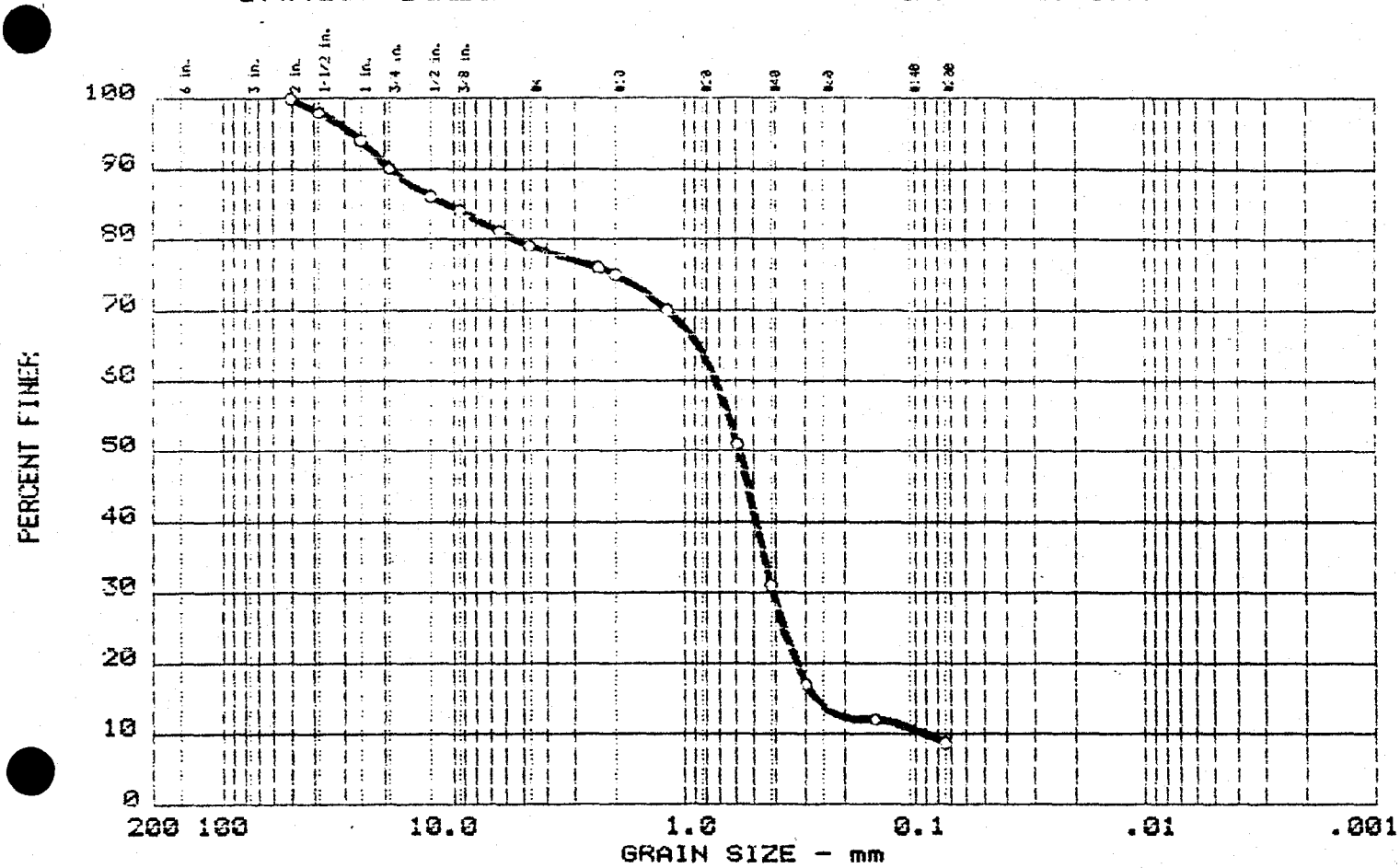
Date: 5/26/88

Remarks:
ASTM D 4221

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 45

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	18	0.0	21.0	70.3	8.7	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○		NP	10.96	0.73	0.58	0.412	0.2692	0.0902	2.58	8.1

MATERIAL DESCRIPTION	USCS	AASHTO
○ SAND; with gravel, some fines	SW-SM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP -17(14 - 15)

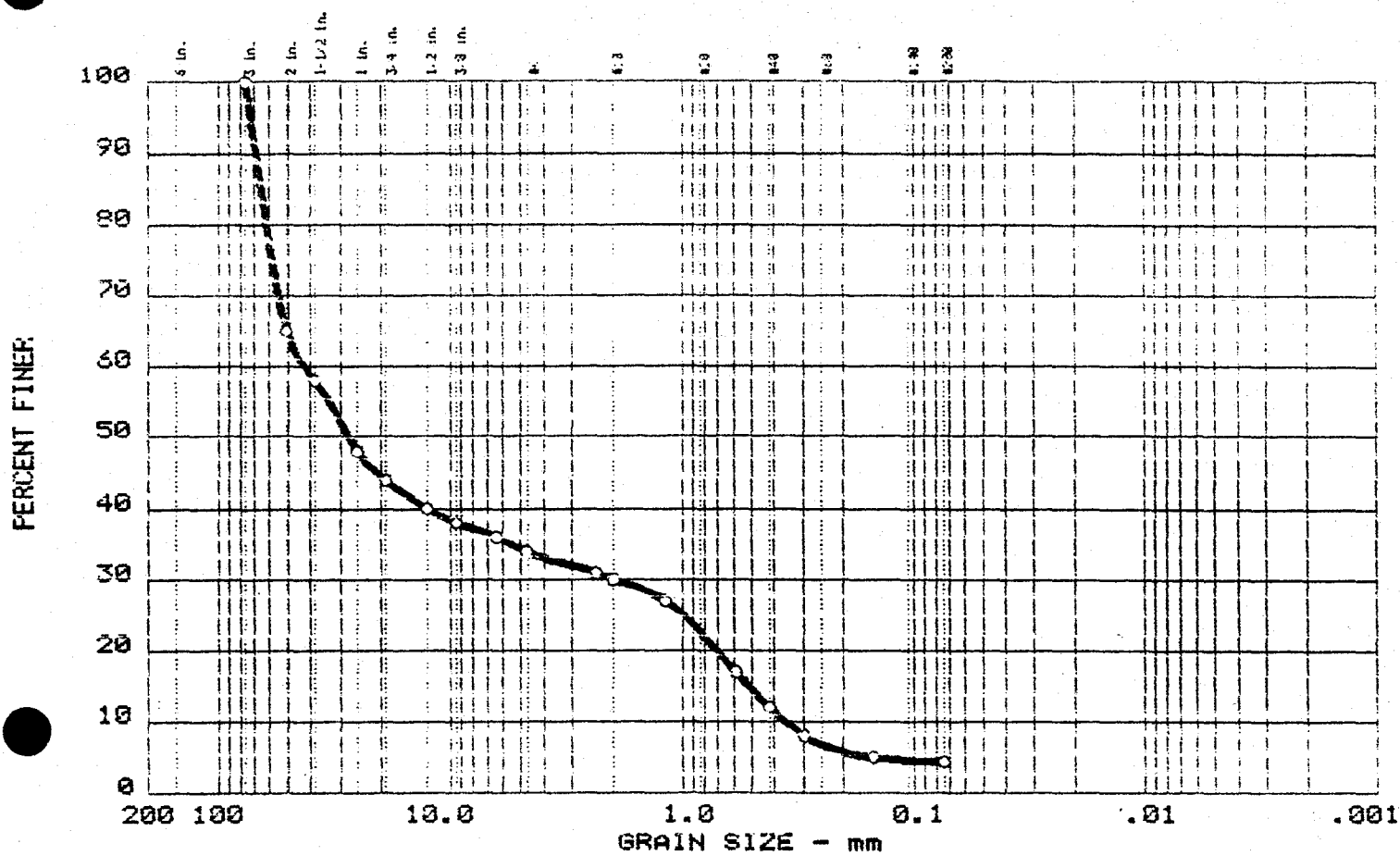
Date: 5/25/88

Remarks:
ASTM D 4221

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 46

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	16	0.0	66.0	29.6	4.4	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			65.84	42.51	27.67	1.982	0.5152	0.3565	0.26	119.3

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY GRAVEL; trace fines	GP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 18(3 - 4)

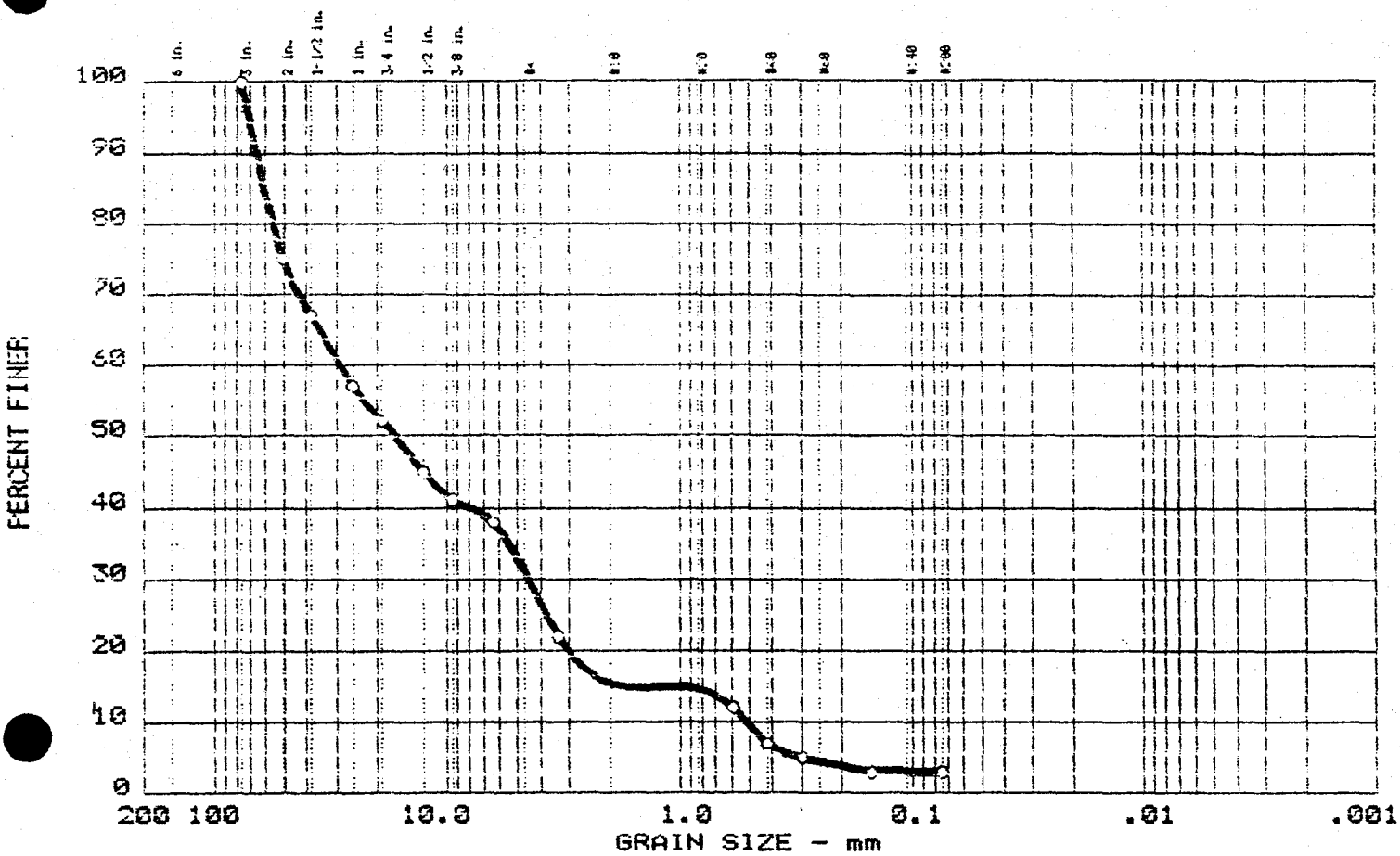
Date: 5/26/88

Remarks:
ASTM D 4221

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 47

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	17	0.0	68.5	31.5	0.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			61.31	28.67	16.88	4.493	1.6692	0.5158	1.36	55.6

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY GRAVEL; trace fines	GW	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 18(16 - 17)

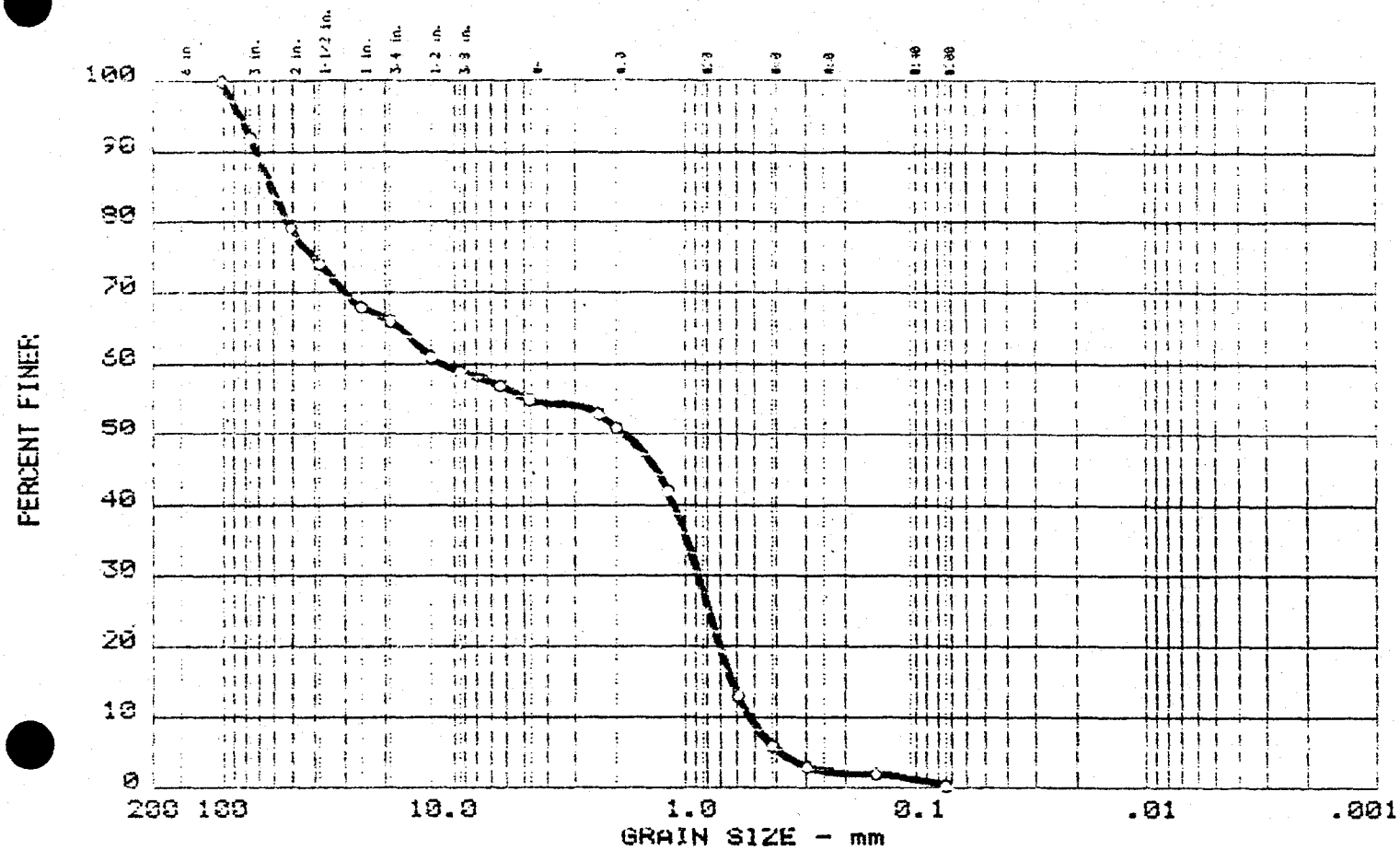
Date: 5/26/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 48

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	3	8.0	37.0	54.7	0.3	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			61.66	11.22	1.82	0.881	0.6237	0.5248	0.13	21.4

MATERIAL DESCRIPTION	USCS	AASHTO
○ GRAVELLY SAND; some cobbles, none to trace fines	SP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 19(3 - 4)

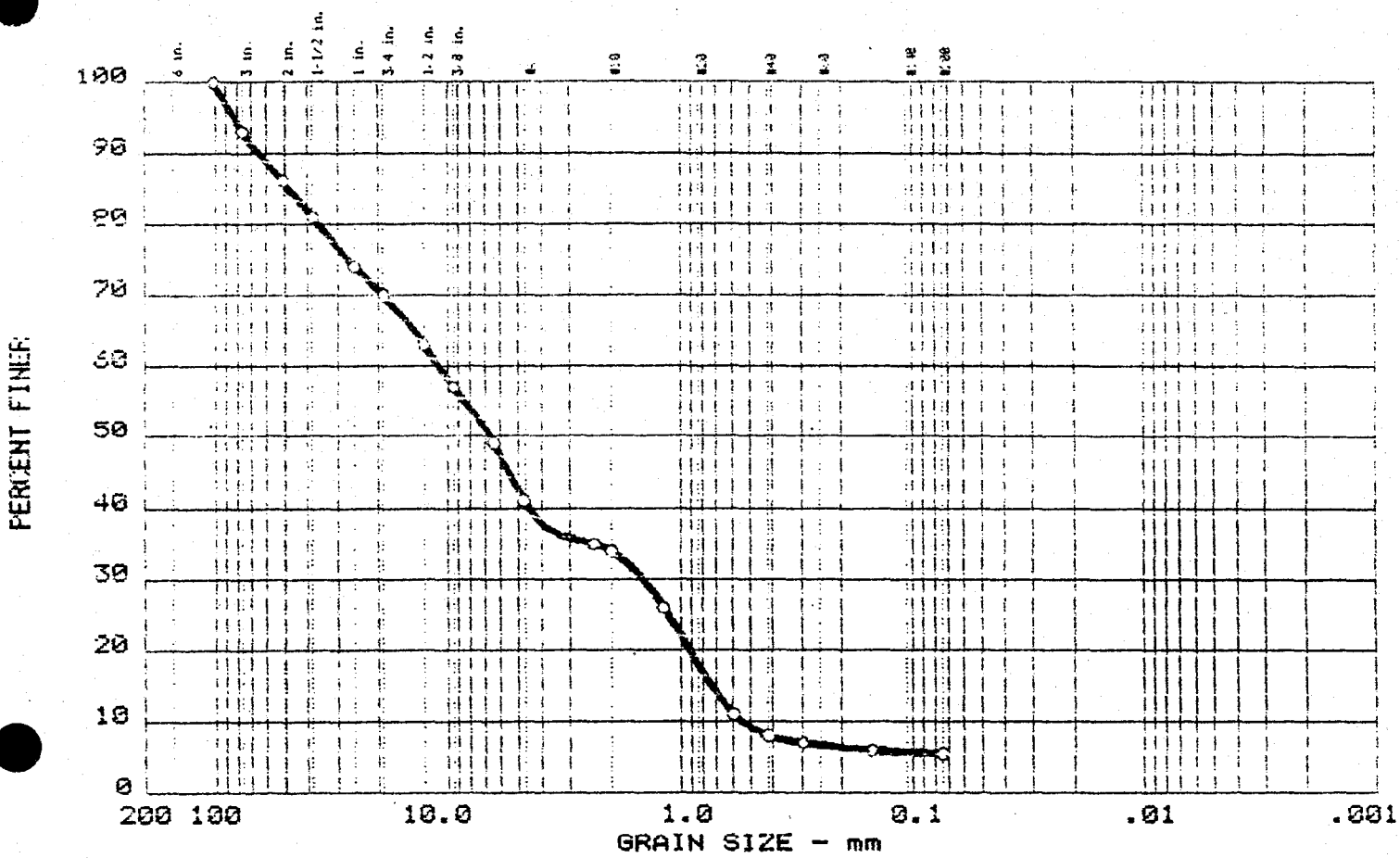
Date: 5/26/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 49

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	4	7.0	52.0	35.5	5.5	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			47.32	10.96	6.61	1.462	0.7328	0.5433	0.36	20.2

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY GRAVEL, some cobbles, some fines	GP-GM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 19(8 - 10)

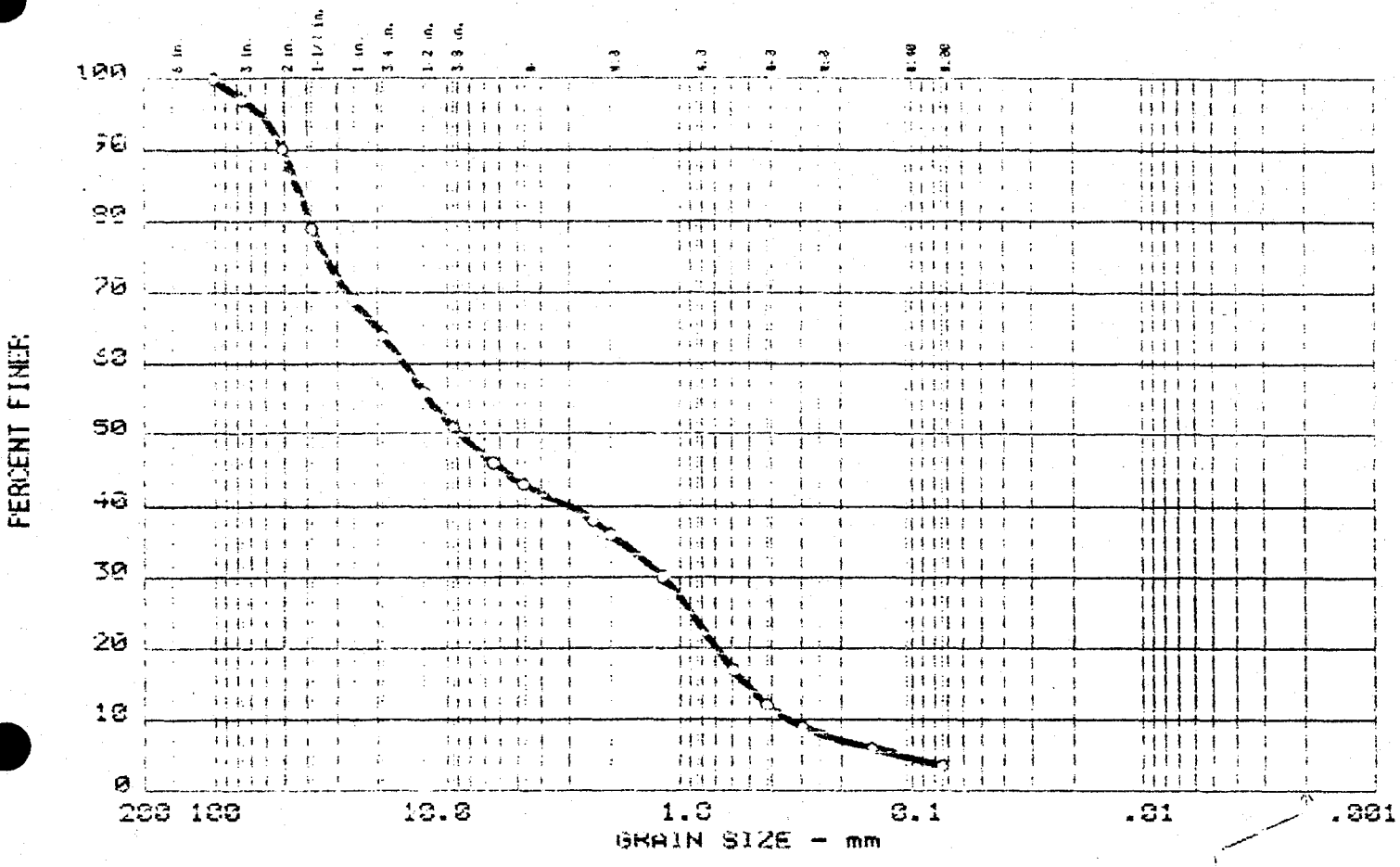
Date: 5/26/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 50

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	17	3.0	54.0	39.5	3.5	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			44.16	15.49	8.81	1.189	0.5188	0.3388	0.27	45.7

MATERIAL DESCRIPTION	USCS	AASHTO
○ SAND AND GRAVELS; trace fines, trace cobbles	GP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 19(10 - 19)

Date: 5/28/88

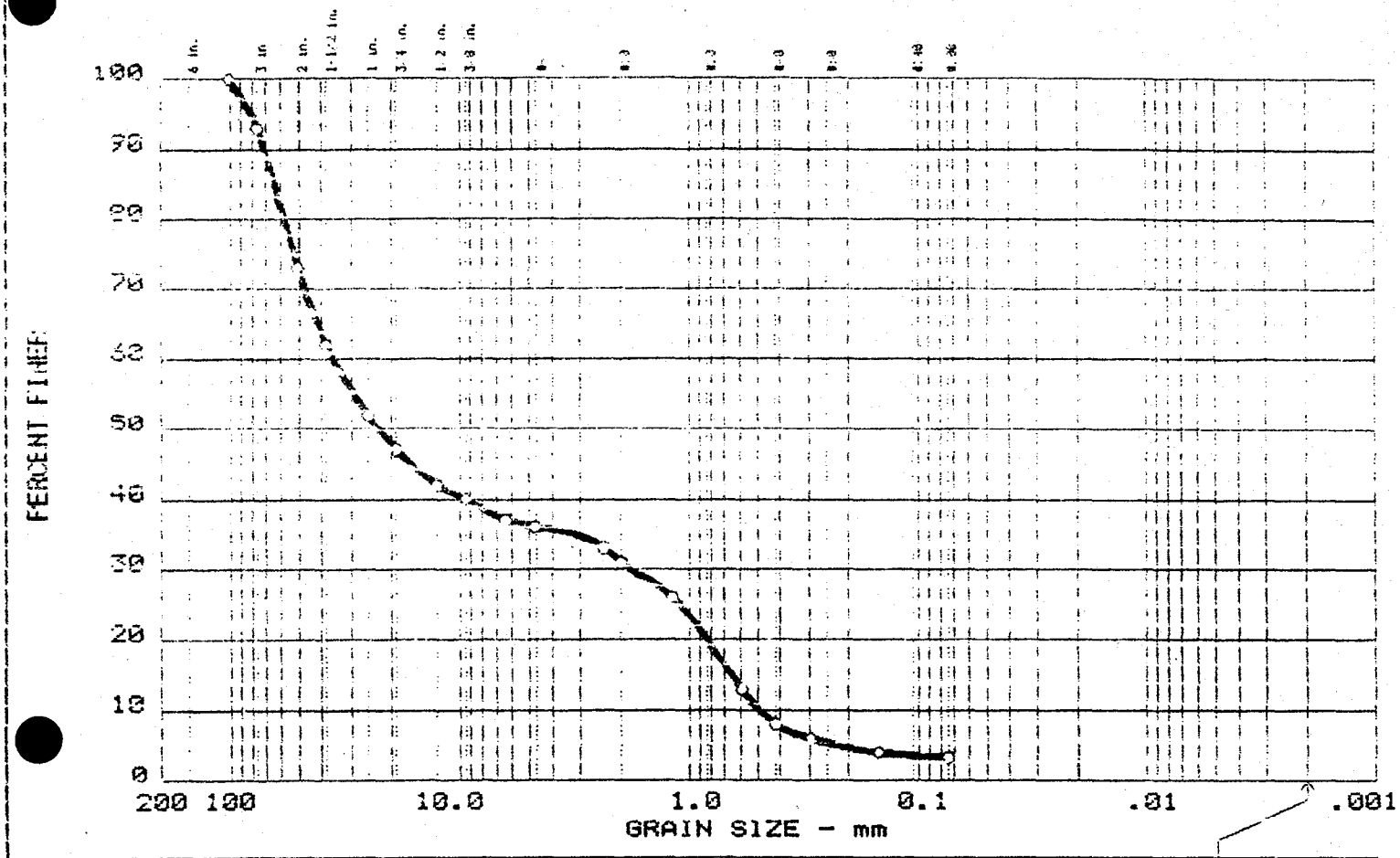
Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT

WESTERN TECHNOLOGIES INC.

Fig. No. 51

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	18	7.0	57.0	32.7	3.3	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			63.83	35.48	22.65	1.778	0.6531	0.4898	0.18	72.4

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY GRAVEL; some cobbles, trace fines	GP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 20(3 - 4)

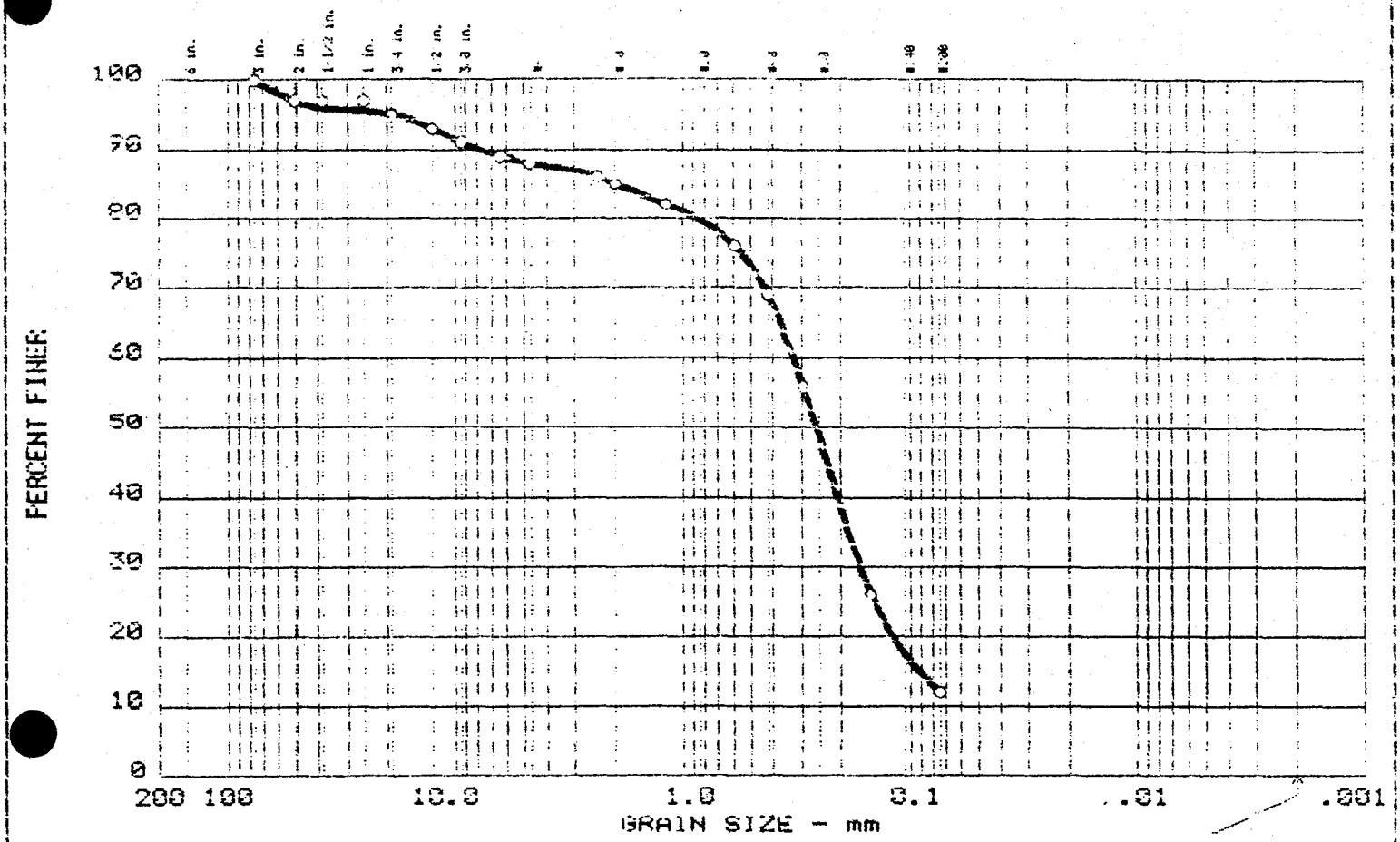
Date: 5/28/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 52

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	19	0.0	12.0	76.0	12.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			2.00	0.33	0.26	0.166	0.0912			

MATERIAL DESCRIPTION	USCS	AASHTO
○ SAND; some fines, some gravel	SP-SM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION
○ Location: TP - 20(21 - 22)

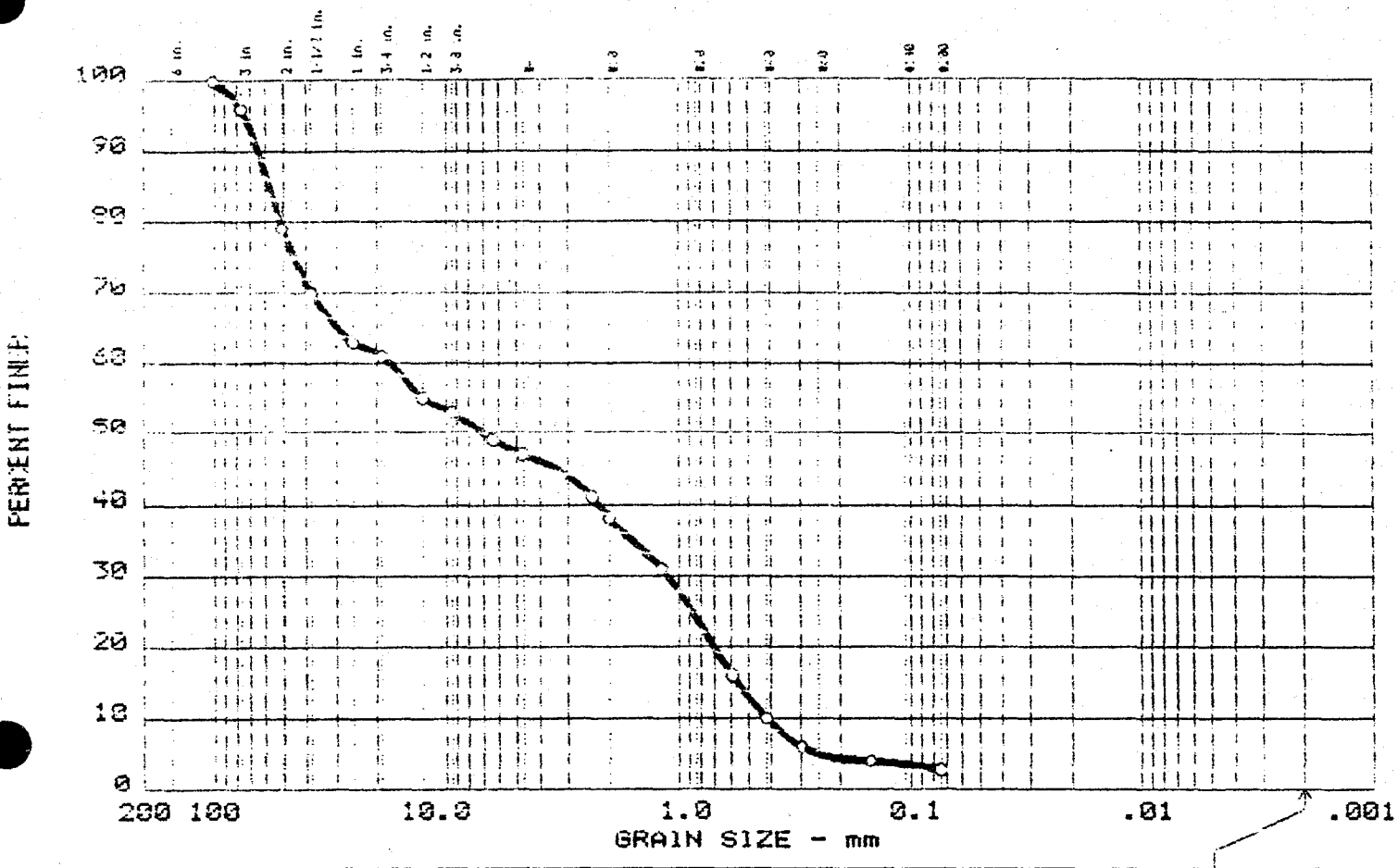
Date: 5/28/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 53

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	20	4.0	49.0	44.2	2.8	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			58.08	17.54	6.98	1.119	0.5610	0.4159	0.17	42.2

MATERIAL DESCRIPTION	USCS	AASHTO
○ SAND AND GRAVELS; trace cobbles, trace fines	SP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 21(1 - 3)

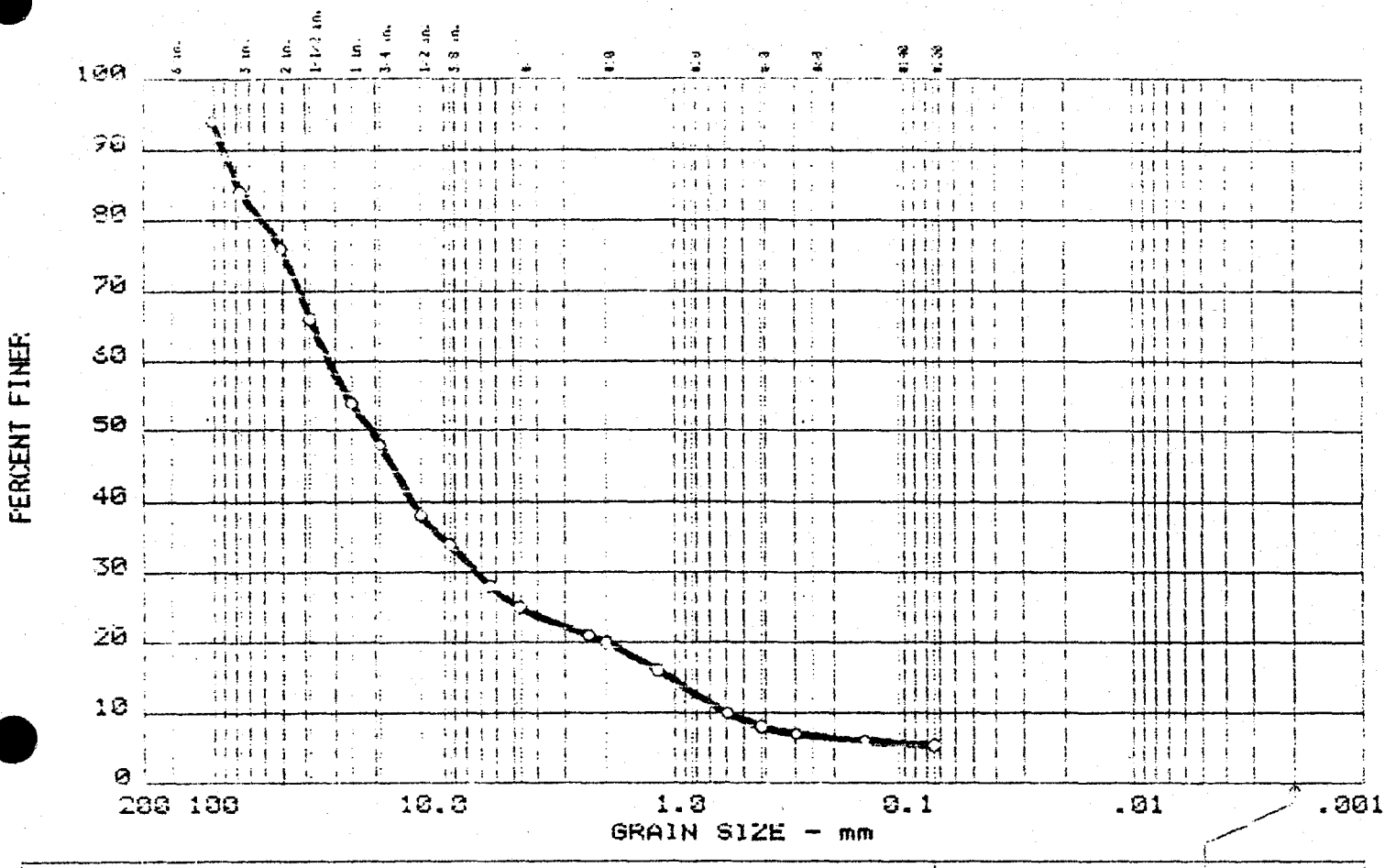
Date: 5/28/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 54

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	4	16.0	59.0	19.6	5.4	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			78.52	31.84	20.80	7.211	1.0544	0.5861	2.79	54.3

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY GRAVELS; with cobbles, some fines	GW-GM	

Project No.: 21280068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 21(7 - 8)

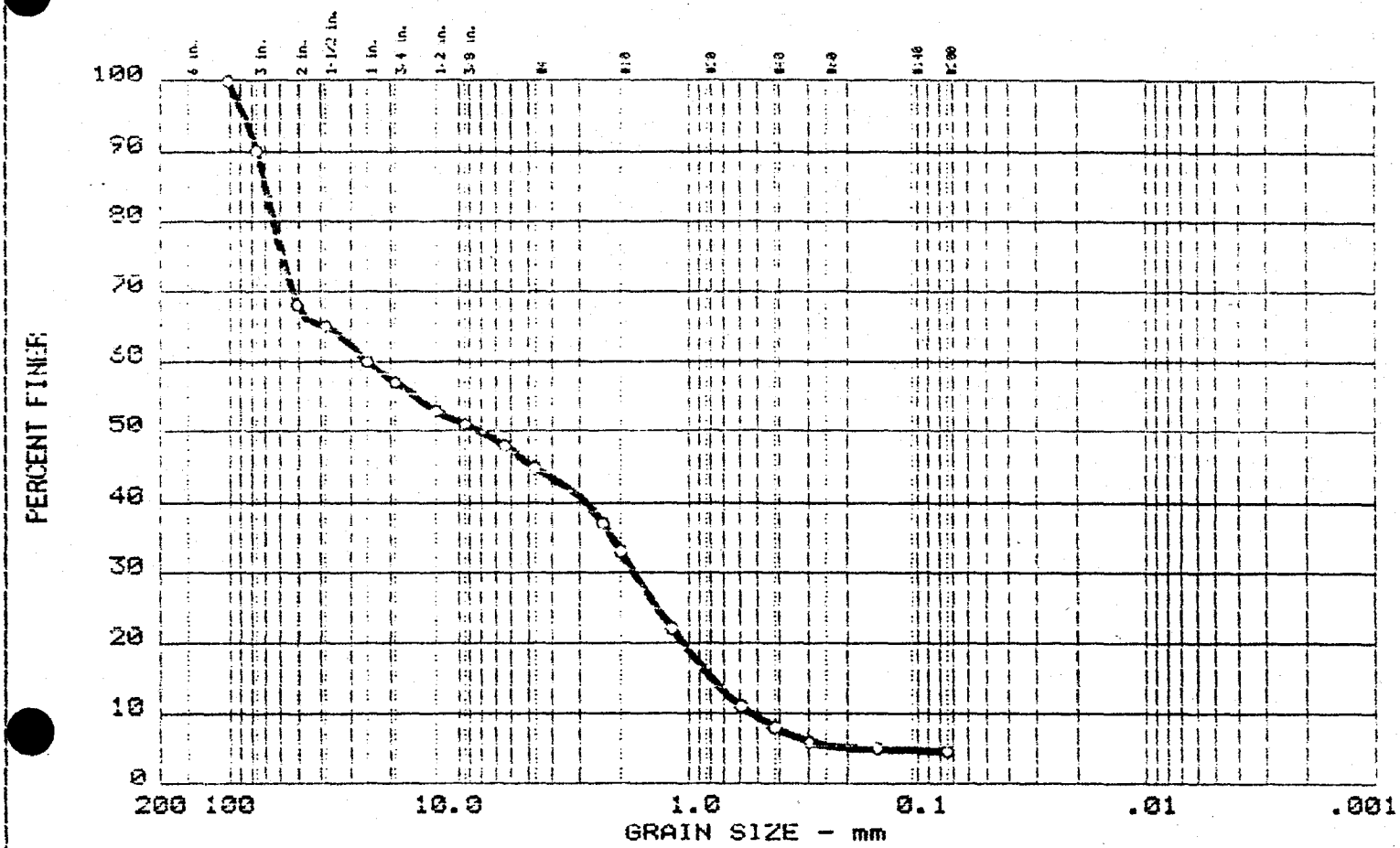
Date: 5/28/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 55

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	15	10.0	45.0	40.3	4.7	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	33	14	69.58	25.26	8.08	1.748	0.7898	0.5339	0.23	47.3

MATERIAL DESCRIPTION	USCS	AASHTO
○ GRAVEL AND SAND; some cobbles, trace fines	GP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 22(1 - 2)

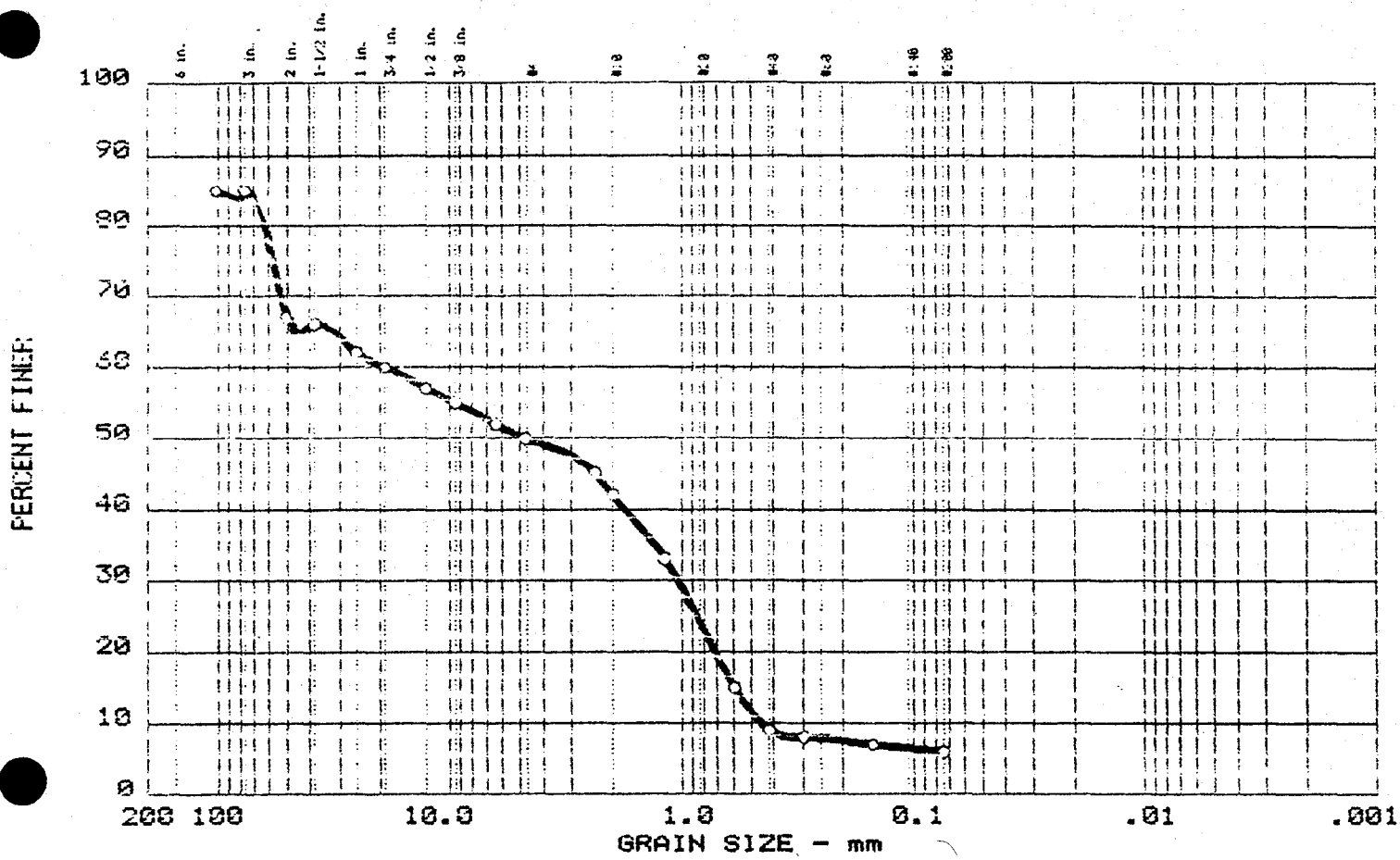
Date: 5/26/88

Remarks:
ASTM D 4221

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 56

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	13	15.7	34.3	44.0	6.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			100.00	18.84	4.73	1.044	0.5868	0.4555	0.13	41.4

MATERIAL DESCRIPTION	USCS	AASHTO
○ GRAVEL AND SAND; with cobbles, some fines	GP-GM	

Project No.: PUPHJRMH
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 22(4 - 5)

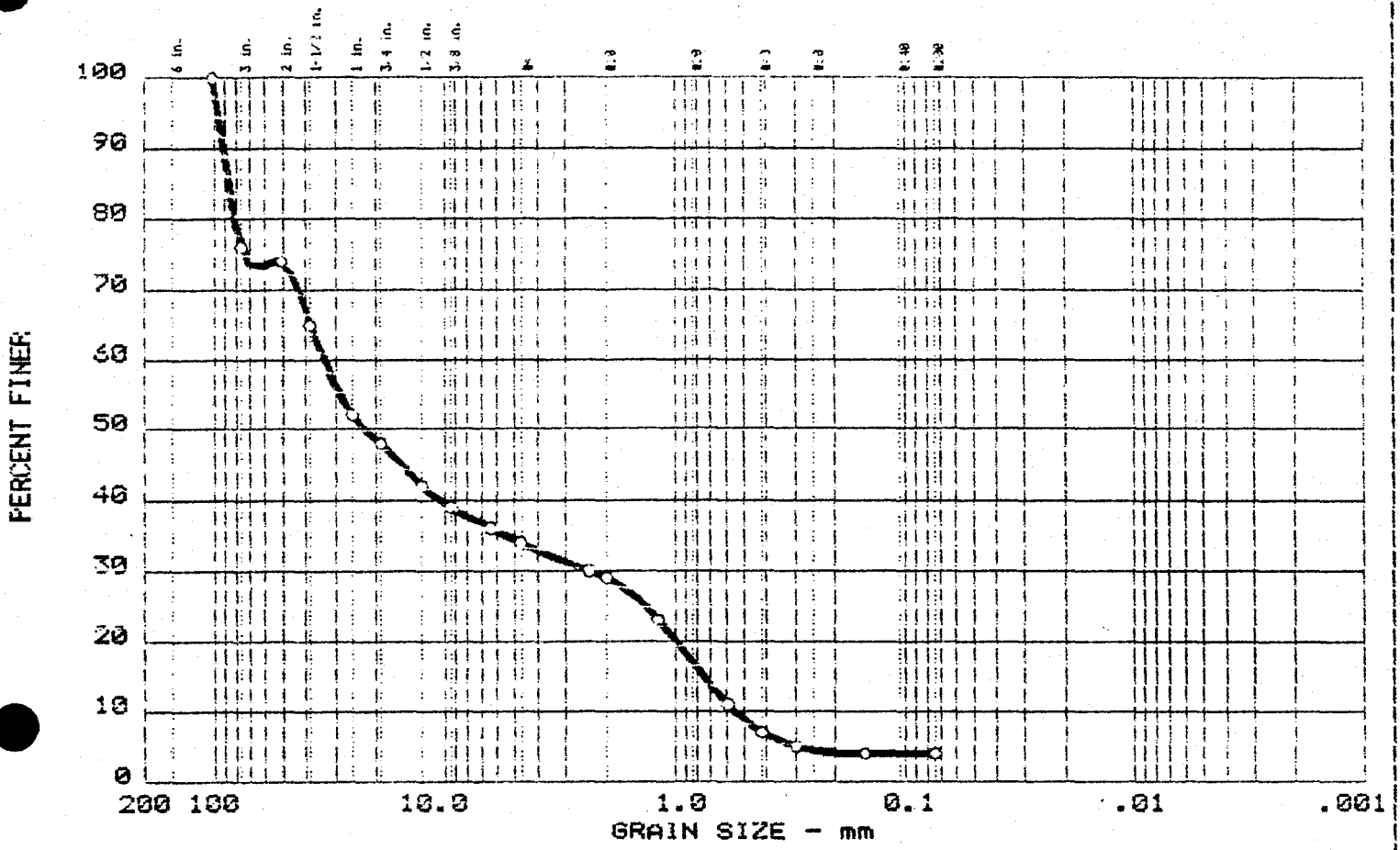
Date: /PM/HH

Remarks:
ASTM D 4221

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 57

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	14	24.0	42.0	34.0	0.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			87.10	33.46	22.36	2.369	0.7490	0.5489	0.31	61.0

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY GRAVEL; with cobbles, trace fines	GP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 23(5 - 7)

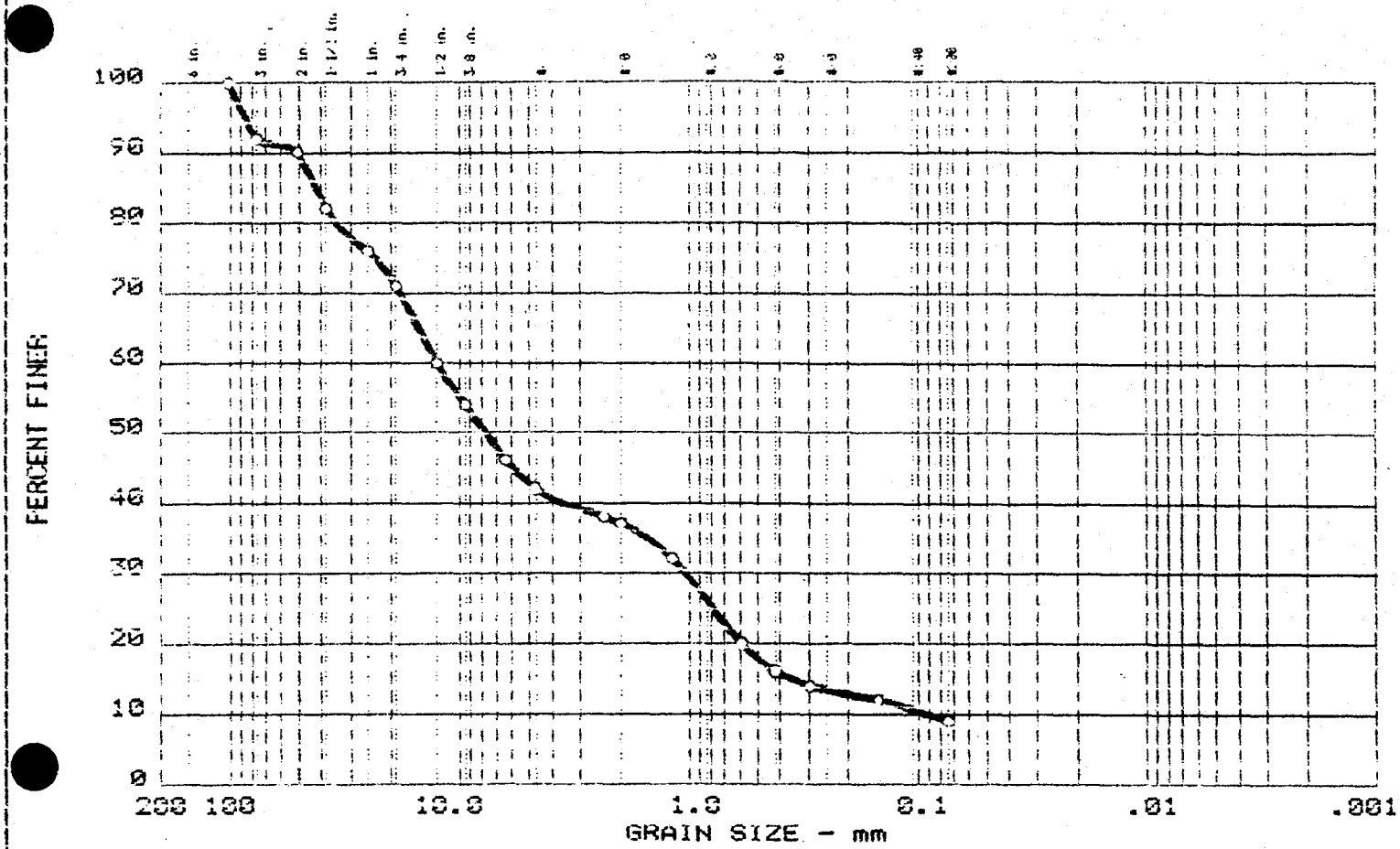
Date: 5/26/88

Remarks:
ASTM D 4221

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 58

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	14	0.0	50.0	33.0	9.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			42.12	12.69	7.83	1.044	0.3618	0.0909	0.94	139.6

MATERIAL DESCRIPTION	USCS	AASHTO
○ GRAVEL AND SAND; some fines, some cobbles	GP-GM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 23(13 - 17)

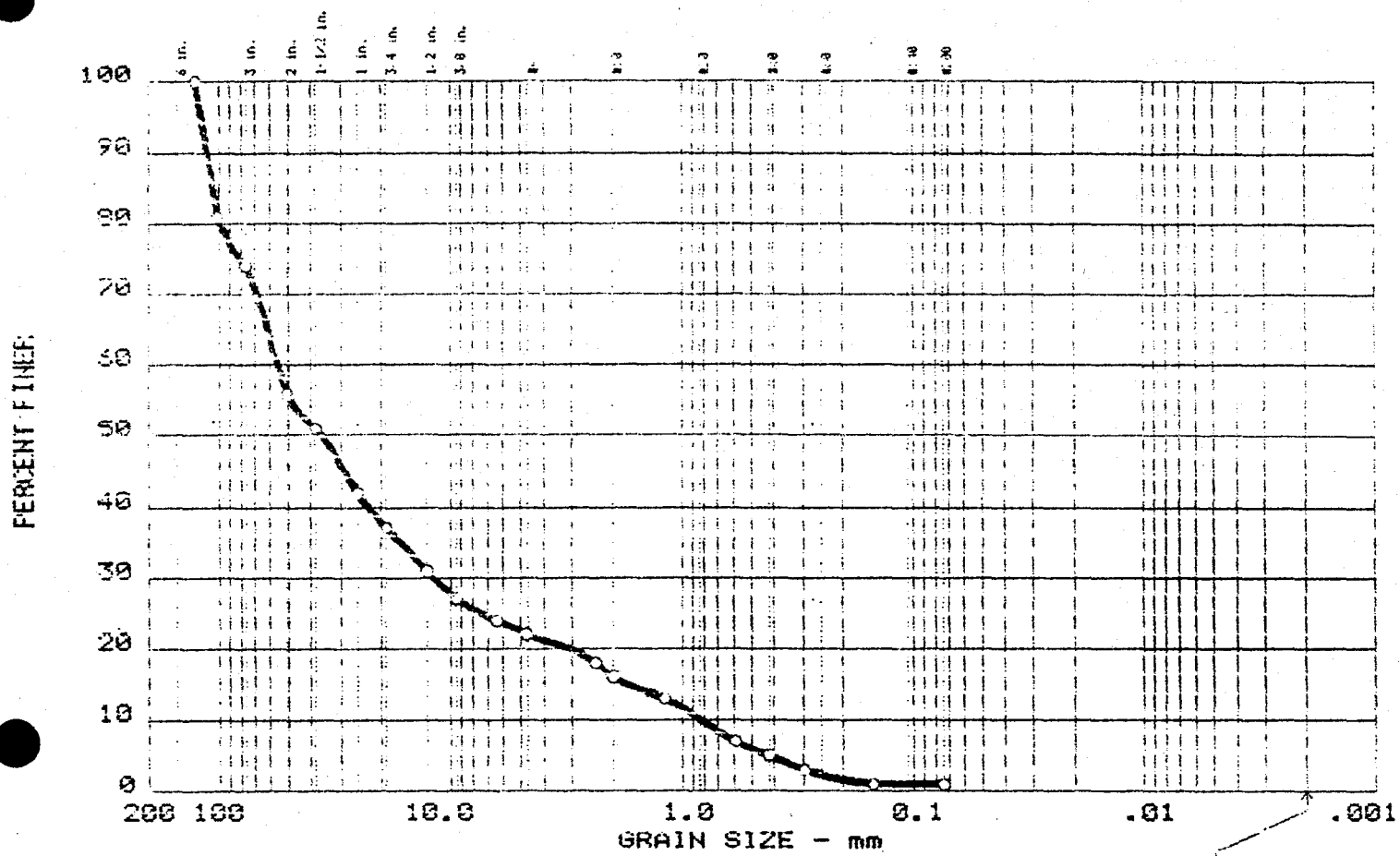
Date: 5/26/88

Remarks:
ASTM D 4221

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 59

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	5	26.0	52.0	22.0	0.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			107.89	55.98	35.73	11.830	1.7701	0.8185	3.05	68.4

MATERIAL DESCRIPTION	USCS	AASHTO
○ GRAVELS AND COBBLES; with sand, trace fines	GP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 24(2 - 3)

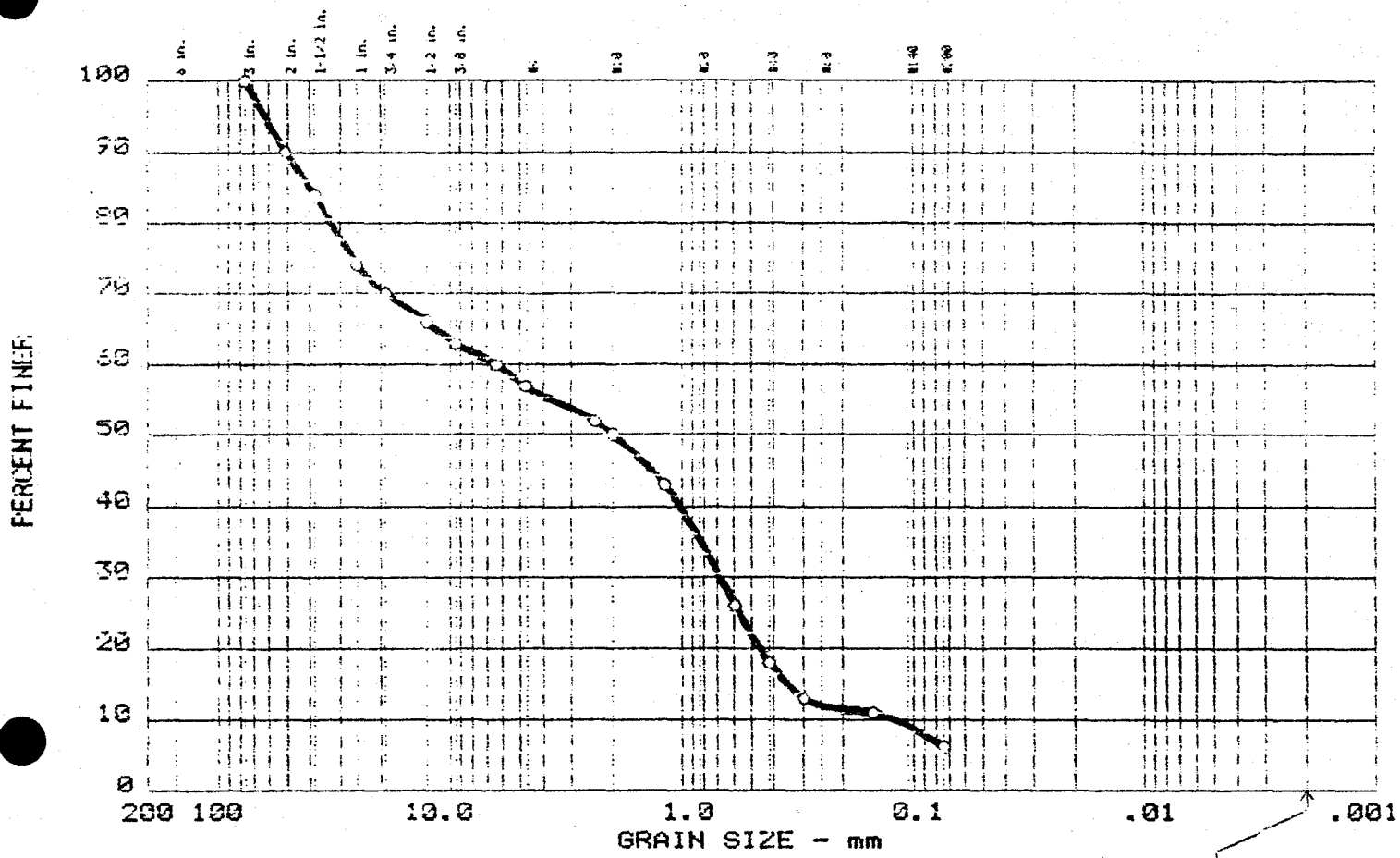
Date: 5/28/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 60

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	7	0.0	43.0	50.8	6.2	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			39.81	6.31	2.00	0.684	0.3508	0.1175	0.63	53.7

MATERIAL DESCRIPTION	USCS	AASHTO
○ GRAVELLY SAND; some fines	SP-SM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 25(2 - 3)

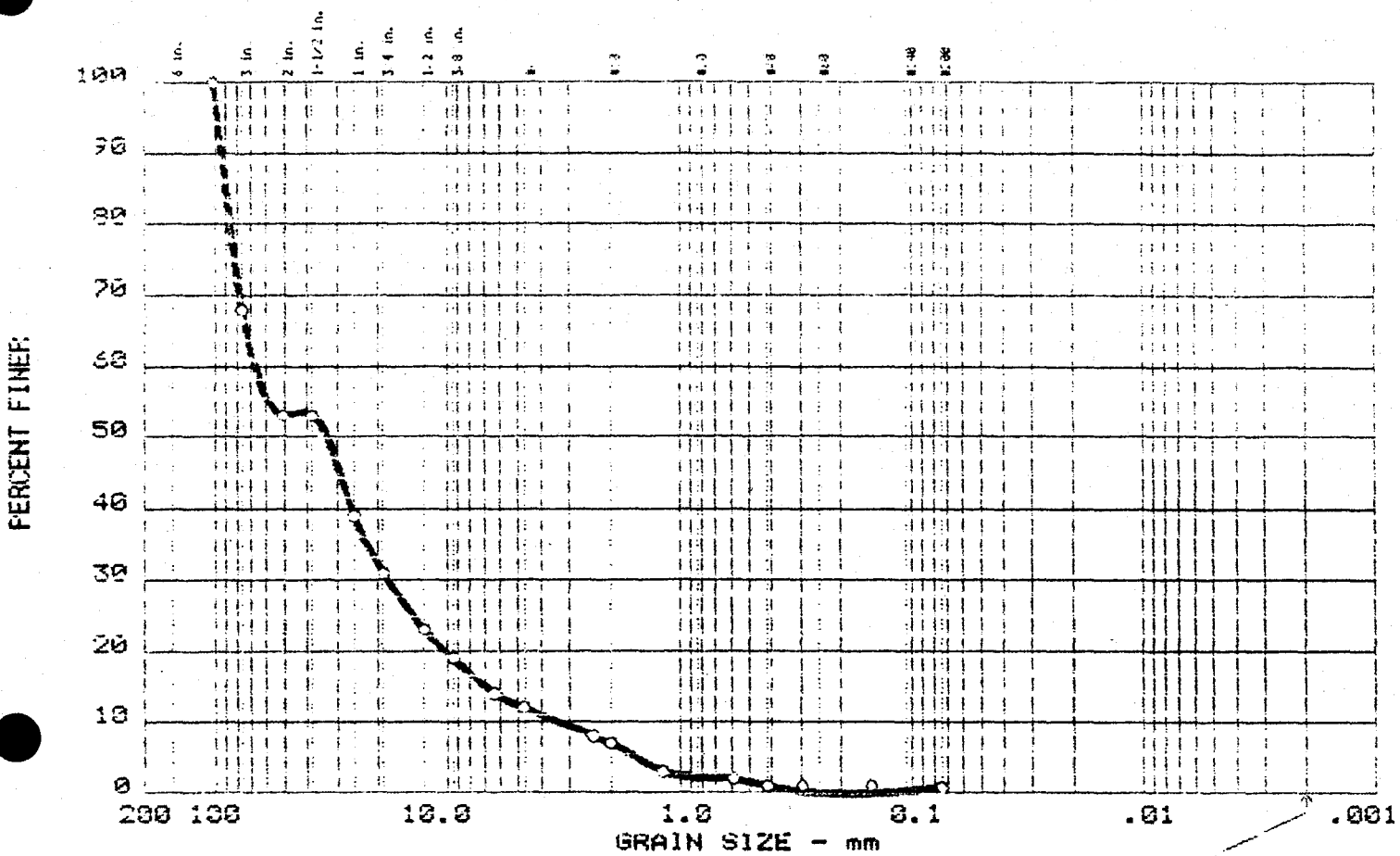
Date: 5/28/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 61

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	6	32.0	56.0	11.3	0.7	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			89.85	67.69	32.77	18.197	6.9183	3.3497	1.46	20.2

MATERIAL DESCRIPTION	USCS	AASHTO
○ GRAVELS AND COBBLES; some sand, trace fines	GW	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 24(9 - 18)

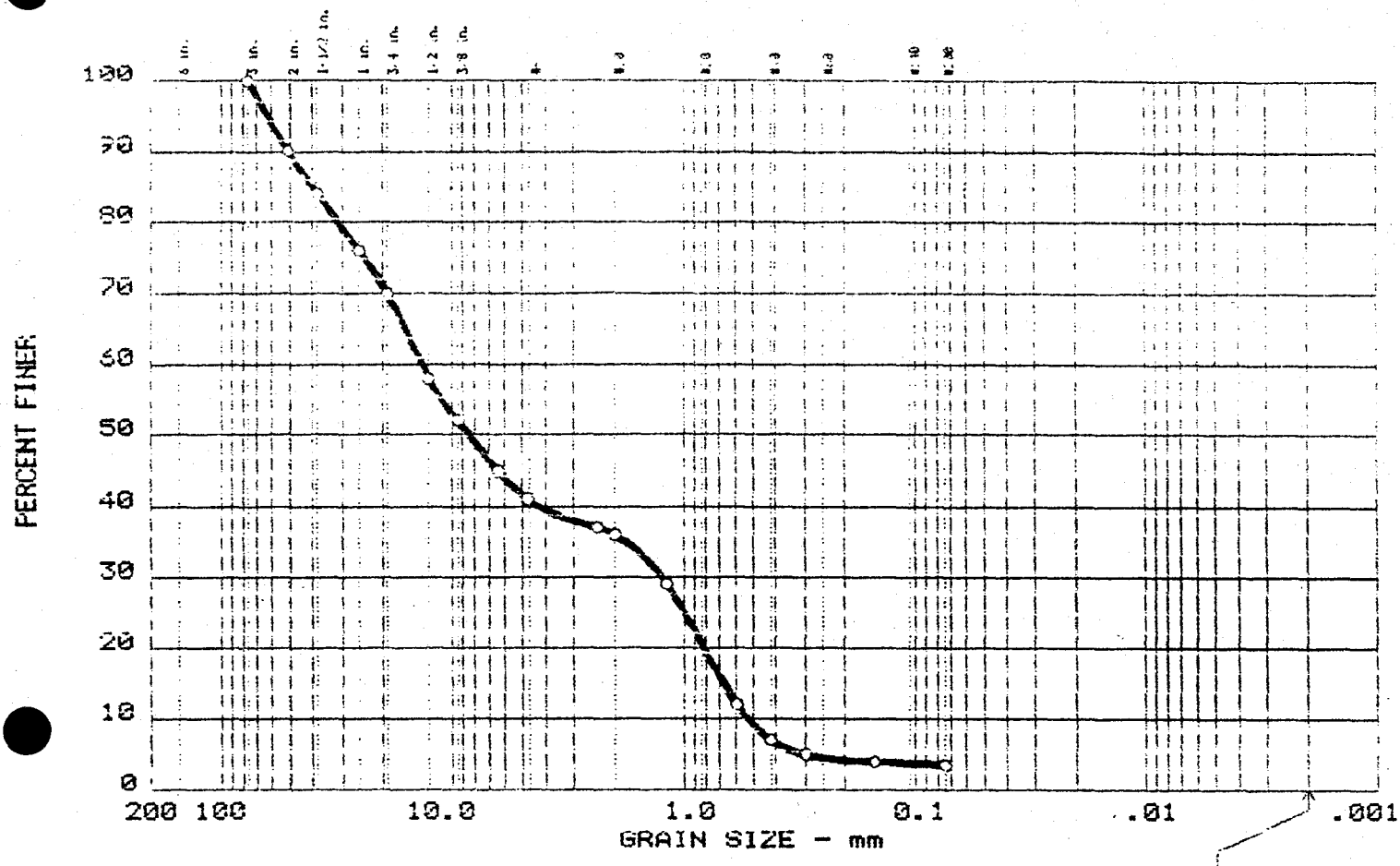
Date: 5/28/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 62

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	8	0.0	59.0	37.5	3.5	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			39.81	13.65	8.51	1.245	0.6753	0.5242	0.22	26.0

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY GRAVELS; trace fines	GP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 25(3 - 7)

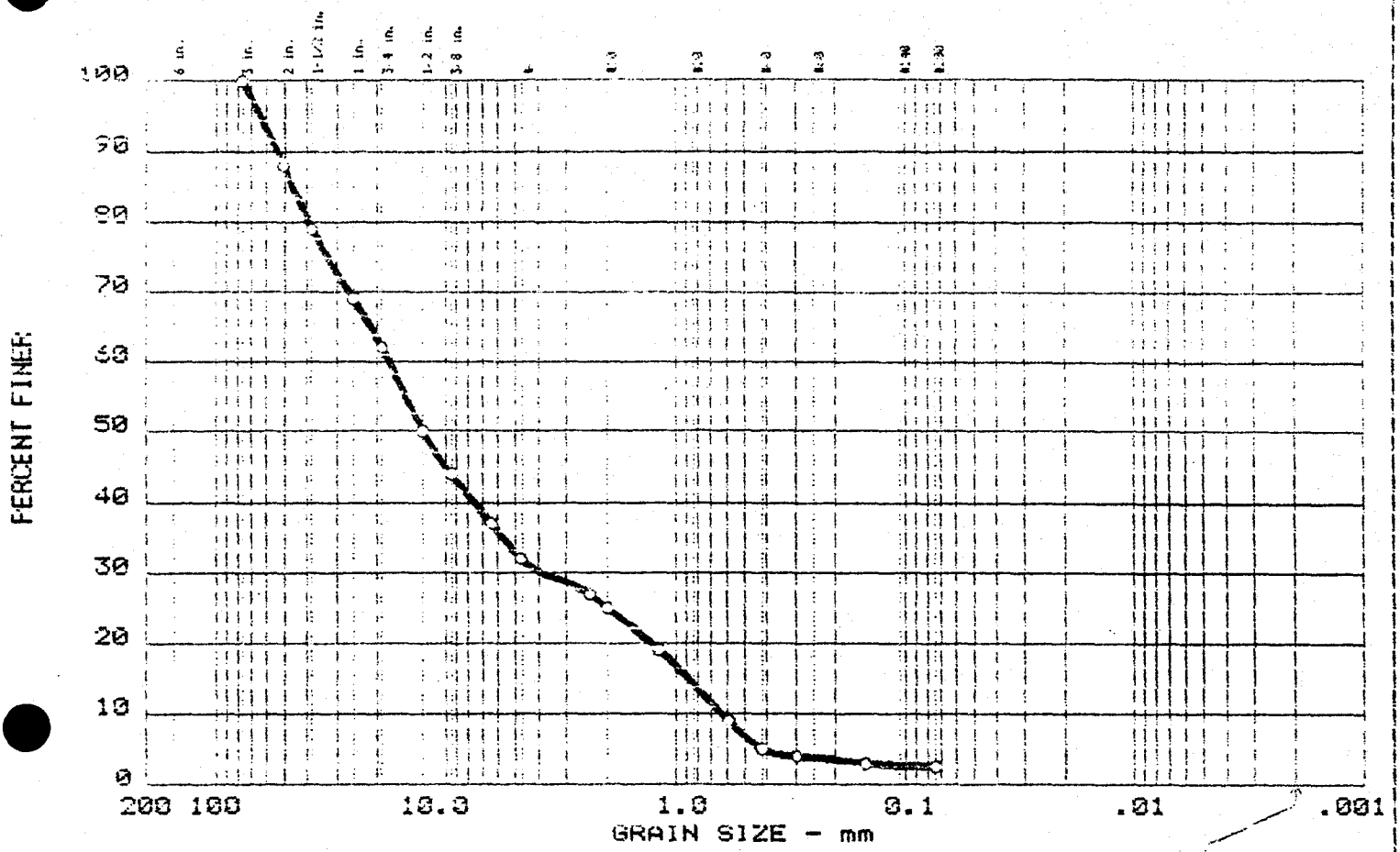
Date: 5/28/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 63

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	10	0.0	68.0	29.4	2.6	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			46.24	17.76	12.69	3.877	0.8780	0.6288	1.35	28.2

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY GRAVEL; trace fines	GW	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 25(17 - 18)

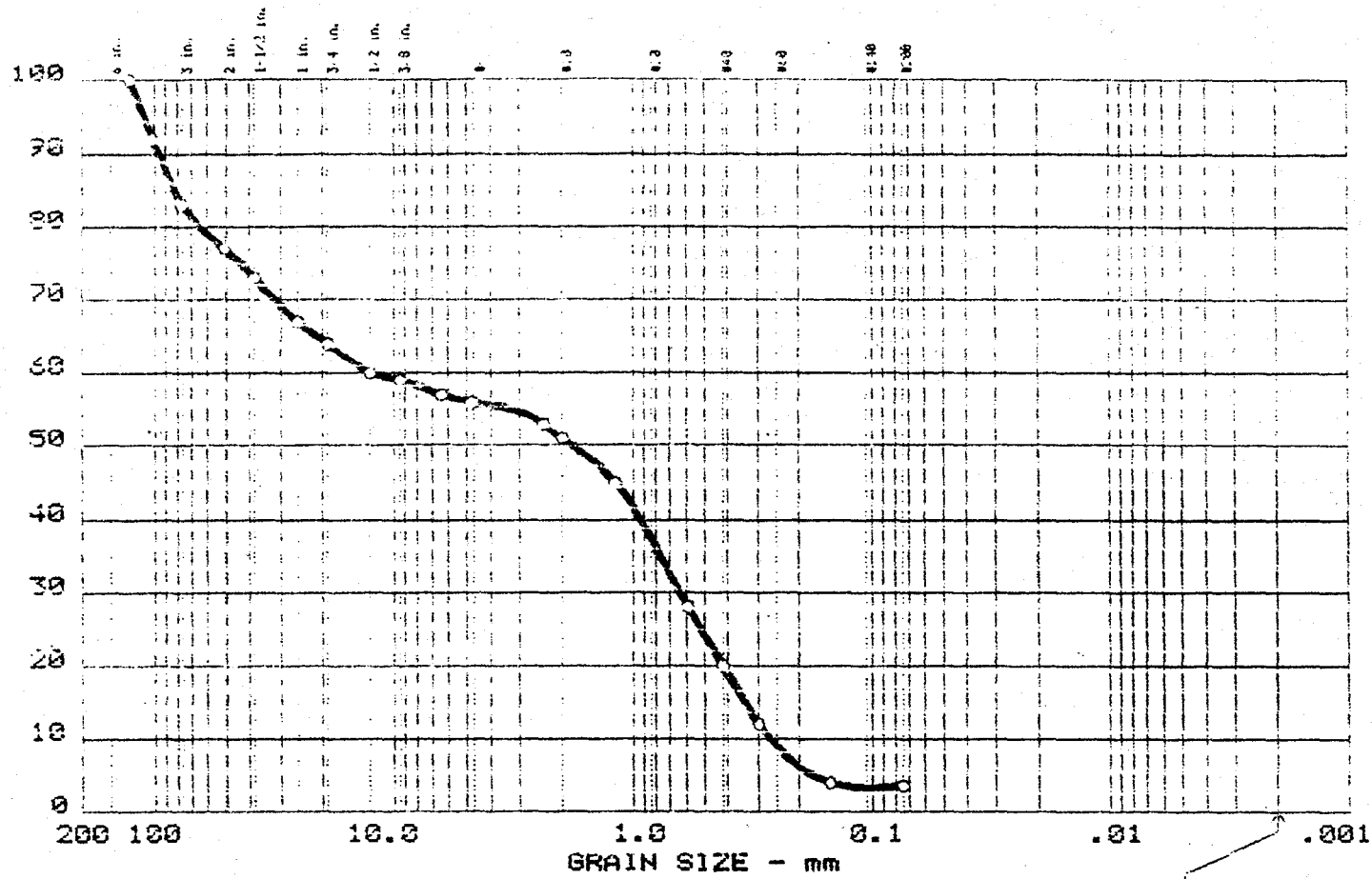
Date: 5/29/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 64

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	12	17.0	27.0	52.4	3.6	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			82.13	12.57	1.92	0.638	0.3385	0.2658	0.12	47.3

MATERIAL DESCRIPTION	USCS	AASHTO
○ GRAVELLY SAND; with cobbles, trace fines	SP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 26(0 - 1)

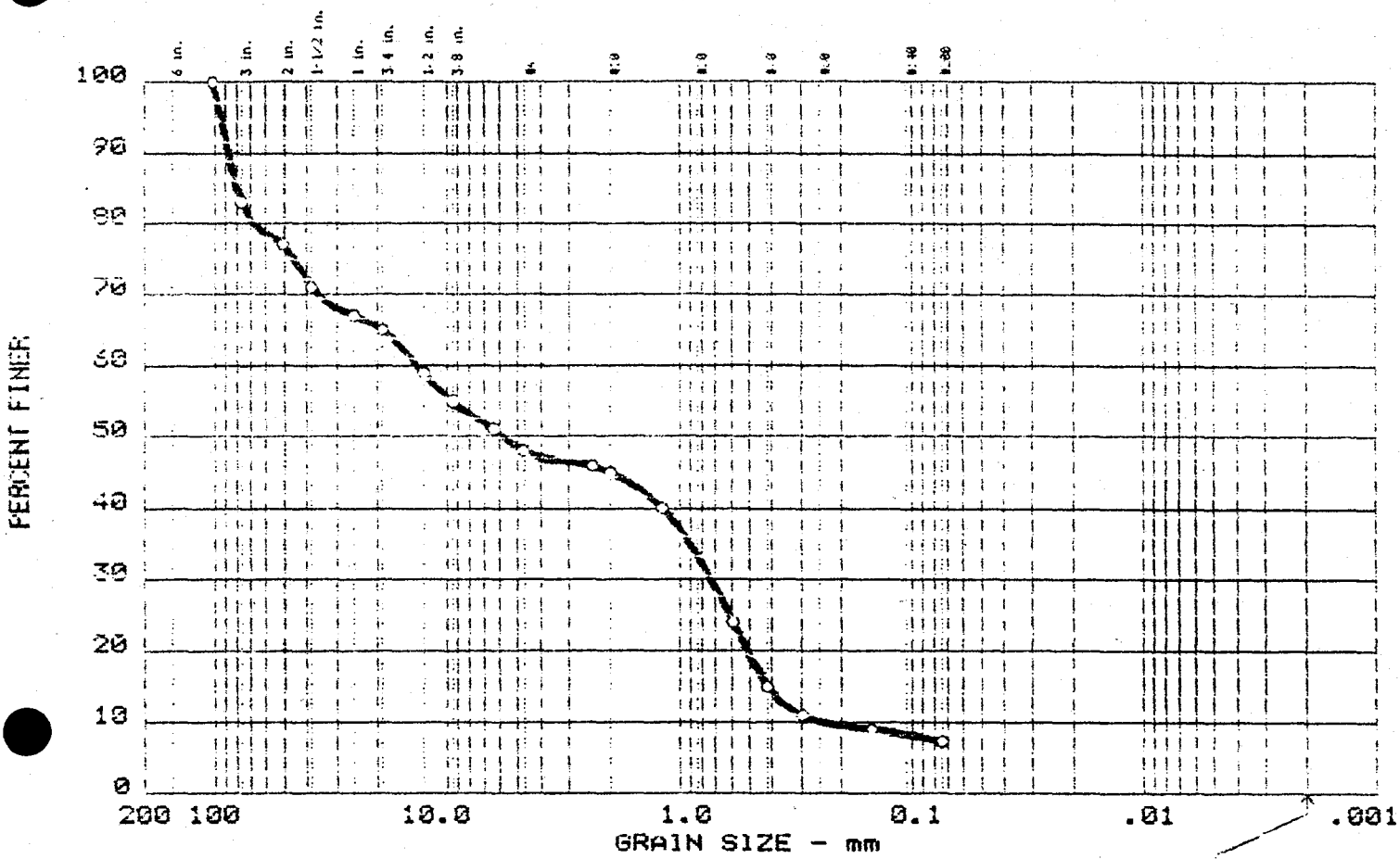
Date: 5/29/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 65

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	11	17.0	35.0	40.6	7.4	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			79.80	13.40	5.78	0.735	0.4178	0.2358	0.17	57.0

MATERIAL DESCRIPTION	USCS	AASHTO
○ SAND AND GRAVEL; with cobbles, some fines	GP-GM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 25(22 - 23)

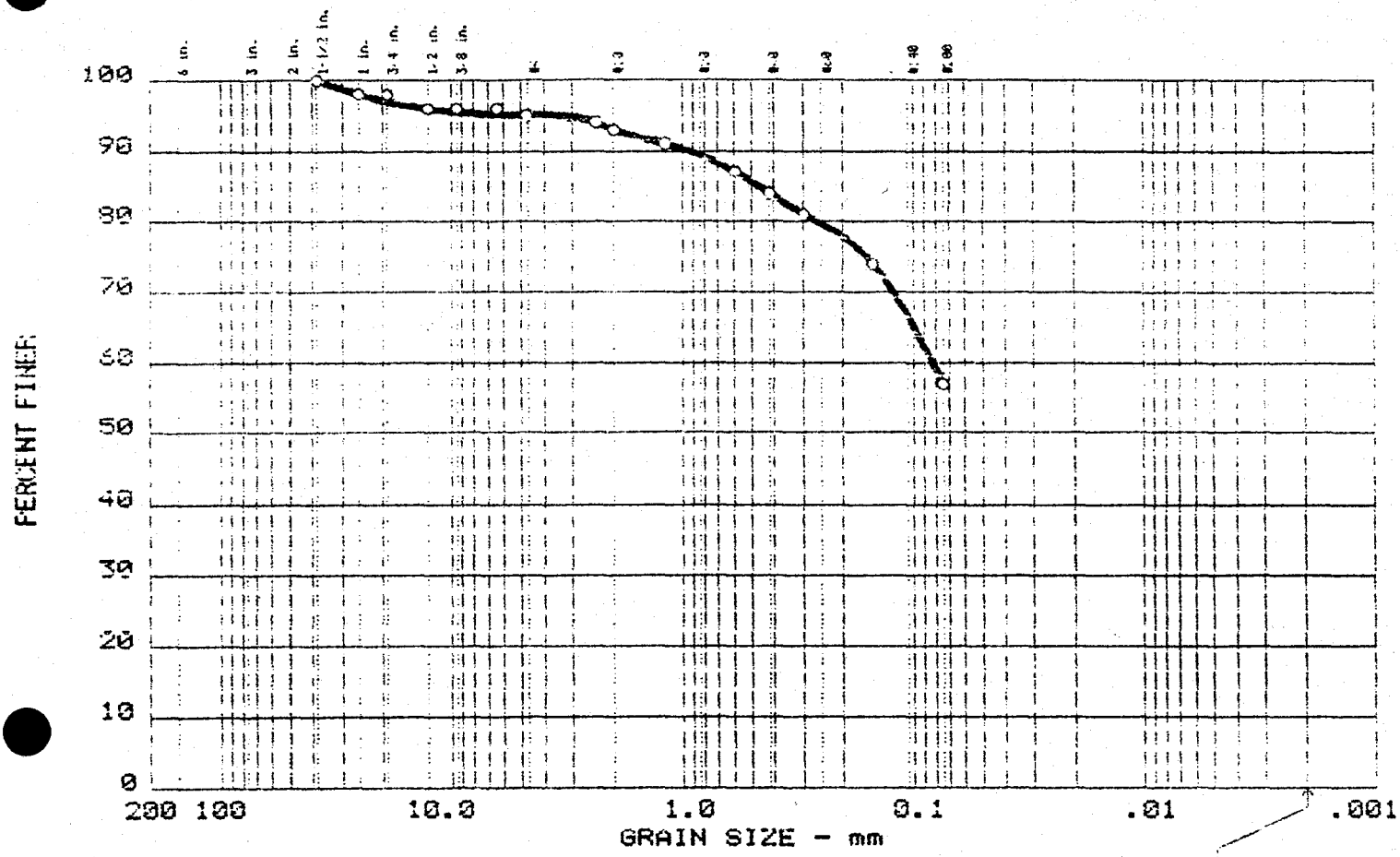
Date: 5/29/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 66

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	13	0.0	5.0	38.0	57.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.47	0.08						

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY CLAY; trace gravel	CL	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 26(3 - 4)

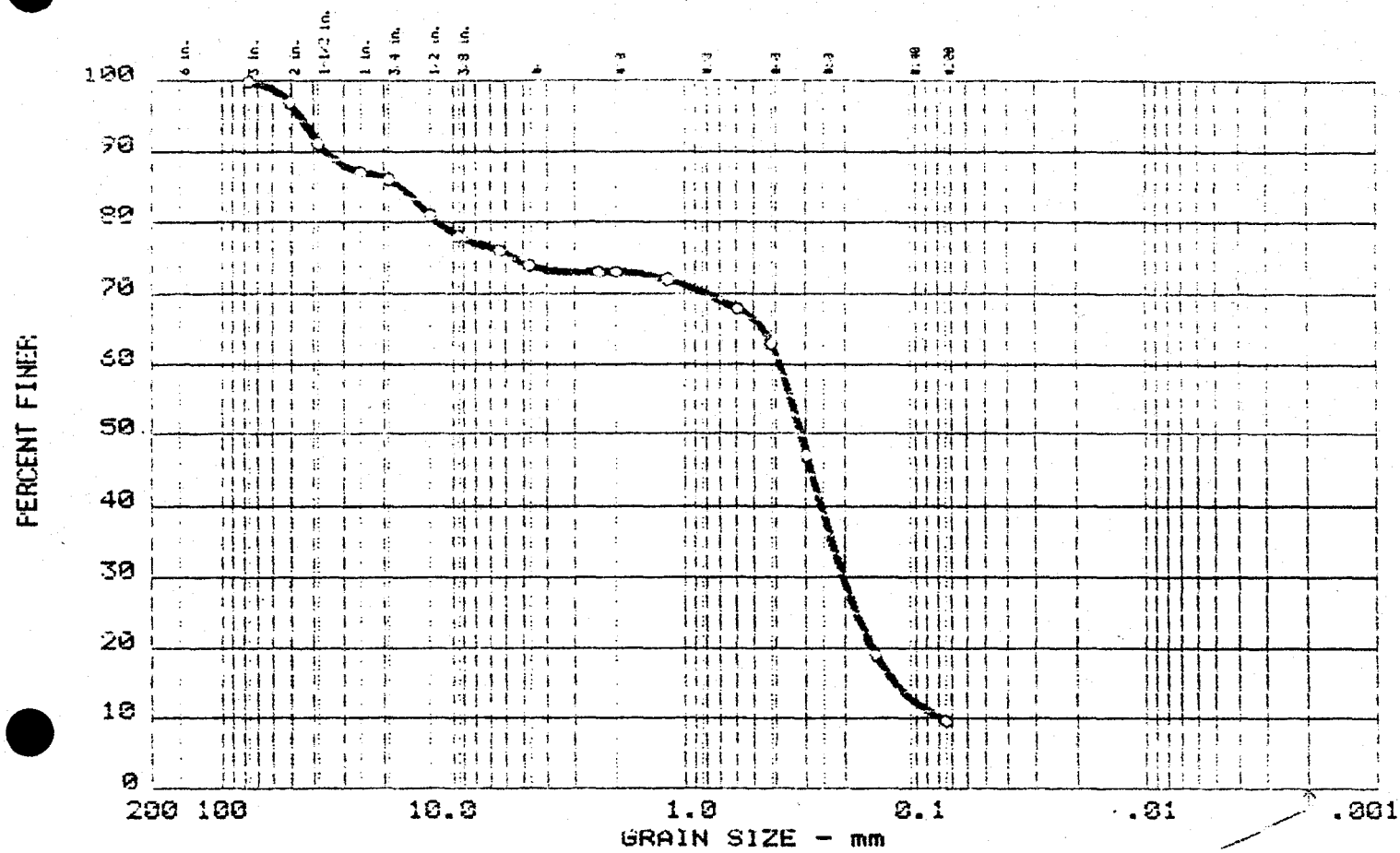
Date: 5/29/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 67

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
O	14	0.0	26.0	64.4	9.6	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
O			16.98	0.39	0.31	0.207	0.1230	0.0776	1.42	5.0

MATERIAL DESCRIPTION	USCS	AASHTO
O GRAVELLY SAND; some fines	SP-SM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
O Location: TP - 26(7 - 8)

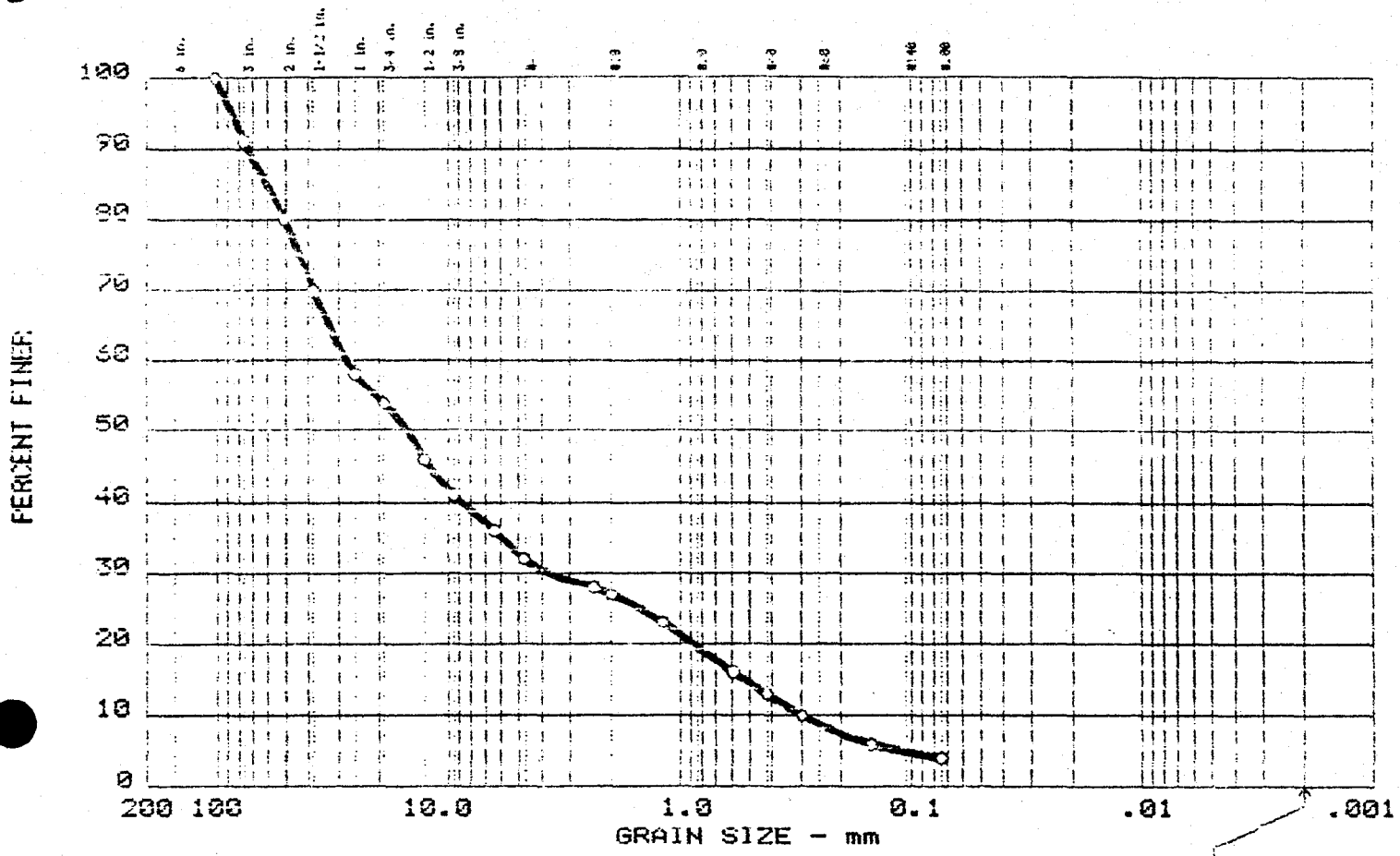
Date: 5/28/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 68

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	9	9.0	59.0	28.0	4.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			60.26	27.90	15.28	3.750	0.5236	0.2944	1.72	94.4

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY GRAVEL; some cobbles, trace fines	GW	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 26(13 - 14)

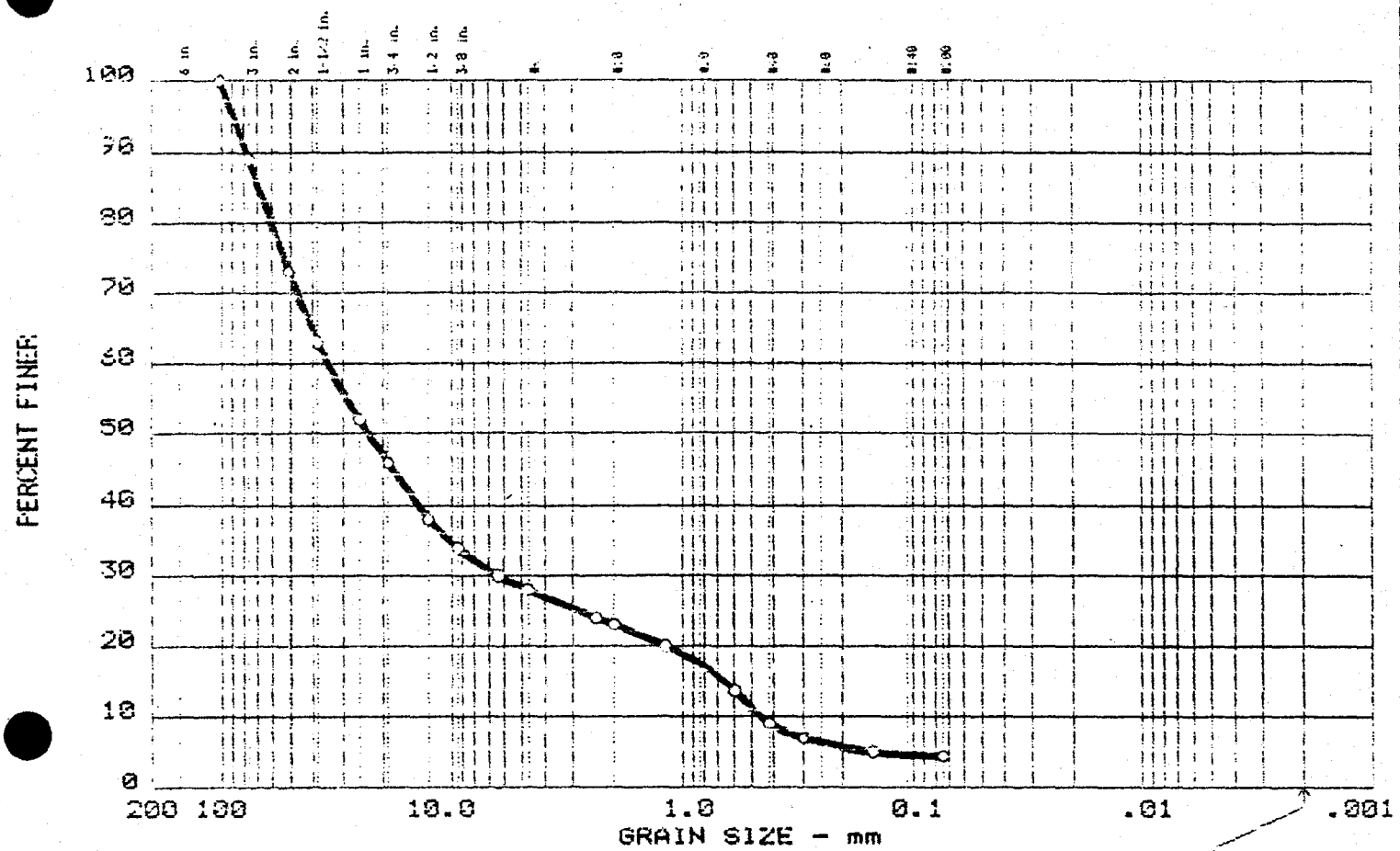
Date: 5/29/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 69

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	4	11.0	61.0	23.5	4.5	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			68.87	34.51	23.07	6.291	0.6577	0.4550	2.51	75.9

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY GRAVEL; some cobbles, trace fines	GW	

Project No.: 21280068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 27(3 - 4)

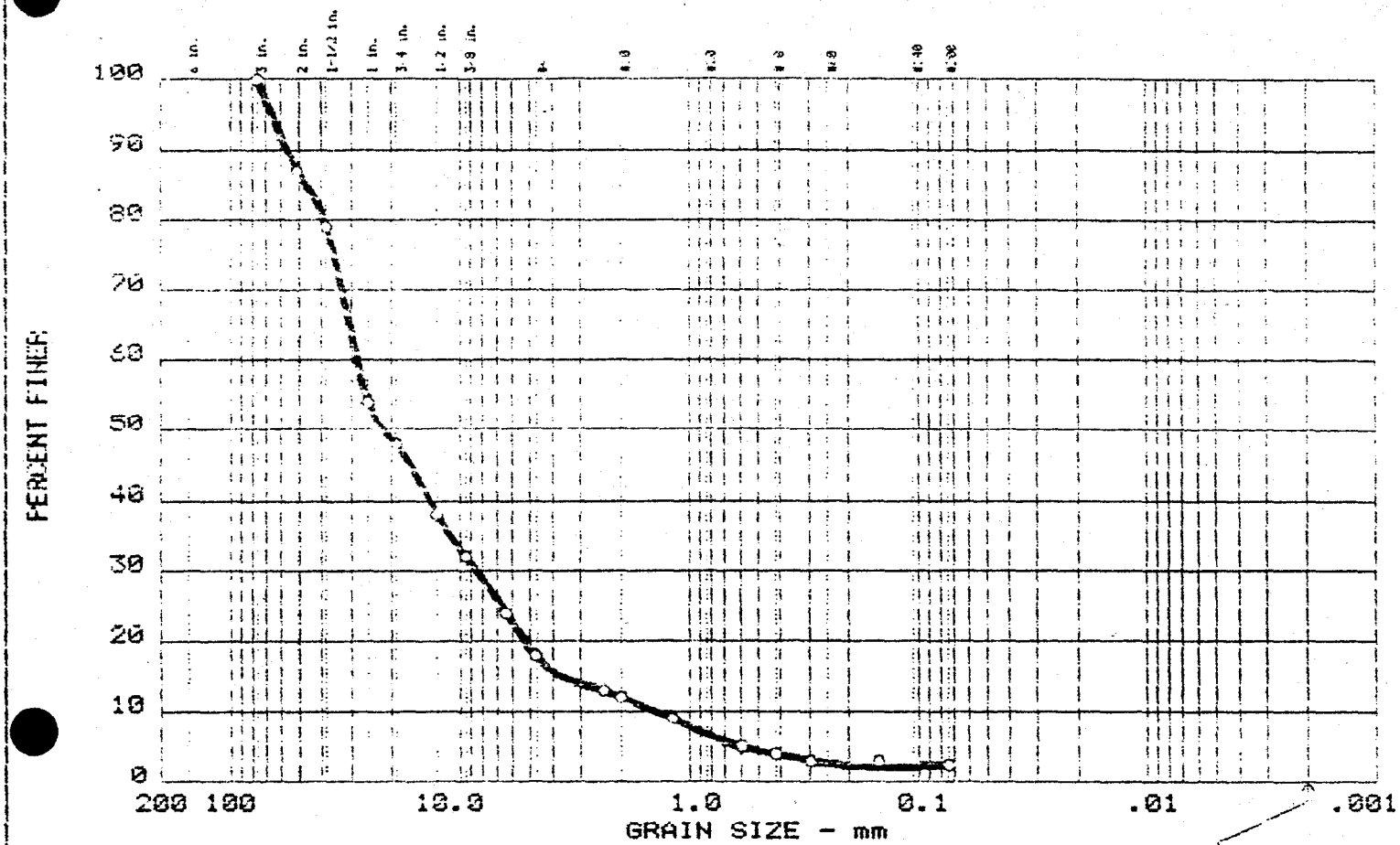
Date: 5/29/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 70

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	5	0.0	82.0	15.6	2.4	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			46.24	28.35	21.75	8.561	3.6517	1.4044	1.84	20.2

MATERIAL DESCRIPTION	USCS	AASHTO
○ GRAVEL; with sand, trace fines	GW	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 27(16 - 17)

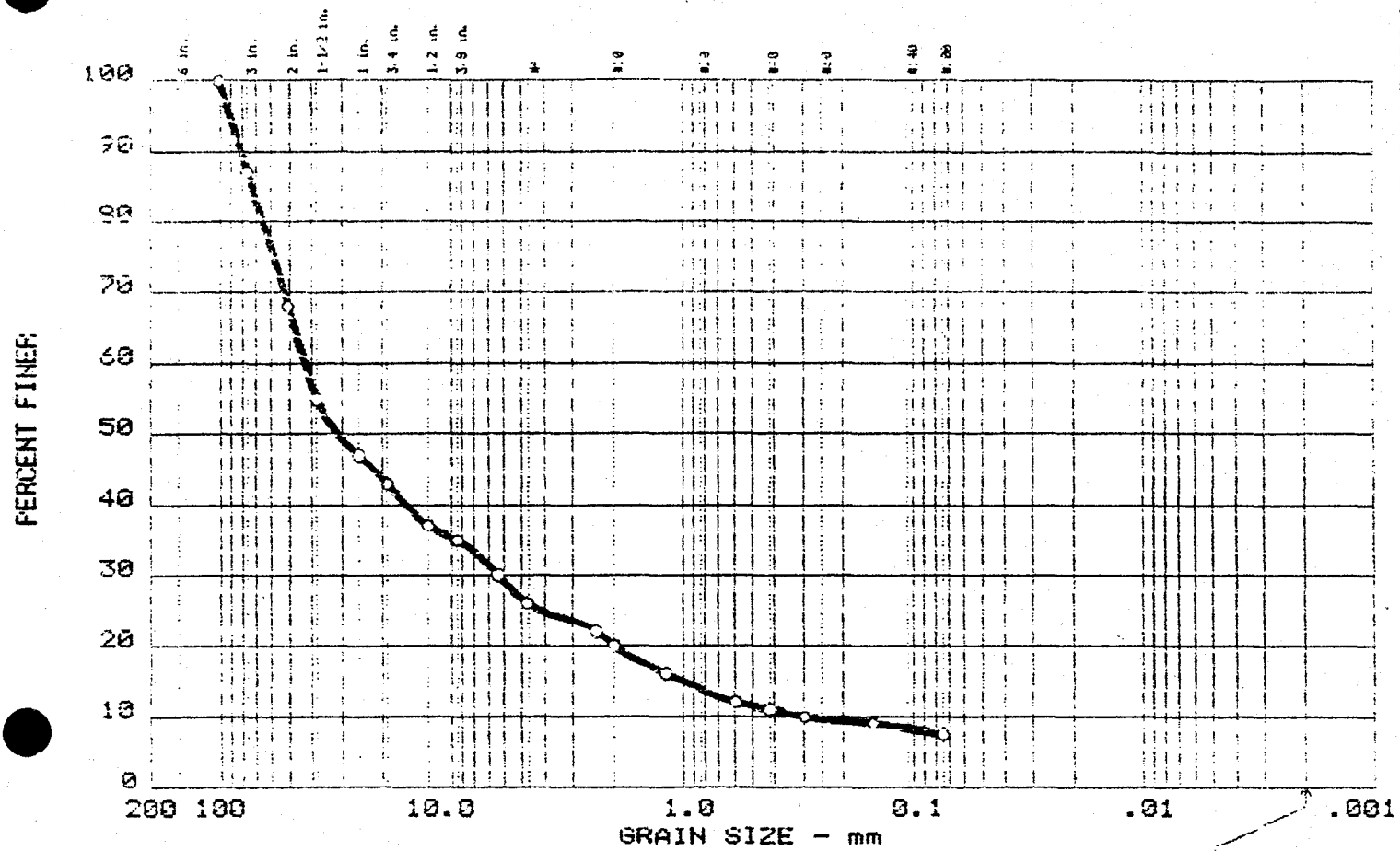
Date: 5/29/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 71

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	6	13.0	61.0	18.5	7.5	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	27	8	72.86	42.90	31.08	6.346	1.0058	0.2968	3.16	144.5

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY GRAVEL; **some cobbles**, some clay	GP-GC	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 28(0 - 2)

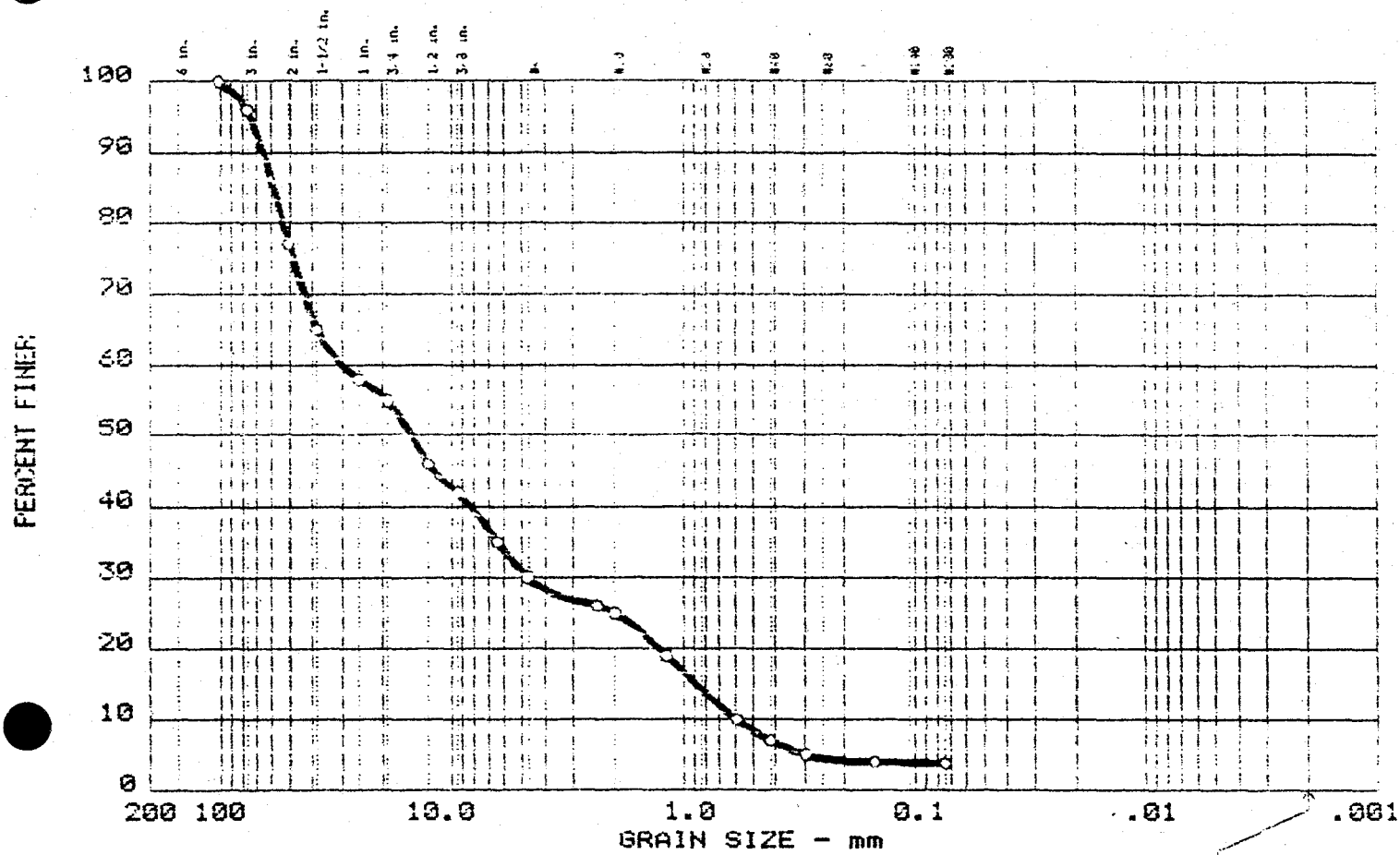
Date: 5/29/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 72

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	7	4.0	66.0	26.2	3.8	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	55	34	59.09	29.96	15.17	4.742	0.8831	0.5834	1.29	51.3

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY GRAVEL; trace clay, trace cobbles	GW	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 28(4 - 5)

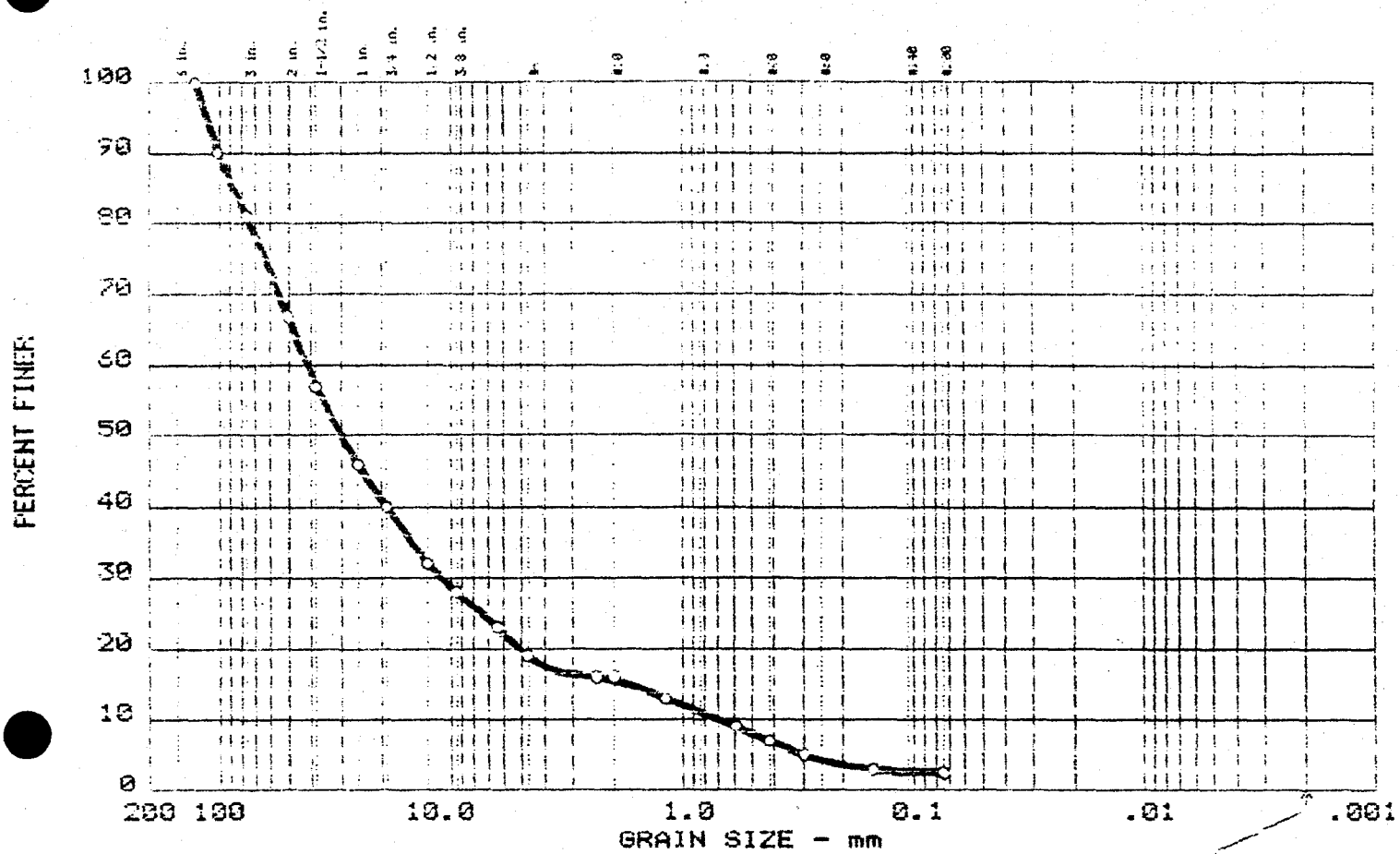
Date: 5/29/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 73

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	8	19.0	62.0	16.5	2.5	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	48	25	87.10	41.69	29.85	11.092	1.7579	0.6998	4.22	59.6

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY-COBBLY GRAVEL; trace fines	GP	

Project No.: 21280068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 28(11 - 13)

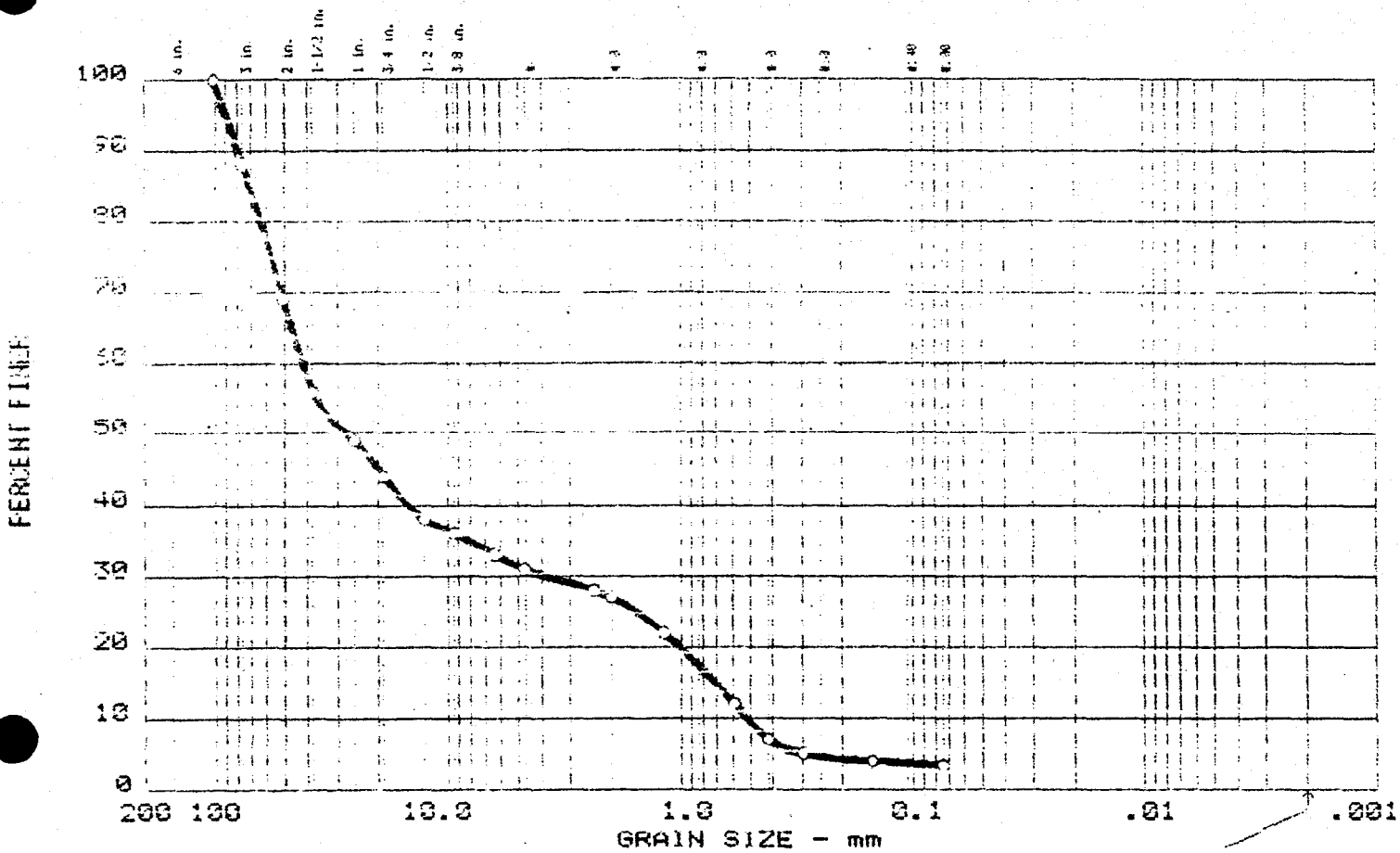
Date: 5/29/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 74

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	9	12.0	57.0	27.6	3.4	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			71.12	42.22	27.26	3.763	0.7888	0.5194	0.65	81.3

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY GRAVEL; some cobbles, trace fines	GP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 29(2 - 3)

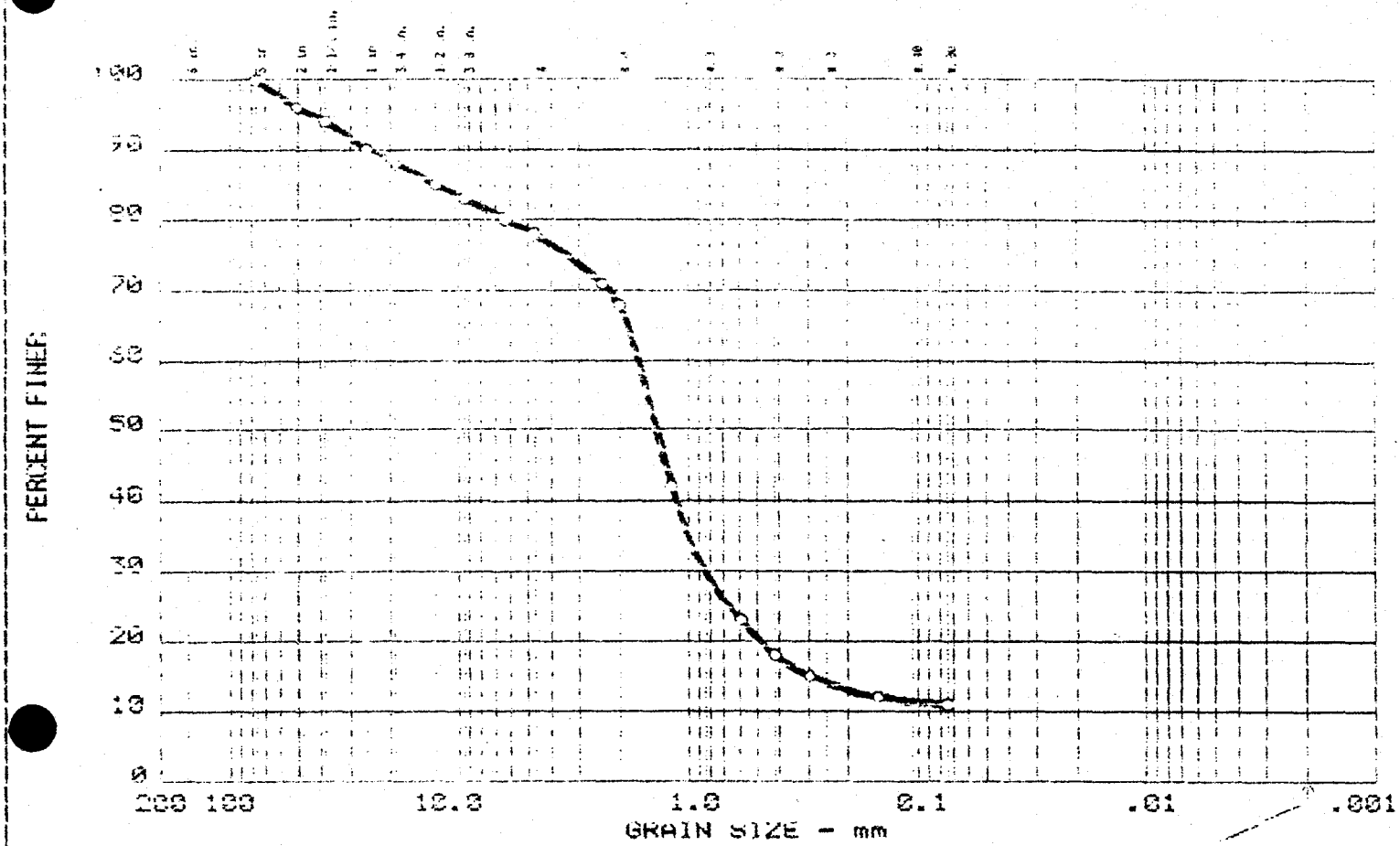
Date: 5/30/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 75

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	10	0.0	22.0	67.0	11.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			12.59	1.65	1.38	0.958	0.2948			

MATERIAL DESCRIPTION	USCS	AASHTO
○ SAND; with gravel, some fines	SP-SM	

Project No.: 2128J008
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 29(9 - 10)

Date: 5/30/88

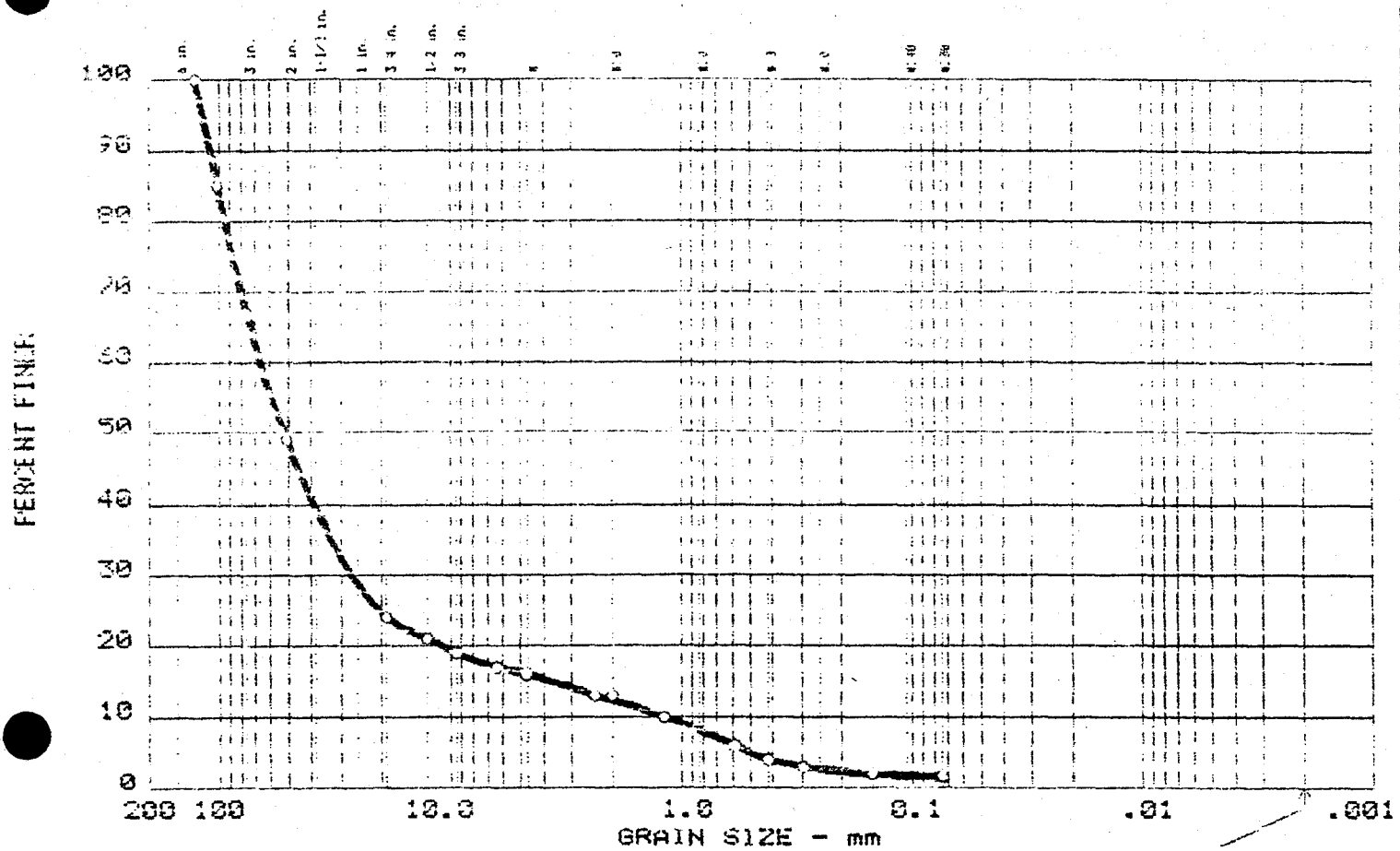
Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT

WESTERN TECHNOLOGIES INC.

Fig. No. 76

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	11	33.0	51.0	14.3	1.7	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			101.51	66.30	52.86	27.088	3.6855	1.1790	9.33	56.2

MATERIAL DESCRIPTION	USCS	AASHTO
○ COBBLY GRAVEL; with sand, trace fines	SP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 30(2 - 3)

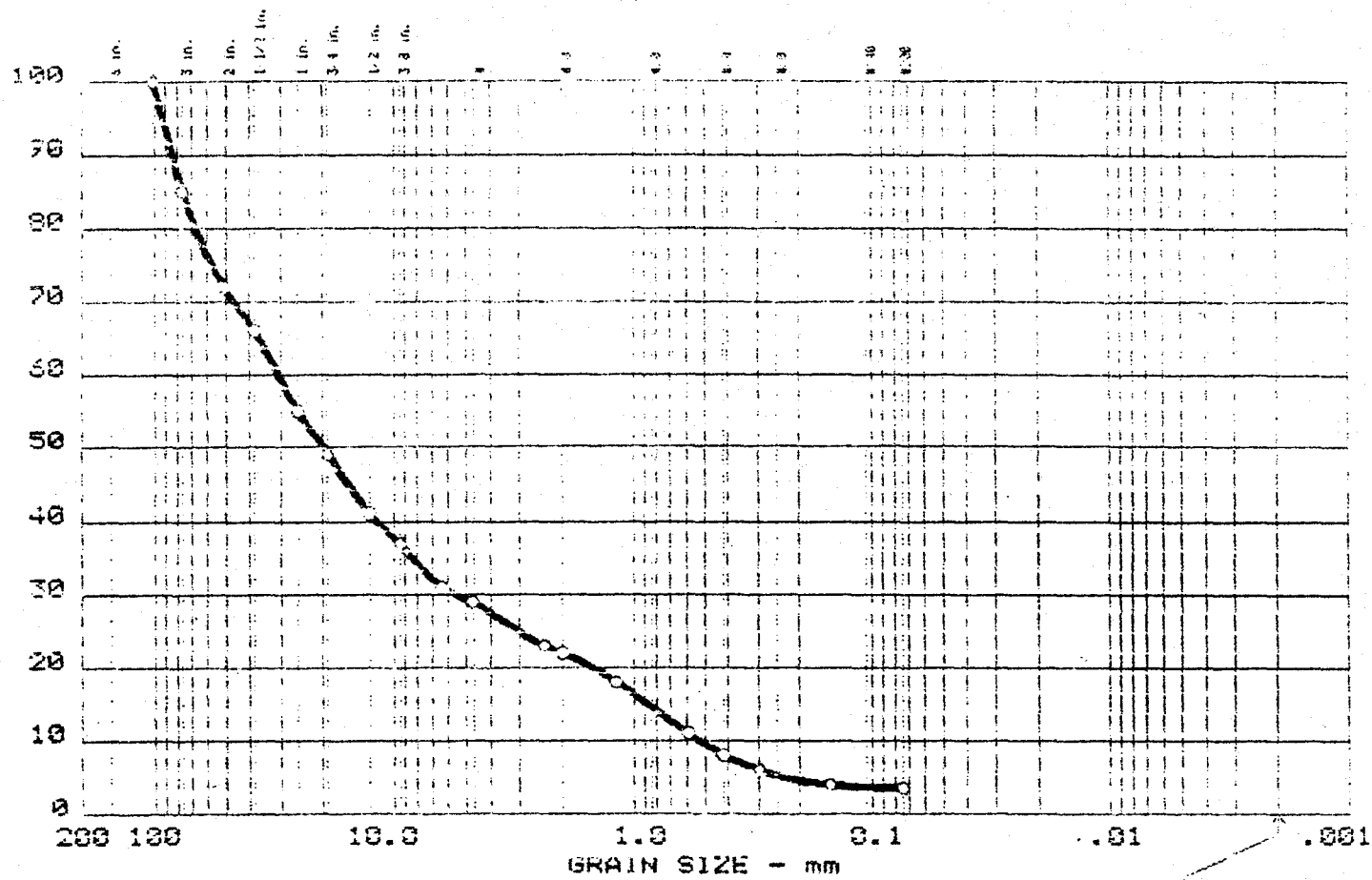
Date: 5/30/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 77

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	12	15.0	56.0	25.5	3.5	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			76.12	30.51	19.93	5.617	0.8700	0.5242	1.97	58.2

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY GRAVEL; with cobbles, trace fines	GW	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 38(4 - 5)

Date: 5/30/88

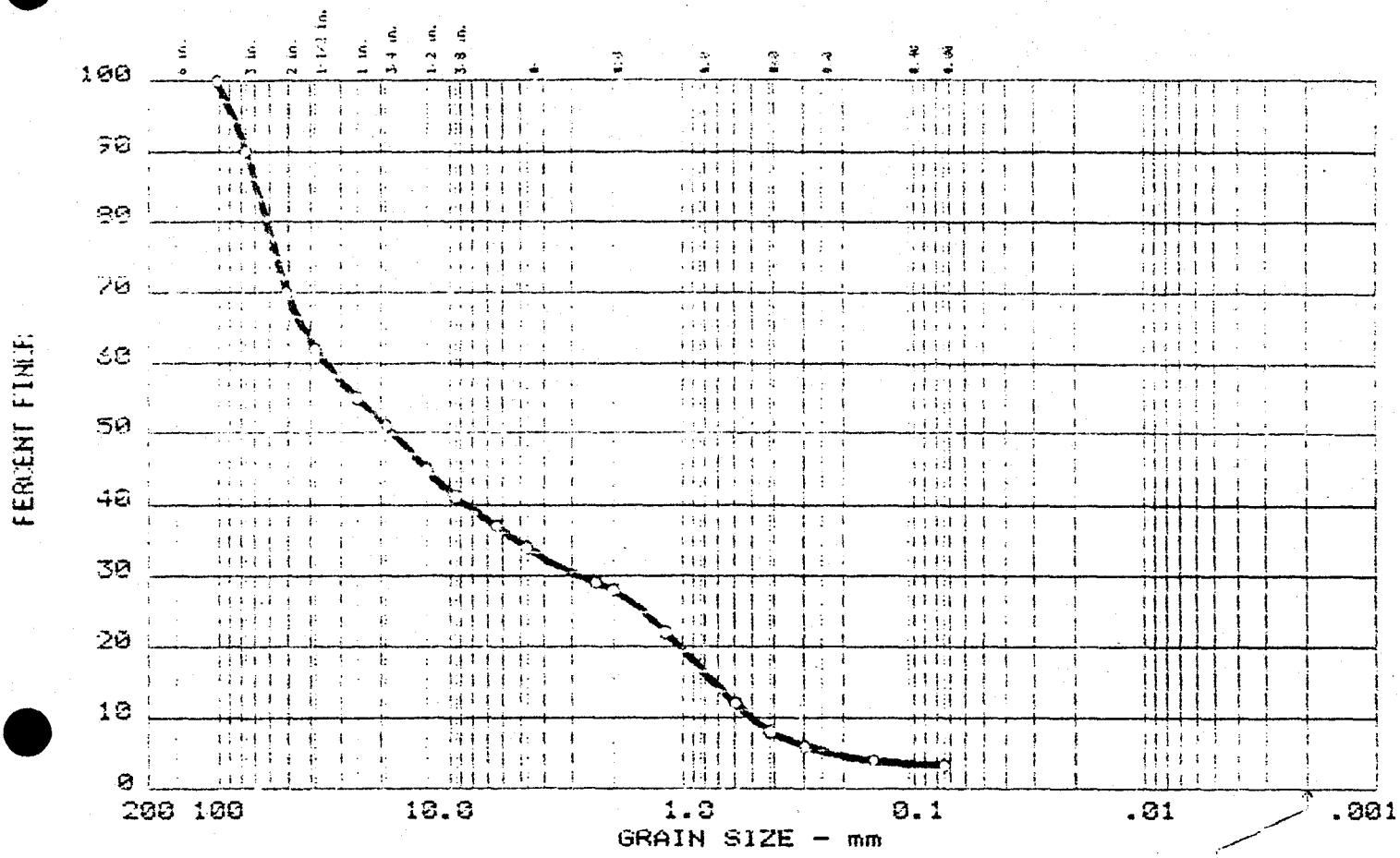
Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT

WESTERN TECHNOLOGIES INC.

Fig. No. 78

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	13	10.0	56.0	30.7	3.3	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			68.63	34.36	17.62	2.825	0.7261	0.5023	0.46	68.4

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY GRAVEL; some cobbles, trace fines	GP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 30(20 - 21)

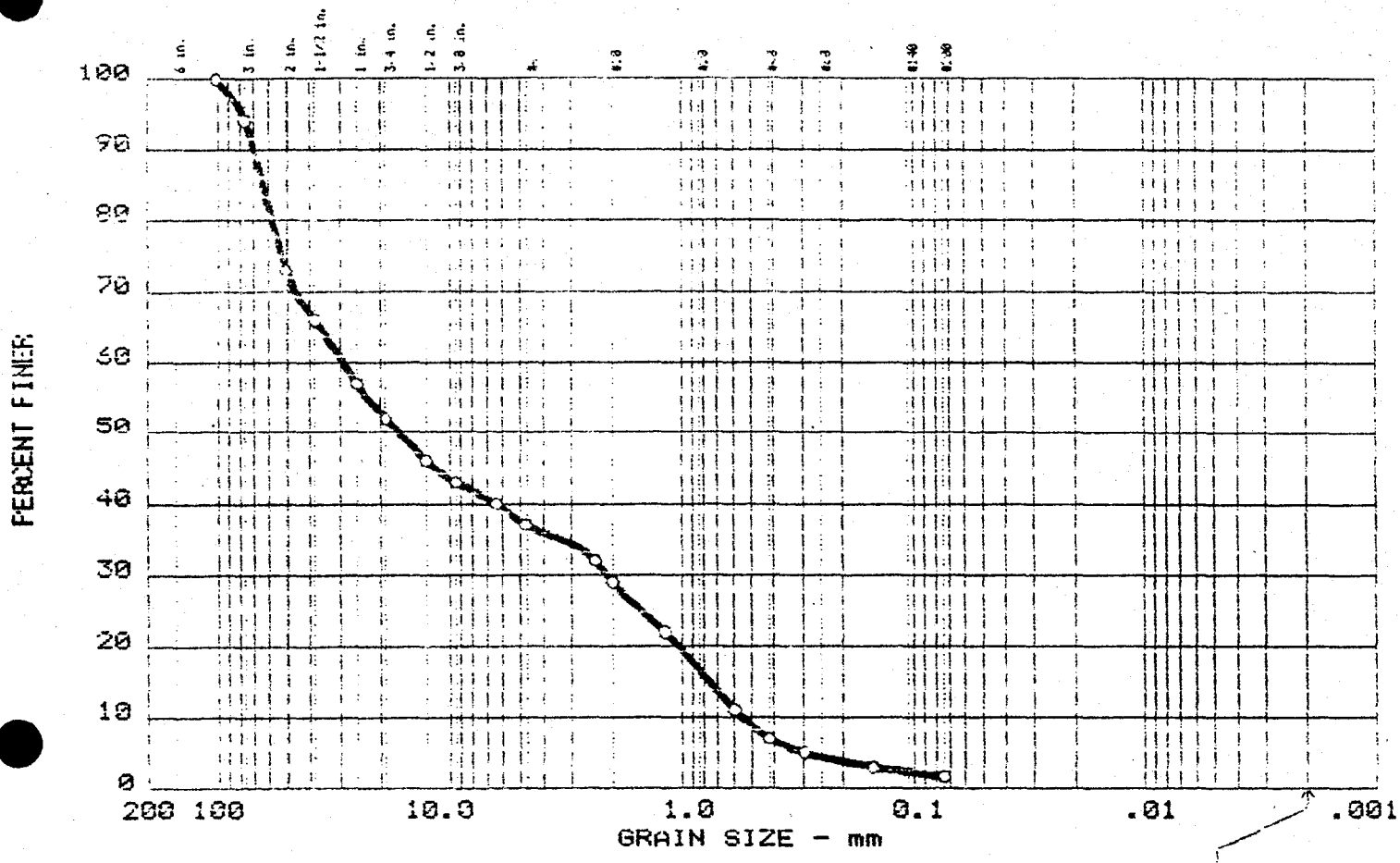
Date: 5/30/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 79

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	15	6.0	57.0	35.3	1.7	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			63.75	29.07	16.73	2.186	0.7560	0.5476	0.28	53.1

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY GRAVEL; some cobbles, trace fines	GP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 30A(1 - 2)

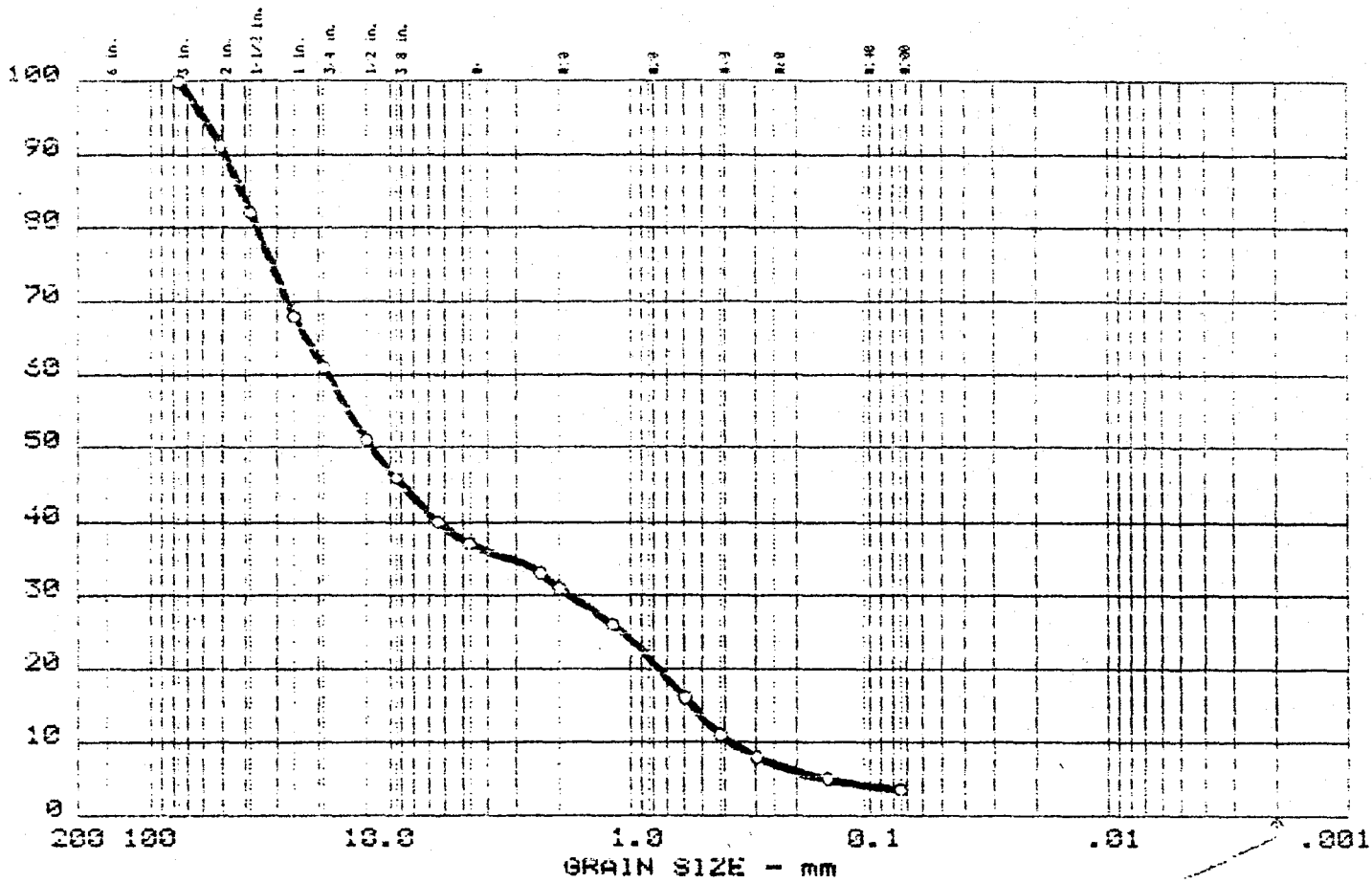
Date: 5/29/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 80

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	16	0.0	63.0	33.5	3.5	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			41.59	18.16	11.99	1.816	0.5483	0.3793	0.48	47.9

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY GRAVEL; trace fines	GP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 30A(14 - 16)

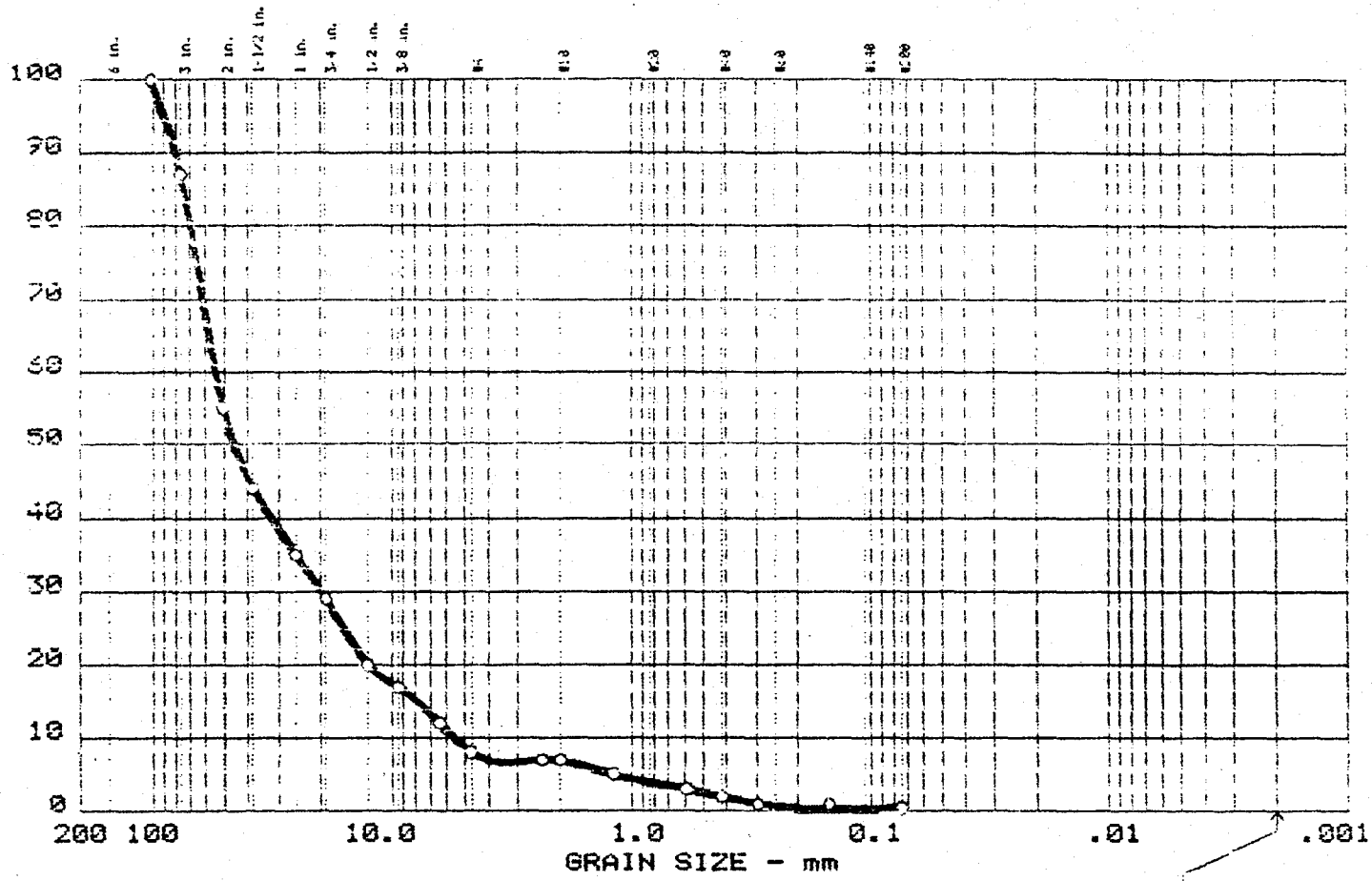
Date: 5/29/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 81

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	17	13.0	79.0	7.5	0.5	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			73.96	54.58	45.92	19.815	7.8886	5.5208	1.38	9.9

MATERIAL DESCRIPTION	USCS	AASHTO
○ GRAVEL; some cobbles, some sand, trace fines	GW	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 31(3 - 4)

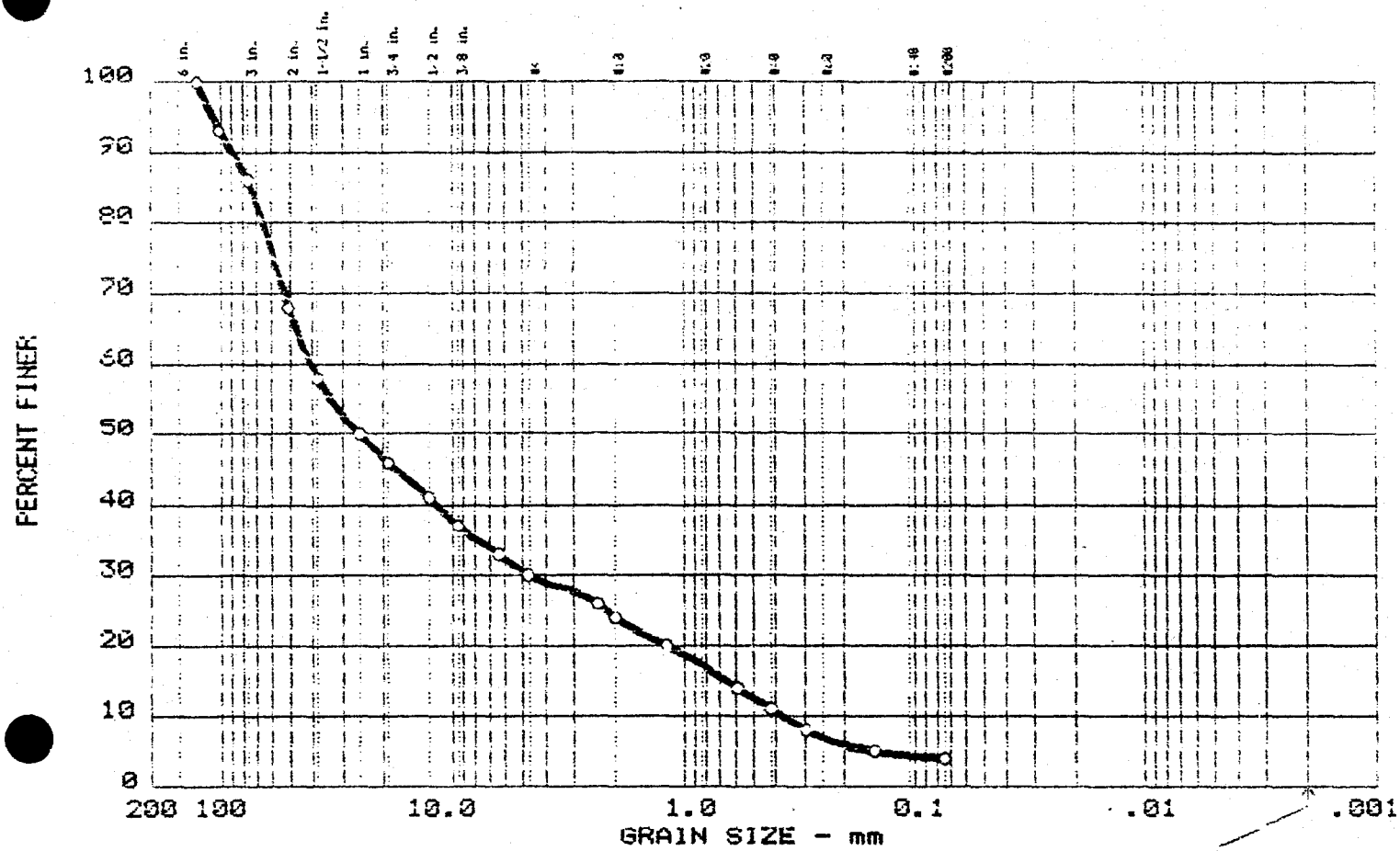
Date: 5/29/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 82

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	18	14.0	56.0	26.0	4.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			73.96	40.64	25.35	4.721	0.6516	0.3707	1.48	109.6

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY GRAVEL; with cobbles, trace fines	GW	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 31(11 - 12)

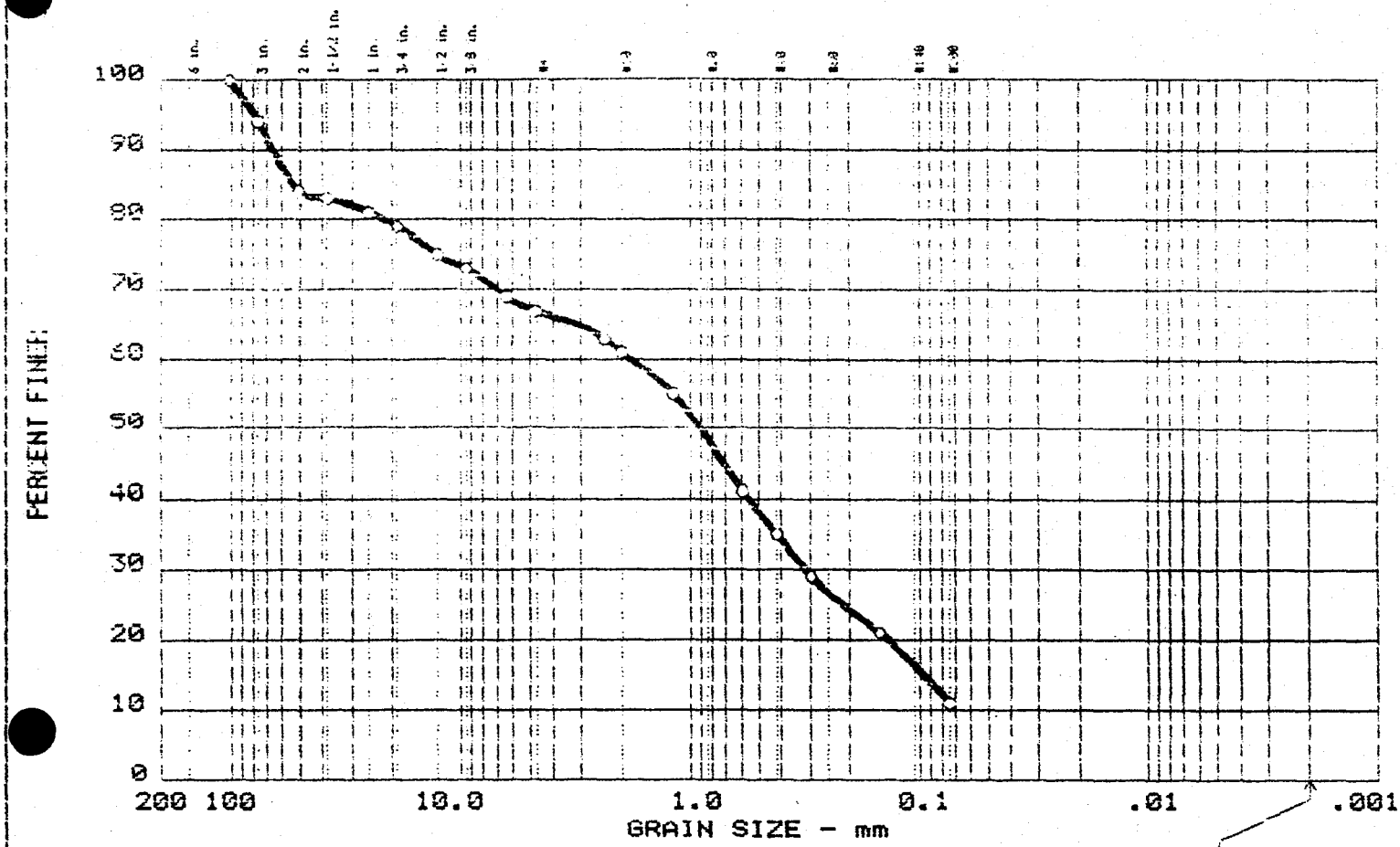
Date: 5/29/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 83

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	19	6.0	27.0	56.0	11.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			53.70	1.82	0.90	0.316	0.0955			

MATERIAL DESCRIPTION	USCS	AASHTO
○ GRAVELLY SAND; some fines, some cobbles	SP-SM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 31(22 - 23)

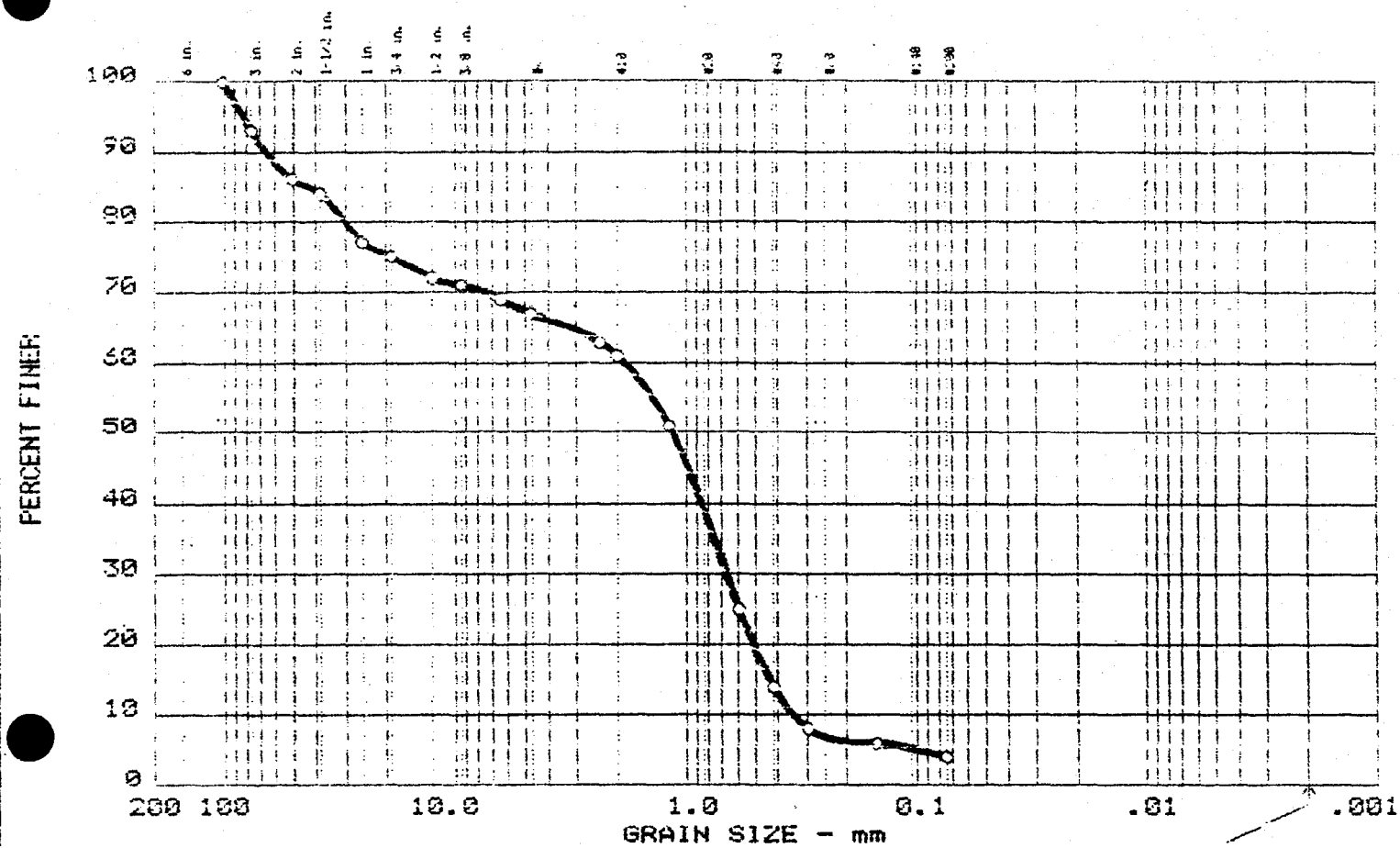
Date: 5/29/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 84

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	20	7.0	26.0	63.0	4.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			42.66	1.84	1.15	0.668	0.4360	0.3424	0.71	5.4

MATERIAL DESCRIPTION	USCS	AASHTO
○ GRAVELLY SAND; some cobbles, trace fines	SP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 32(4 - 6)

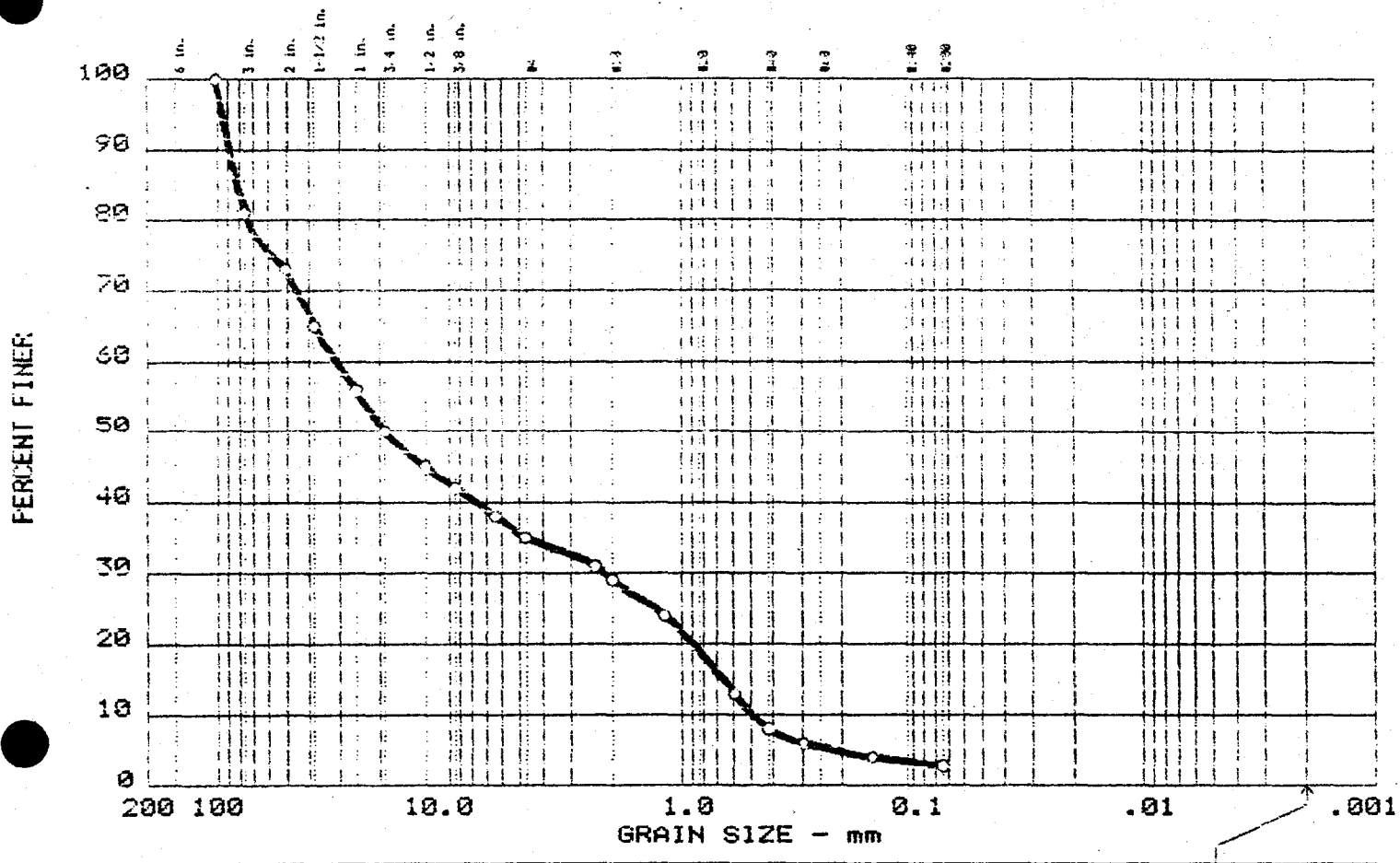
Date: 5/29/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 85

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	1	19.0	46.0	32.2	2.8	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			82.22	30.87	19.03	2.160	0.6599	0.4892	0.31	63.1

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY GRAVEL; with cobbles, trace fines	GP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 32(15 - 16)

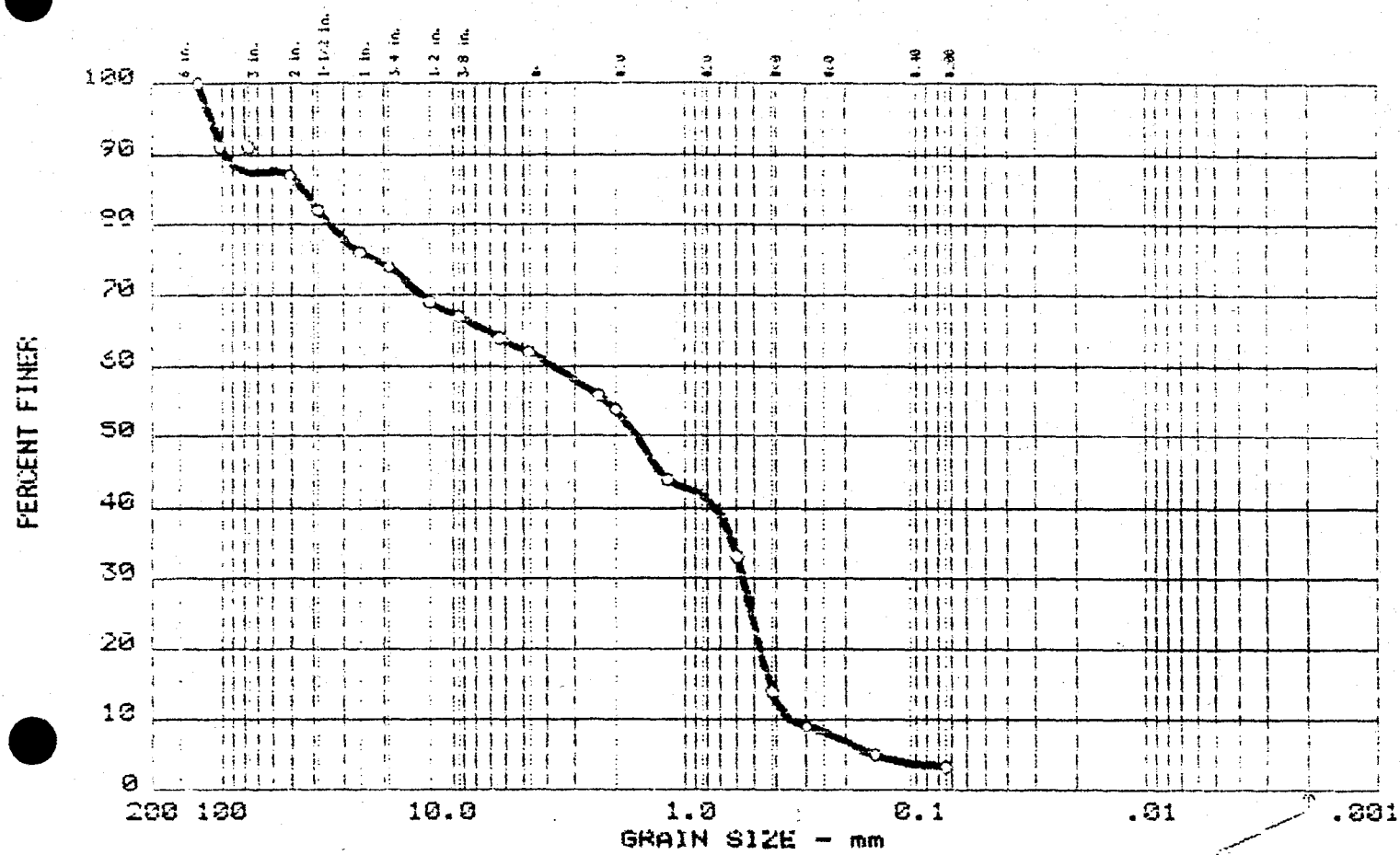
Date: 5/29/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 86

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	2	12.7	25.3	58.7	3.3	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			44.16	3.67	1.62	0.556	0.4295	0.3532	0.24	10.4

MATERIAL DESCRIPTION	USCS	AASHTO
○ GRAVELLY SAND; some cobbles, trace fines	SP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 33(3 - 4)

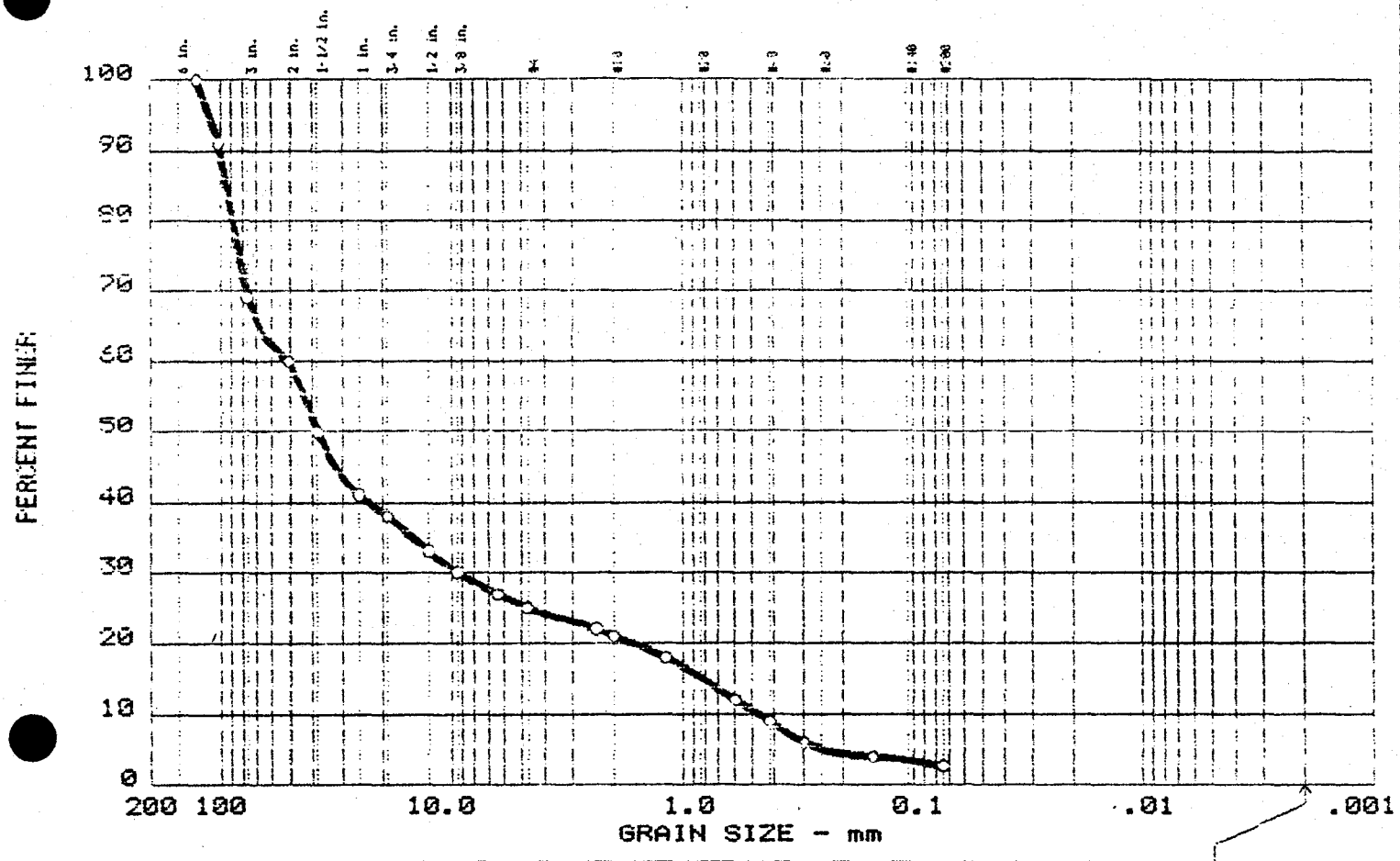
Date: 5/29/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 87

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	3	31.0	44.0	22.3	2.7	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			93.54	50.76	38.06	9.451	0.8138	0.4683	3.76	108.4

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY-COBBLEY GRAVEL; trace fines	GP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 33(16 - 17)

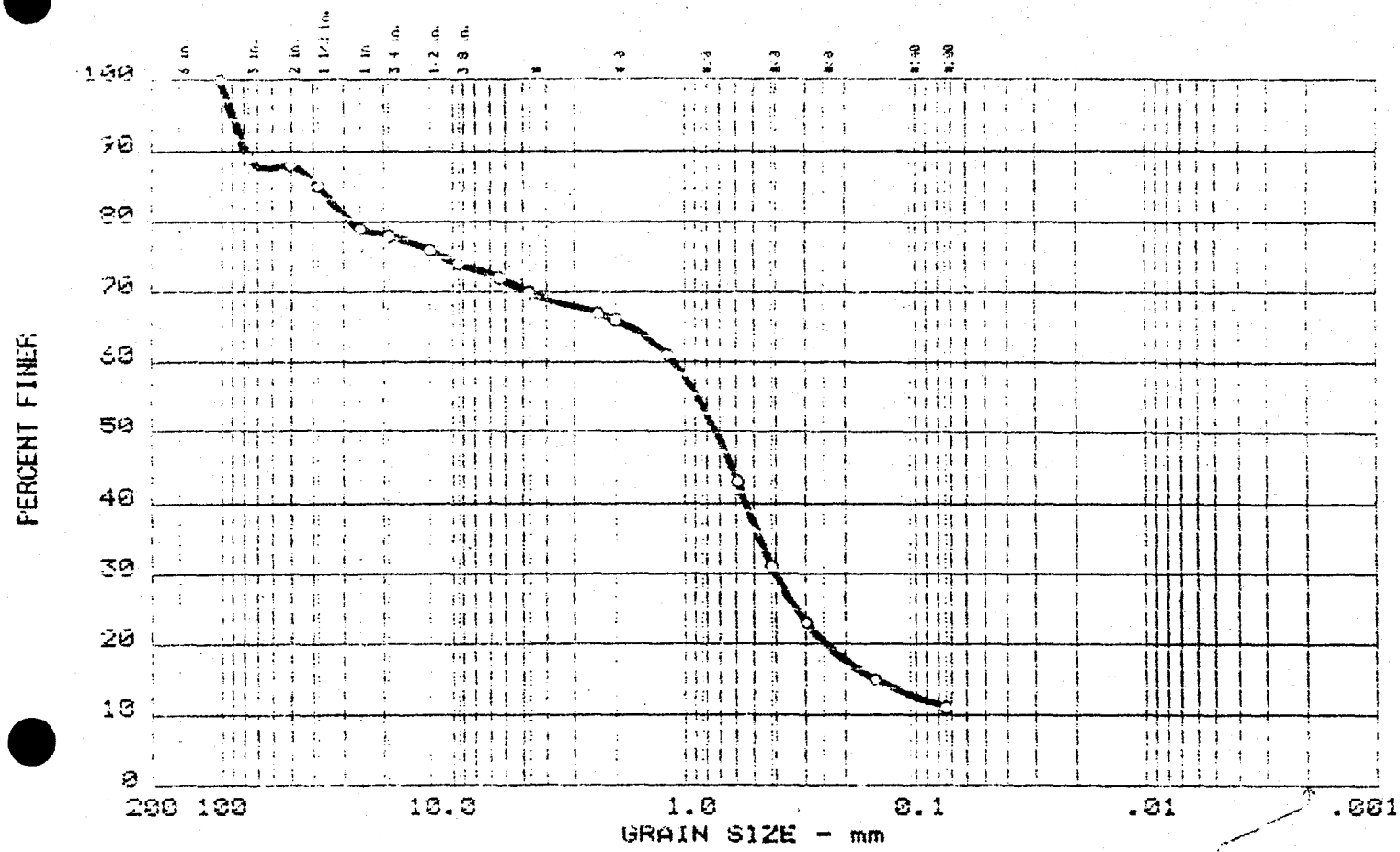
Date: 5/29/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 88

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	14	11.0	19.0	59.0	11.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○		NP	38.02	1.11	0.73	0.406	0.1474			

MATERIAL DESCRIPTION	USCS	AASHTO
○ GRAVELLY SAND; some cobbles, some fines	SP-SM	

Project No.: 2126J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 34(8 - 1)

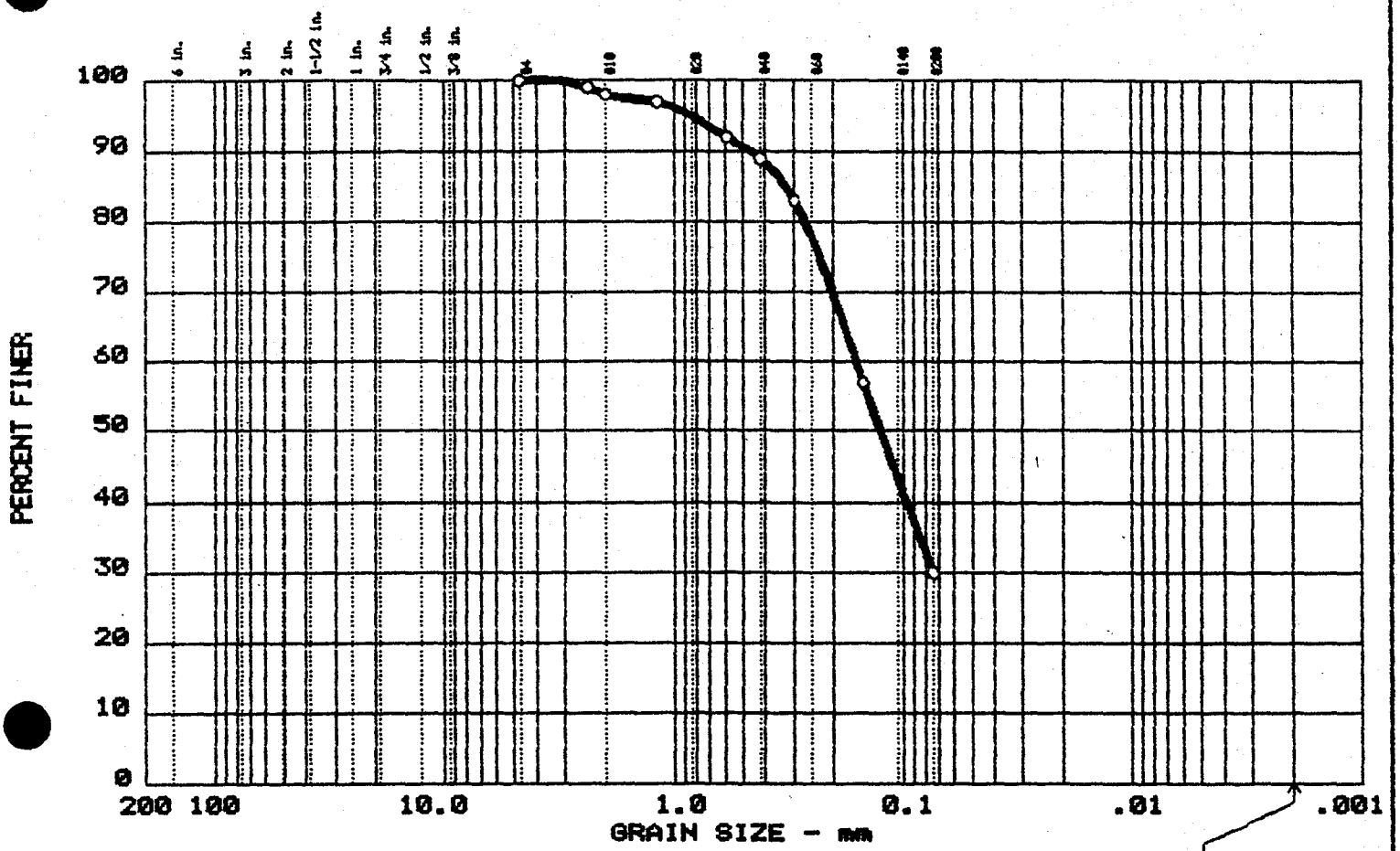
Date: 5/30/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 89

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	20	0.0	0.0	70.0	30.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○		NP	0.32	0.16	0.13					

MATERIAL DESCRIPTION	USCS	AASHTO
○ SILTY SAND	SM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 34(4 - 5)

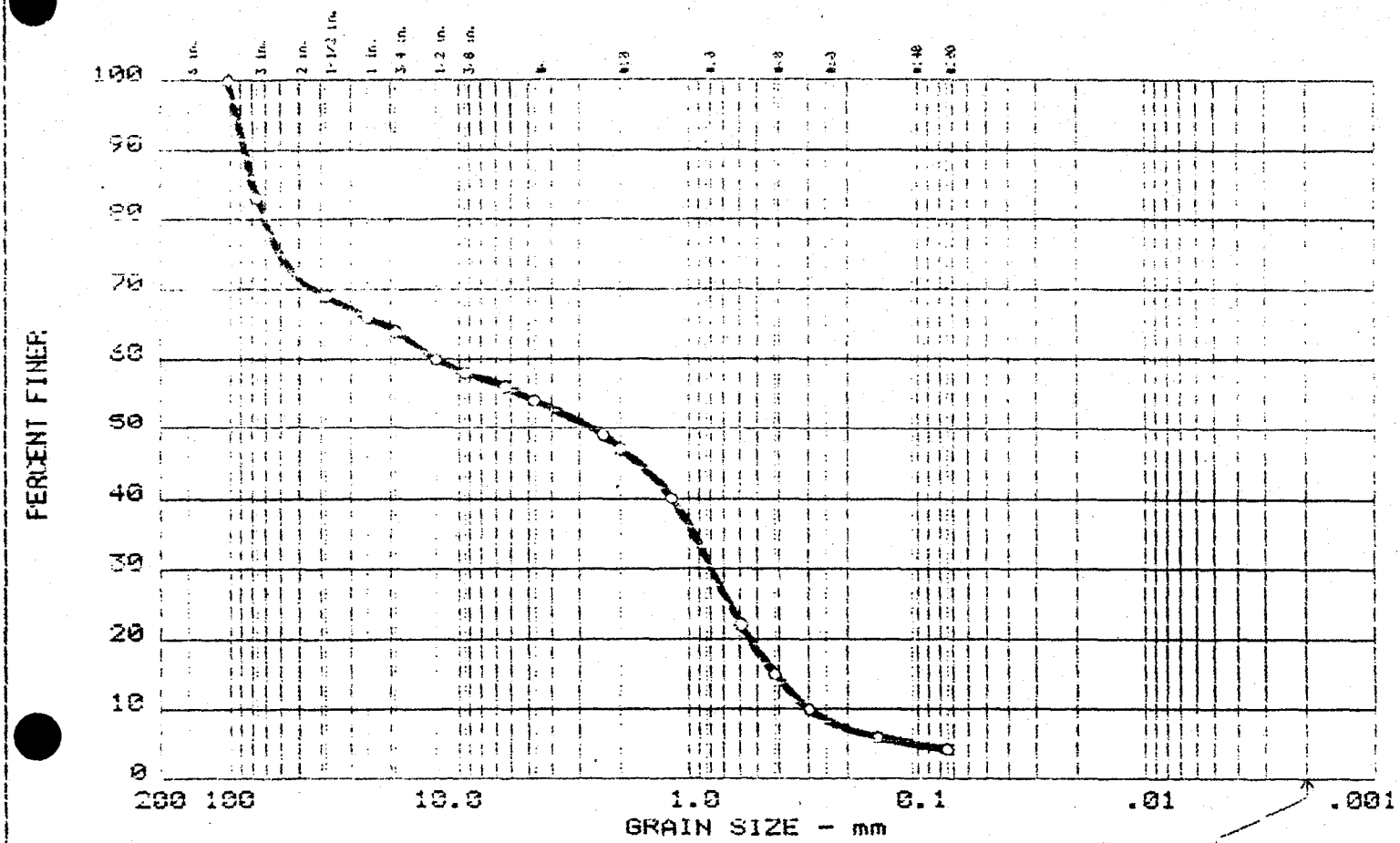
Date: 6/14/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 90

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	17	17.0	29.0	49.8	4.2	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○		NP	79.25	12.56	2.62	0.793	0.4159	0.2944	0.17	42.7

MATERIAL DESCRIPTION	USCS	AASHTO
○ GRAVELLY SAND; with cobbles, trace fines	SP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 34(7 - 8)

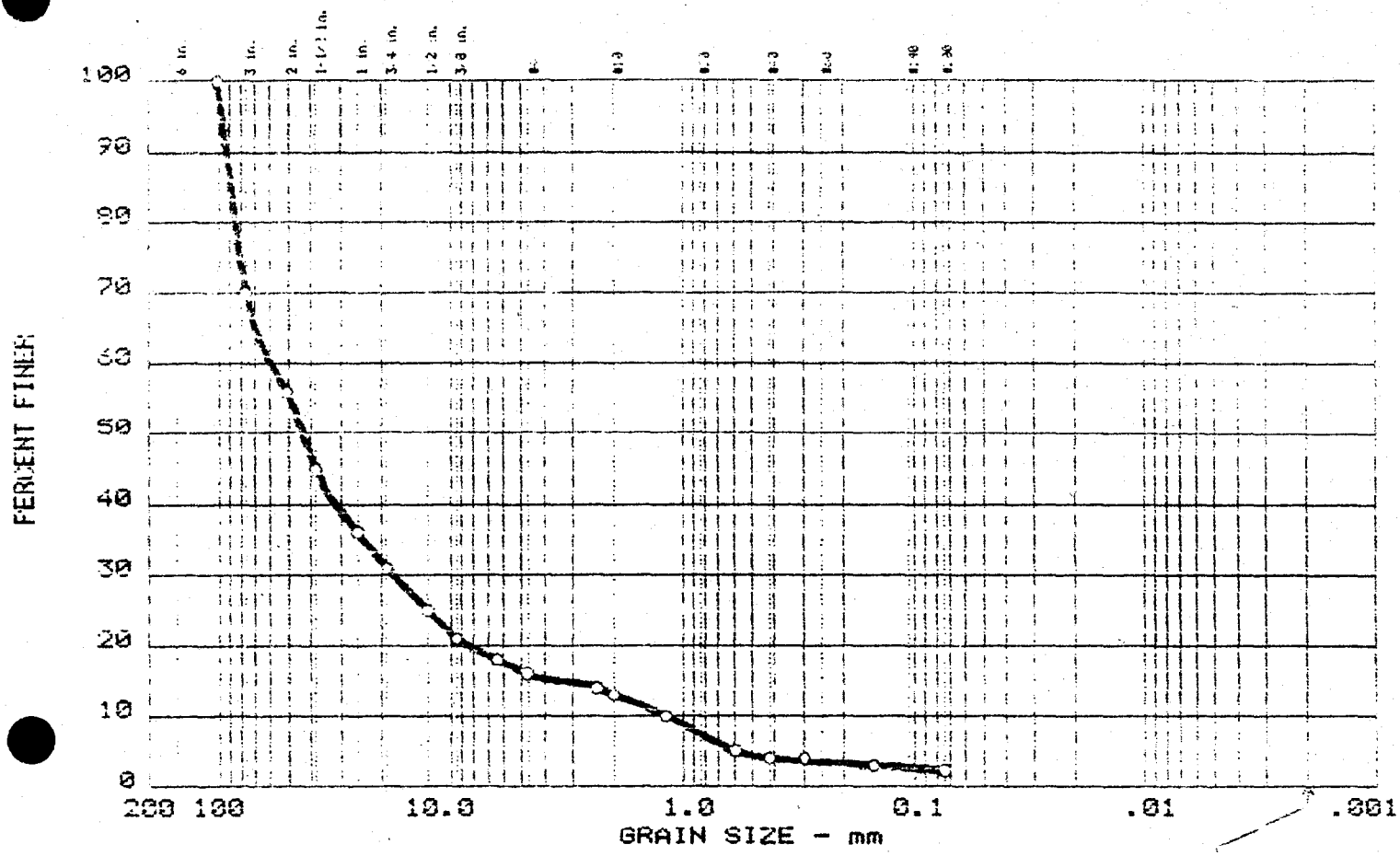
Date: 5/30/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 91

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	18	30.0	54.0	13.8	2.2	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			89.33	59.70	43.25	17.824	3.3574	1.1776	4.52	50.7

MATERIAL DESCRIPTION	USCS	AASHTO
○ GRAVEL; with cobbles, with sand, trace fines	GP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: TP - 34(11 - 12)

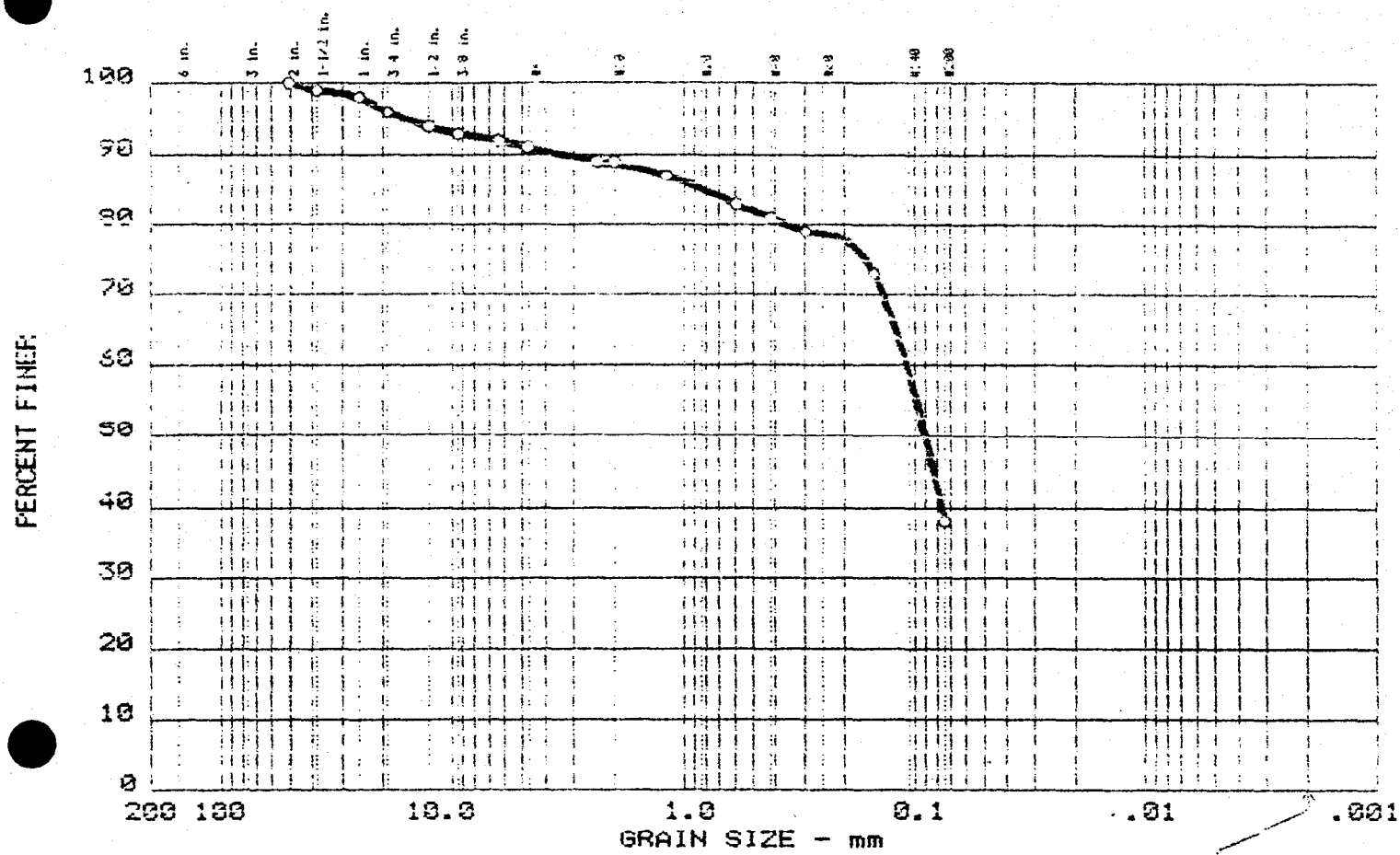
Date: 5/30/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 92

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	19	0.0	9.0	53.0	38.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○		NP	0.81	0.11	0.09					

MATERIAL DESCRIPTION	USCS	AASHTO
○ SILTY SAND; some gravel	SM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: B-1W (0 - 2)

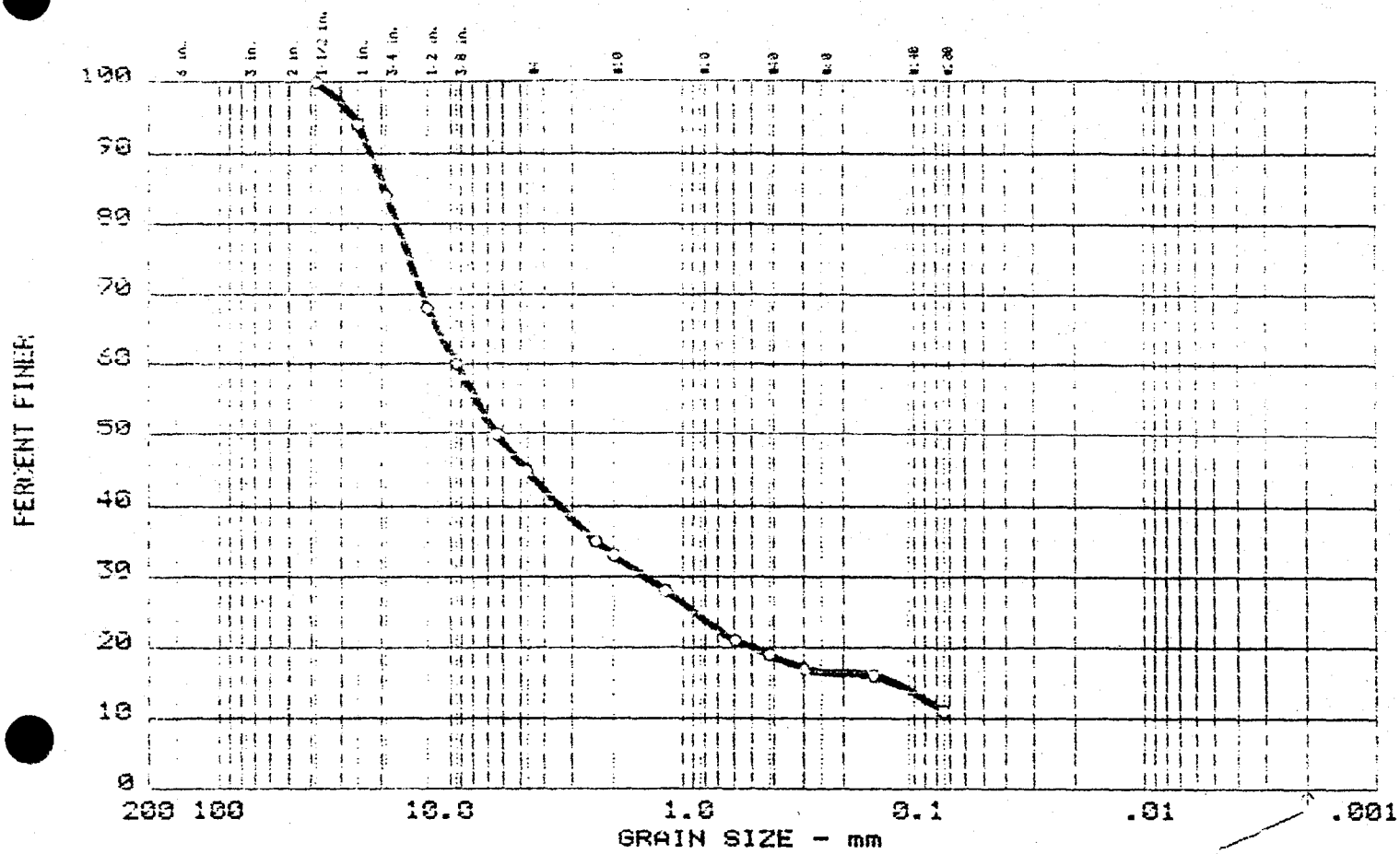
Date: 5/30/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 93

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	20	0.0	55.0	34.0	11.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○		NP	19.50	9.52	6.35	1.454	0.1182			

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY GRAVEL; some fines	SP-GM	

Project No.: 21280068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: B -1W (3 - 10)

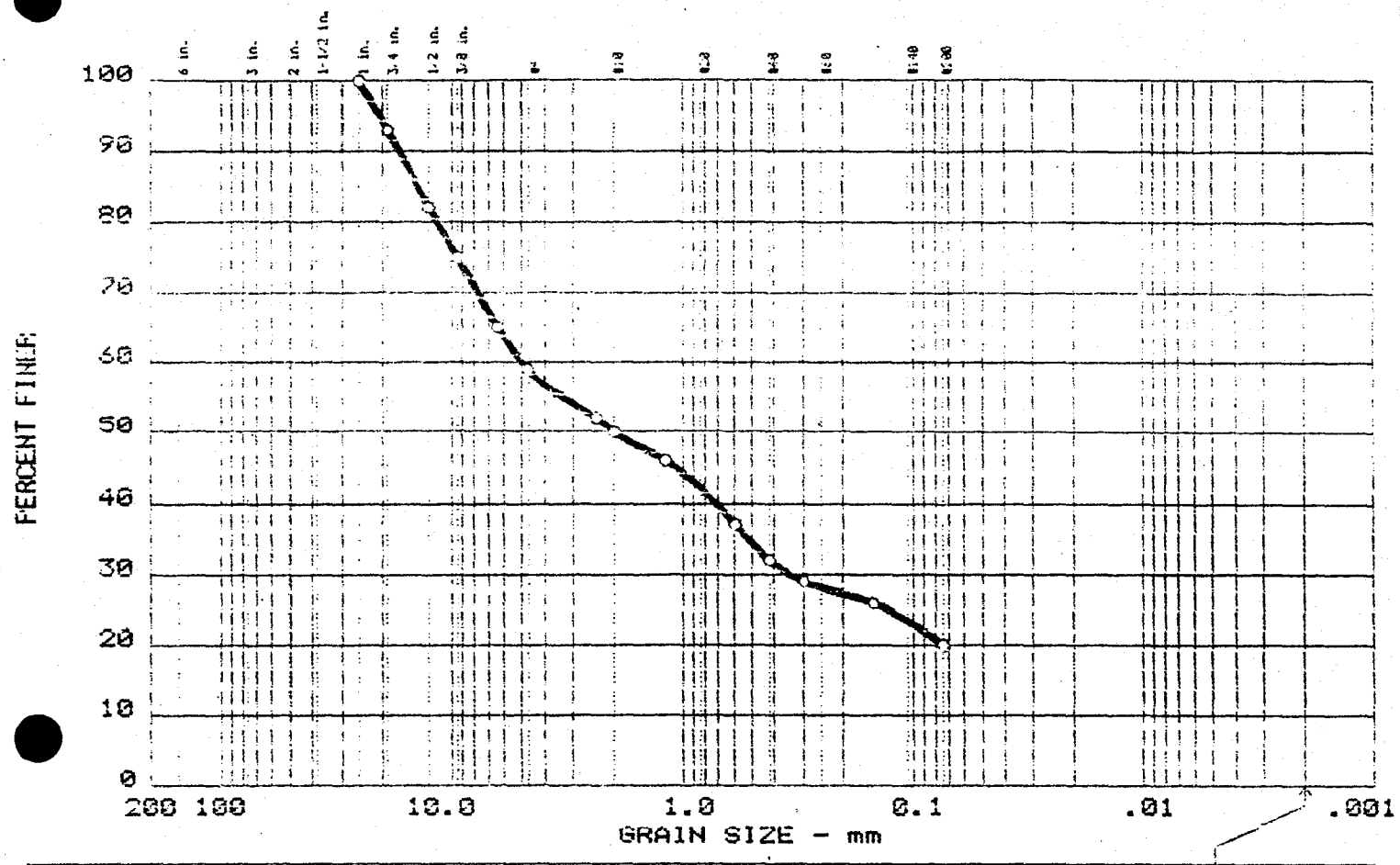
Date: 5/30/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 94

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	1	0.0	41.0	39.0	20.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	27	10	14.13	5.01	2.00	0.343				

MATERIAL DESCRIPTION	USCS	AASHTO
○ SAND AND GRAVEL; with fines	GC	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: B -1W (20 - 22)

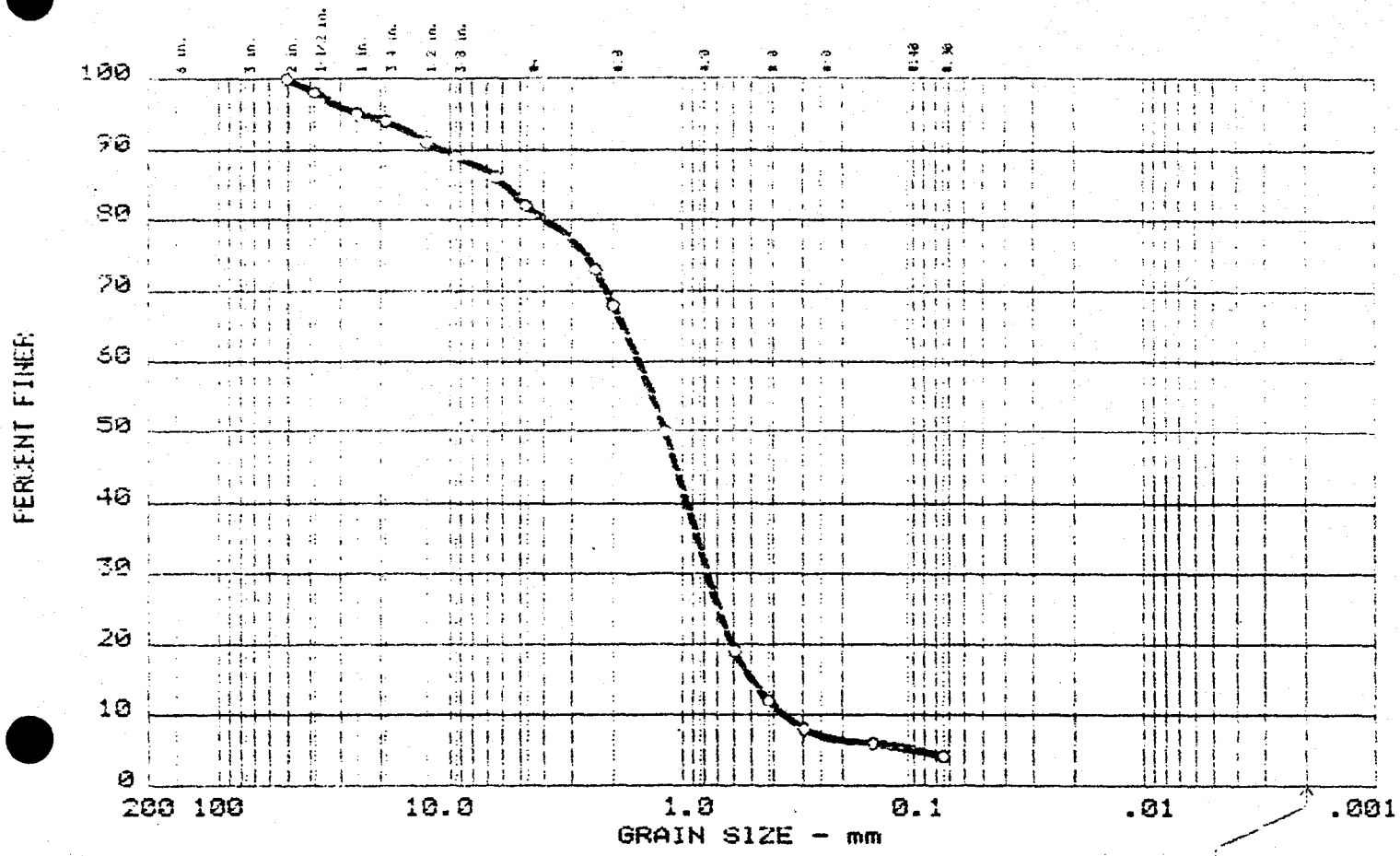
Date: 5/30/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 95

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	2	0.0	18.0	77.8	4.2	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○		NP	5.82	1.55	1.19	0.776	0.5012	0.3589	1.08	4.3

MATERIAL DESCRIPTION	USCS	AASHTO
○ SAND; with gravel, trace fines	SP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: B-3W (0 - 6)

Date: 5/30/88

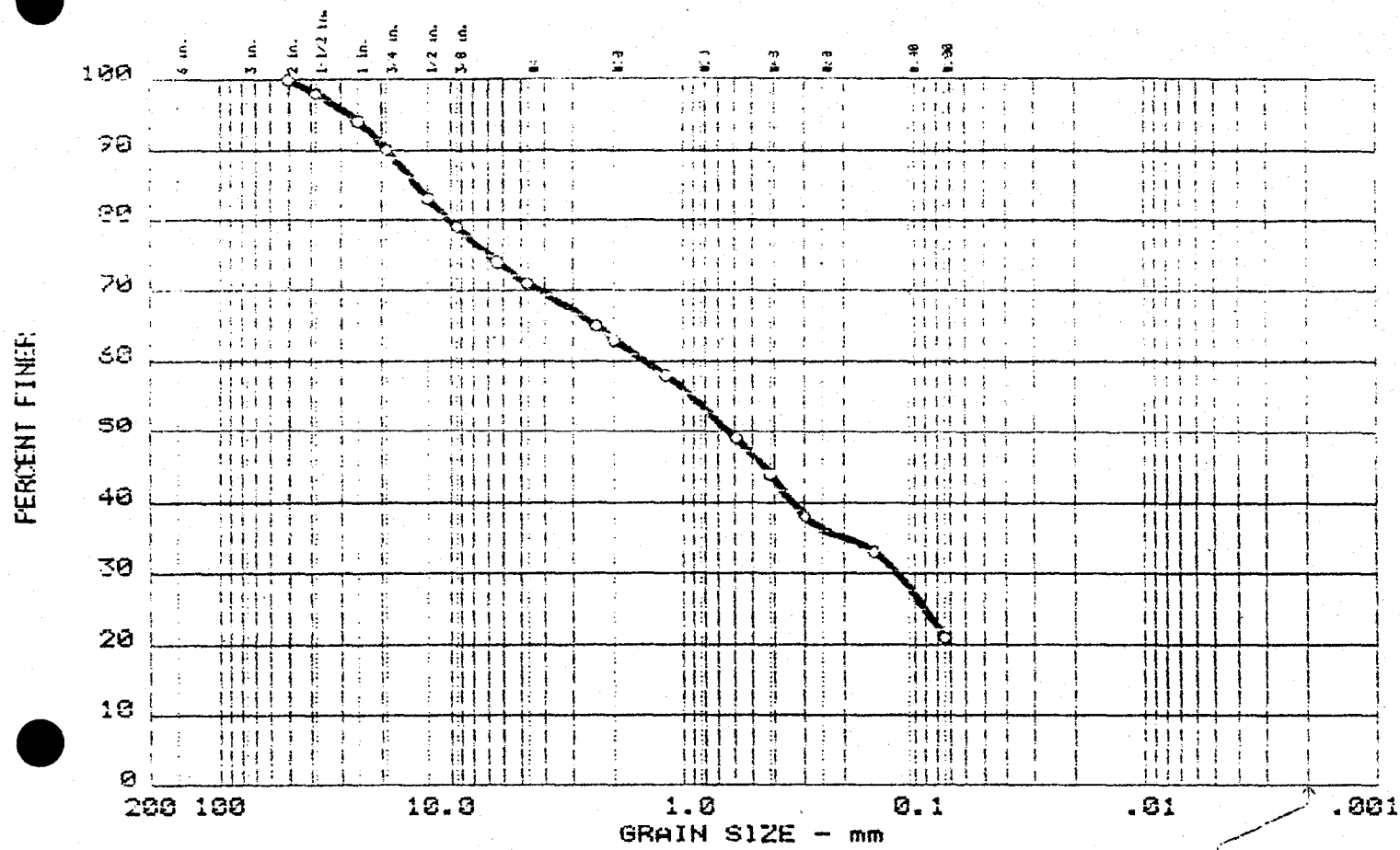
Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT

WESTERN TECHNOLOGIES INC.

Fig. No. 96

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	3	0.0	29.0	50.0	21.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○		NP	14.29	1.46	0.63	0.117				

MATERIAL DESCRIPTION	USCS	AASHTO
○ SILTY-GRAVELLY SAND	SM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: B -4W (0 - 5)

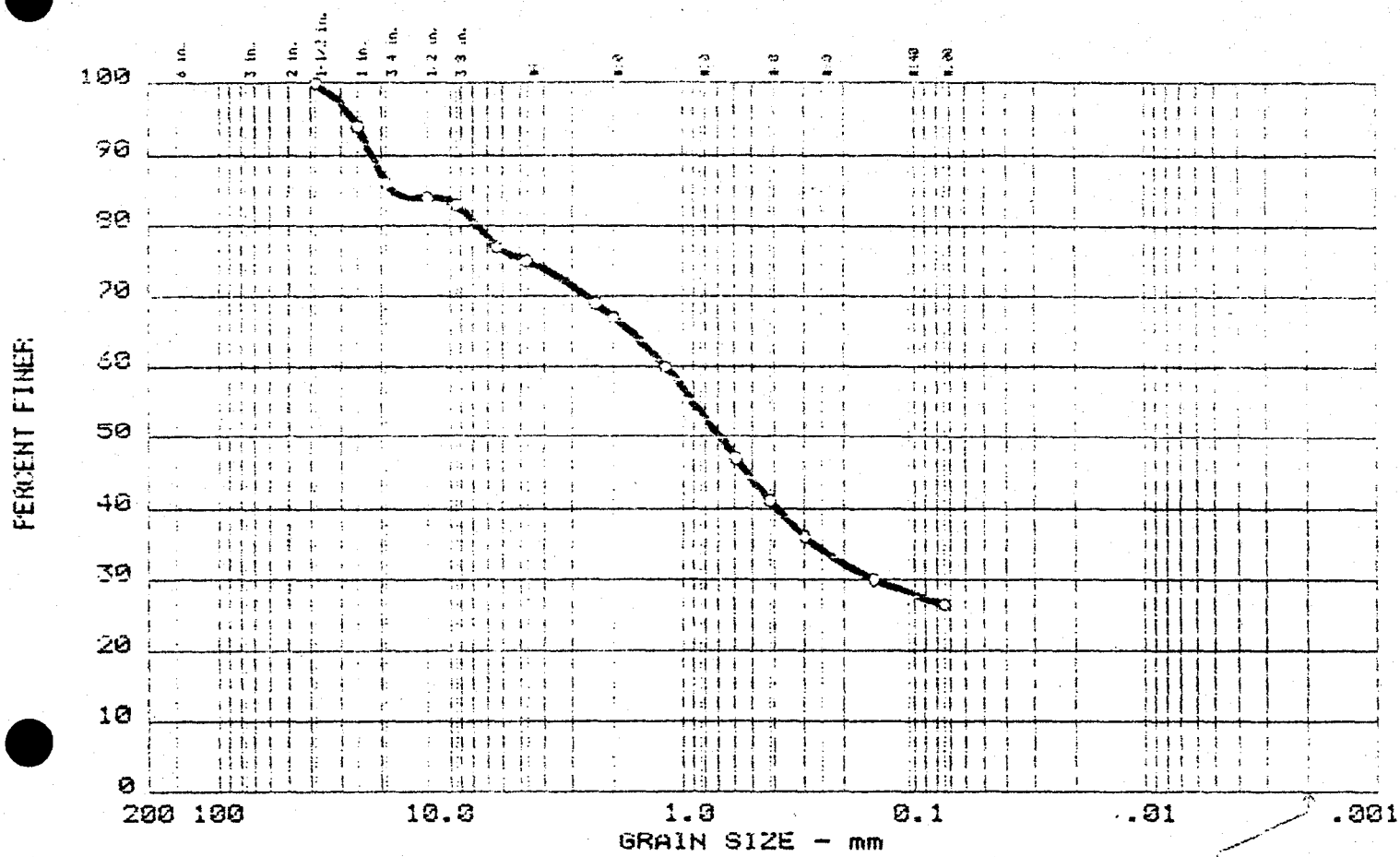
Date: 5/30/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 97

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	4	0.0	25.0	48.5	26.5	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	36	17	17.78	1.19	0.68	0.148				

MATERIAL DESCRIPTION	USCS	AASHTO
○ CLAYEY SAND; with gravel	SC	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: B -19W (2 - 3.5)

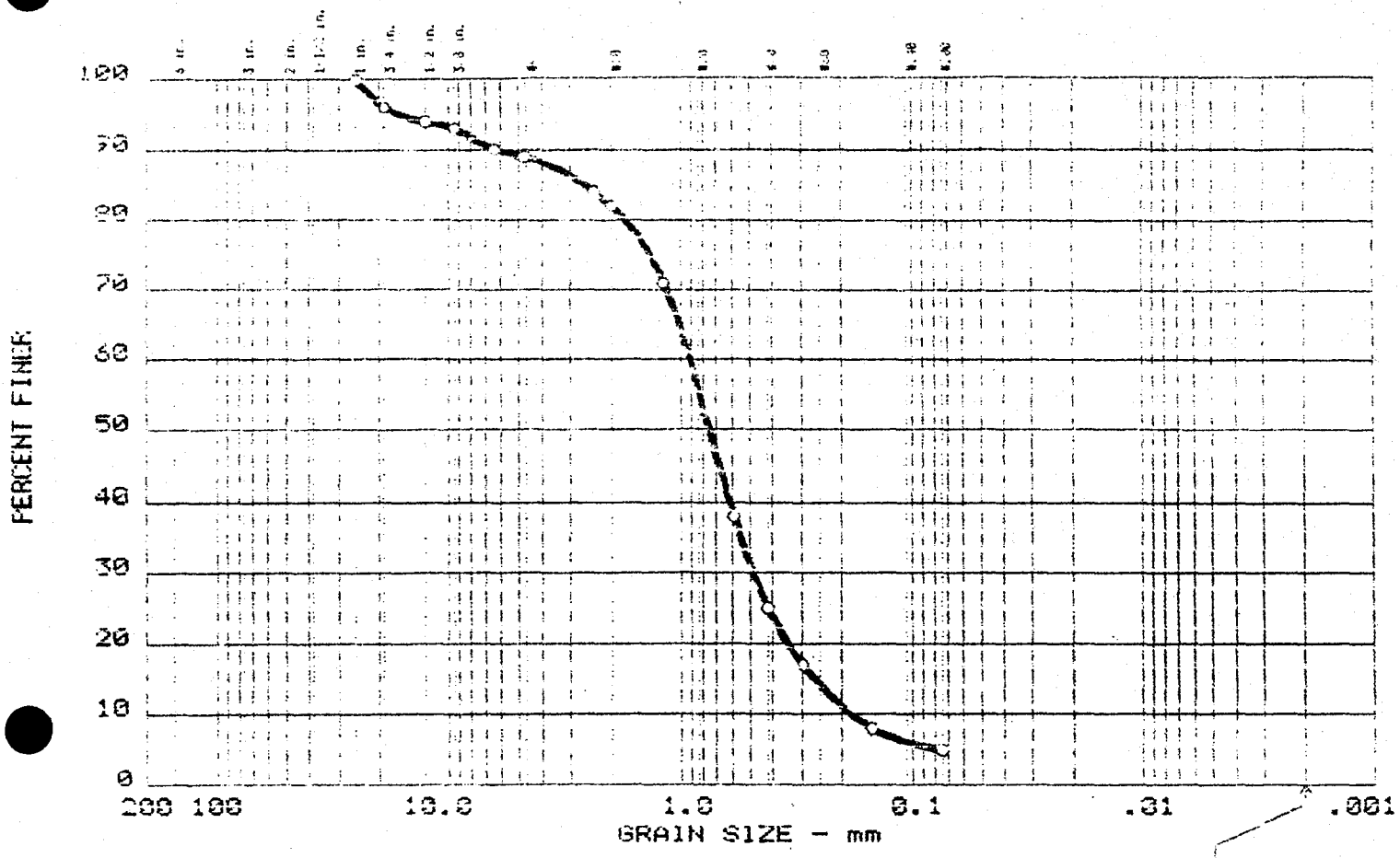
Date: 5/30/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 98

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	5	0.0	11.0	84.1	4.9	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			2.60	0.92	0.75	0.486	0.2639	0.1826	1.41	5.0

MATERIAL DESCRIPTION	USCS	AASHTO
○ SAND; some gravel, trace fines	SP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: B-21W (4 - 5.5)

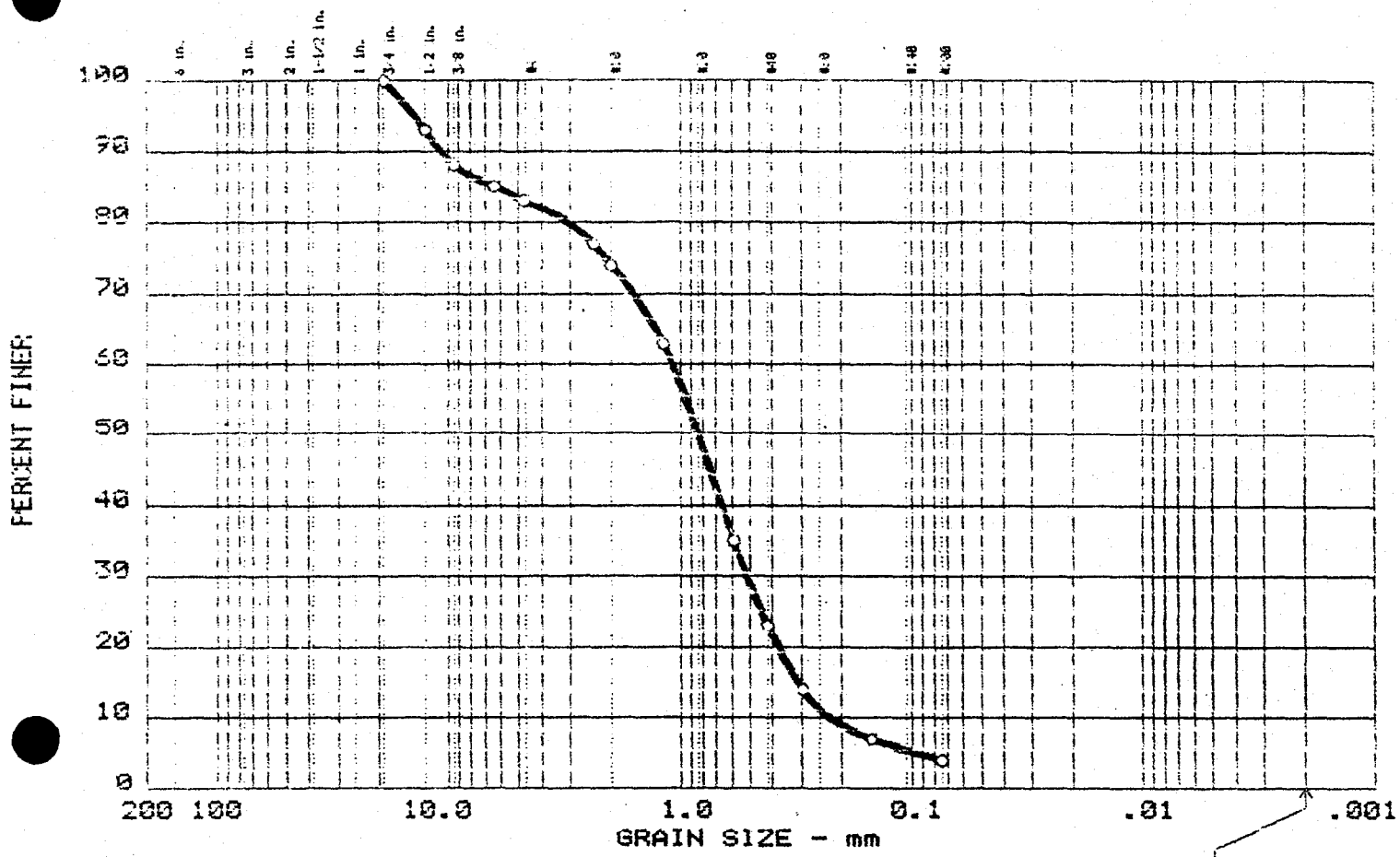
Date: 5/30/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 99

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	6	0.0	17.0	79.0	4.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			6.31	1.08	0.84	0.517	0.3115	0.2257	1.09	4.8

MATERIAL DESCRIPTION	USCS	AASHTO
○ SAND; with gravel, trace fines	SP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: B-23W (4 - 5.5)

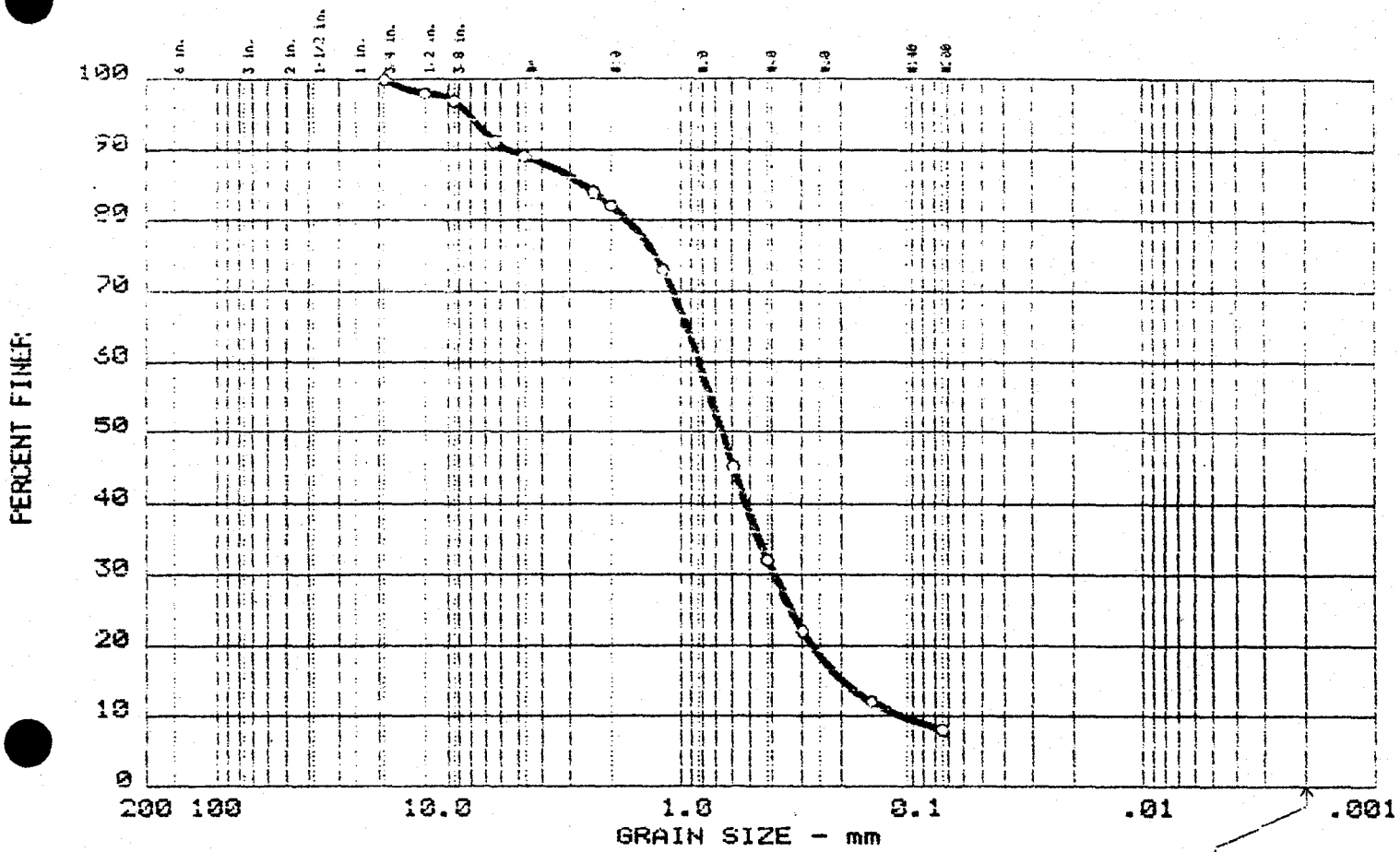
Date: 5/30/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 100

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	7	0.0	11.0	81.0	8.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			2.60	0.83	0.66	0.394	0.1995	0.1109	1.68	7.5

MATERIAL DESCRIPTION	USCS	AASHTO
○ SAND; some gravel, some fines	SW-SM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: B-24W (2 - 3)

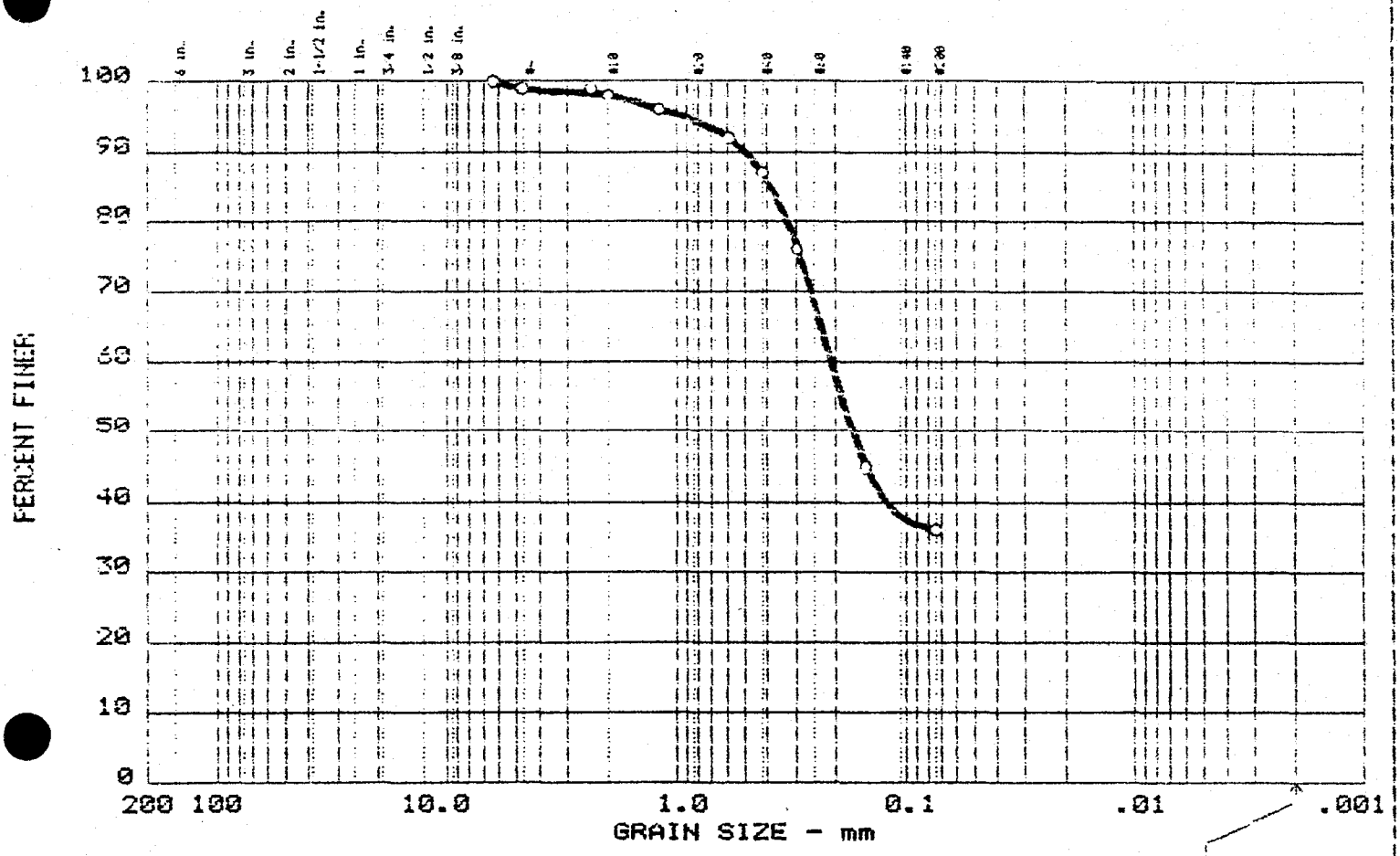
Date: 5/30/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 101

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	8	0.0	1.0	63.0	36.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○		NP	0.38	0.21	0.17					

MATERIAL DESCRIPTION	USCS	AASHTO
○ SILTY; trace gravel	SM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: B-25W (4 - 5.5)

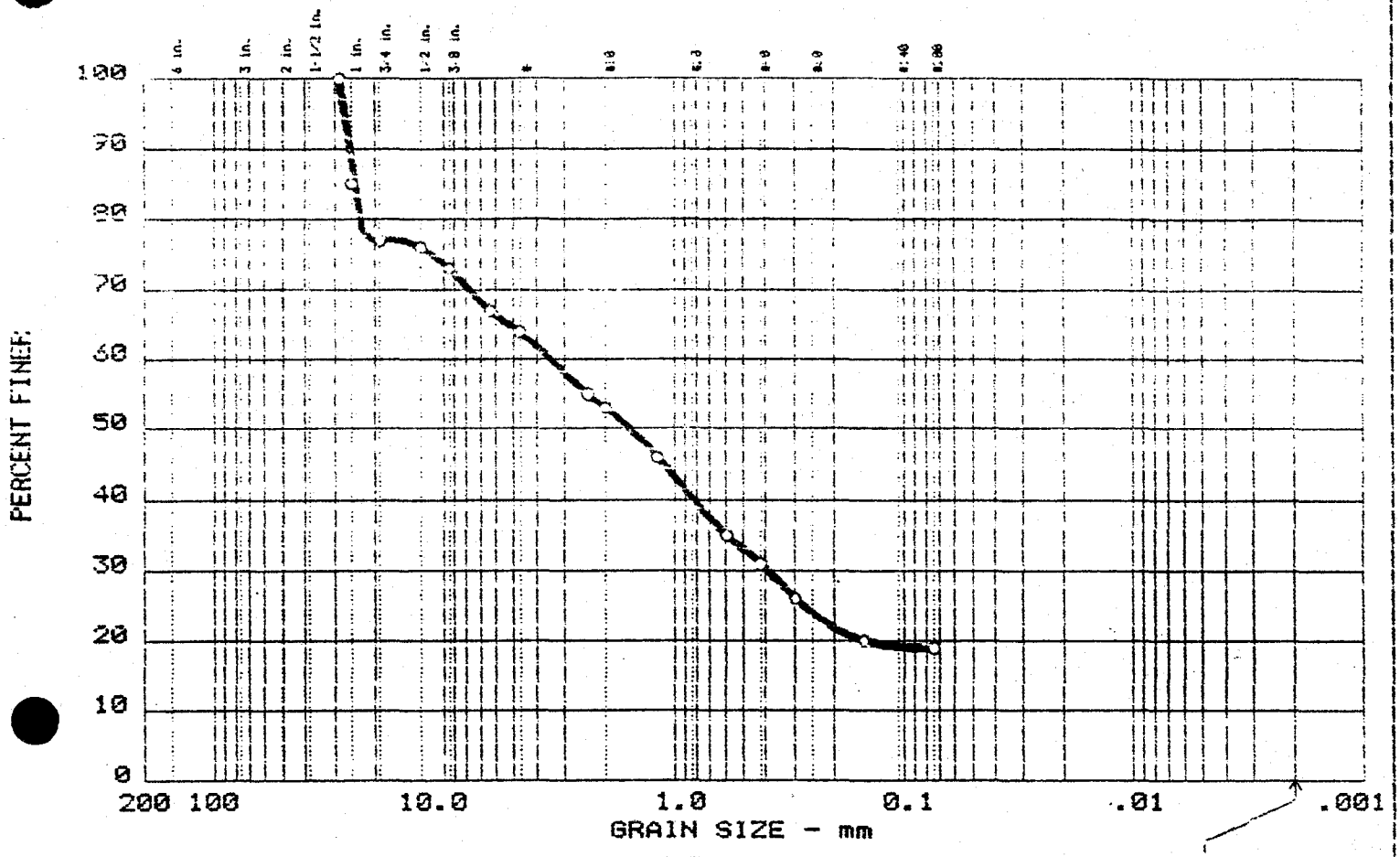
Date: 5/30/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 102

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	9	0.0	36.0	45.1	18.9	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			25.38	3.42	1.56	0.389				

MATERIAL DESCRIPTION	USCS	AASHTO
○ GRAVELLY SAND; with clay	SC	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: B-26W (4 - 5.5)

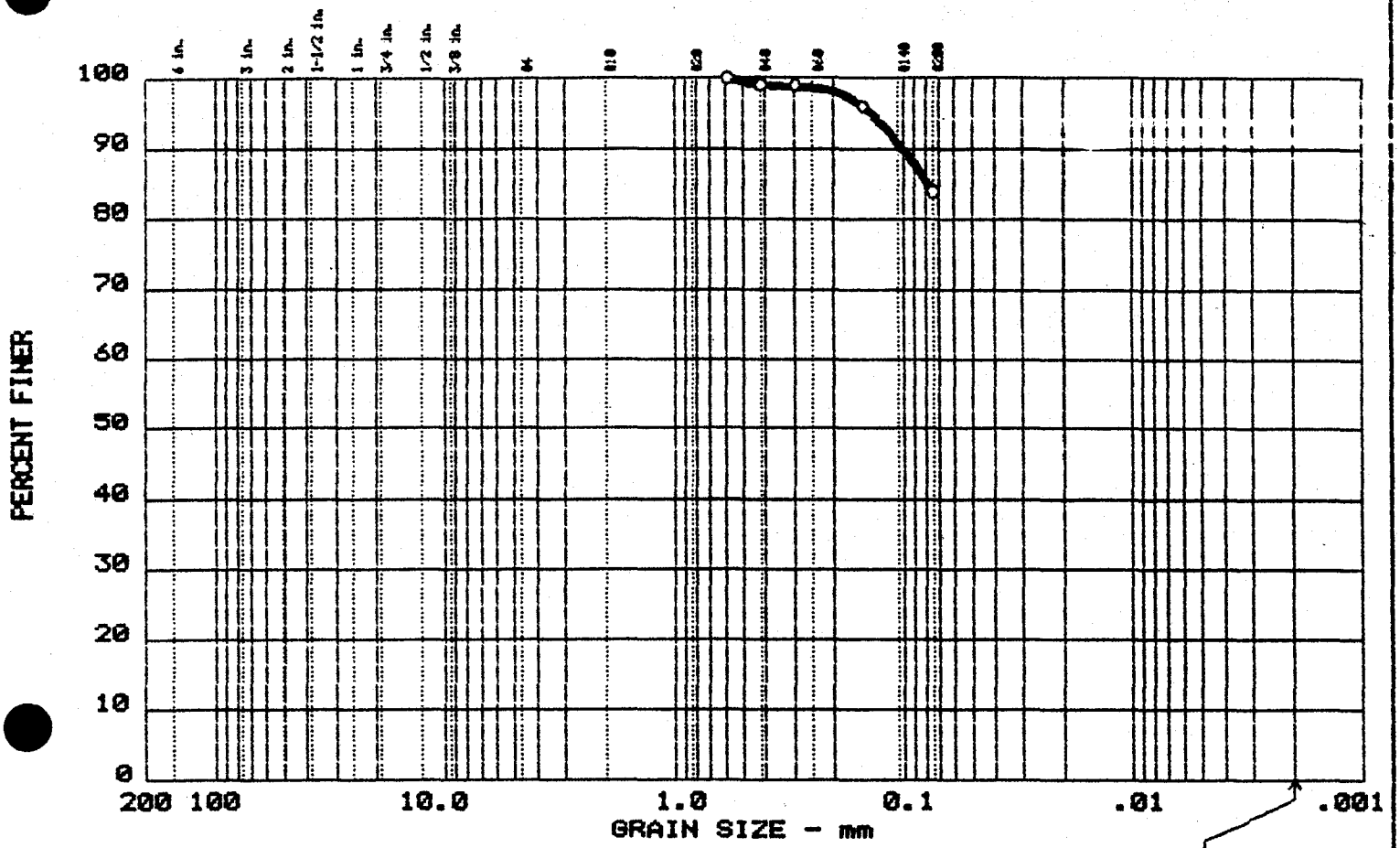
Date: 5/30/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 103

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
O	19	0.0	0.0	16.0	84.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
O	26	4	0.08							

MATERIAL DESCRIPTION	USCS	AASHTO
O CLAY AND SILT; with sand	ML	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
O Location: B -31W.(2 - 3)

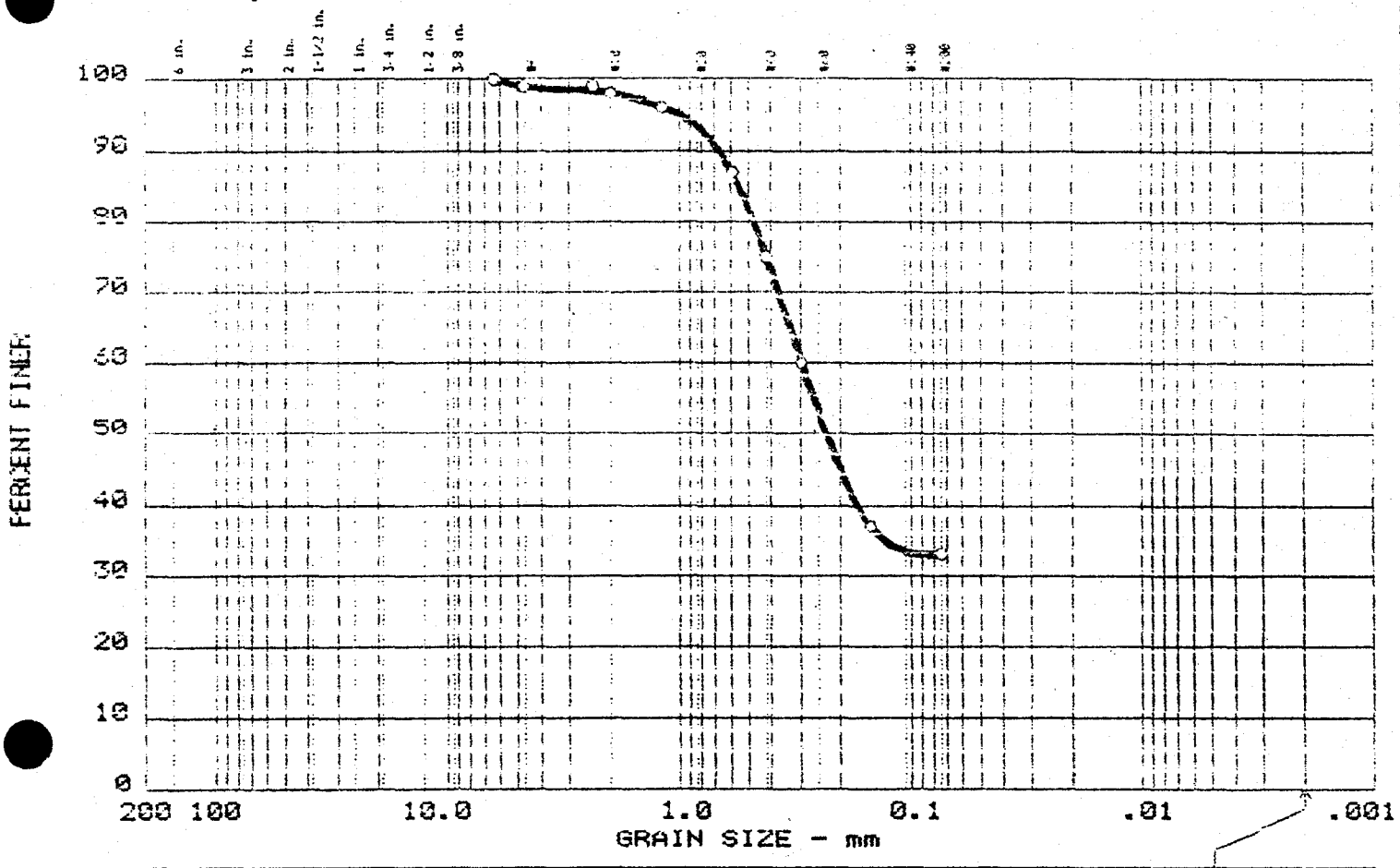
Date: 6/14/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 104

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	14	0.0	1.0	66.0	33.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○		NP	0.55	0.30	0.23					

MATERIAL DESCRIPTION	USCS	AASHTO
○ SILTY-CLAYEY SAND; trace gravel	SC-SM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: B -31W (5 - 6)

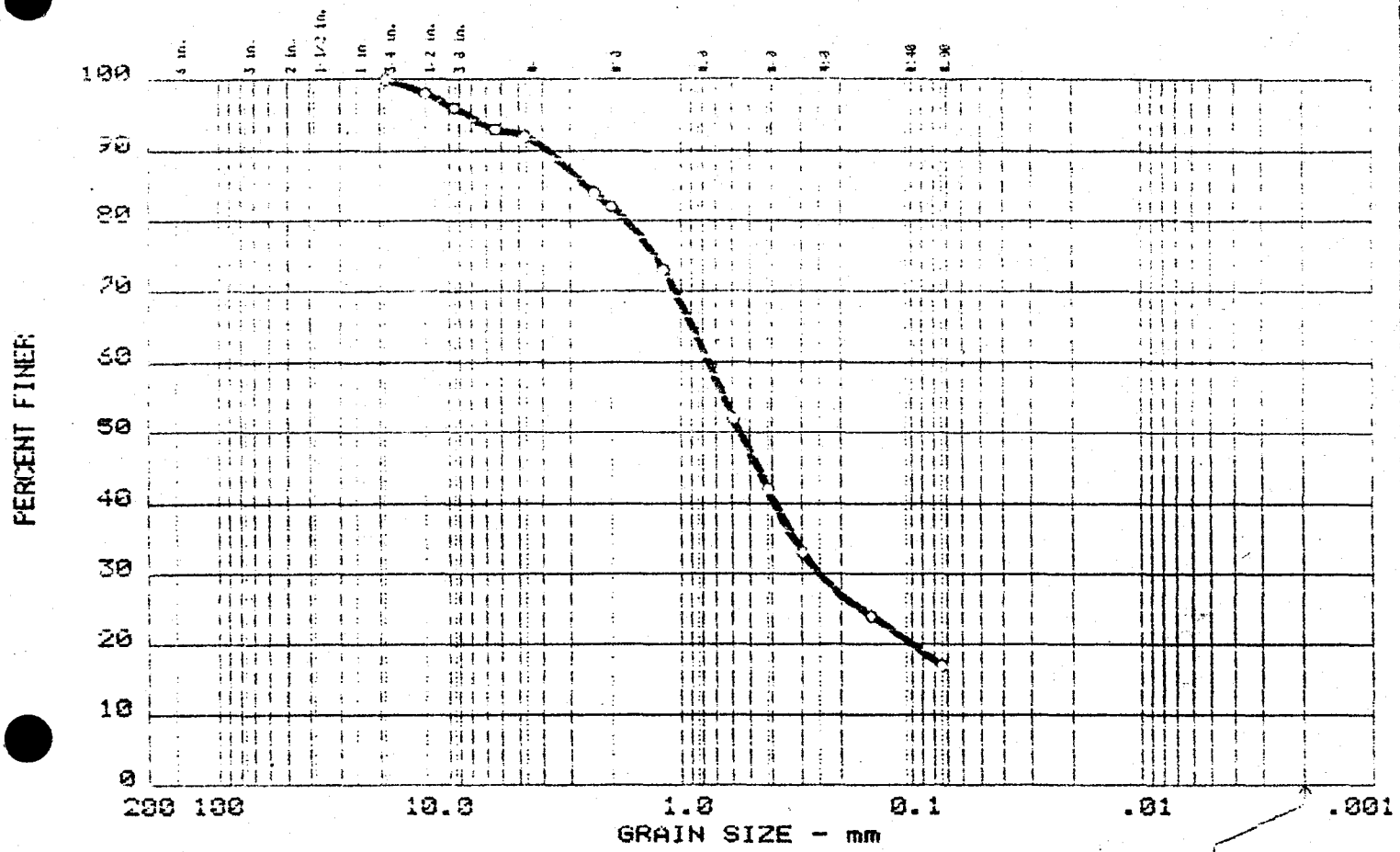
Date: 5/31/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 105

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	15	0.0	8.0	75.0	17.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			2.57	0.76	0.55	0.251				

MATERIAL DESCRIPTION	USCS	AASHTO
○ SAND; with silt, some gravel	SM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: B - 3E(2 - 3.5)

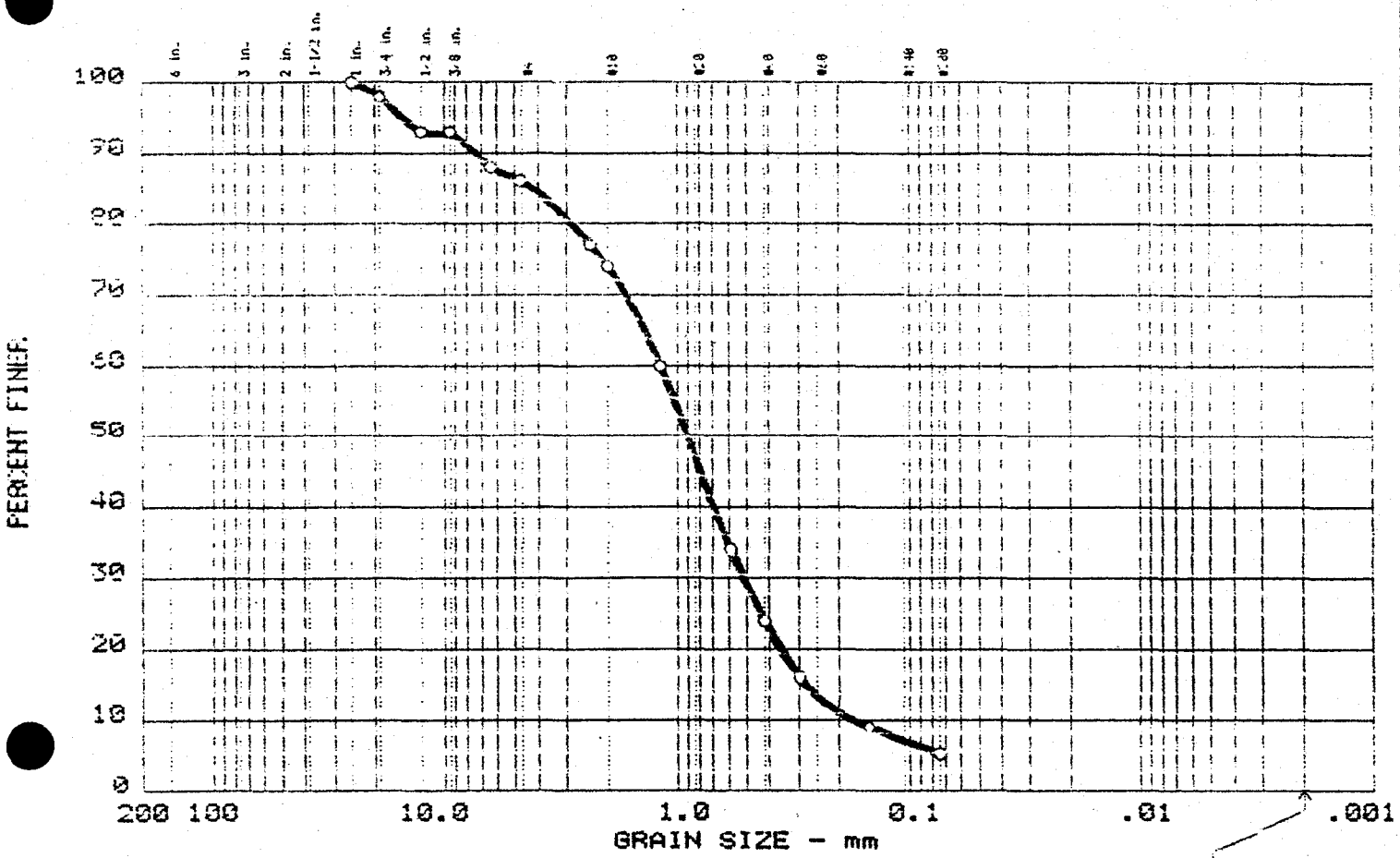
Date: 5/31/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 106

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	16	0.0	14.0	80.7	5.3	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			4.22	1.19	0.91	0.520	0.2793	0.1742	1.31	6.8

MATERIAL DESCRIPTION	USCS	AASHTO
○ SAND; with gravel, some fines	SW-SM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: B - 4E(3 - 4.5)

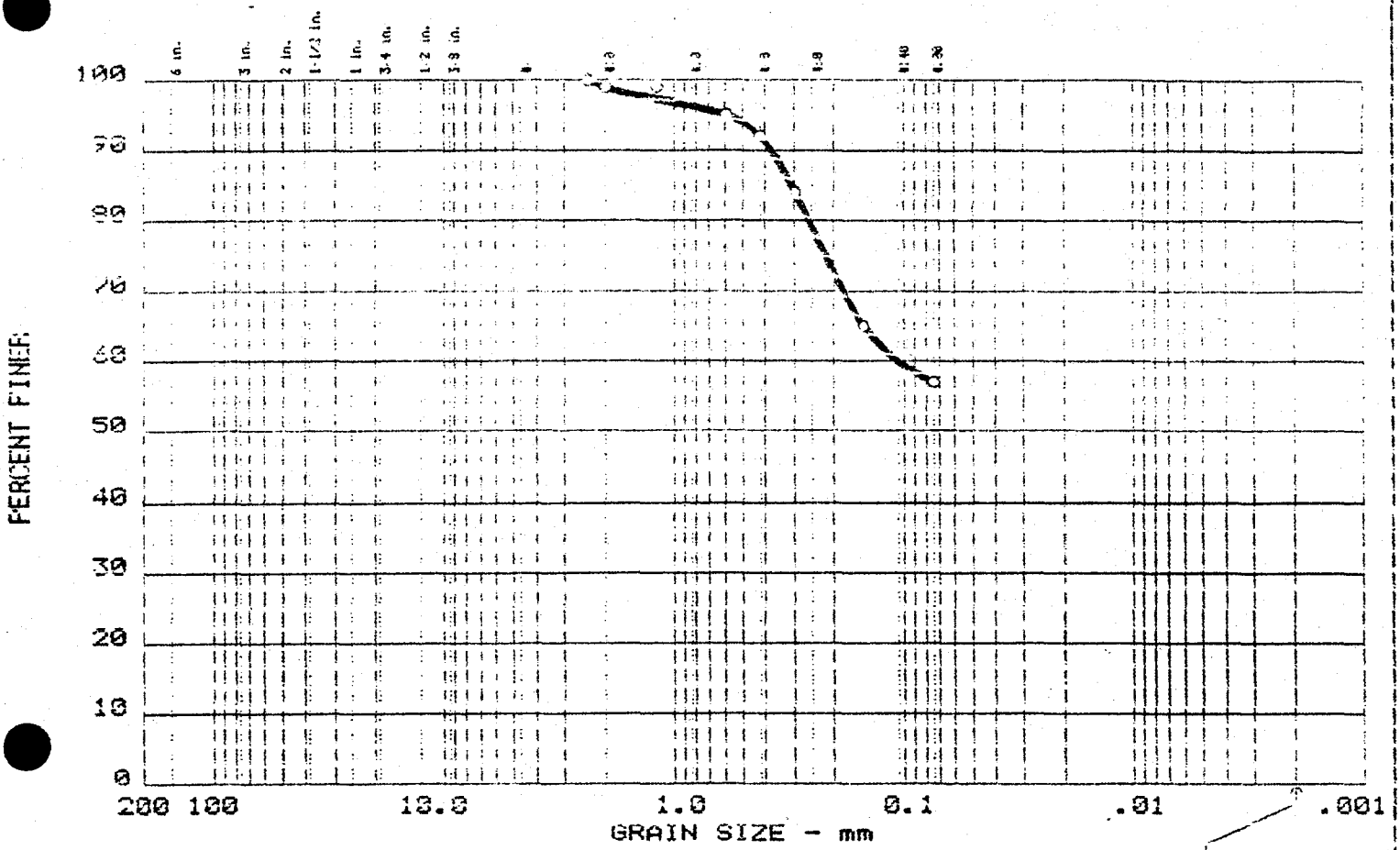
Date: 5/31/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 107

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	9	0.0	0.0	43.0	57.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	27	7	0.31	0.11						

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY SILT	CL-ML	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: B - 5E(0 - 2)

Date: 6/8/88

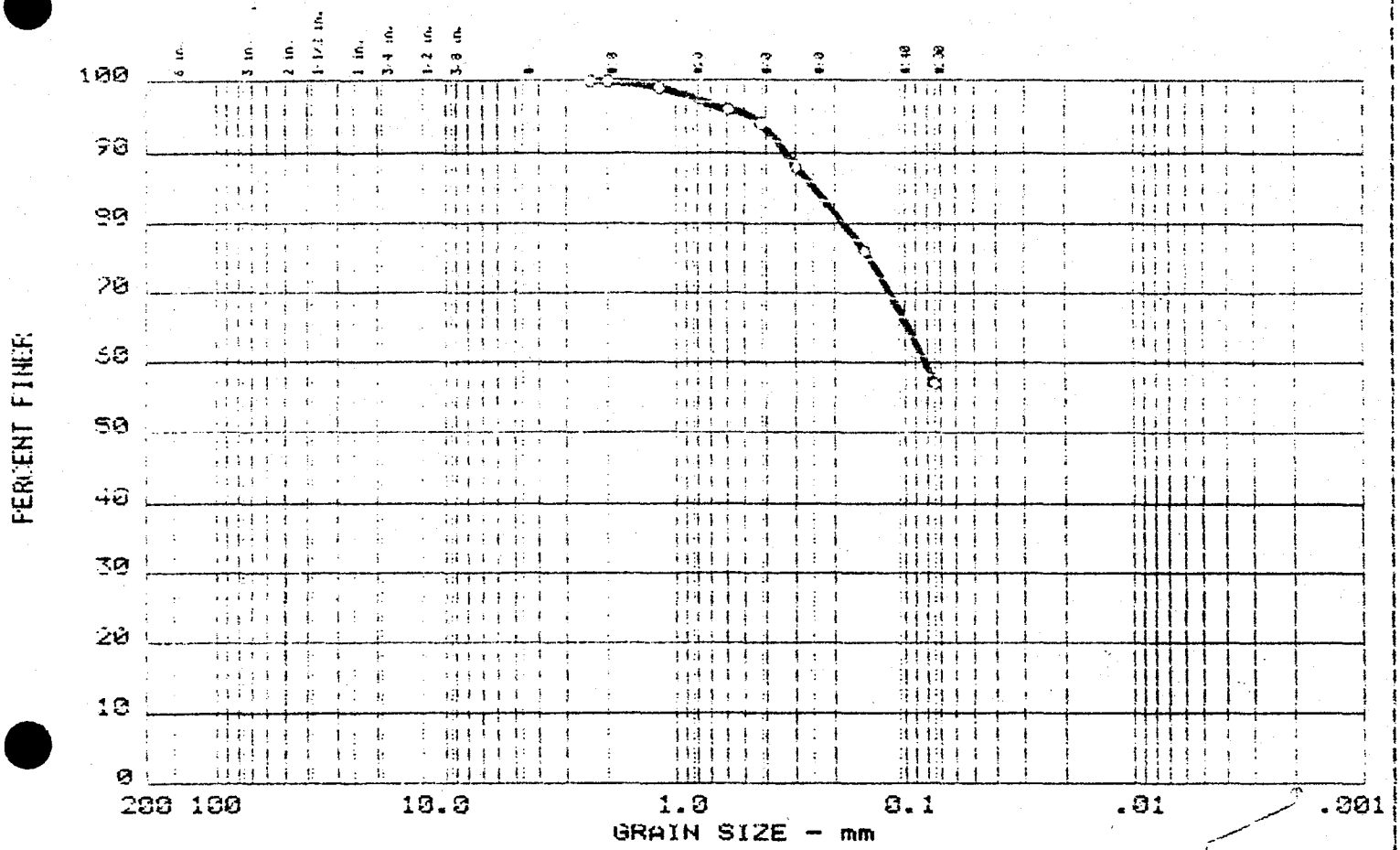
Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT

WESTERN TECHNOLOGIES INC.

Fig. No. 108

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	8	0.0	0.0	43.0	57.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	23	3	0.25	0.08						

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY SILT	ML	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: B - 5E(2 - 3)

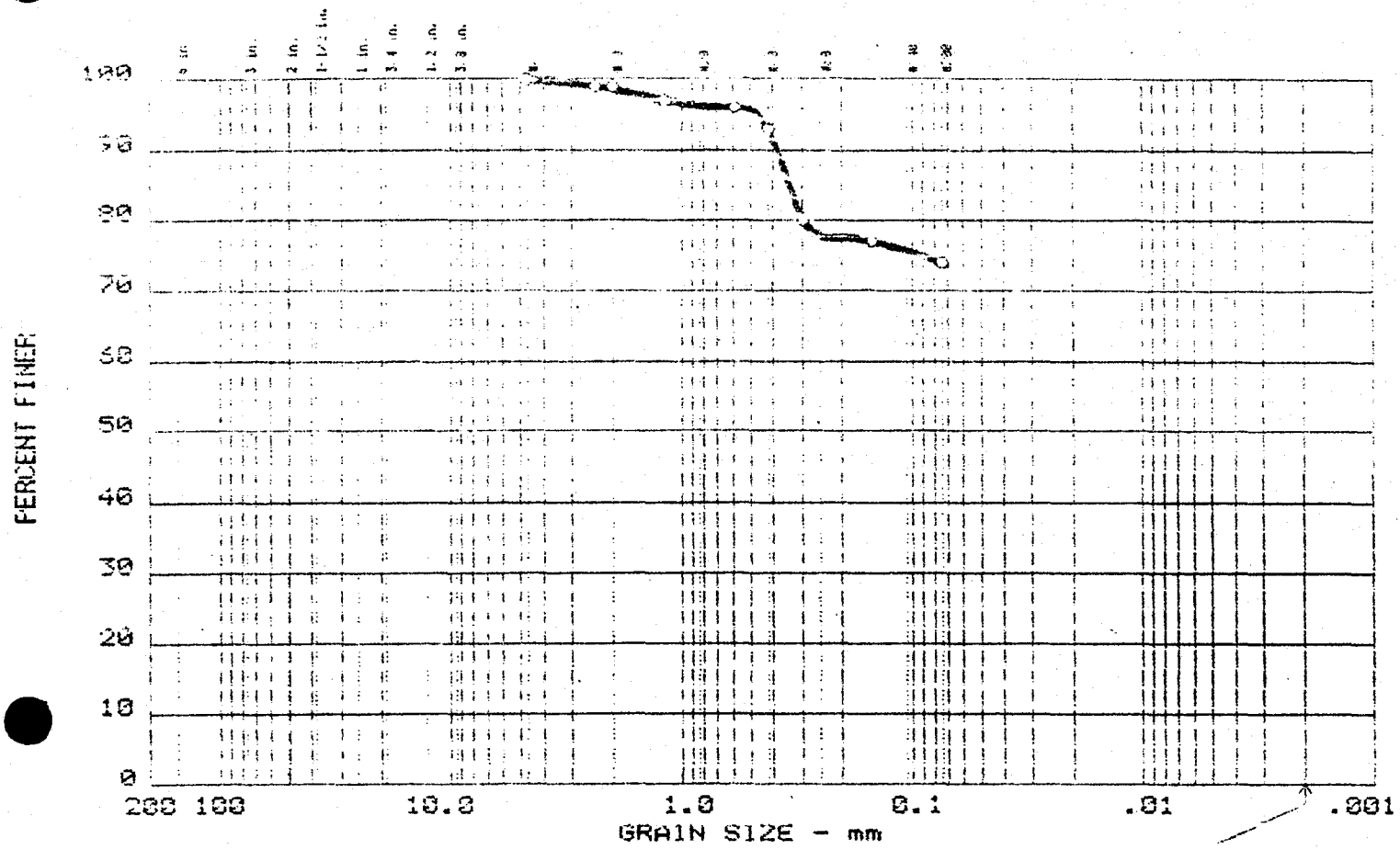
Date: 6/8/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 109

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	10	0.0	0.0	26.0	74.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	29	7	0.34							

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY SILT	CL-ML	

Project No.: 21280068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: B - 6E(0 - 2)

Date: 6/9/88

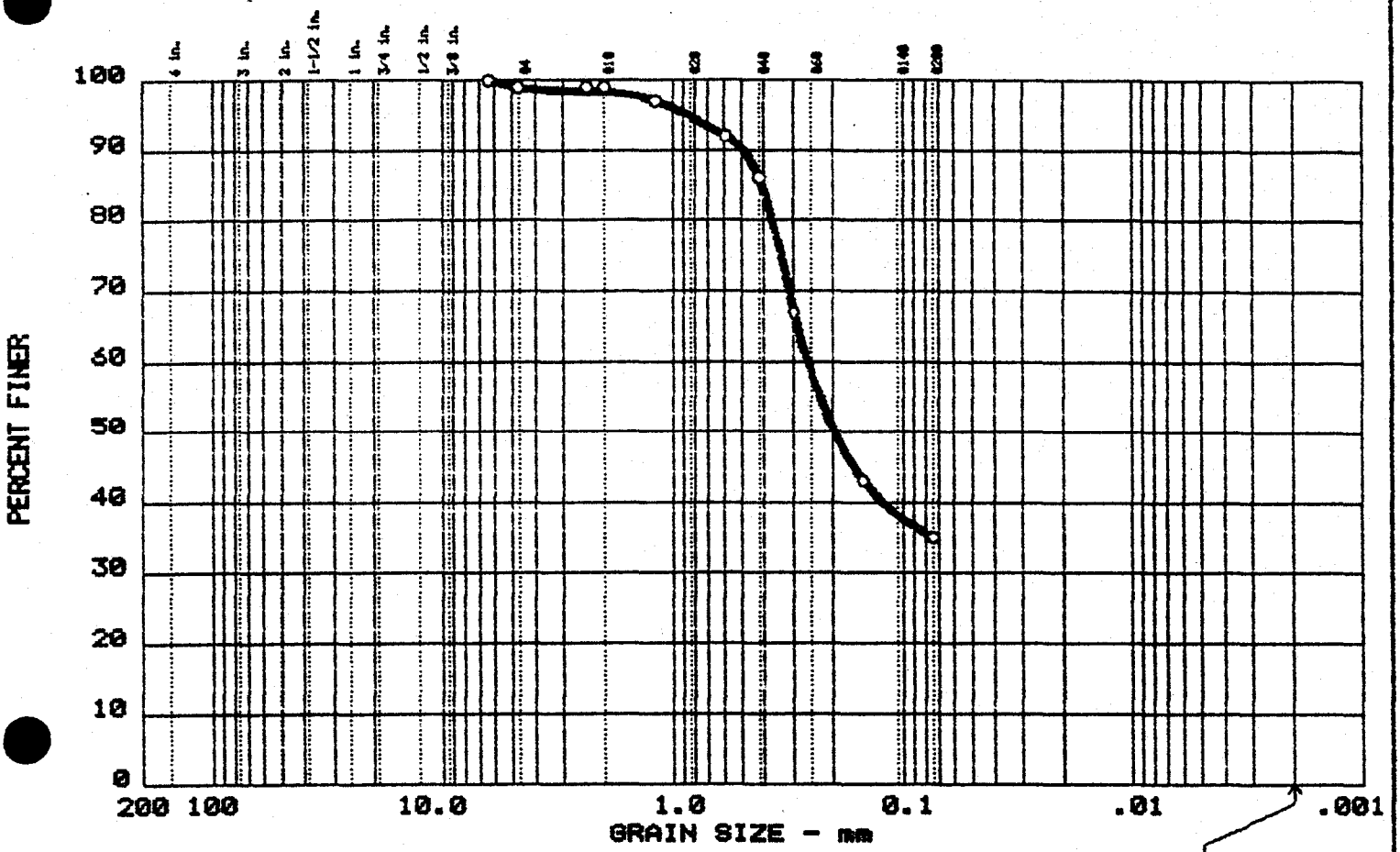
Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT

WESTERN TECHNOLOGIES INC.

Fig. No. 110

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
o	12	0.0	1.0	64.0	35.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
o		NP	0.41	0.26	0.20					

MATERIAL DESCRIPTION	USCS	AASHTO
o SILTY SAND; trace gravel	SM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
o Location: B - 7E(0 - 2)

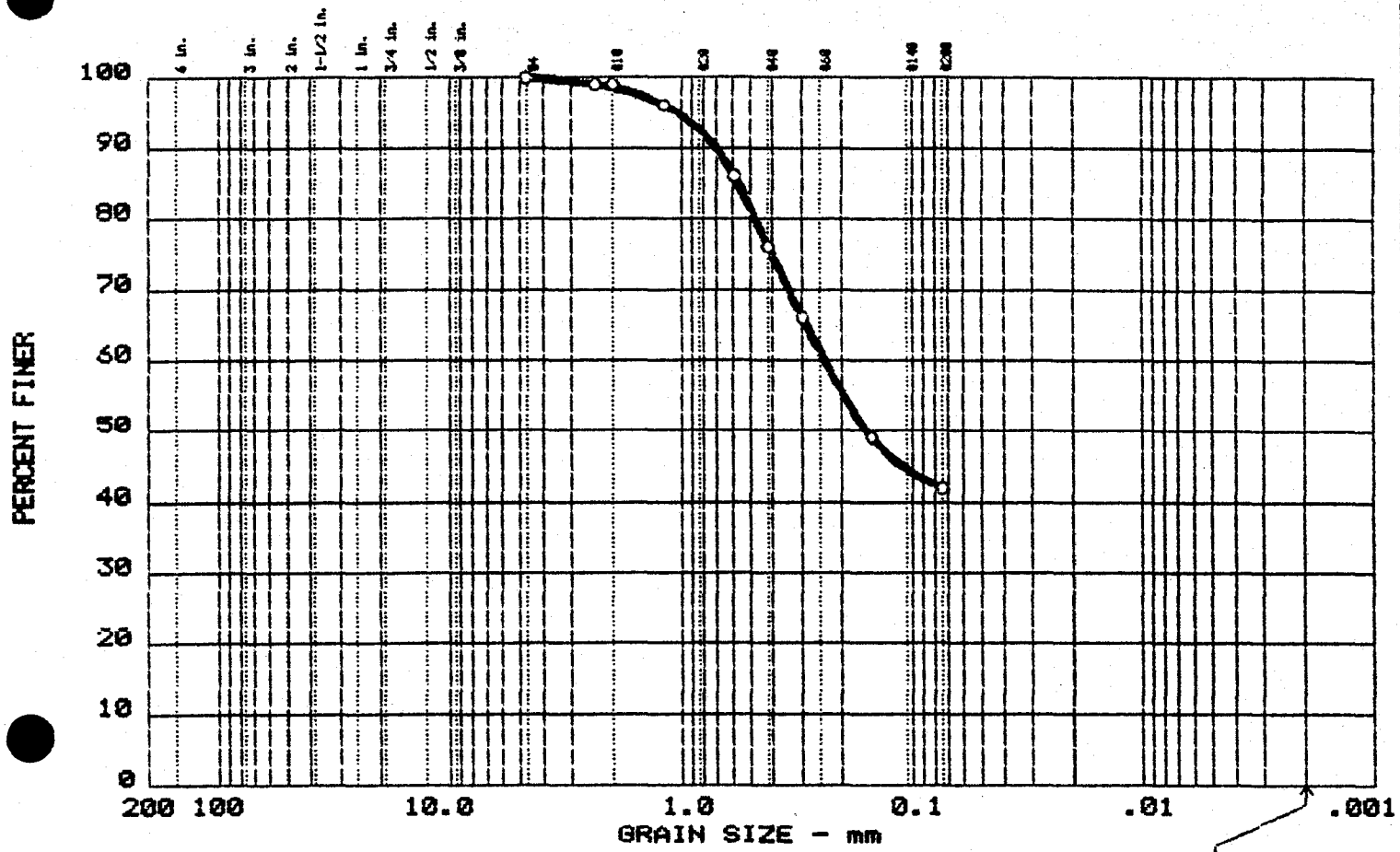
Date: u6/9/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 111

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	13	0.0	0.0	58.0	42.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	21	3	0.57	0.24	0.16					

MATERIAL DESCRIPTION	USCS	AASHTO
○ SILT AND SAND	SM	

Project No.: 2128j068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: B - SE(0 - 2)

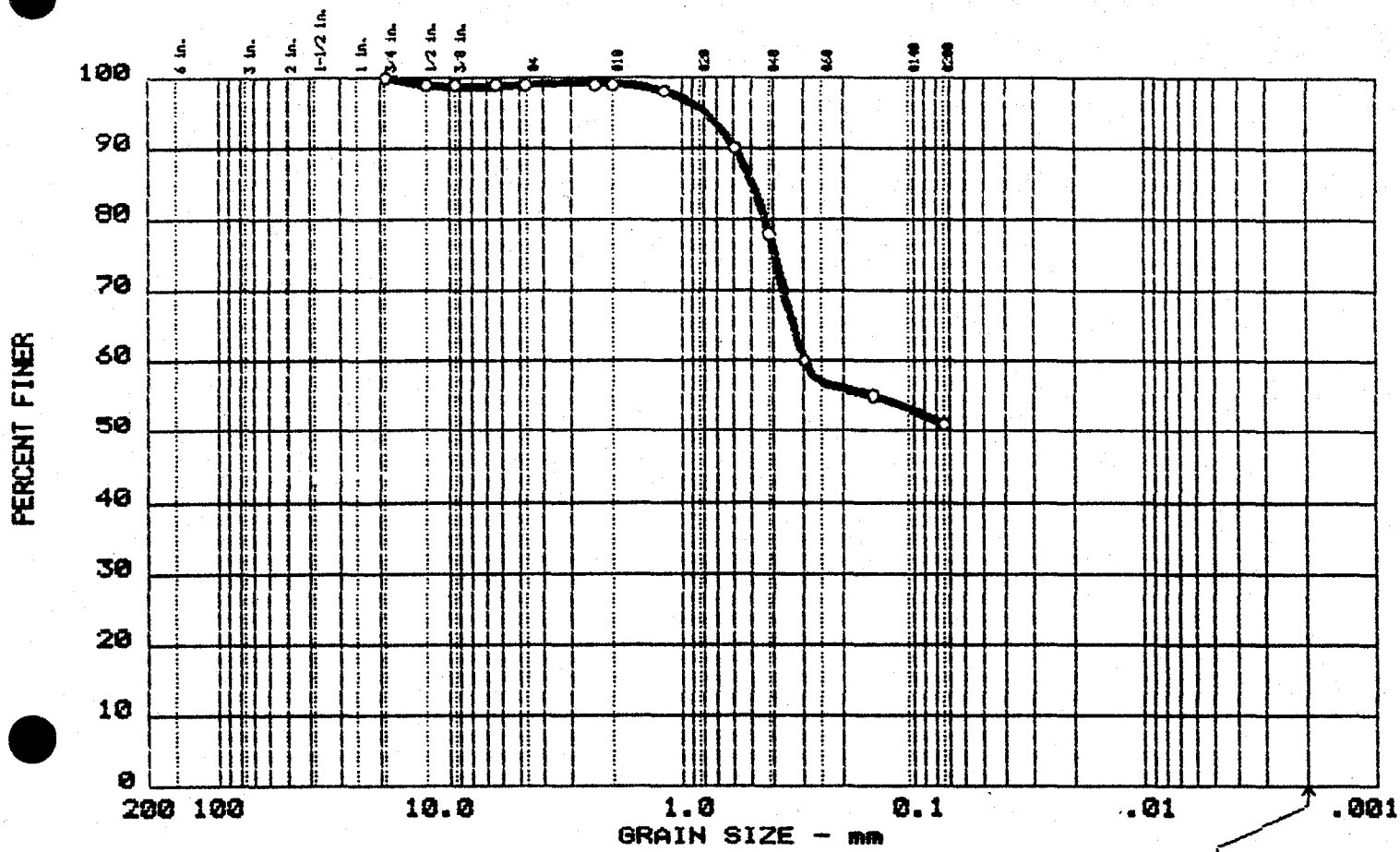
Date: 6/9/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 112

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
O	14	0.0	1.0	48.0	51.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
O	25	4	0.49	0.30						

MATERIAL DESCRIPTION	USCS	AASHTO
O SILT AND SAND; some clay, trace gravel	CL-ML	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
O Location: B - 9E(0 - 2)

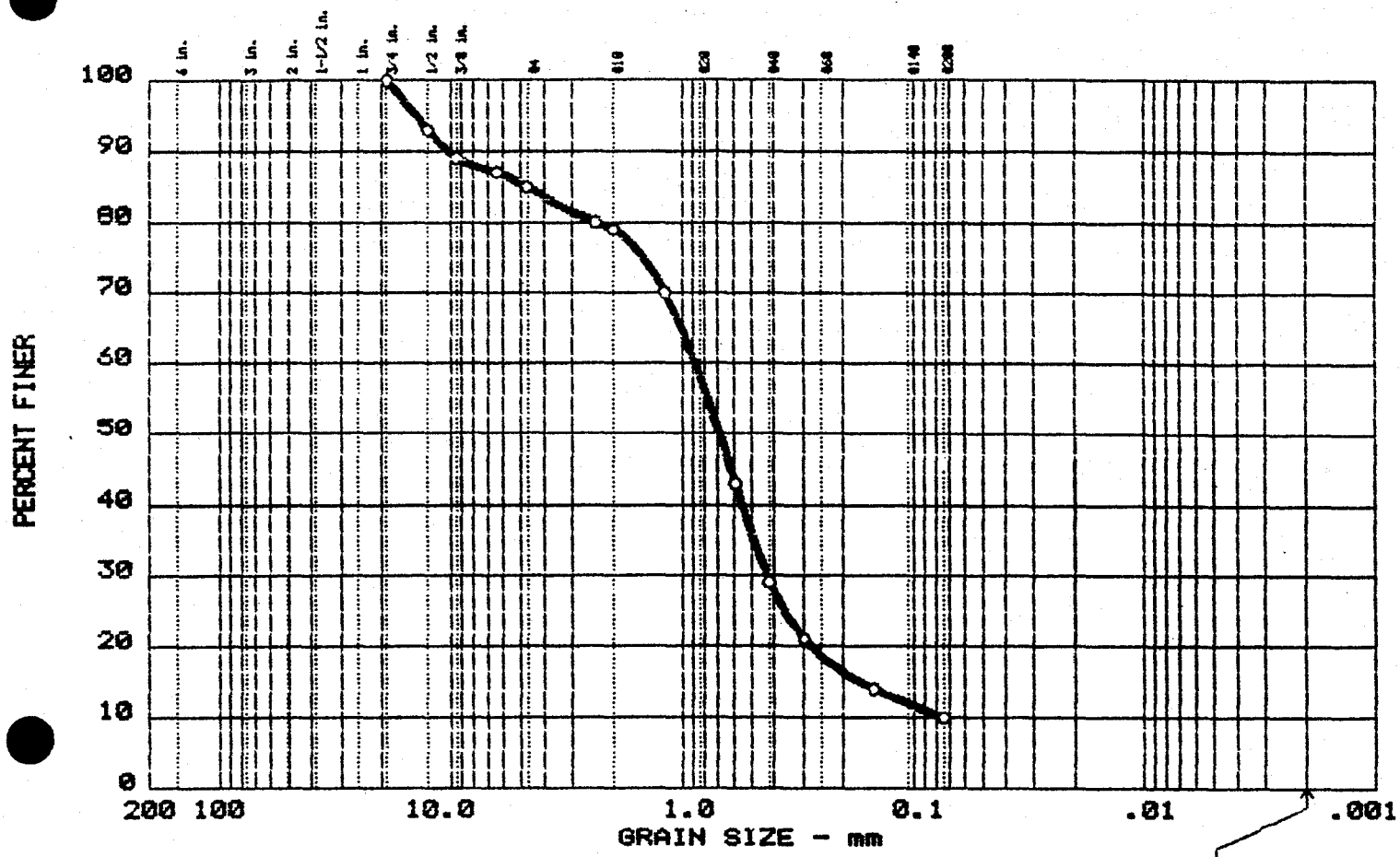
Date: 6/9/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 113

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
O	16	0.0	15.0	75.0	10.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
O		NP	4.73	0.88	0.69	0.431	0.1716			

MATERIAL DESCRIPTION	USCS	AASHTO
O SAND; with gravel, some fines	SP-SM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
O Location: B - 11E(0 - 2)

Date: 6/14/88

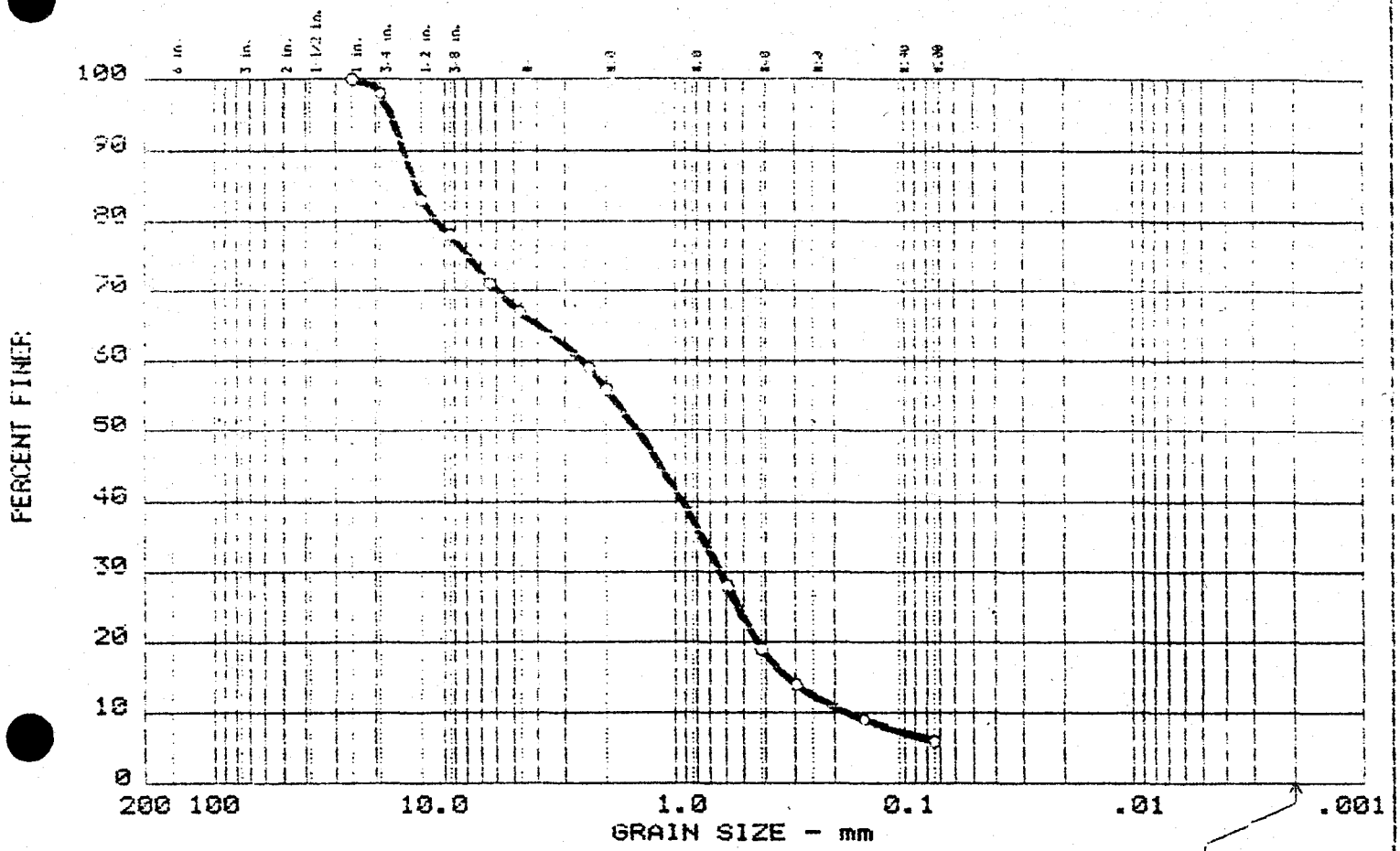
Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT

WESTERN TECHNOLOGIES INC.

Fig. No. 114

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	6	0.0	33.0	61.0	6.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			13.47	2.54	1.46	0.630	0.3232	0.1776	0.88	14.3

MATERIAL DESCRIPTION	USCS	AASHTO
○ GRAVELLY SAND; some fines	SP-SM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: B - 13E(5 - 6.5)

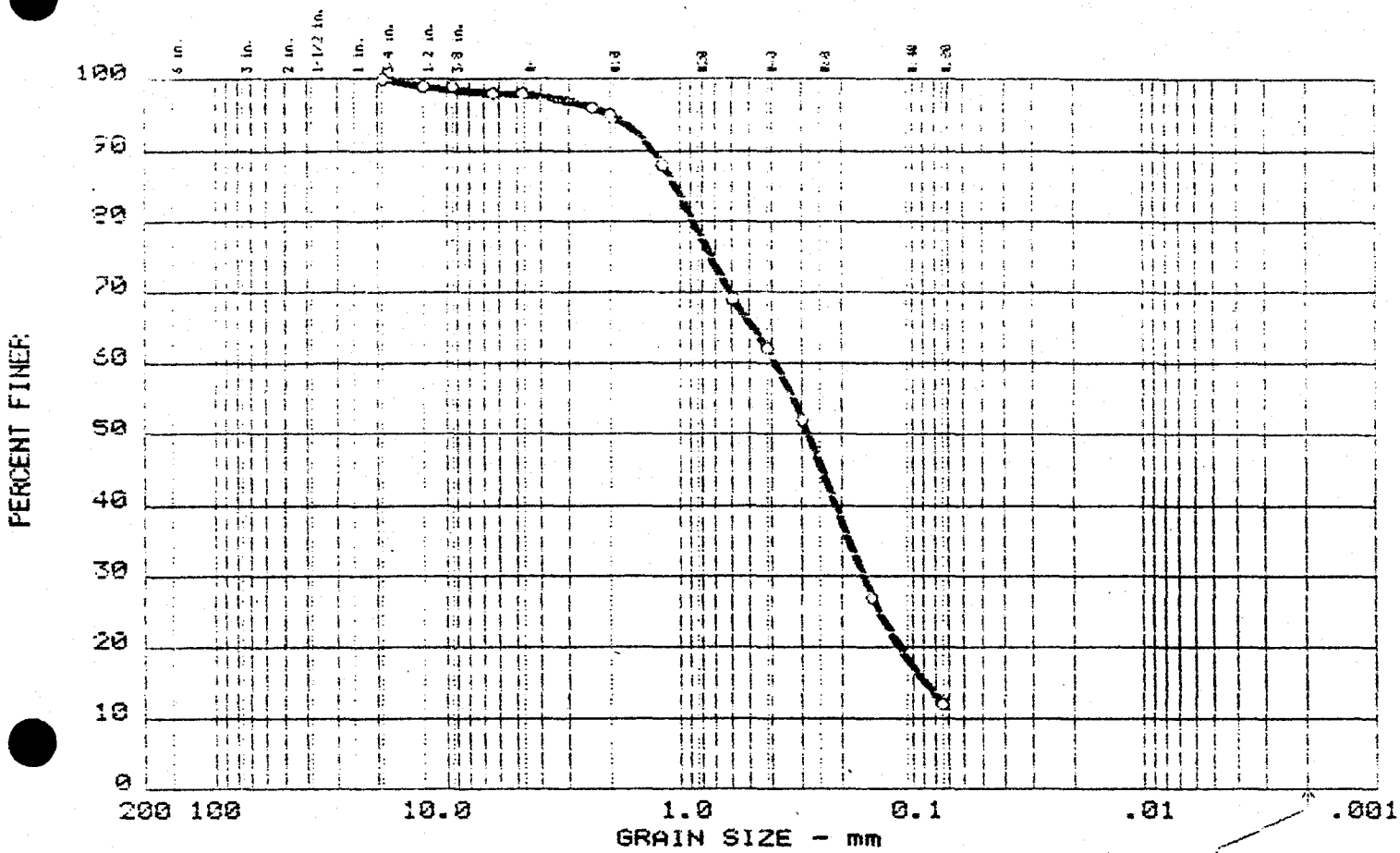
Date: 5/31/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 115

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	17	0.0	2.3	85.7	12.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			1.05	0.38	0.28	0.163	0.0876			

MATERIAL DESCRIPTION	USCS	AASHTO
○ SAND; some silt, trace gravel	SP-SM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: B - 15E(2 - 3.5)

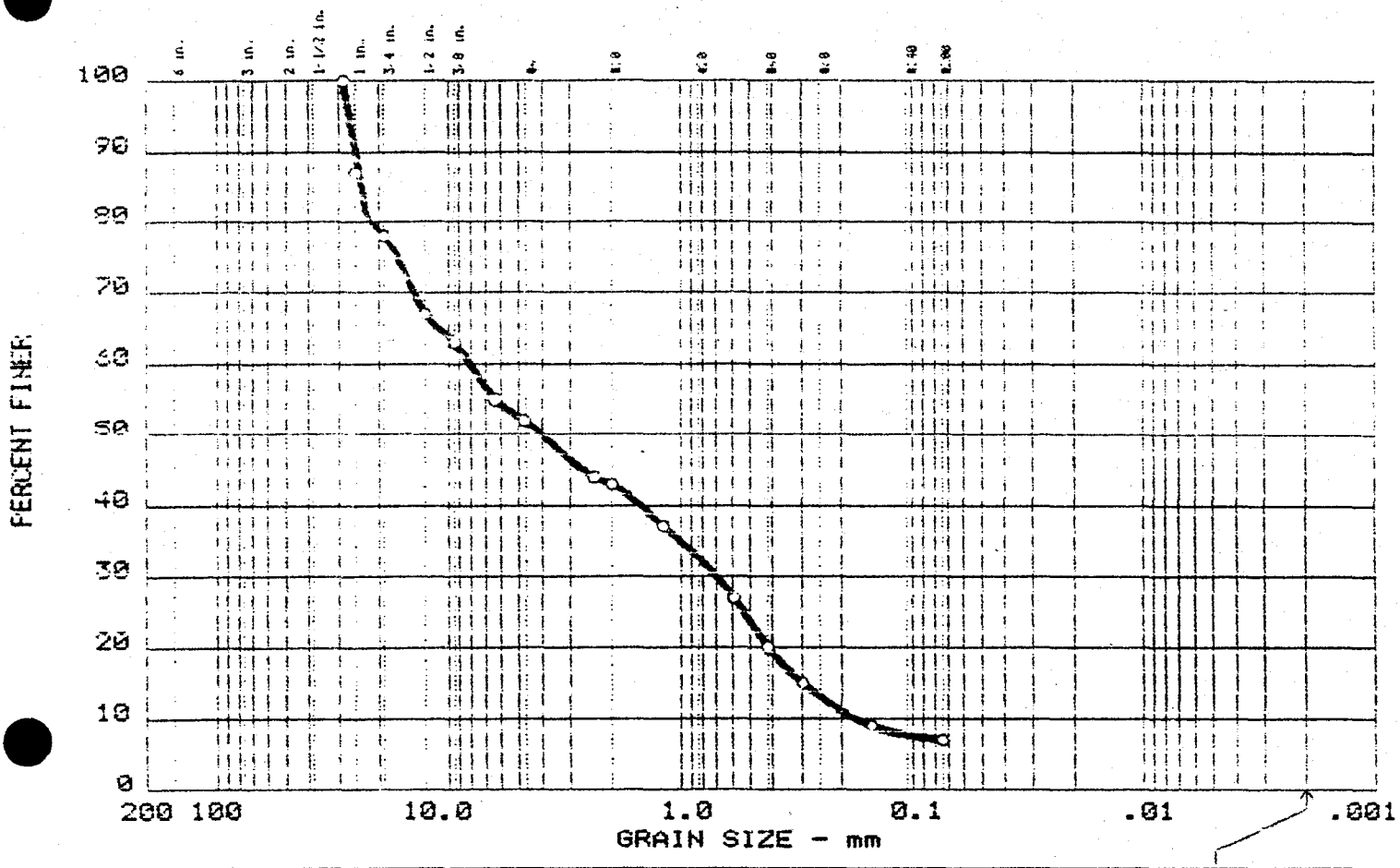
Date: 5/31/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 116

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	18	0.0	48.0	45.0	7.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			24.75	8.10	3.97	0.697	0.2941	0.1732	0.35	46.8

MATERIAL DESCRIPTION	USCS	AASHTO
○ SAND AND GRAVEL; some fines	GP-GM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: B - 15E(10 - 11.5)

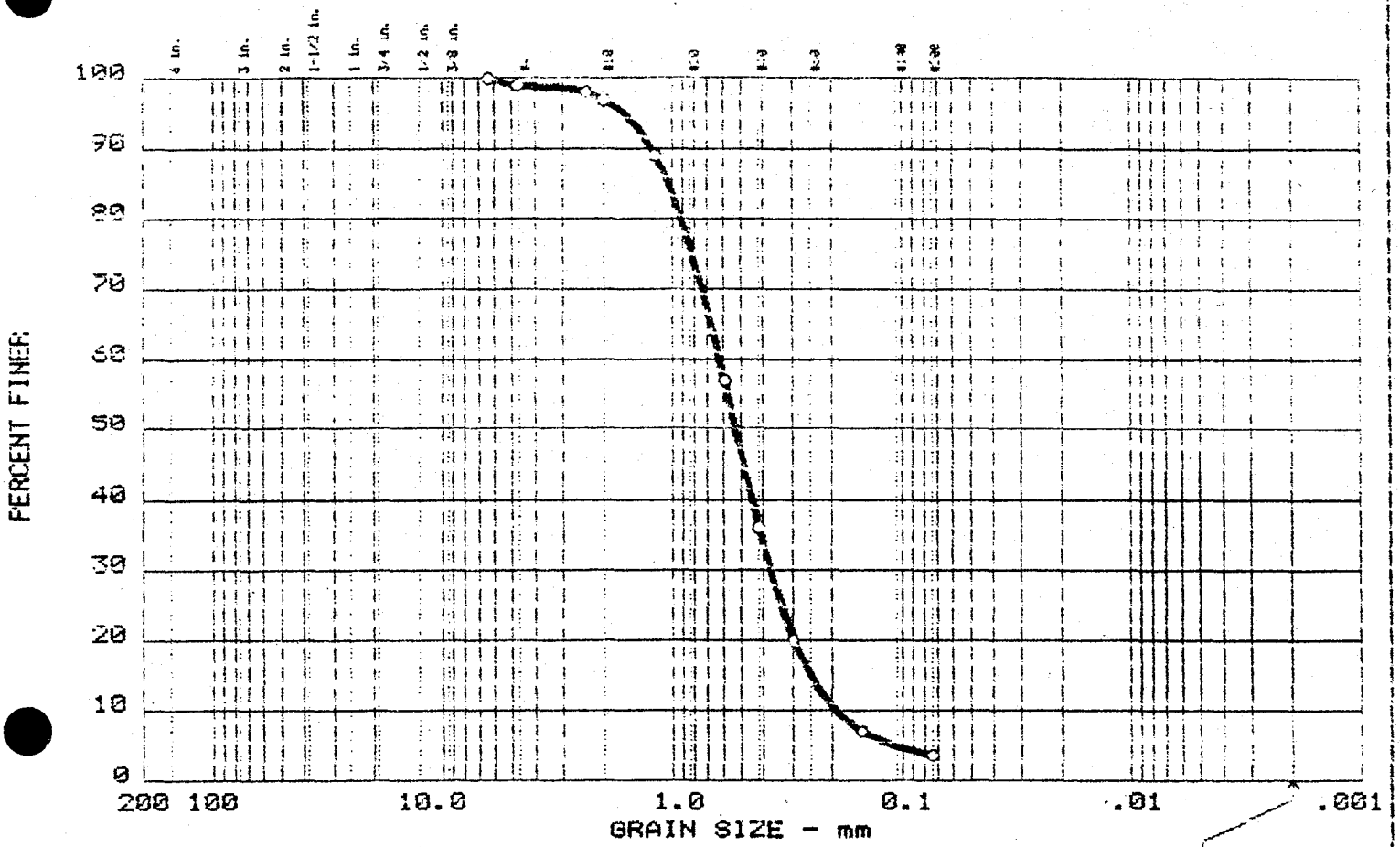
Date: 5/31/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 117

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	19	0.0	1.0	95.4	3.6	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			1.05	0.62	0.53	0.375	0.2509	0.1948	1.17	3.2

MATERIAL DESCRIPTION	USCS	AASHTO
○ SAND; trace fines, trace gravel	SP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION
○ Location: B - 16E(5 - 6.5)

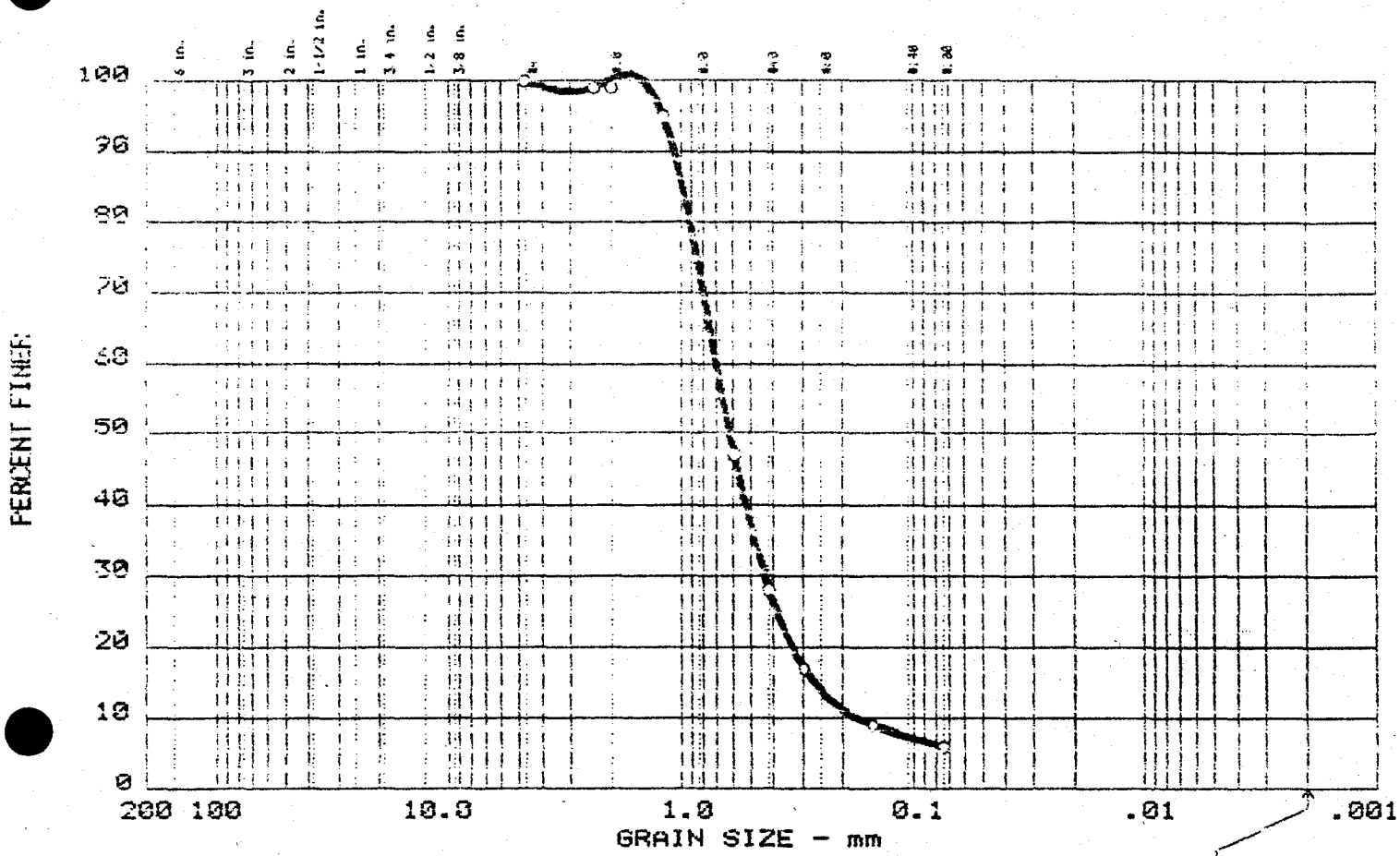
Date: 5/31/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 118

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	4	0.0	0.0	94.0	6.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○		NP	0.99	0.70	0.62	0.439	0.2676	0.1748	1.57	4.0

MATERIAL DESCRIPTION	USCS	AASHTO
○ SAND; somefines	SP-SM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: B - 17E(5 - 6.5)

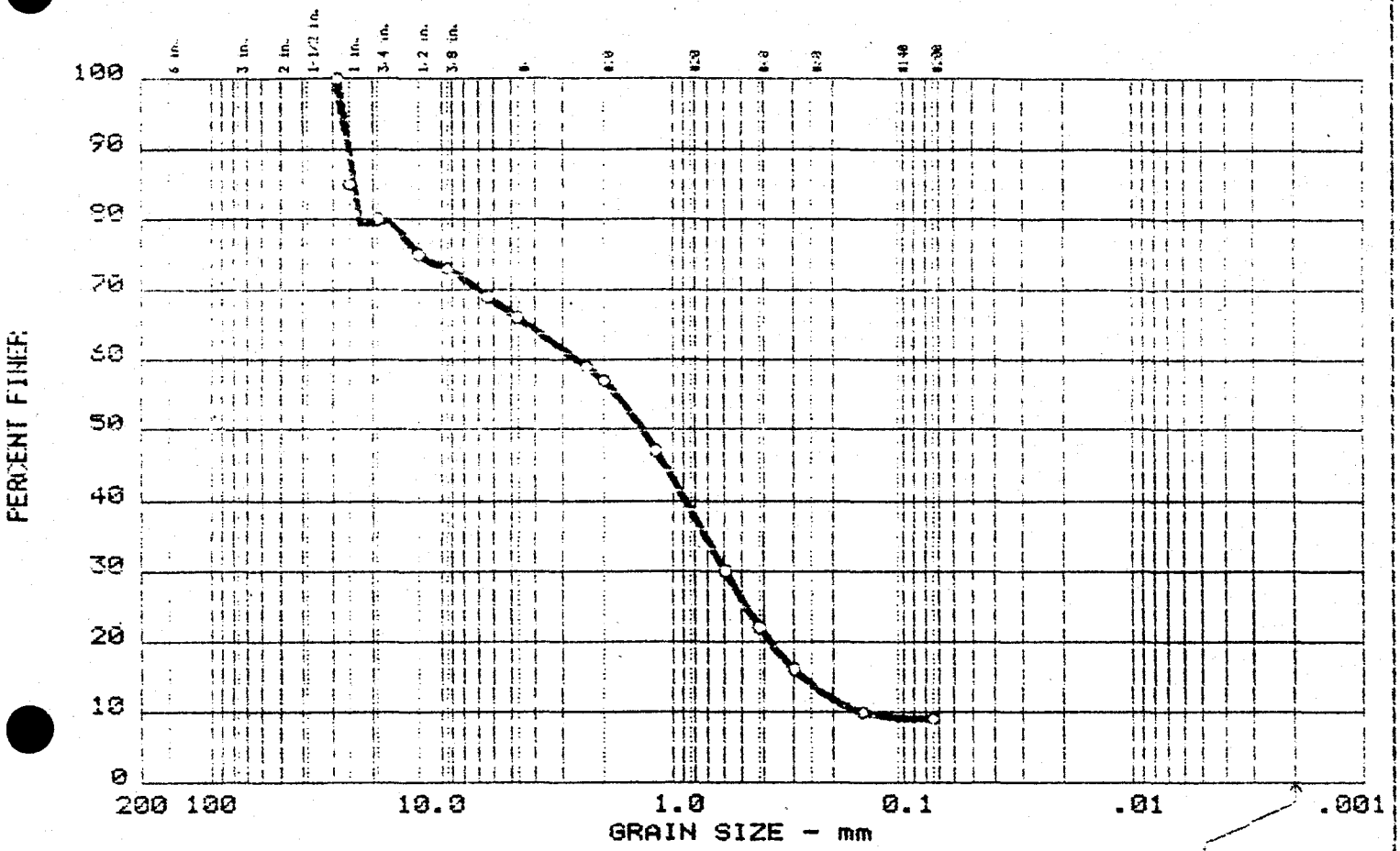
Date: 5/31/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 119

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	20	0.0	34.0	57.0	9.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			25.38	2.60	1.36	0.587	0.2745	0.1474	0.90	17.6

MATERIAL DESCRIPTION	USCS	AASHTO
○ GRAVELLY SAND; some fines	SP-SM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: B - 19E(5 - 6.5)

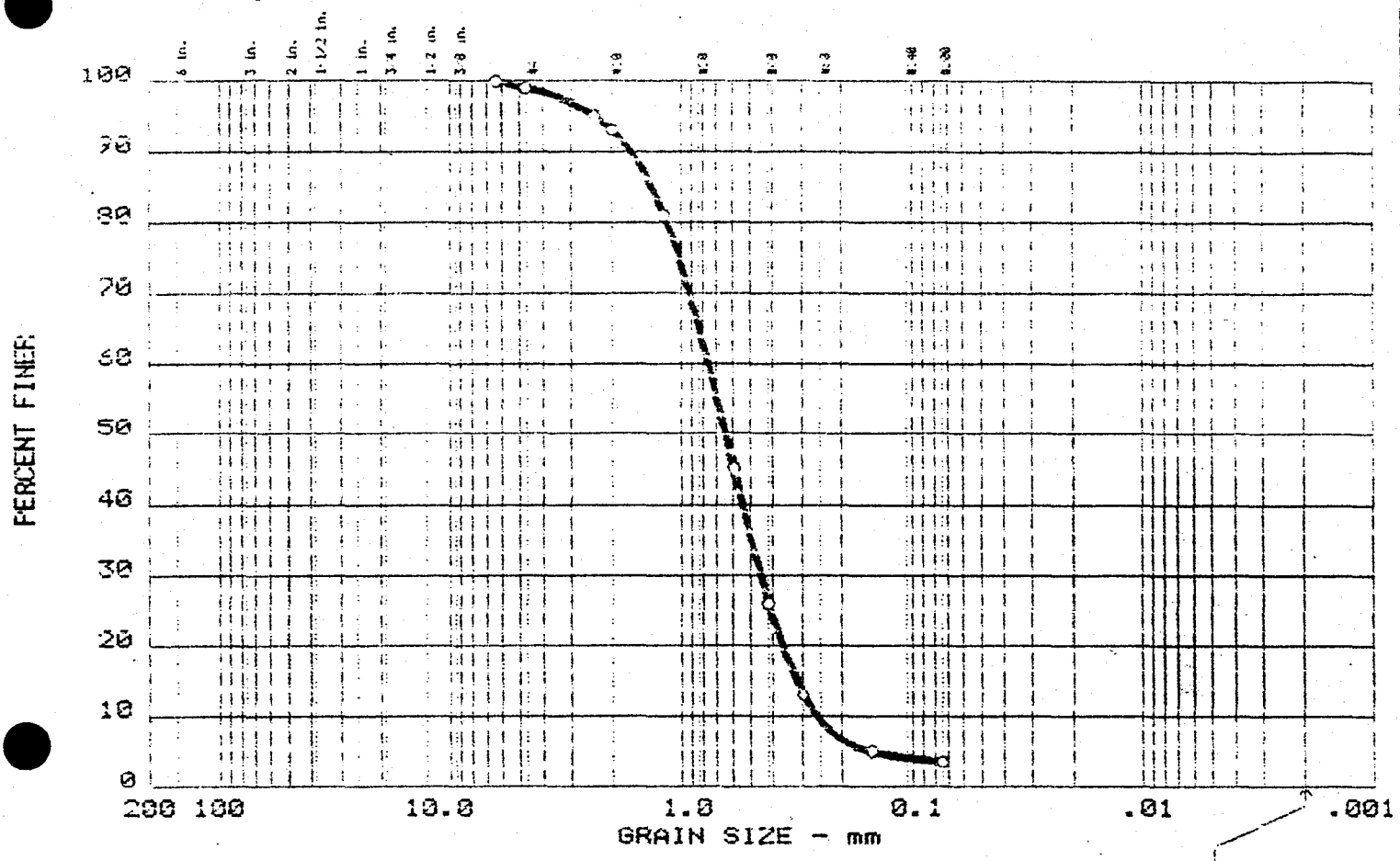
Date: 5/31/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 120

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	1	0.0	1.0	95.5	3.5	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			1.35	0.76	0.64	0.454	0.3177	0.2582	1.04	3.0

MATERIAL DESCRIPTION	USCS	AASHTO
○ SAND; trace fines, trace gravel	SP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: B - 20E(2 - 3)

Date: 5/31/88

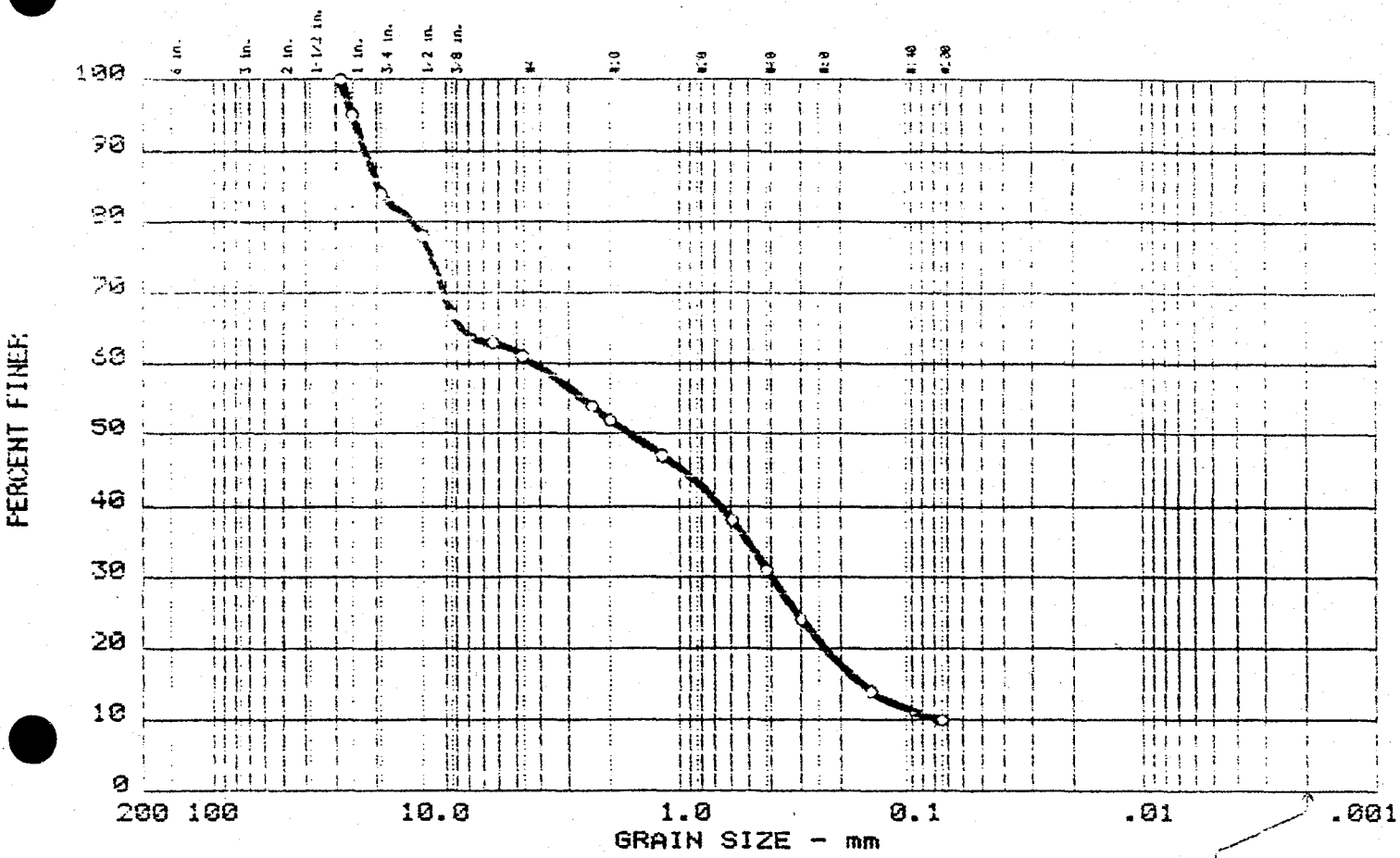
Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT

WESTERN TECHNOLOGIES INC.

Fig. No. 121

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	2	0.0	39.0	51.0	10.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			19.72	4.22	1.64	0.398	0.1641			

MATERIAL DESCRIPTION	USCS	AASHTO
○ GRAVELLY SAND; some fines	SP-SM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: B - 22E(5 - 6.5)

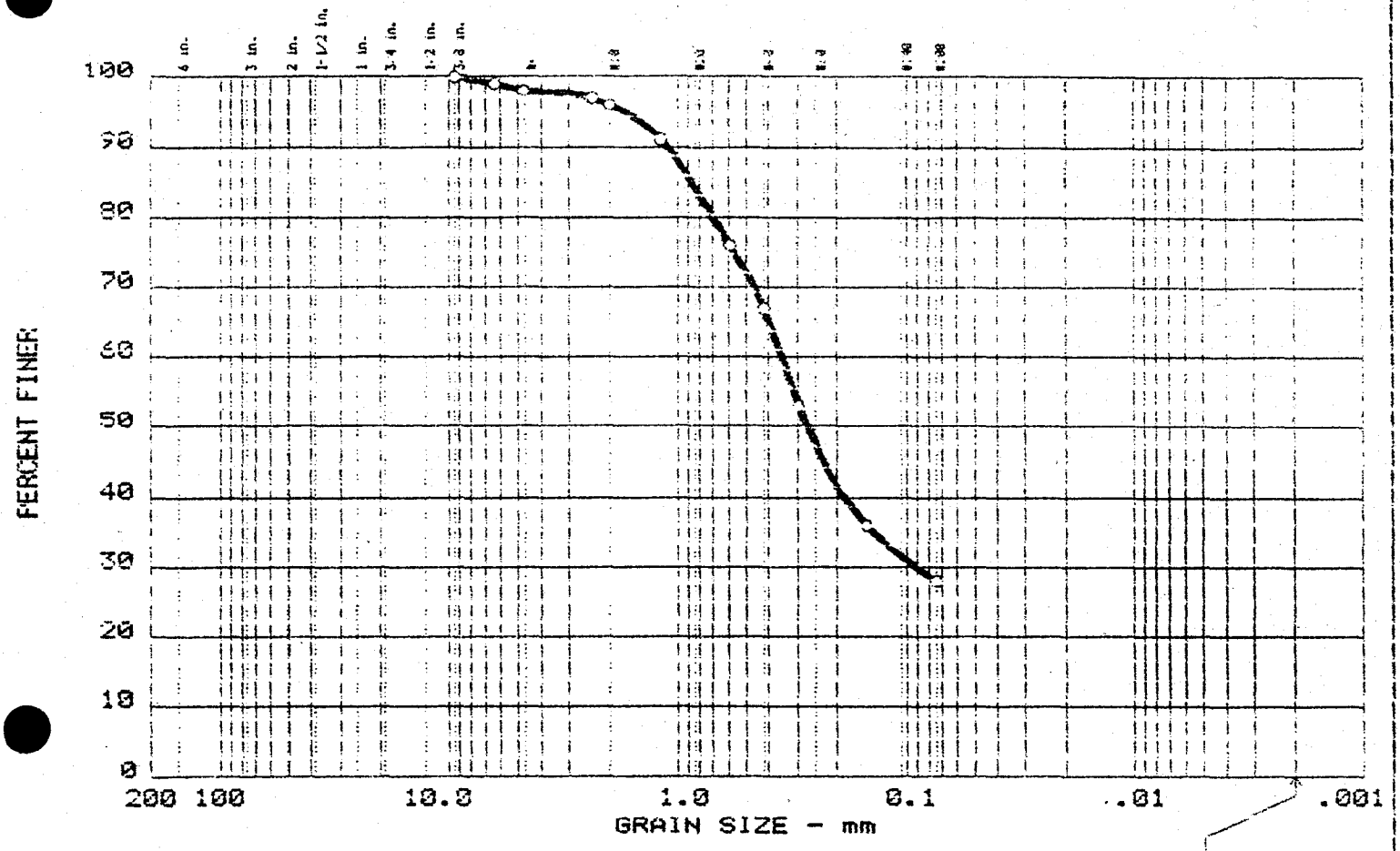
Date: 5/31/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 122

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	3	0.0	2.0	70.0	28.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○		NP	0.86	0.35	0.27	0.090				

MATERIAL DESCRIPTION	USCS	AASHTO
○ SILTY SAND; trace gravel	SM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: B - 25E(2 - 3.5)

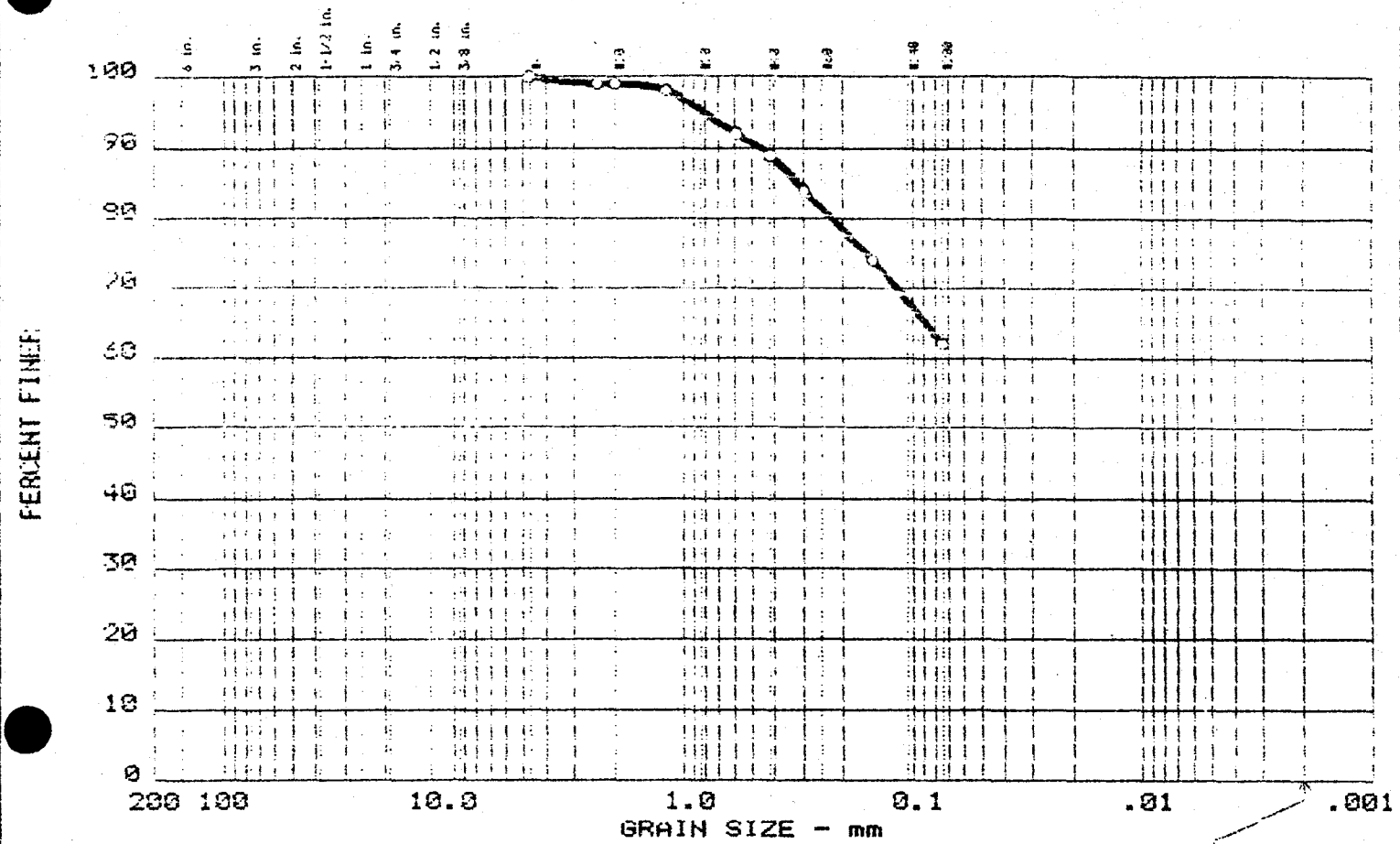
Date: 5/31/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 123

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	12	0.0	0.0	38.0	62.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.32							

MATERIAL DESCRIPTION	USCS	AASHTO
○ SANDY CLAY; with silt	CL	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: B - 26E(2 - 3.5)

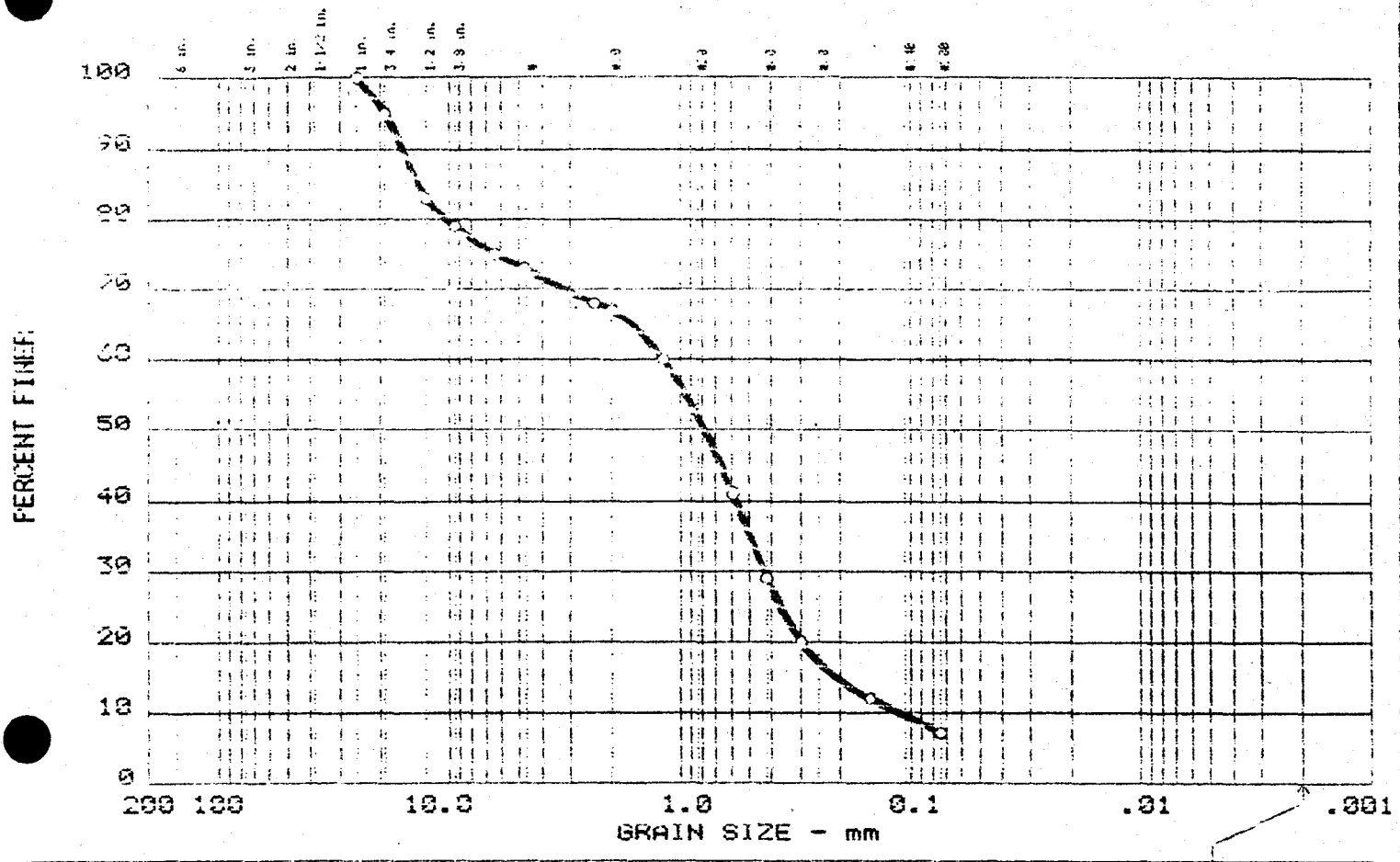
Date: 5/31/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 124

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	7	0.0	27.0	65.8	7.2	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			13.65	1.19	0.78	0.431	0.2084	0.1119	1.39	10.6

MATERIAL DESCRIPTION	USCS	AASHTO
○ GRAVELLY SAND; some fines	SW-SM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: B - 27E(10 - 11.5)

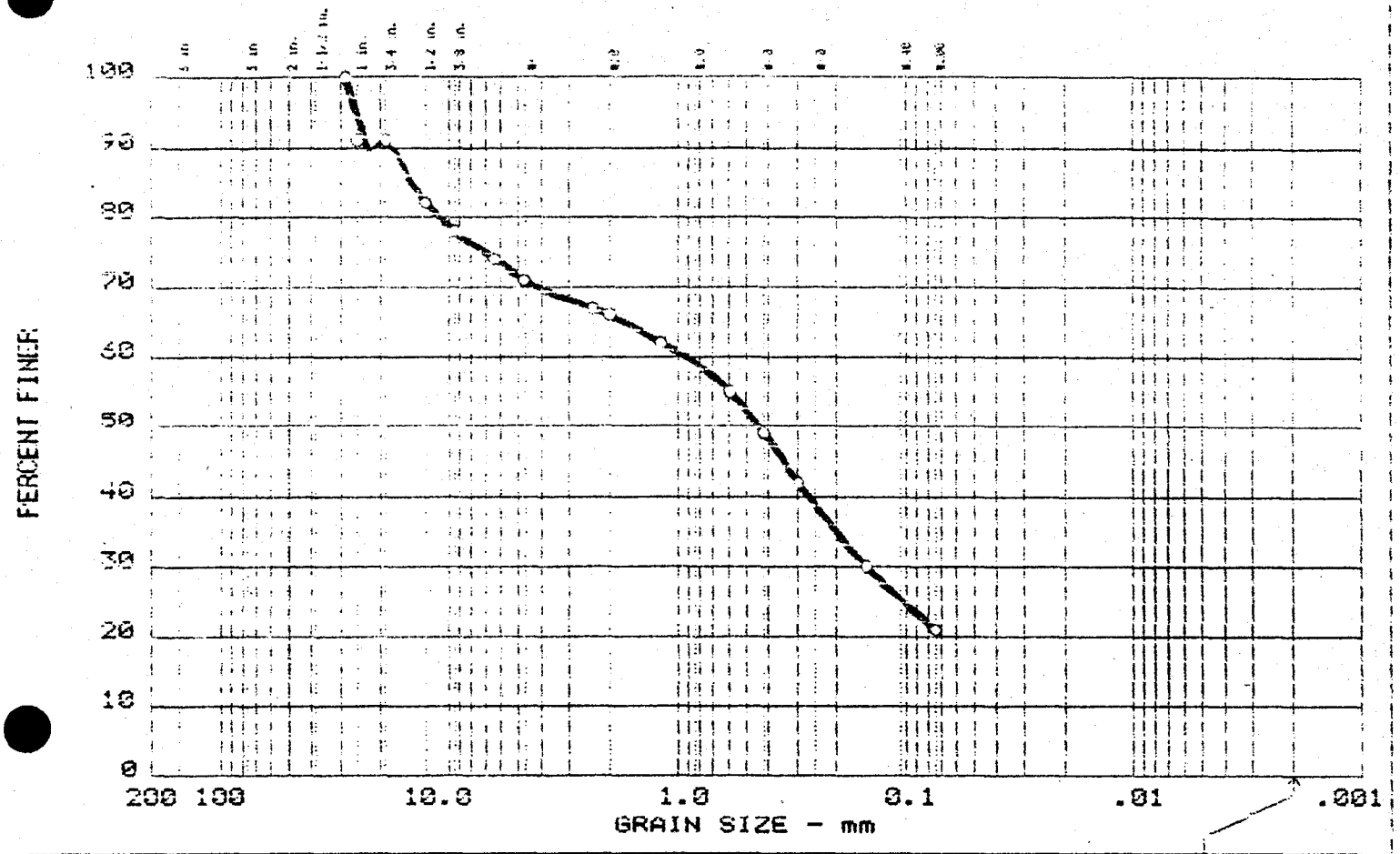
Date: 6/1/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 125

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	8	0.0	29.0	50.0	21.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○		NP	14.74	0.92	0.44	0.147				

MATERIAL DESCRIPTION	USCS	AASHTO
○ GRAVELLY SAND; with fines	SM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: B - 29E(2 - 3.5)

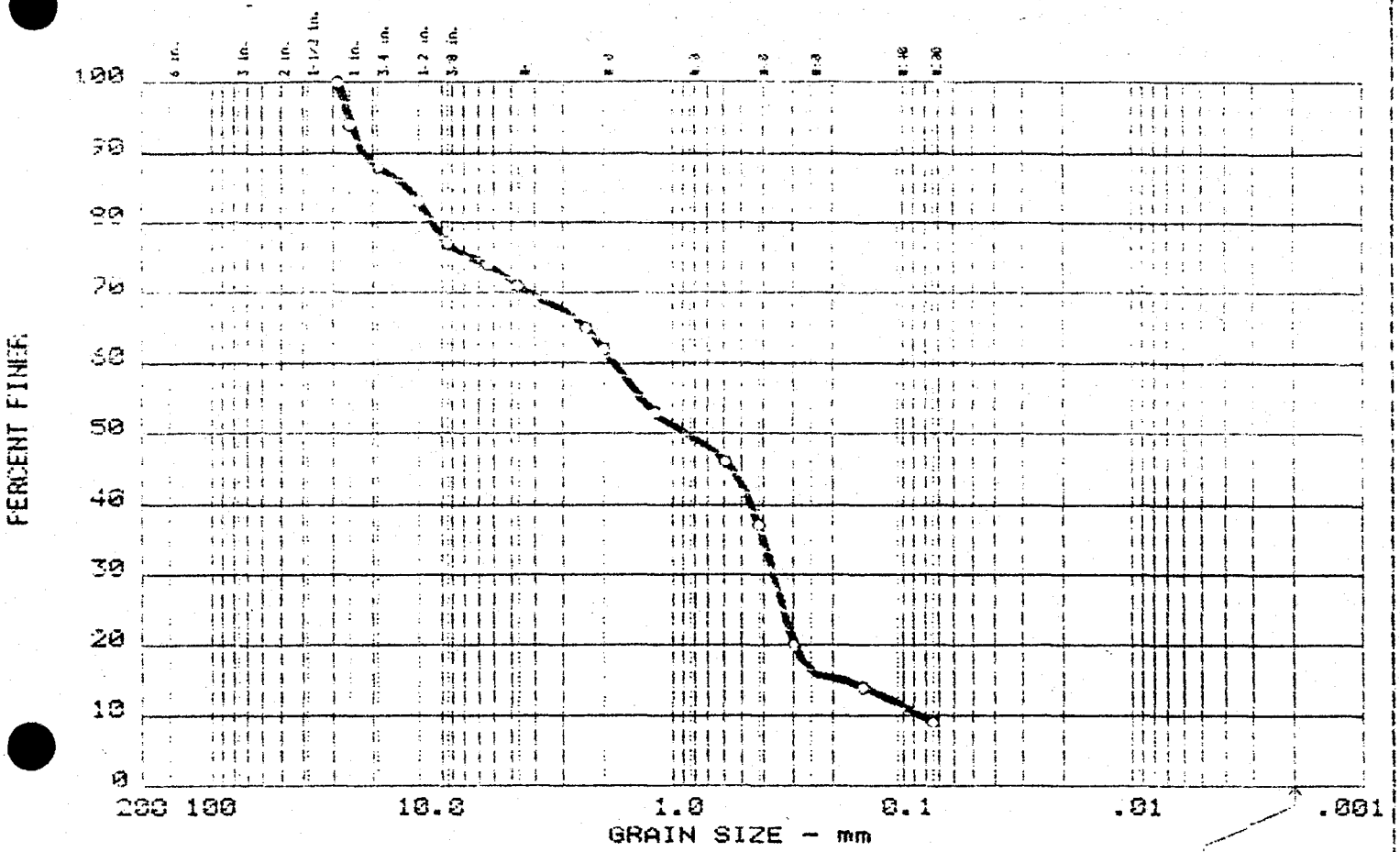
Date: 6/1/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 126

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	7	0.0	29.0	62.0	9.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			14.29	1.80	0.97	0.366	0.1811	0.0838	0.89	21.5

MATERIAL DESCRIPTION	USCS	AASHTO
○ GRAVELLY SAND; some fines	SP-SM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: B - 28E(5 - 6.5)

Date: 6/6/88

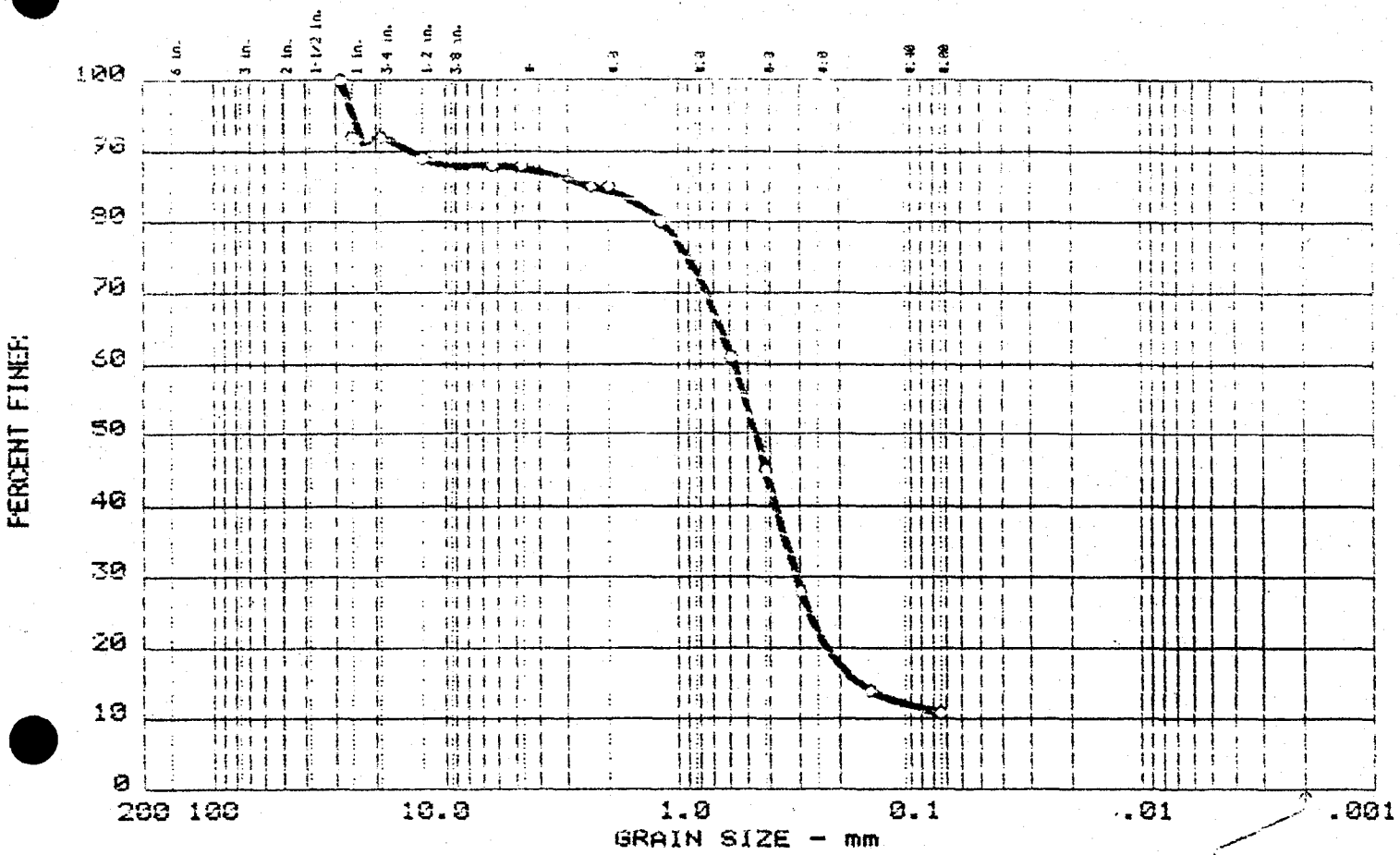
Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT

WESTERN TECHNOLOGIES INC.

Fig. No. 127

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	13	0.0	12.5	76.7	10.8	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			2.37	0.58	0.46	0.311	0.1652			

MATERIAL DESCRIPTION	USCS	AASHTO
○ SAND; some fines, some gravel	SP-SM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: B - 29E(2 - 3.5)

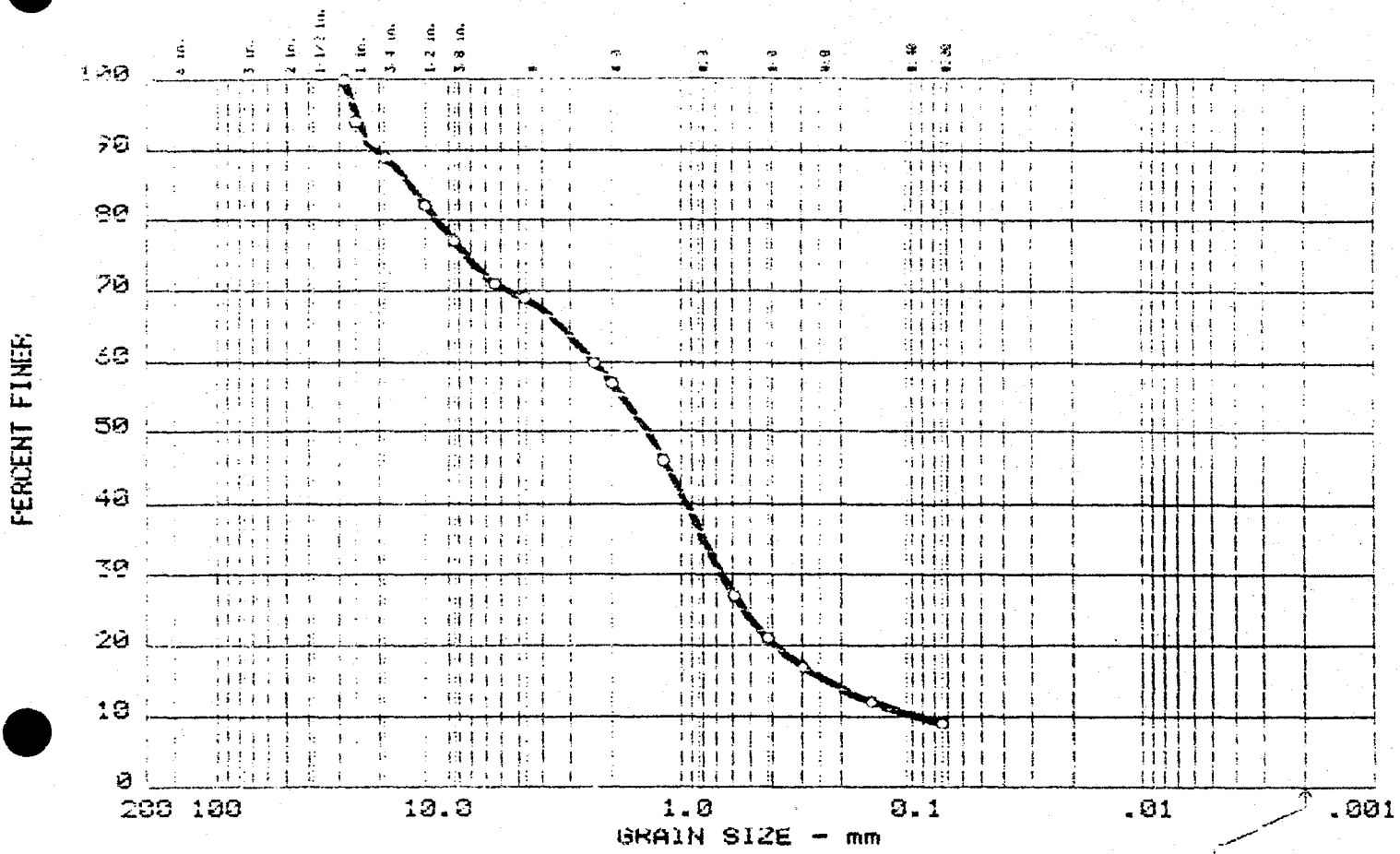
Date: 5/31/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 128

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	11	0.0	31.0	60.0	9.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			14.79	2.37	1.40	0.668	0.2344	0.0933	2.02	25.4

MATERIAL DESCRIPTION	USCS	AASHTO
○ GRAVELLY SAND; some fines	SW-SM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: B - 29E(10 - 11.5)

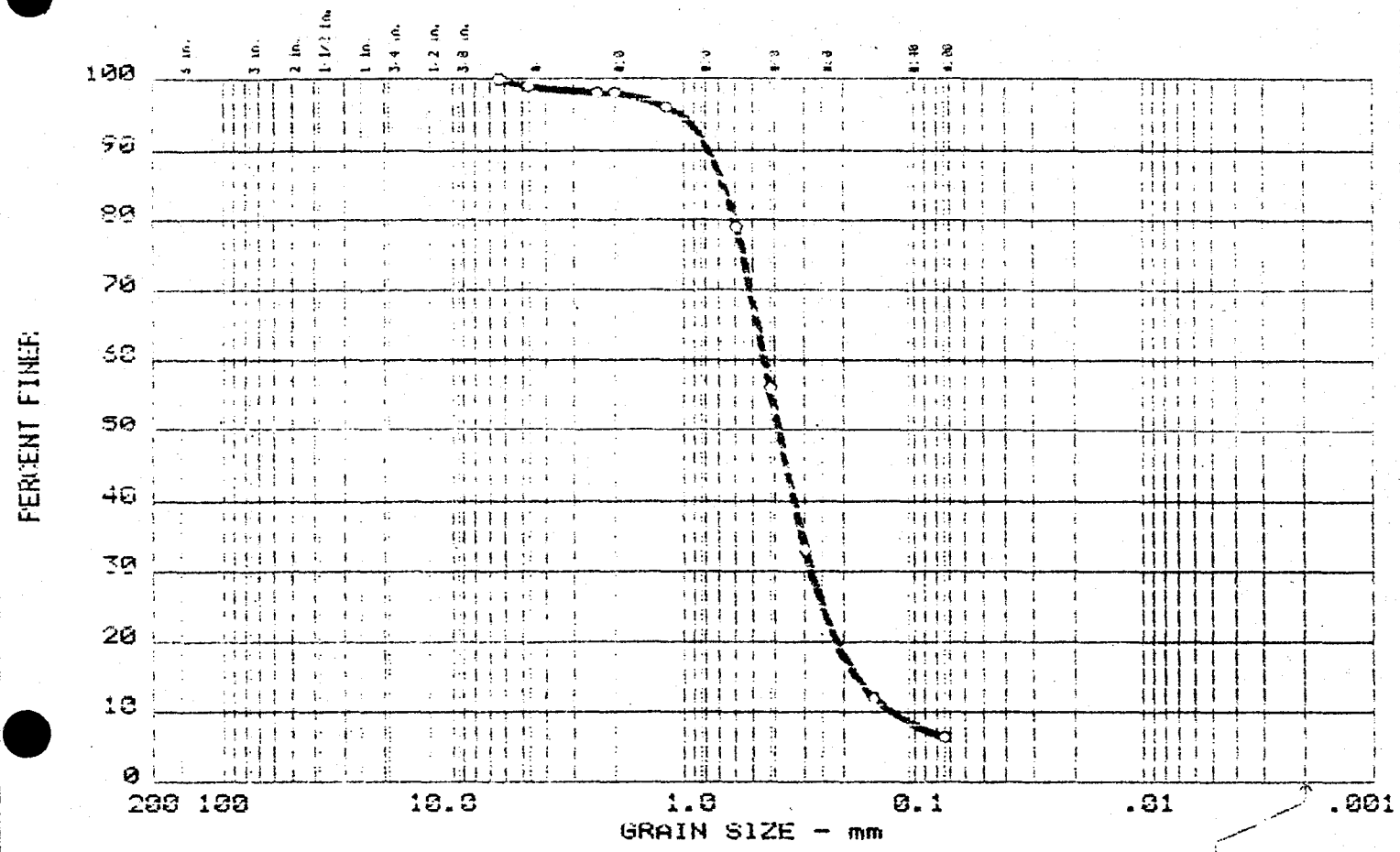
Date: 05/31/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 129

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	10	0.0	1.0	92.6	6.4	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.67	0.44	0.39	0.280	0.1782	0.1247	1.41	3.6

MATERIAL DESCRIPTION	USCS	AASHTO
○ SAND; some fines, trace gravel	SP-SM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: B - 30E(2 - 3.5)

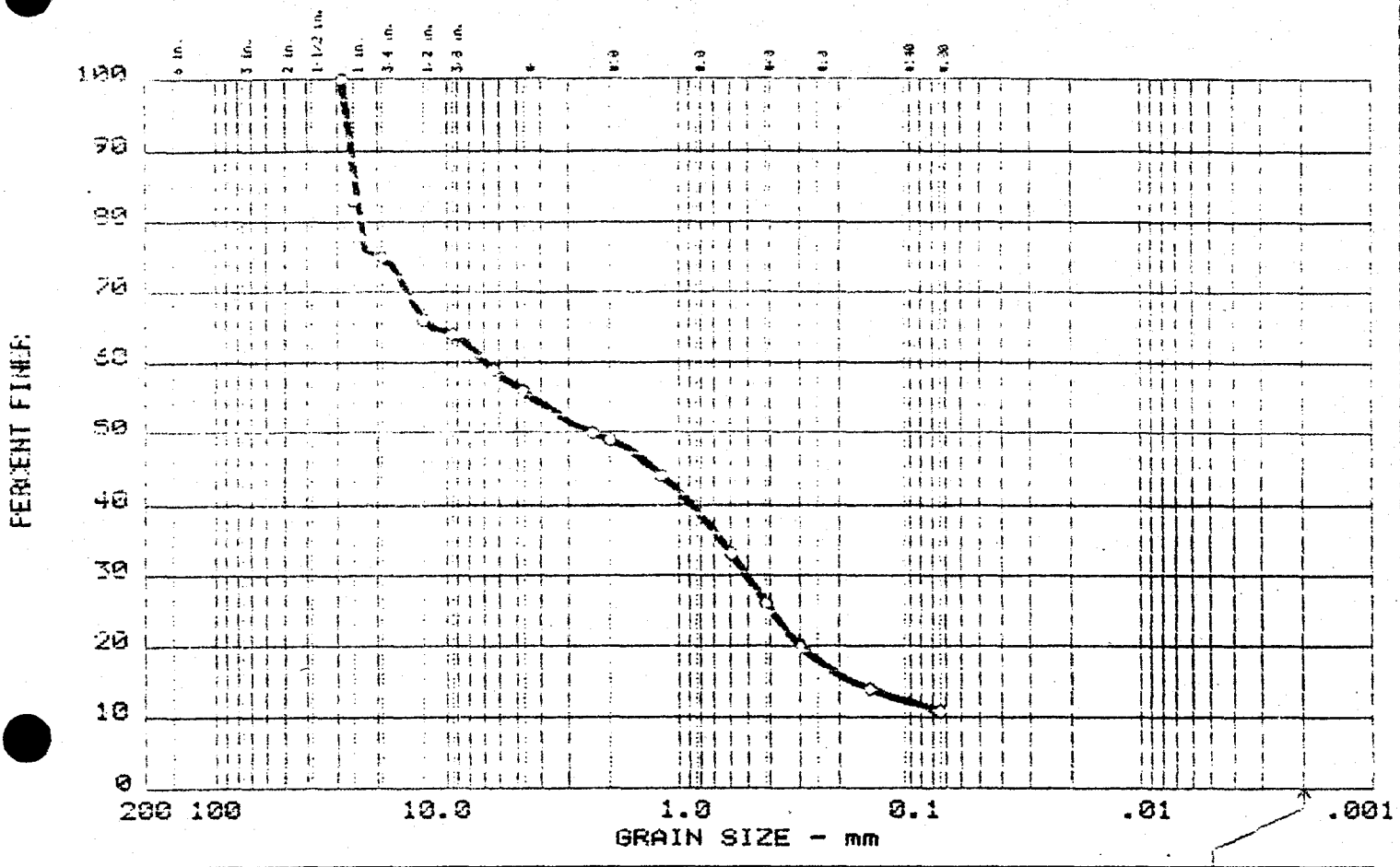
Date: 5/31/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 130

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
○	10	0.0	44.0	45.2	10.8	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			25.82	6.79	2.36	0.589	0.1766			

MATERIAL DESCRIPTION	USCS	AASHTO
○ SAND AND GRAVEL; some fines	SP-SM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
○ Location: B - 30E(10 - 11.5)

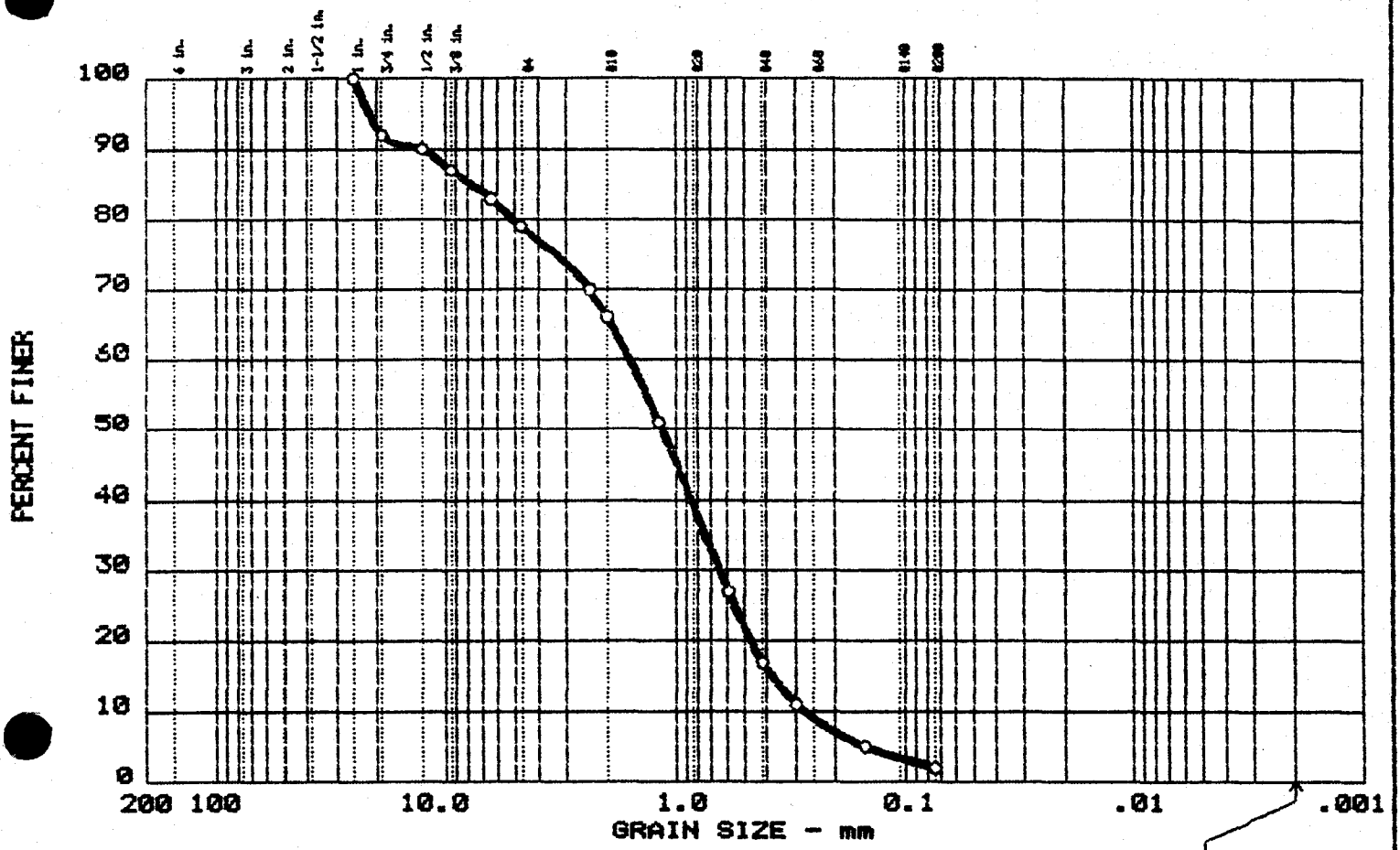
Date: 5/31/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 131

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
o	17	0.0	21.0	77.0	2.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
o			7.67	1.60	1.15	0.641	0.3819	0.2735	0.94	5.8

MATERIAL DESCRIPTION	USCS	AASHTO
o GRAVELLY SAND; trace fines	SP	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
o Location: B - 33E(2 - 3)

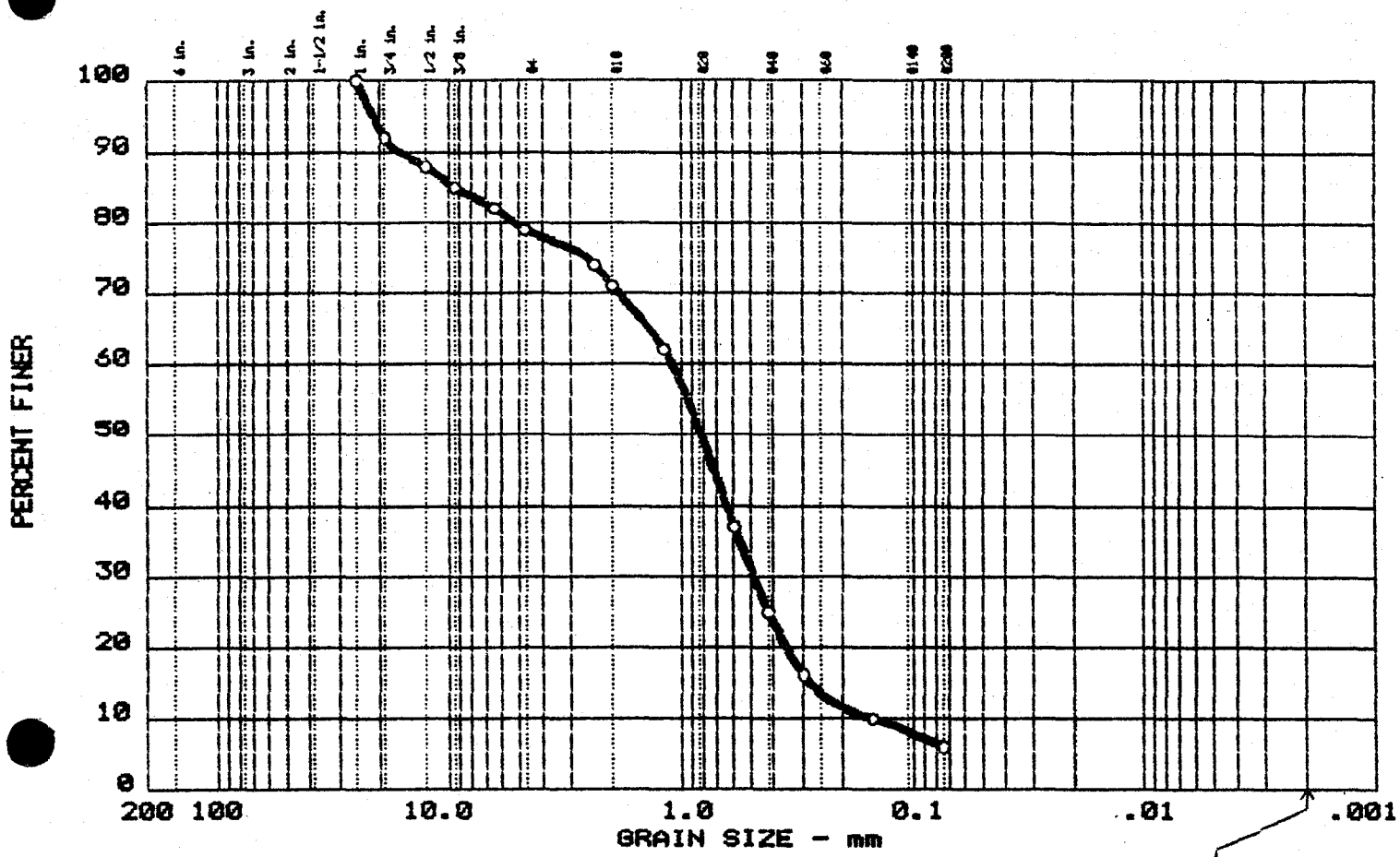
Date: 6/14/88

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 132

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+3"	% GRAVEL	% SAND	% SILT	% CLAY
O	18	0.0	21.0	73.0	6.0	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
O			9.44	1.10	0.82	0.488	0.2805	0.1489	1.46	7.4

MATERIAL DESCRIPTION	USCS	AASHTO
O GRAVELLY SAND; some fines	SW-SM	

Project No.: 2128J068
Project: NEW RIVER CHANNELIZATION PROJECT
O Location: B - 34E(2 - 3)

Date: 6/14/88

Remarks:

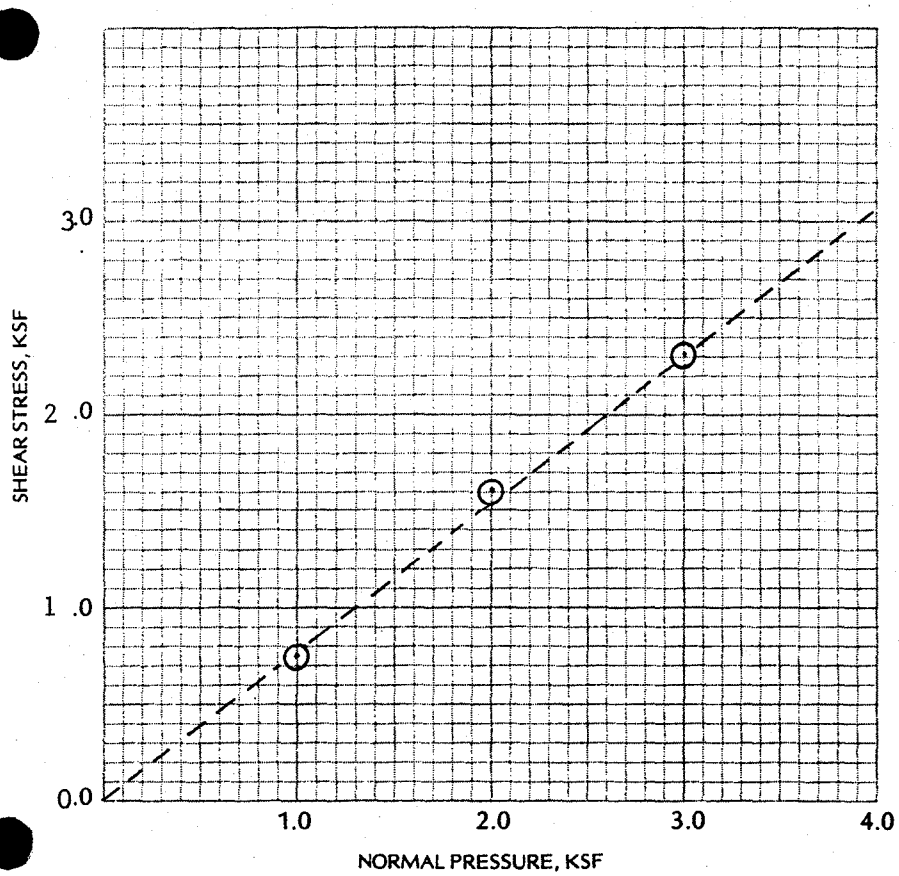
GRAIN SIZE DISTRIBUTION TEST REPORT
WESTERN TECHNOLOGIES INC.

Fig. No. 133

DIRECT SHEAR TEST

Job No. 2128J068

Lab/Invoice No.



Type of Material SM

Source of Material B-3E 5' - 6.5'

Sampled By J. Waldner Date 5-10-88

Submitted By M. Ali Date 7-8-88

Reviewed By E. Hoque Date 8-4-88

Test Procedure ASTM D3080- Single Shear

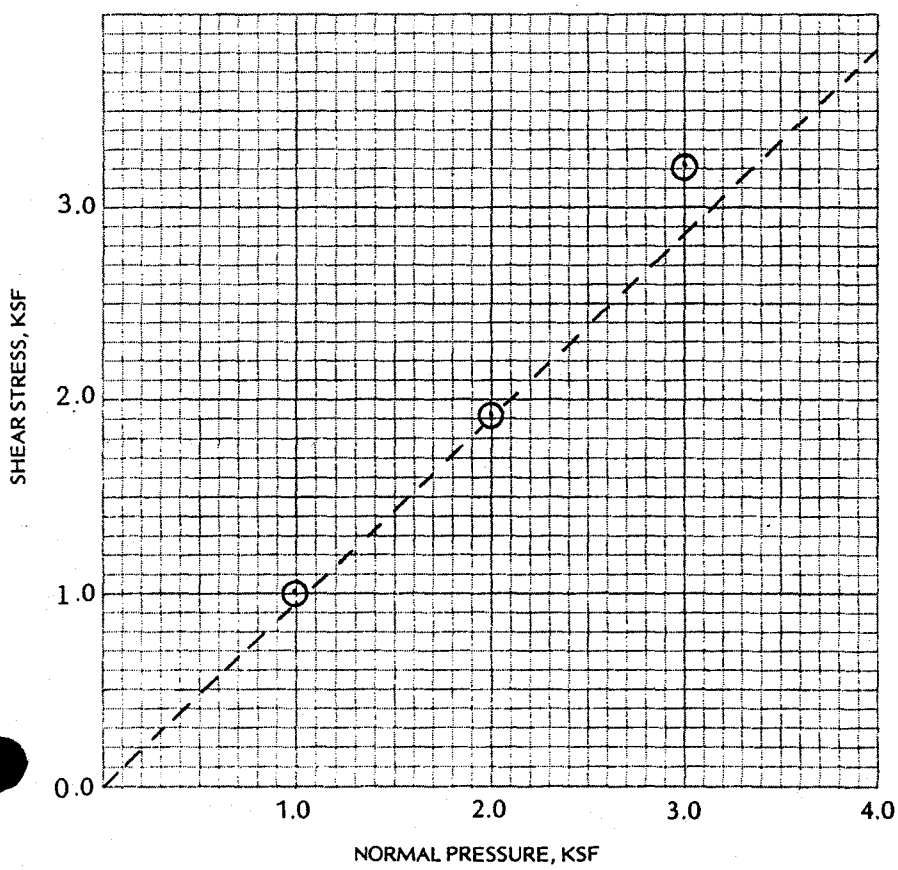
Test Condition: —— InSitu ---- Saturated

Sample Condition: ☐ Undisturbed ☒ Remolded

Initial Dry Density, pcf 100

Initial Moisture Content, % 4.9

ϕ = 38 ° C = 0 Kips/Sq. Ft.



Type of Material SP

Source of Material B-9E 10' - 11.5'

Sampled By J. Waldner Date 5-10-88

Submitted By M. Ali Date 7-8-88

Reviewed By E. Hoque Date 8-4-88

Test Procedure ASTM D3080- Single Shear

Test Condition: —— InSitu ---- Saturated

Sample Condition: ☐ Undisturbed ☒ Remolded

Initial Dry Density, pcf 120

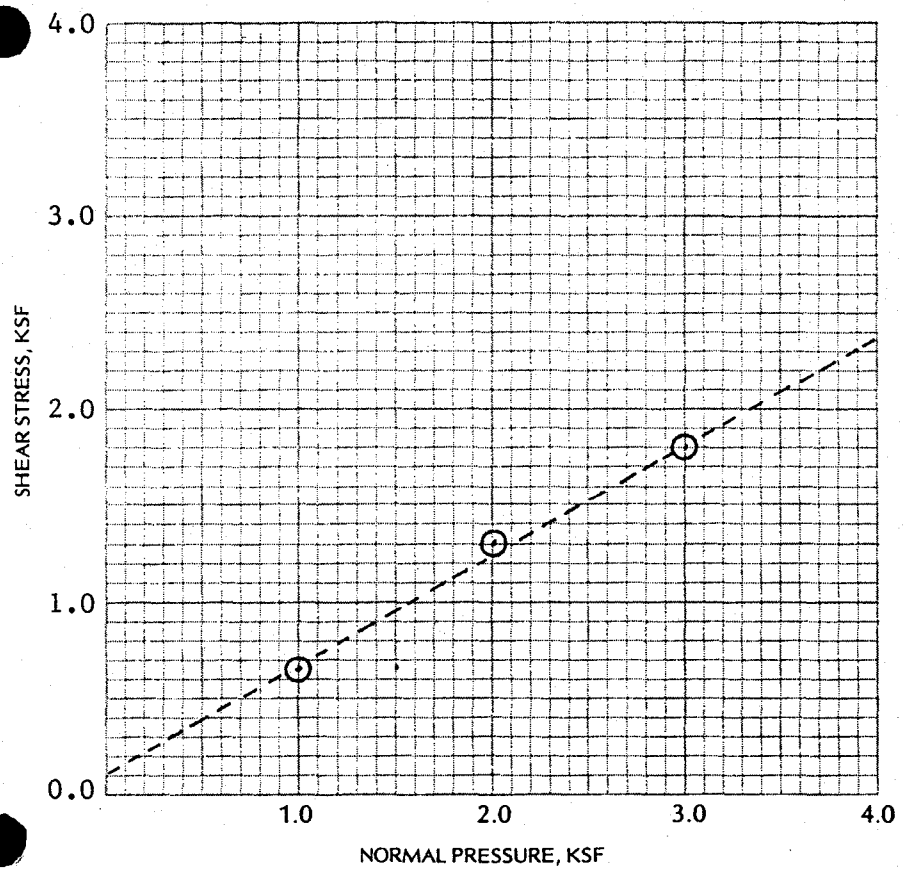
Initial Moisture Content, % 3

ϕ = 46 ° C = 0 Kips/Sq. Ft.

DIRECT SHEAR TEST

Job No. 2128J068

Lab/Invoice No.



Type of Material SC

Source of Material B-5E 2' - 3'

Sampled By J. Waldner Date

Submitted By Ali Date 5/25/88

Reviewed By E. Hoque Date 6/04/88

Test Procedure ASTM D3080- Single Shear

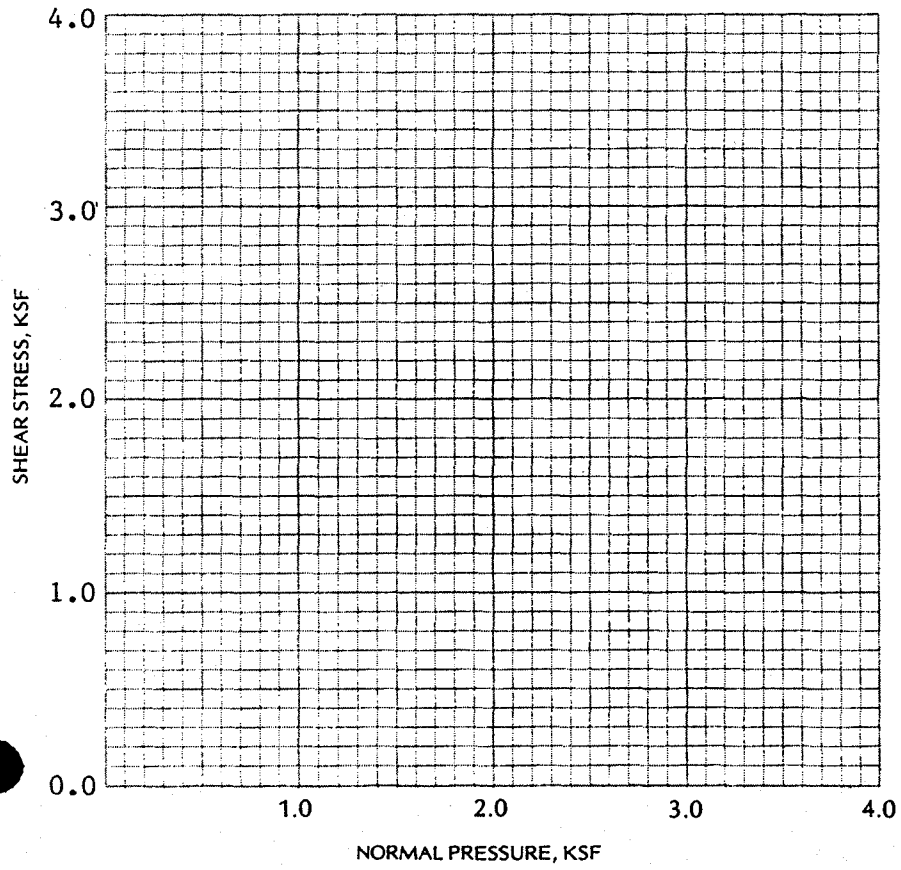
Test Condition: —— InSitu ---- Saturated

Sample Condition: ☒ Undisturbed ☐ Remolded

Initial Dry Density, pcf 102

Initial Moisture Content, % 3.6

ϕ = 29 ° C = 0.1 Kips/Sq. Ft.



Type of Material SP

Source of Material B-10E (2'-3')

Sampled By J. Waldner Date

Submitted By M. Ali Date 5/25/88

Reviewed By E. Hoque Date 6/9/88

Test Procedure ASTM D3080- Single Shear

Test Condition: —— InSitu ---- Saturated

Sample Condition: ☒ Undisturbed ☐ Remolded

Initial Dry Density, pcf 100

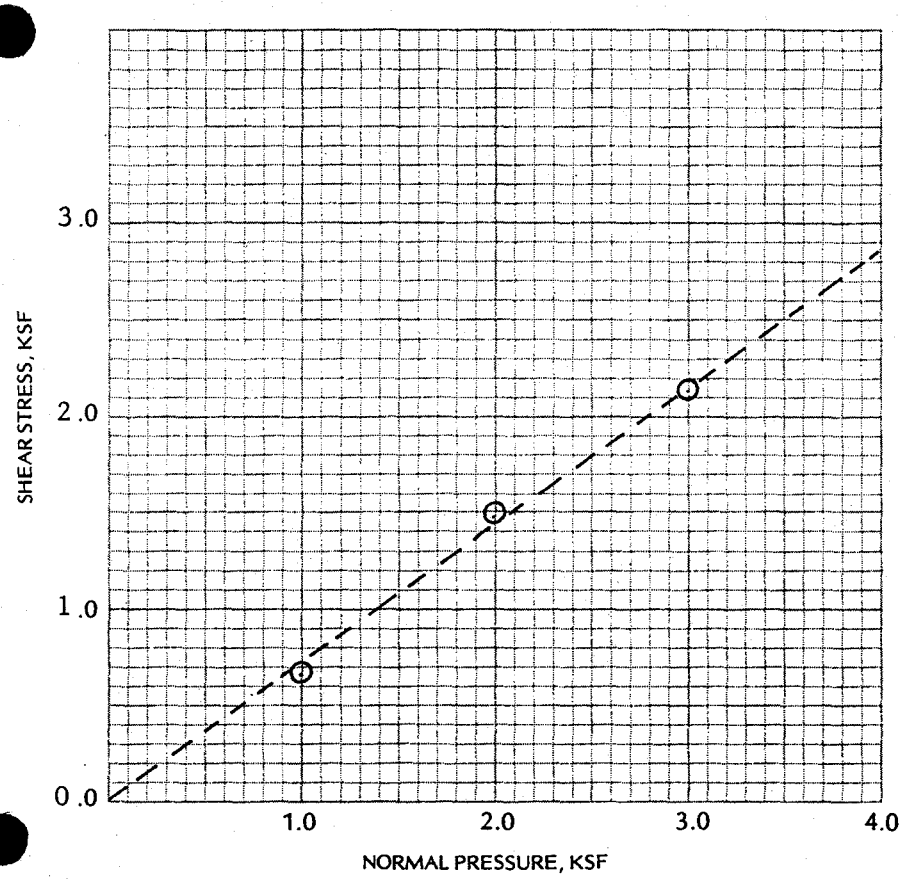
Initial Moisture Content, % 7.7

ϕ = 34 ° C = 0 Kips/Sq. Ft.

DIRECT SHEAR TEST

Job No. 2128J068

Lab/Invoice No.



Type of Material SP

Source of Material B-7E 2' - 3'

Sampled By J. Waldner Date

Submitted By M. Ali Date 5/16/88

Reviewed By E. Hoque Date 5/27/88

Test Procedure ASTM D3080- Single Shear

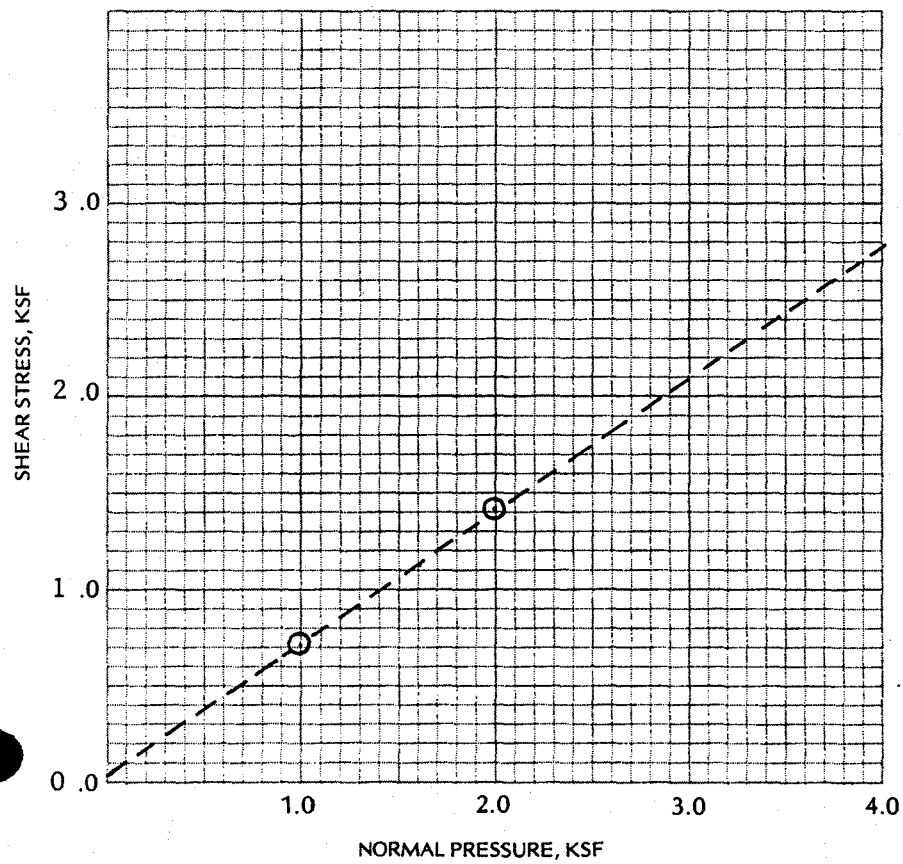
Test Condition: —— InSitu ---- Saturated

Sample Condition: ☒ Undisturbed ☐ Remolded

Initial Dry Density, pcf 105

Initial Moisture Content, % 3.3

ϕ = 35 ° C = 0 Kips/Sq. Ft.



Type of Material SC

Source of Material B-8E 2' - 3'

Sampled By J. Waldner Date

Submitted By M. Ali Date 5/16/88

Reviewed By E. Hoque Date 5/27/88

Test Procedure ASTM D3080- Single Shear

Test Condition: —— InSitu ---- Saturated

Sample Condition: ☒ Undisturbed ☐ Remolded

Initial Dry Density, pcf 101

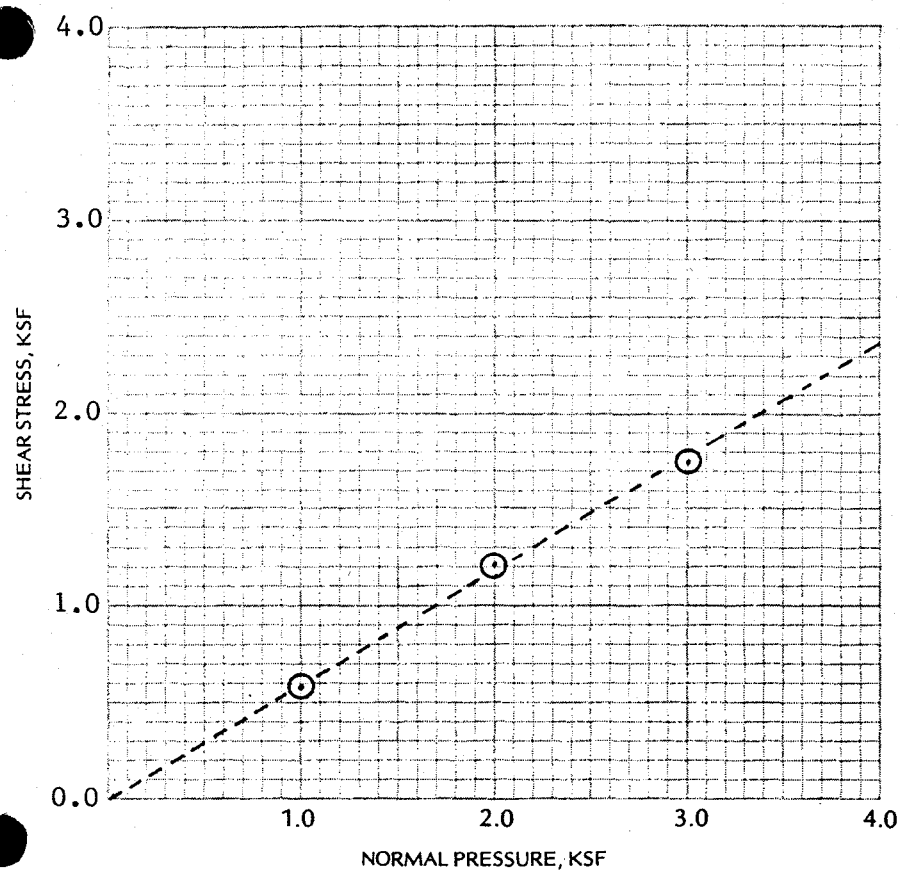
Initial Moisture Content, % 5.4

ϕ = 34 ° C = 0.1 Kips/Sq. Ft.

DIRECT SHEAR TEST

Job No. 2128J068

Lab/Invoice No.



Type of Material SP

Source of Material B-14E (2'-3')

Sampled By J. Waldner Date

Submitted By M. Ali Date 5/26/88

Reviewed By E. Hoque Date 6/9/88

Test Procedure ASTM D3080- Single Shear

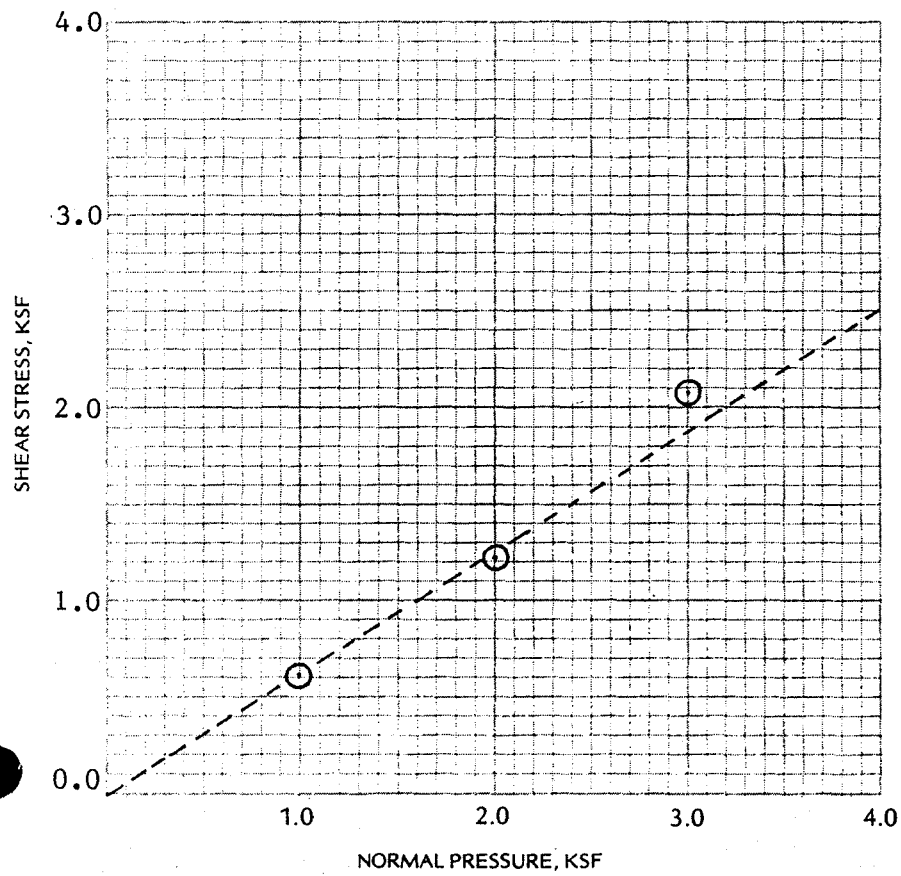
Test Condition: —— InSitu ---- Saturated

Sample Condition: ☒ Undisturbed ☐ Remolded

Initial Dry Density, pcf 93

Initial Moisture Content, % 6.5

ϕ = 31 ° C = 0 Kips/Sq. Ft.



Type of Material SP

Source of Material B-15E (5'-6')

Sampled By J. Waldner Date

Submitted By M. Ali Date 5/28/88

Reviewed By E. Hoque Date 6/9/88

Test Procedure ASTM D3080- Single Shear

Test Condition: —— InSitu ---- Saturated

Sample Condition: ☒ Undisturbed ☐ Remolded

Initial Dry Density, pcf 98

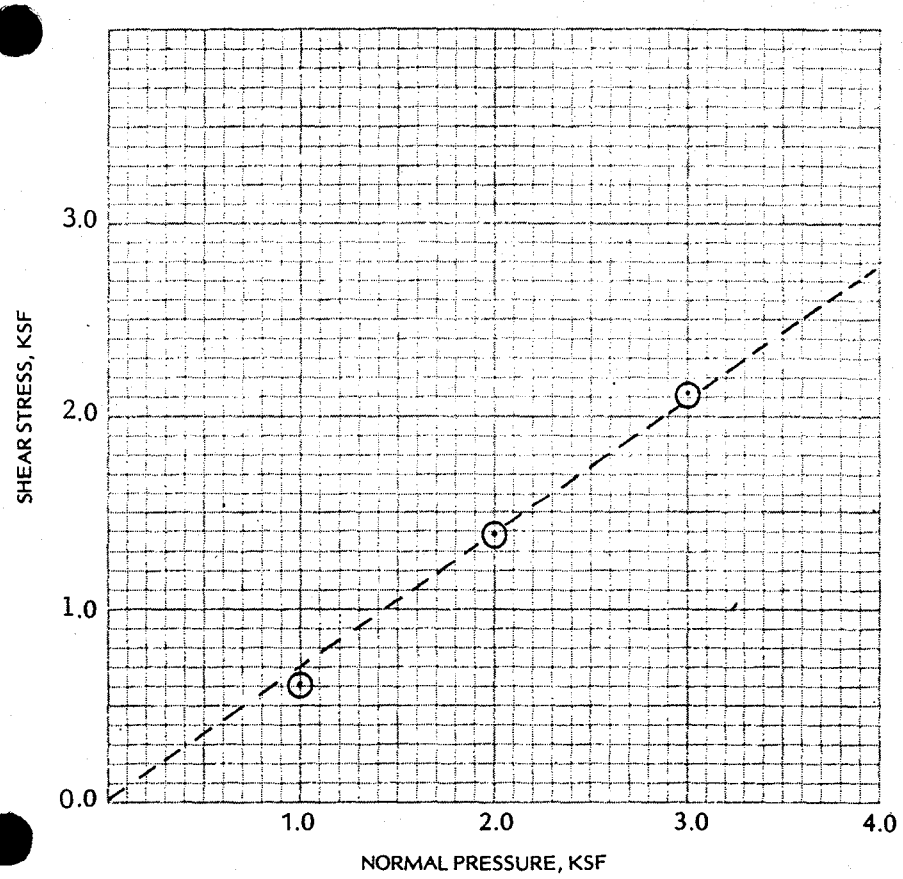
Initial Moisture Content, % 2.0

ϕ = 33 ° C = 0 Kips/Sq. Ft.

DIRECT SHEAR TEST

Job No. 2128J068

Lab/Invoice No.



Type of Material SP

Source of Material B-11E (2' - 3.5')

Sampled By J. Waldner Date 5-10-88

Submitted By M. Ali Date 7-21-88

Reviewed By Date 9-30-88

Test Procedure ASTM D3080- Single Shear

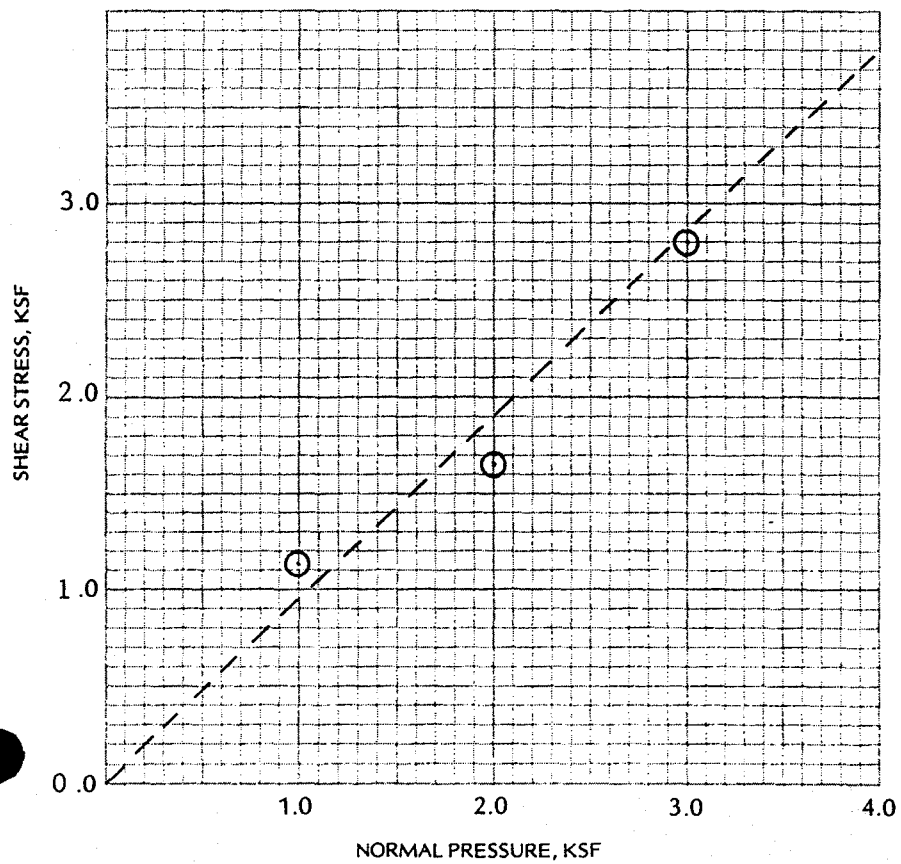
Test Condition: —— InSitu ---- Saturated

Sample Condition: ☐ Undisturbed ☒ Remolded

Initial Dry Density, pcf 105

Initial Moisture Content, % 3.8

ϕ = 35 ° C = 0 Kips/Sq. Ft.



Type of Material SP

Source of Material B-18E (10' - 11.5')

Sampled By J. Waldner Date 5-9-88

Submitted By M. Ali Date 7-19-88

Reviewed By E. Hoque Date 9-30-88

Test Procedure ASTM D3080- Single Shear

Test Condition: —— InSitu ---- Saturated

Sample Condition: ☐ Undisturbed ☒ Remolded

Initial Dry Density, pcf 115

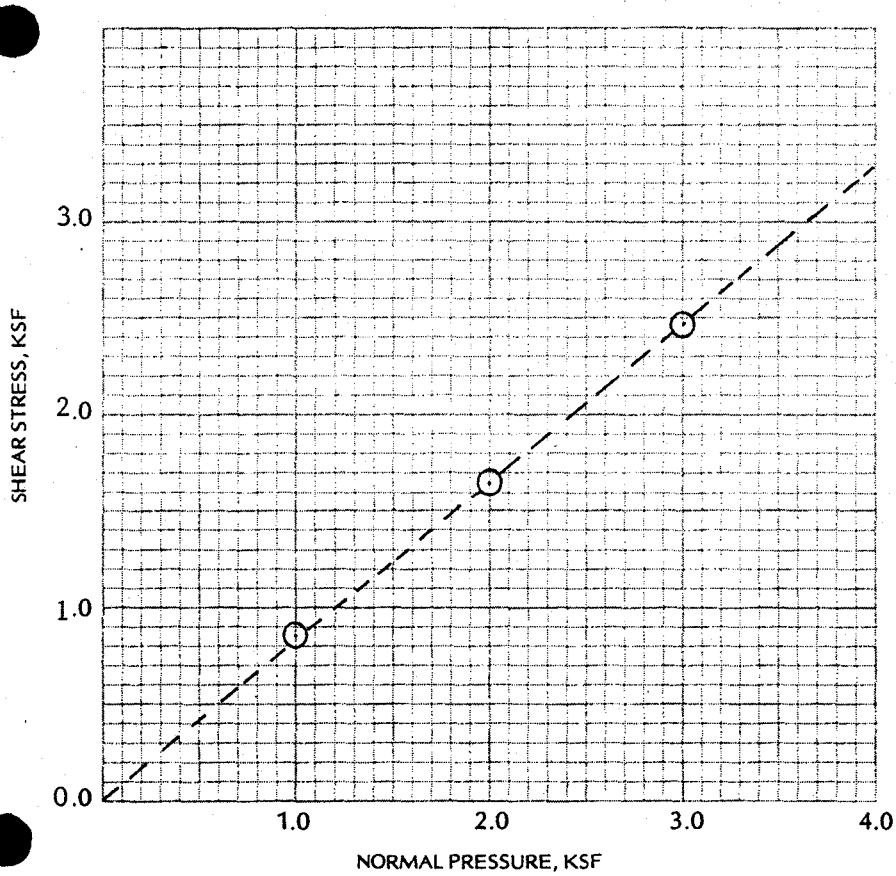
Initial Moisture Content, % 2.5

ϕ = 44 ° C = 0 Kips/Sq. Ft.

DIRECT SHEAR TEST

Job No. 2128J068

Lab/Invoice No.



Type of Material SP

Source of Material B-19E (2' - 3.5')

Sampled By J. Waldner Date 5-9-88

Submitted By M. Ali Date 7-28-88

Reviewed By E. Hoque Date 7-30-88

Test Procedure ASTM D3080- Single Shear

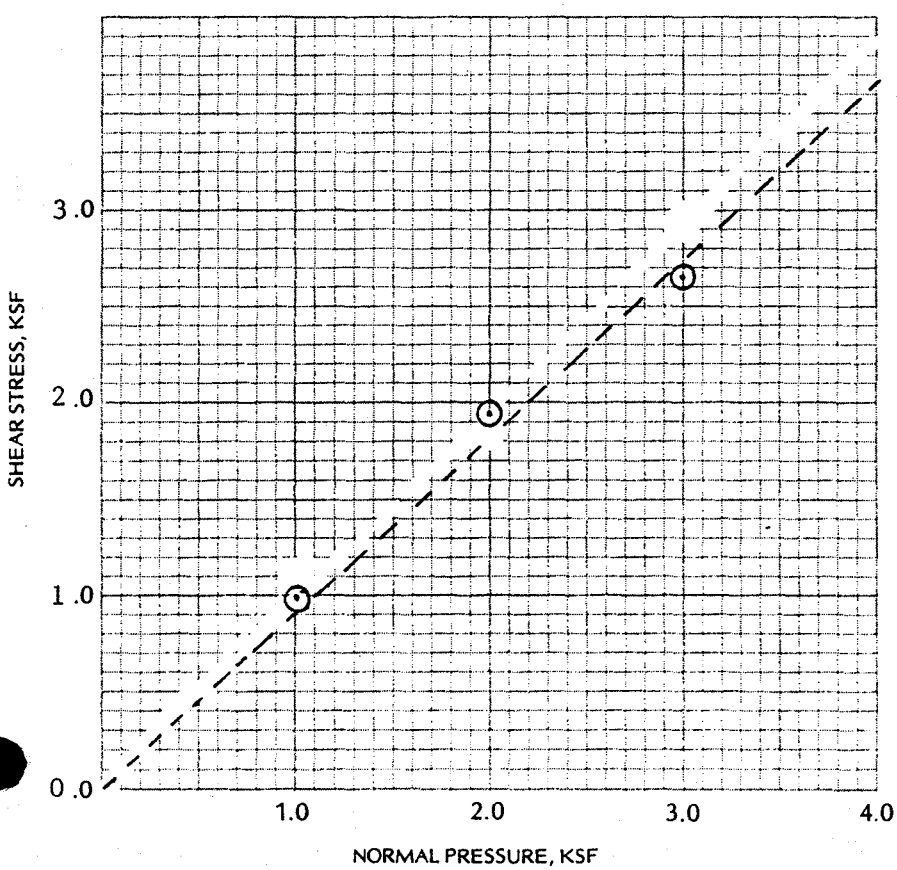
Test Condition: —— InSitu ---- Saturated

Sample Condition: ☐ Undisturbed ☒ Remolded

Initial Dry Density, pcf 105

Initial Moisture Content, % 2.5

ϕ = 40 ° C = 0 Kips/Sq. Ft.



Type of Material SP

Source of Material B-20E (5' - 6.5')

Sampled By J. Waldner Date 5-9-88

Submitted By M. Ali Date 7-19-88

Reviewed By E. Hoque Date 8-31-88

Test Procedure ASTM D3080- Single Shear

Test Condition: —— InSitu ---- Saturated

Sample Condition: ☐ Undisturbed ☒ Remolded

Initial Dry Density, pcf 110

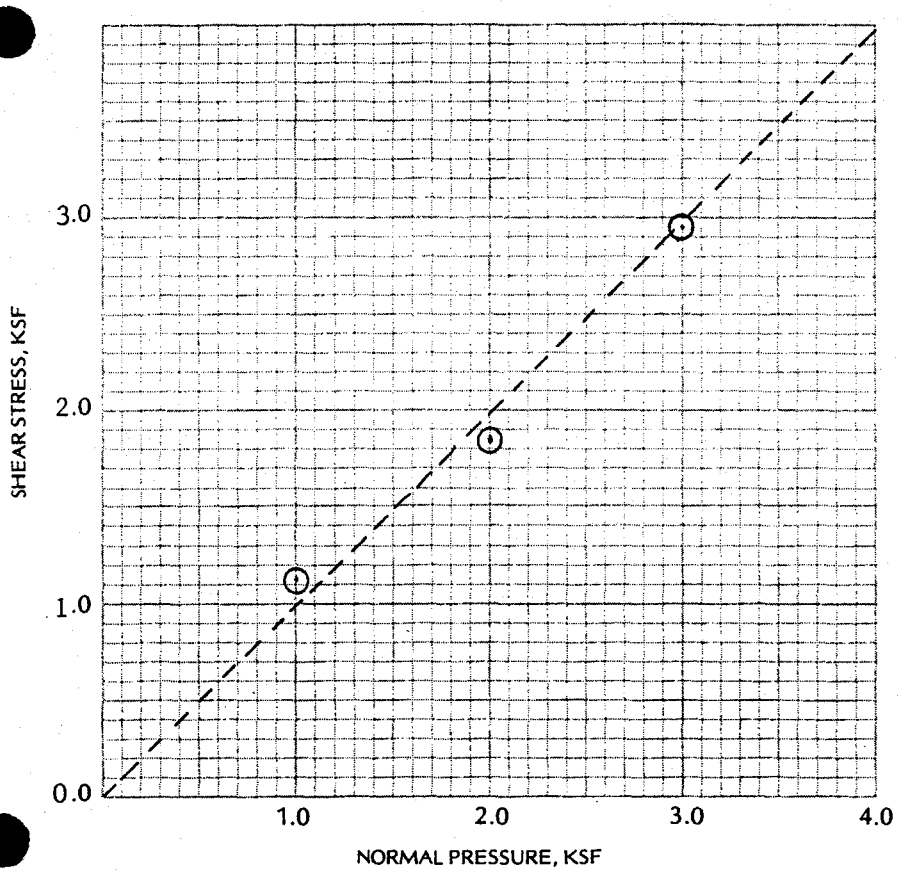
Initial Moisture Content, % 1.0

ϕ = 42 ° C = 0 Kips/Sq. Ft.

DIRECT SHEAR TEST

Job No. 2128J068

Lab/Invoice No.



Type of Material SP

Source of Material B-20E 10' - 11')

Sampled By J. Waldner Date 5-19-88

Submitted By M. Ali Date 7-20-88

Reviewed By E. Hoque Date 8-31-88

Test Procedure ASTM D3080- Single Shear

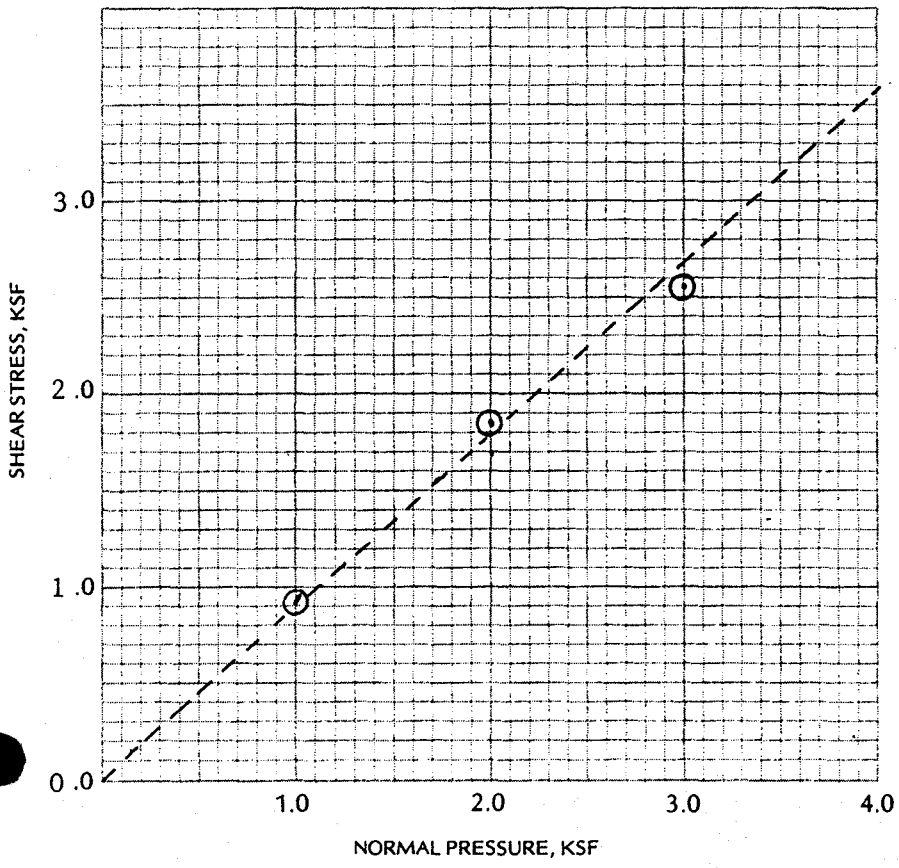
Test Condition: —— InSitu ---- Saturated

Sample Condition: ☐ Undisturbed ☒ Remolded

Initial Dry Density, pcf 120

Initial Moisture Content, % 1.0

ϕ = 44 ° C = 0 Kips/Sq. Ft.



Type of Material SP

Source of Material B-21E (2' - 3.5')

Sampled By J. Waldner Date 5-9-88

Submitted By M. Ali Date 7-20-88

Reviewed By E. Hoque Date 8-31-88

Test Procedure ASTM D3080- Single Shear

Test Condition: —— InSitu ---- Saturated

Sample Condition: ☐ Undisturbed ☒ Remolded

Initial Dry Density, pcf 105

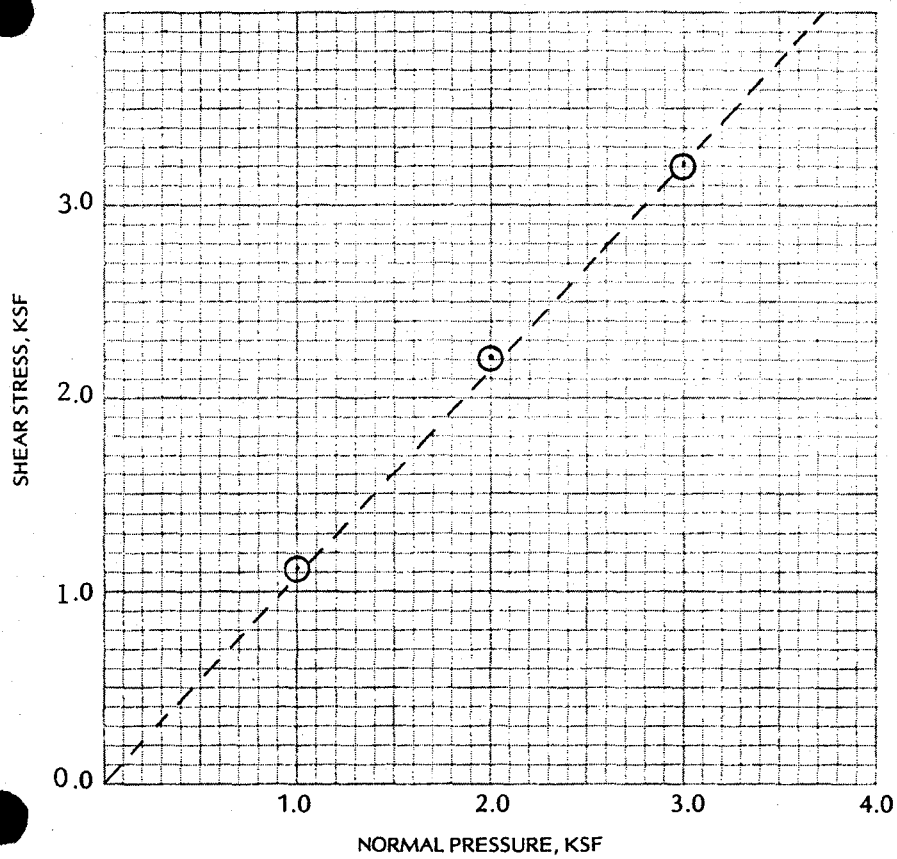
Initial Moisture Content, % 2.0

ϕ = 42 ° C = 0 Kips/Sq. Ft.

DIRECT SHEAR TEST

Job No. 2128J068

Lab/Invoice No.



Type of Material GP

Source of Material B-24E (10' - 11')

Sampled By J. Waldner Date 5-9-88

Submitted By M. Ali Date 7-20-88

Reviewed By E. Hoque Date 8-31-88

Test Procedure ASTM D3080- Single Shear

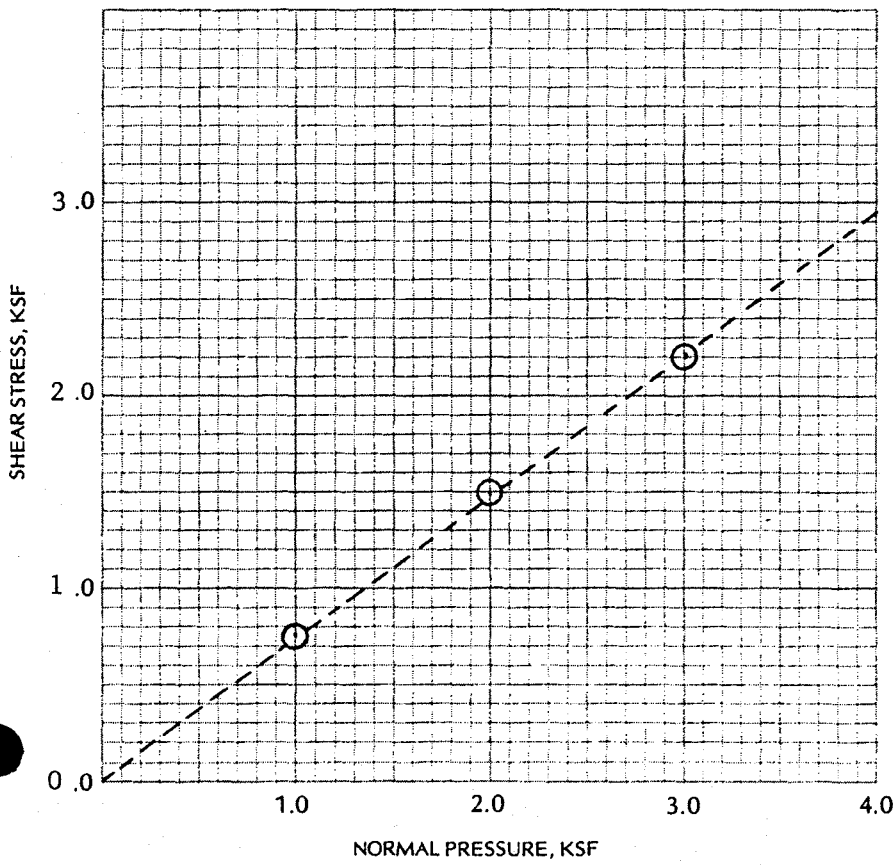
Test Condition: —— InSitu ---- Saturated

Sample Condition: ☐ Undisturbed ☒ Remolded

Initial Dry Density, pcf 125

Initial Moisture Content, % 2.0

ϕ = 46 ° C = 0 Kips/Sq. Ft.



Type of Material SP

Source of Material B-32E (5' - 6.5')

Sampled By J. Waldner Date 5-11-88

Submitted By M. Ali Date 7-20-88

Reviewed By E. Hoque Date 8-31-88

Test Procedure ASTM D3080- Single Shear

Test Condition: —— InSitu ---- Saturated

Sample Condition: ☐ Undisturbed ☒ Remolded

Initial Dry Density, pcf 110

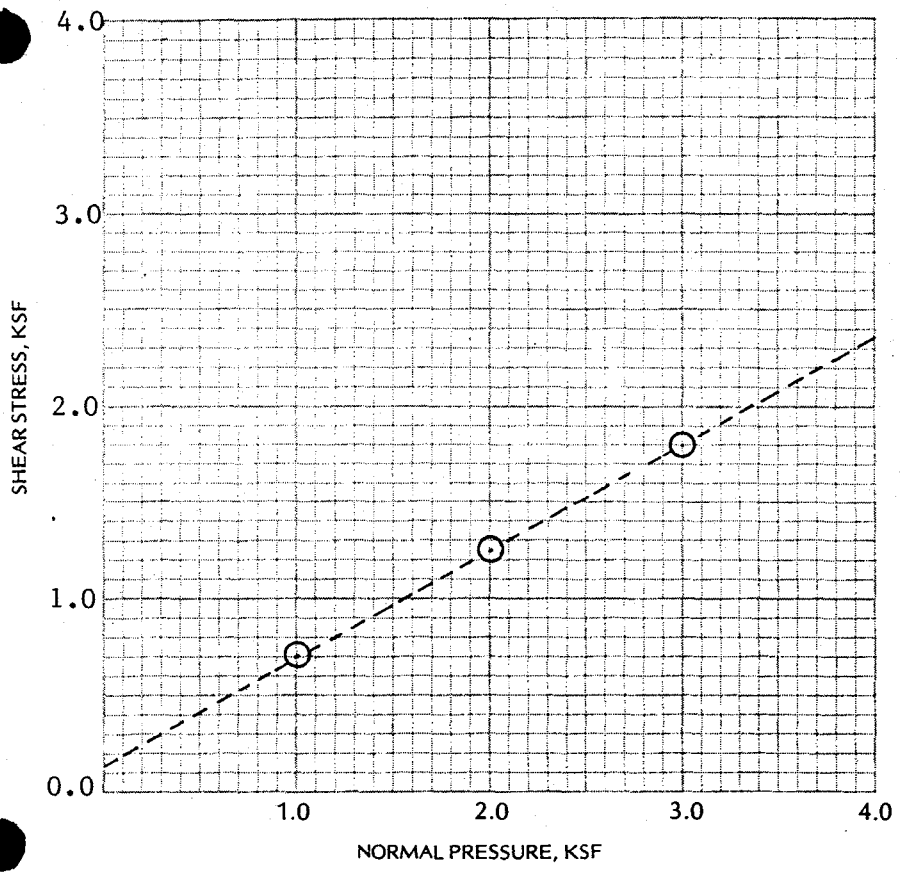
Initial Moisture Content, % 3.5

ϕ = 44 ° C = 0 Kips/Sq. Ft.

DIRECT SHEAR TEST

Job No. 2128J068

Lab/Invoice No. _____



Type of Material SC

Source of Material B-27E (2'-3')

Sampled By J. Waldner Date _____

Submitted By M. Ali Date 5/31/88

Reviewed By E. Hoque Date 6/9/88

Test Procedure ASTM D3080- Single Shear

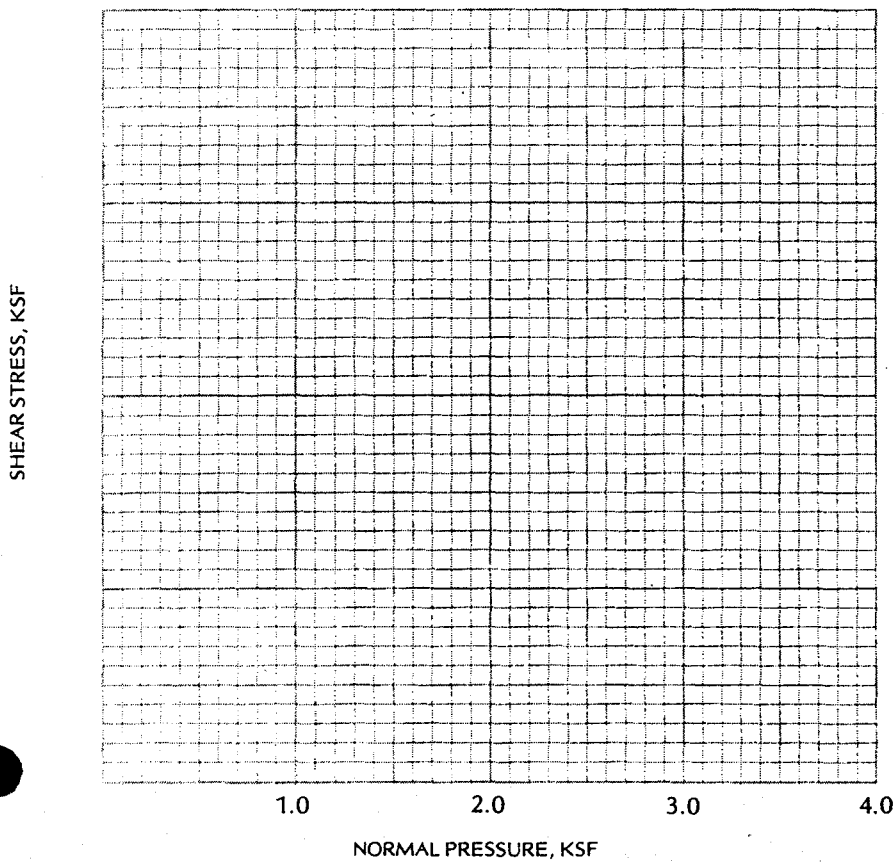
Test Condition: —— InSitu ---- Saturated

Sample Condition: ☒ Undisturbed ☐ Remolded

Initial Dry Density, pcf 103

Initial Moisture Content, % 9.2

ϕ = 29 ° C = 0.1 Kips/Sq. Ft.



Type of Material _____

Source of Material _____

Sampled By _____ Date _____

Submitted By _____ Date _____

Reviewed By _____ Date _____

Test Procedure ASTM D3080- Single Shear

Test Condition: —— InSitu ---- Saturated

Sample Condition: ☐ Undisturbed ☐ Remolded

Initial Dry Density, pcf _____

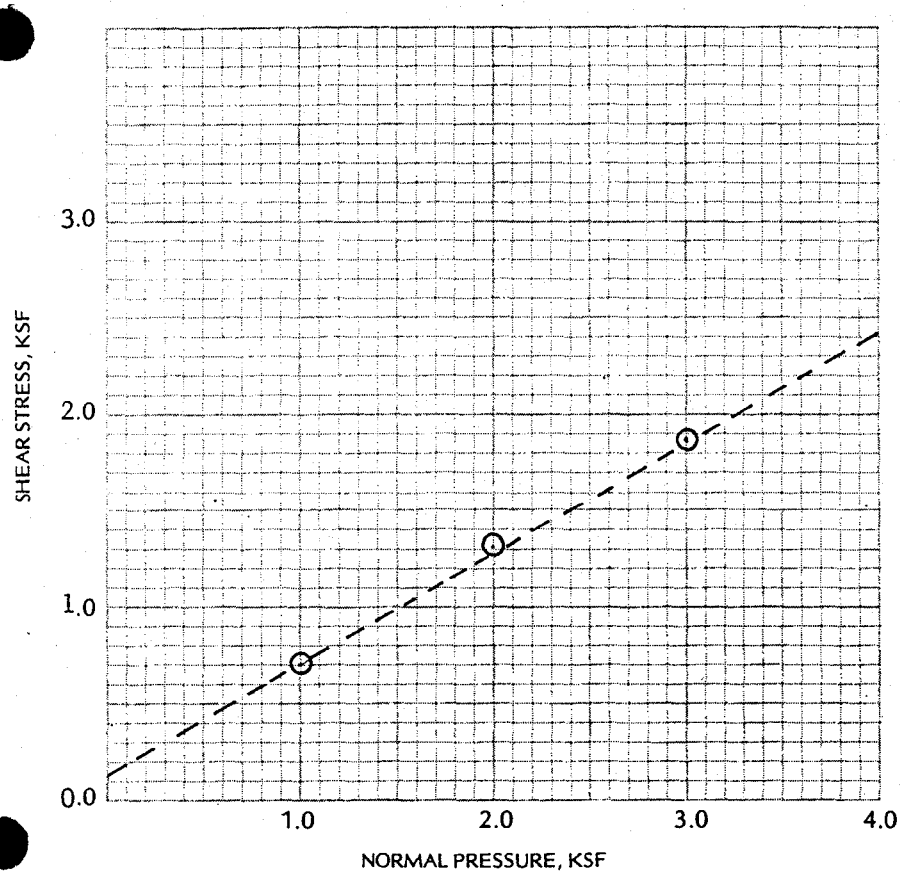
Initial Moisture Content, % _____

ϕ = _____ ° C = _____ Kips/Sq. Ft.

DIRECT SHEAR TEST

Job No. 2128J068

Lab/Invoice No.



Type of Material SC

Source of Material B-6W (4' - 5')

Sampled By J. Waldner Date

Submitted By M. Ali Date 5/06/88

Reviewed By E. Hoque Date 5/27/88

Test Procedure ASTM D3080- Single Shear

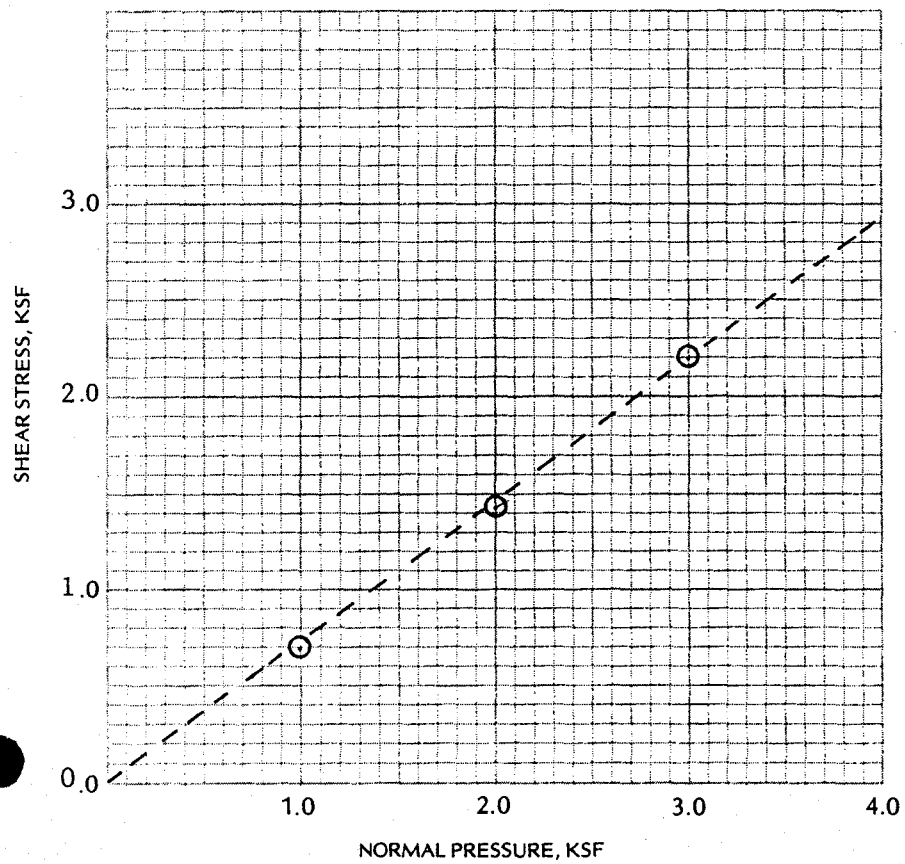
Test Condition: —— InSitu ---- Saturated

Sample Condition: ☒ Undisturbed ☐ Remolded

Initial Dry Density, pcf 99

Initial Moisture Content, % 9.5

ϕ = 30 ° C = 0.1 Kips/Sq. Ft.



Type of Material SP

Source of Material B-8W (5' - 6')

Sampled By J. Waldner Date

Submitted By M. Ali Date 5/06/88

Reviewed By E. Hoque Date 5/27/88

Test Procedure ASTM D3080- Single Shear

Test Condition: —— InSitu ---- Saturated

Sample Condition: ☒ Undisturbed ☐ Remolded

Initial Dry Density, pcf 108

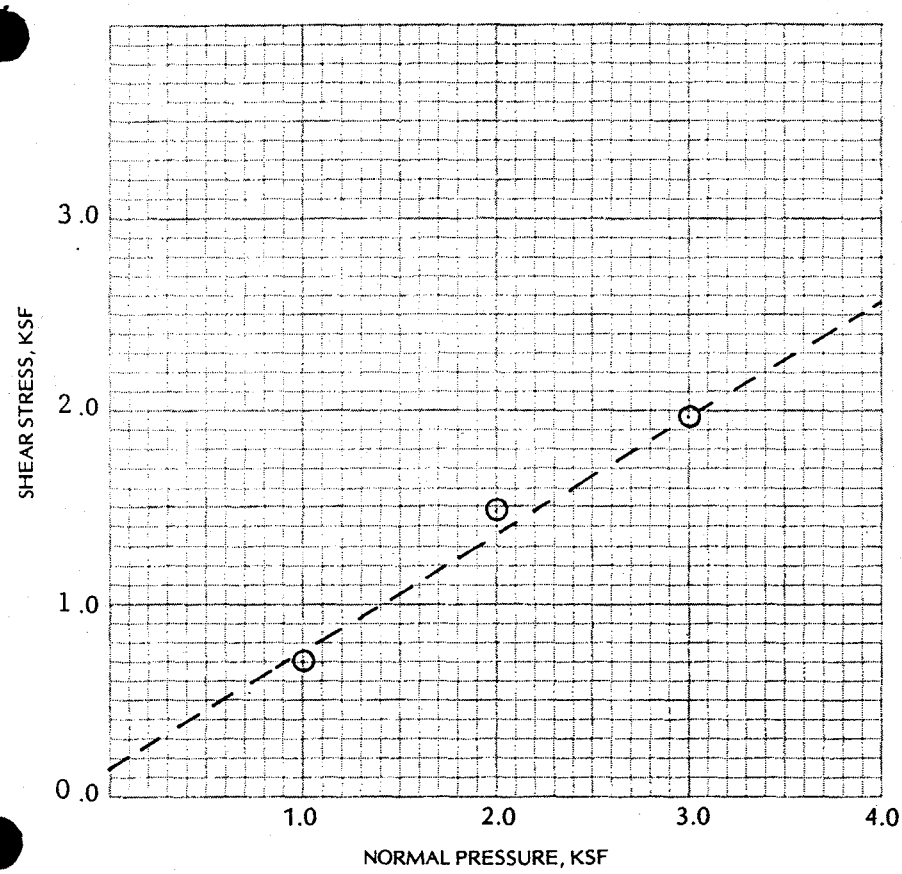
Initial Moisture Content, % 2.0

ϕ = 36 ° C = 0 Kips/Sq. Ft.

DIRECT SHEAR TEST

Job No. 2128J068

Lab/Invoice No.



Type of Material SP-SC

Source of Material B-12W (5' - 6')

Sampled By J. Waldner Date

Submitted By E. Hoque Date 5/06/88

Reviewed By E. Hoque Date 5/27/88

Test Procedure ASTM D3080- Single Shear

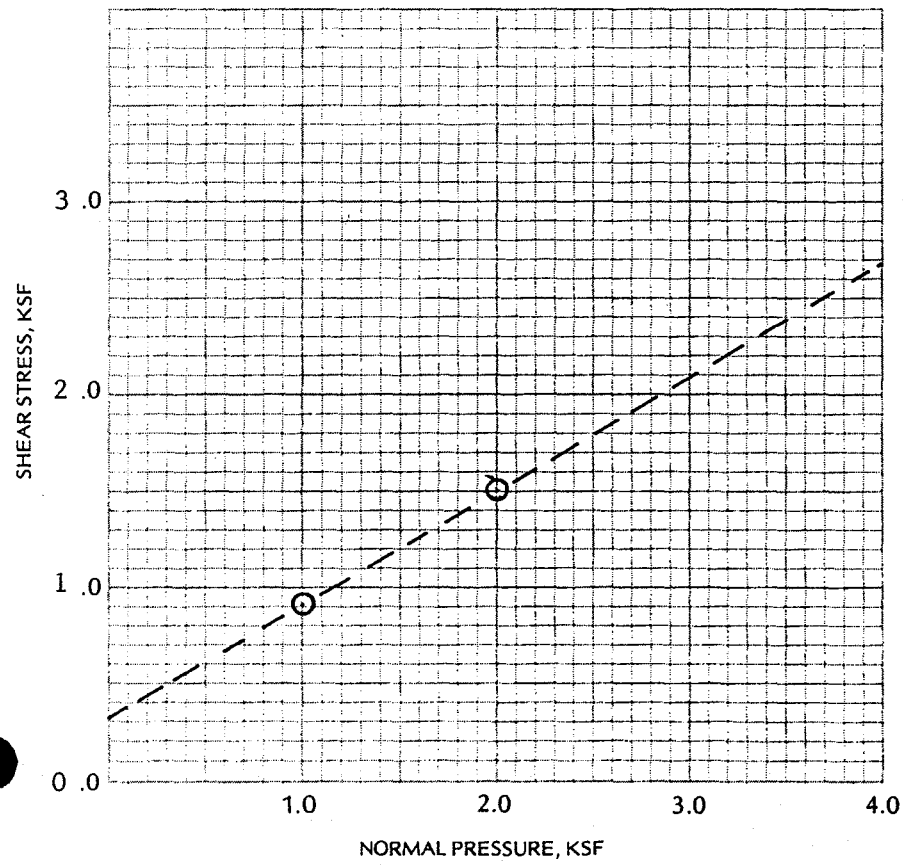
Test Condition: —— InSitu ---- Saturated

Sample Condition: ☒ Undisturbed ☐ Remolded

Initial Dry Density, pcf 102

Initial Moisture Content, % 3.8

ϕ = 32 ° C = 0.1 Kips/Sq. Ft.



Type of Material SC

Source of Material 20W (2' - 3')

Sampled By J. Waldner Date

Submitted By E. Hoque Date 5/06/88

Reviewed By E. Hoque Date 5/27/88

Test Procedure ASTM D3080- Single Shear

Test Condition: —— InSitu ---- Saturated

Sample Condition: ☒ Undisturbed ☐ Remolded

Initial Dry Density, pcf 107

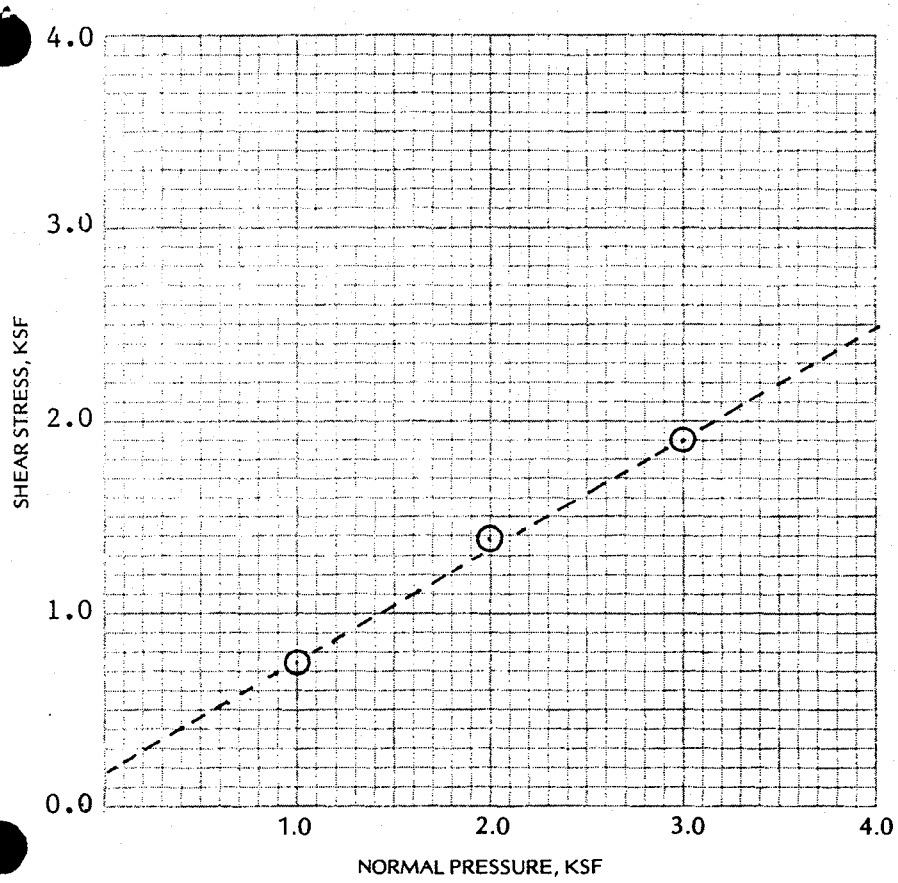
Initial Moisture Content, % 10.2

ϕ = 32 ° C = 0.3 Kips/Sq. Ft.

DIRECT SHEAR TEST

Job No. 2128J068

Lab/Invoice No.



Type of Material SC

Source of Material B-22W (4' - 5')

Sampled By J. Waldner Date 5/5/88

Submitted By M. Ali Date 5/23/88

Reviewed By E. HOque Date 6/4/88

Test Procedure ASTM D3080- Single Shear

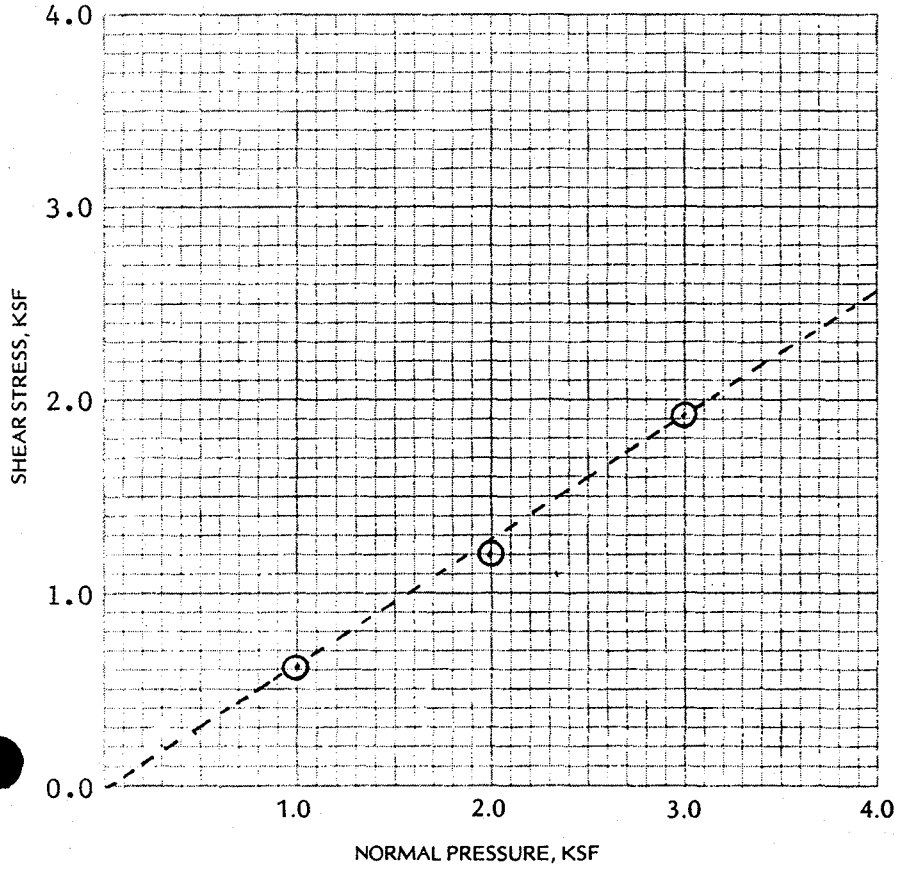
Test Condition: —— InSitu ---- Saturated

Sample Condition: ☒ Undisturbed ☐ Remolded

Initial Dry Density, pcf 107

Initial Moisture Content, % 5.9

ϕ = 29 ° C = 0.2 Kips/Sq. Ft.



Type of Material SC

Source of Material B-25W (2' - 3')

Sampled By J. Waldner Date 5/5/88

Submitted By M. Ali Date 5/23/88

Reviewed By E. HOque Date 6/4/88

Test Procedure ASTM D3080- Single Shear

Test Condition: —— InSitu ---- Saturated

Sample Condition: ☒ Undisturbed ☐ Remolded

Initial Dry Density, pcf 85

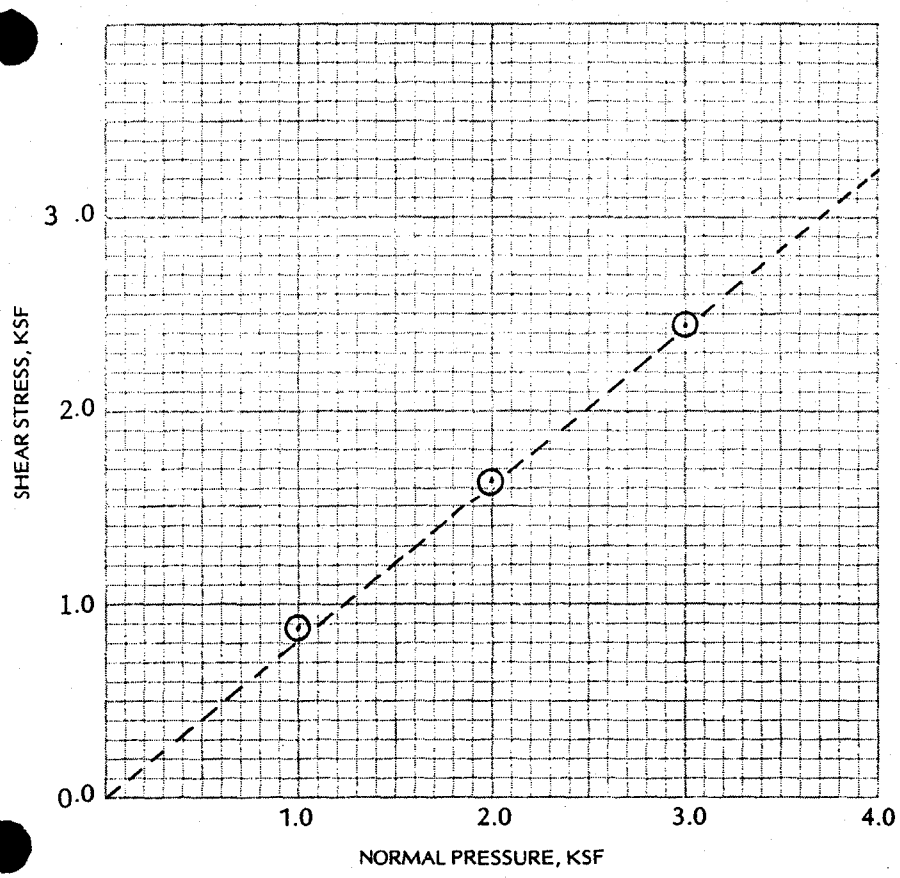
Initial Moisture Content, % 8.4

ϕ = 32 ° C = 0 Kips/Sq. Ft.

DIRECT SHEAR TEST

Job No. 2128J068

Lab/Invoice No.



Type of Material SP

Source of Material B-30BW (2' - 3.5')

Sampled By J. Waldner Date 5-6-88

Submitted By M. Ali Date 7-28-88

Reviewed By E. Hoque Date 8-4-88

Test Procedure ASTM D3080- Single Shear

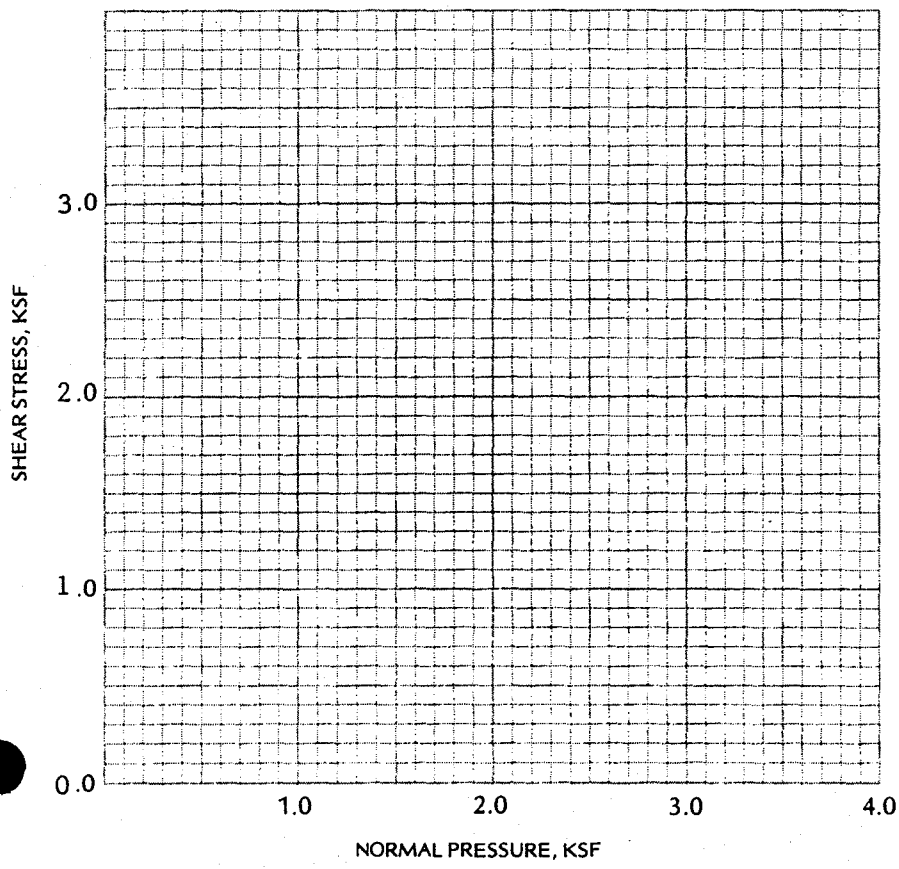
Test Condition: —— InSitu ---- Saturated

Sample Condition: ☐ Undisturbed ☒ Remolded

Initial Dry Density, pcf 105

Initial Moisture Content, % 2.0

ϕ = 40 ° C = 0 Kips/Sq. Ft.



Type of Material

Source of Material

Sampled By Date

Submitted By Date

Reviewed By Date

Test Procedure ASTM D3080- Single Shear

Test Condition: —— InSitu ---- Saturated

Sample Condition: ☐ Undisturbed ☐ Remolded

Initial Dry Density, pcf

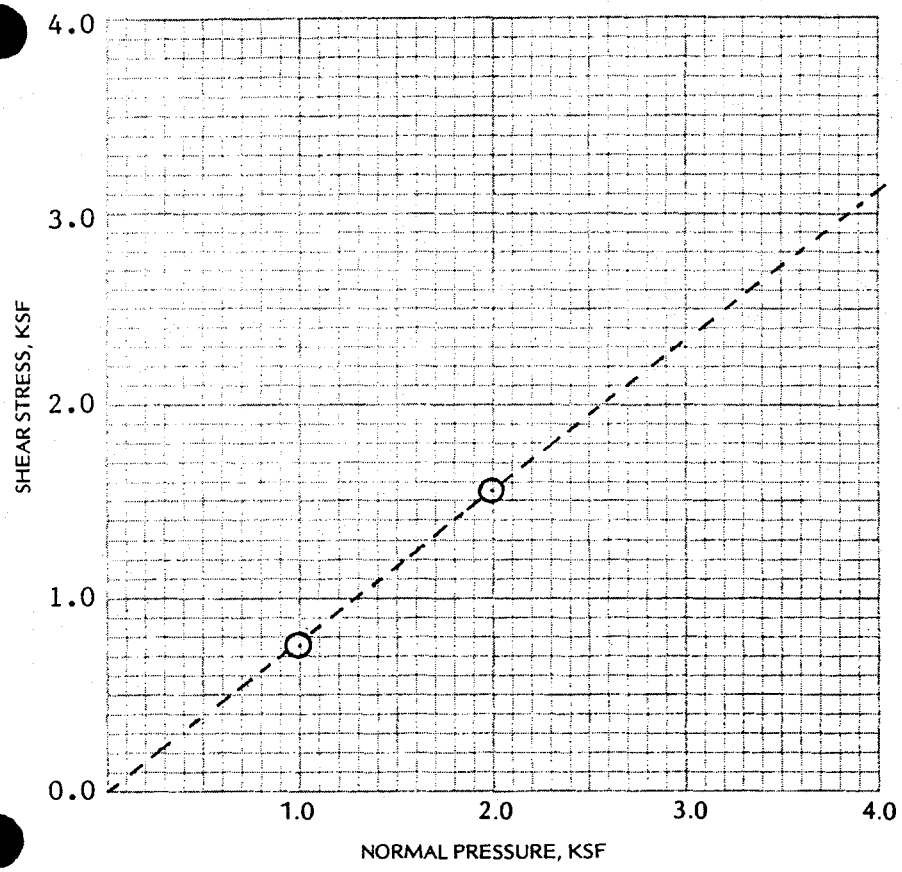
Initial Moisture Content, %

ϕ = ° C = Kips/Sq. Ft.

DIRECT SHEAR TEST

Job No. 2128J068

Lab/Invoice No.



Type of Material SC

Source of Material B-30W (2' - 3')

Sampled By J. Waldner Date 5/6/88

Submitted By M. Ali Date 5/24/88

Reviewed By E. Hoque Date 6/4/88

Test Procedure ASTM D3080- Single Shear

Test Condition: —— InSitu ---- Saturated

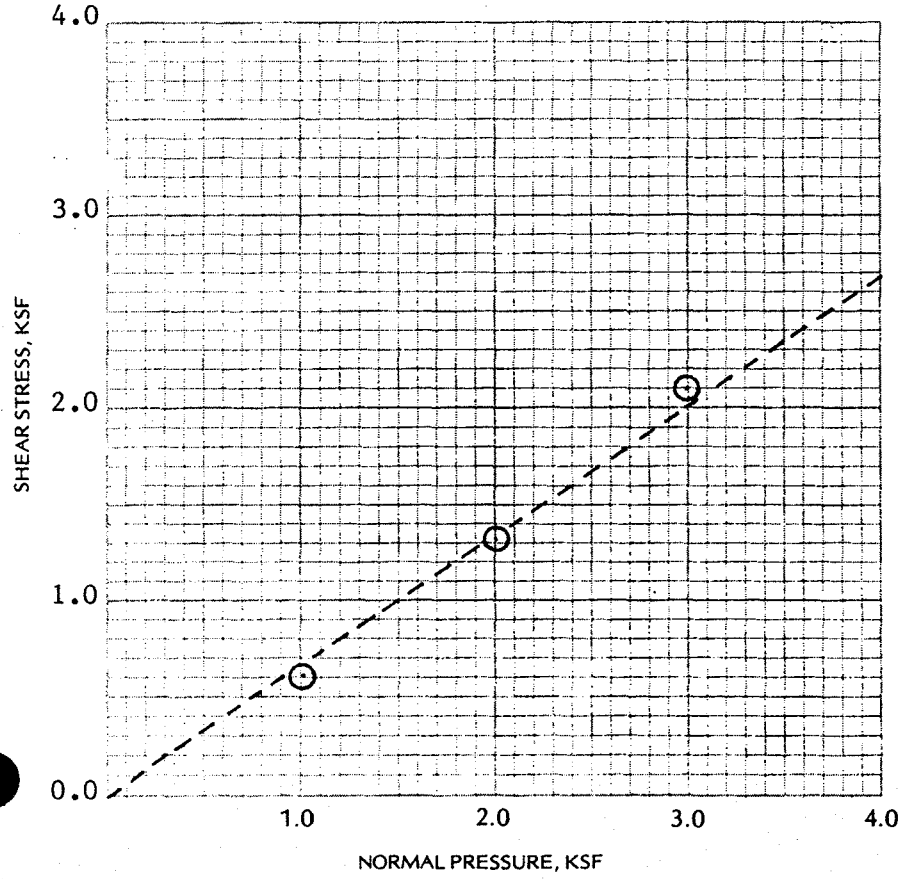
Sample Condition: ☒ Undisturbed ☐ Remolded

Initial Dry Density, pcf 73

Initial Moisture Content, % 11.6

ϕ = 0 ° C = 38 Kips/Sq. Ft.

?



Type of Material CL-ML

Source of Material B-31W (2' - 3')

Sampled By J. Waldner Date 5/6/88

Submitted By M. Ali Date 5/24/88

Reviewed By E. Hoque Date 6/4/88

Test Procedure ASTM D3080- Single Shear

Test Condition: —— InSitu ---- Saturated

Sample Condition: ☒ Undisturbed ☐ Remolded

Initial Dry Density, pcf 80

Initial Moisture Content, % 7.9

ϕ = 37 ° C = 0 Kips/Sq. Ft.

Coe and Van Loo
Job No. 2128J068

COEFFICIENT OF PERMEABILITY

Sample Identification		Soil Class.	Initial Density (pcf)	Moisture Content %	Coefficient of Permeability (cm/sec)
Boring No.	Depth (feet)				
B-7W	2-3	SC	102	6.8	$2X10^{-5}$
B-21W	2-3	SP	105	3.8	$3X10^{-3}$
B-22W	2-3	SC	98	6.2	$2X10^{-5}$
B-6E	2-3	SM	129	4.8	$6X10^{-5}$
B-9E	5-6	SP	95	1.2	$3X10^{-3}$
B-11E	5-6	SP	92	2.9	$6X10^{-3}$
B-14E	5-6	SP	106	1.5	$4X10^{-3}$
B-23E	2-3	SP	95	2.0	$1X10^{-3}$
B-27E	5-6	SP	108	2.4	$4X10^{-3}$

Coe and Van Loo
Job No. 2128J068

SOLUBLE SULFUR CONTENT

Boring No.	Depth (foot)	Soil Class.	Sulfur (ppm)
7W	2-3	SC	29
12W	2-3	SC	20
21W	2-3	SM	165
9E	5-6	SP	170
14E	5-6	SP	9
23E	2-3	SP	50
27E	5-6	SP	13

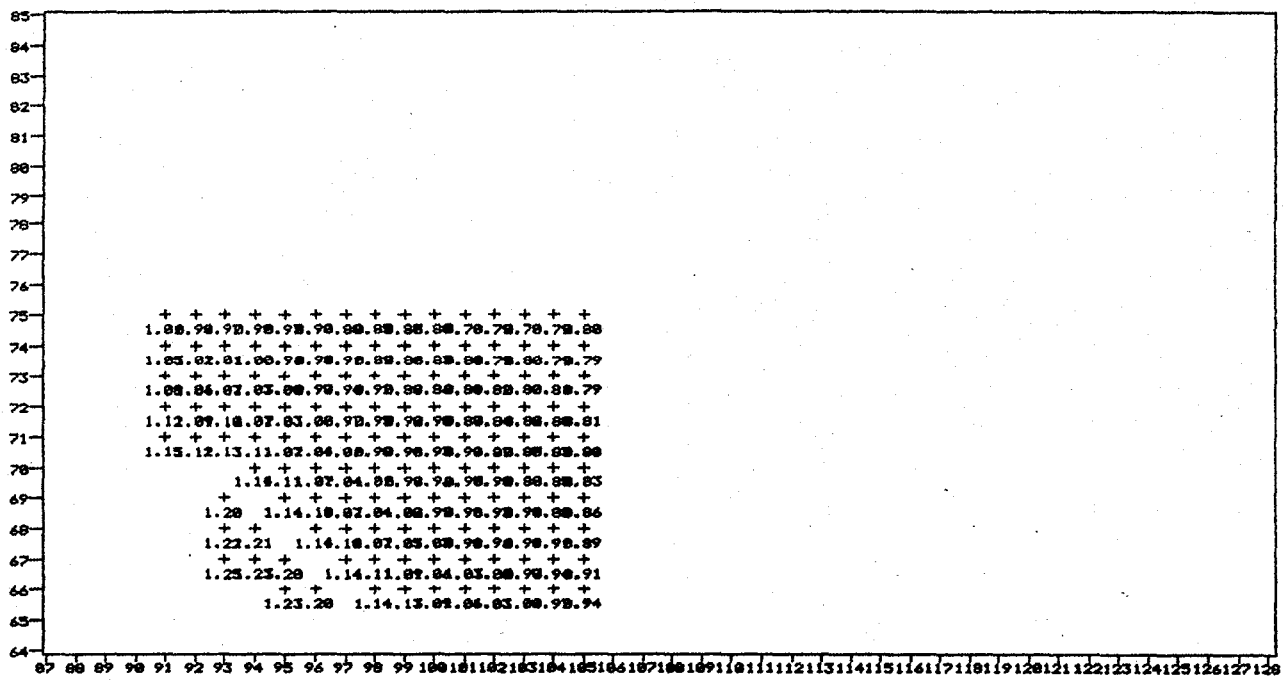
SB-SLOPE

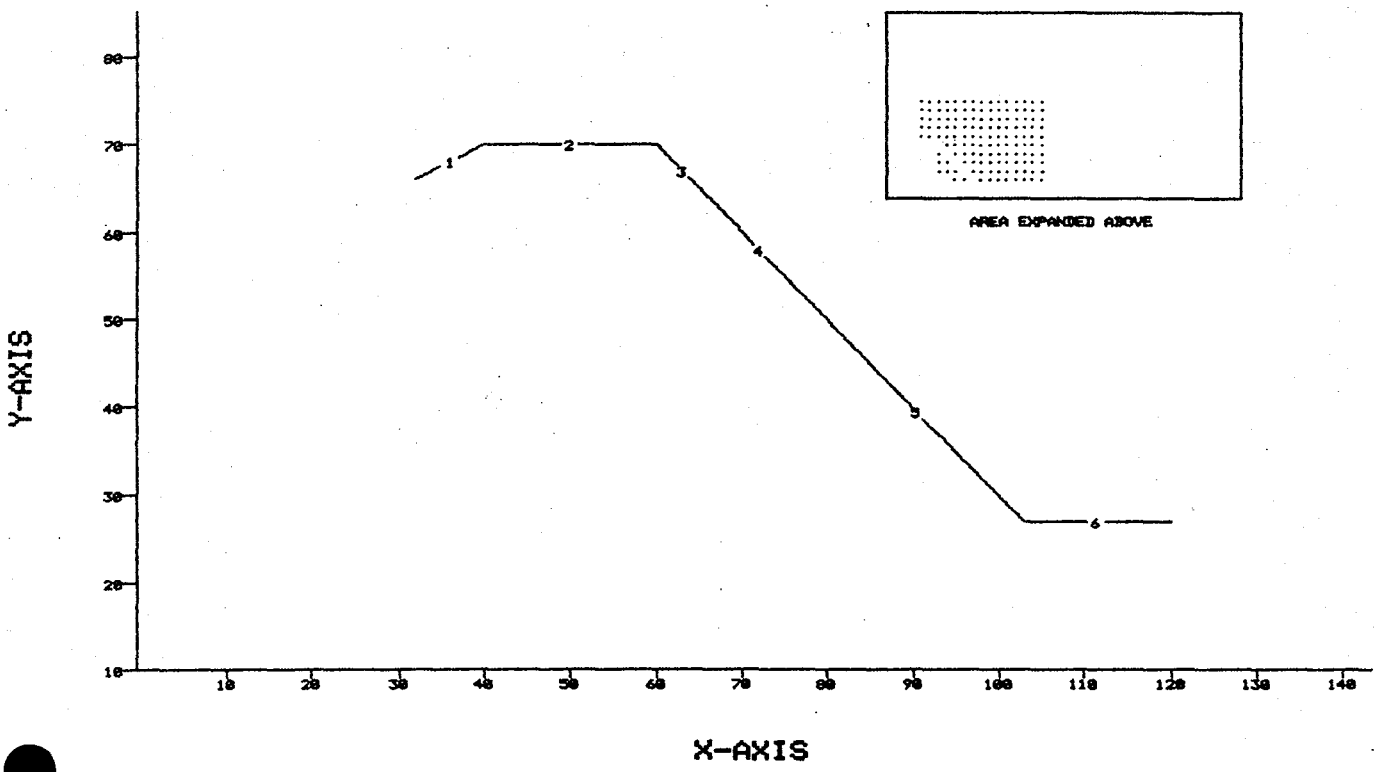
Simplified Bishop Slope Stability Analysis

PROJECT: NEW RIVER

LOCATION: OLIVE AVENUE TO BETHANY HOME ROAD

FILE: SLOPE



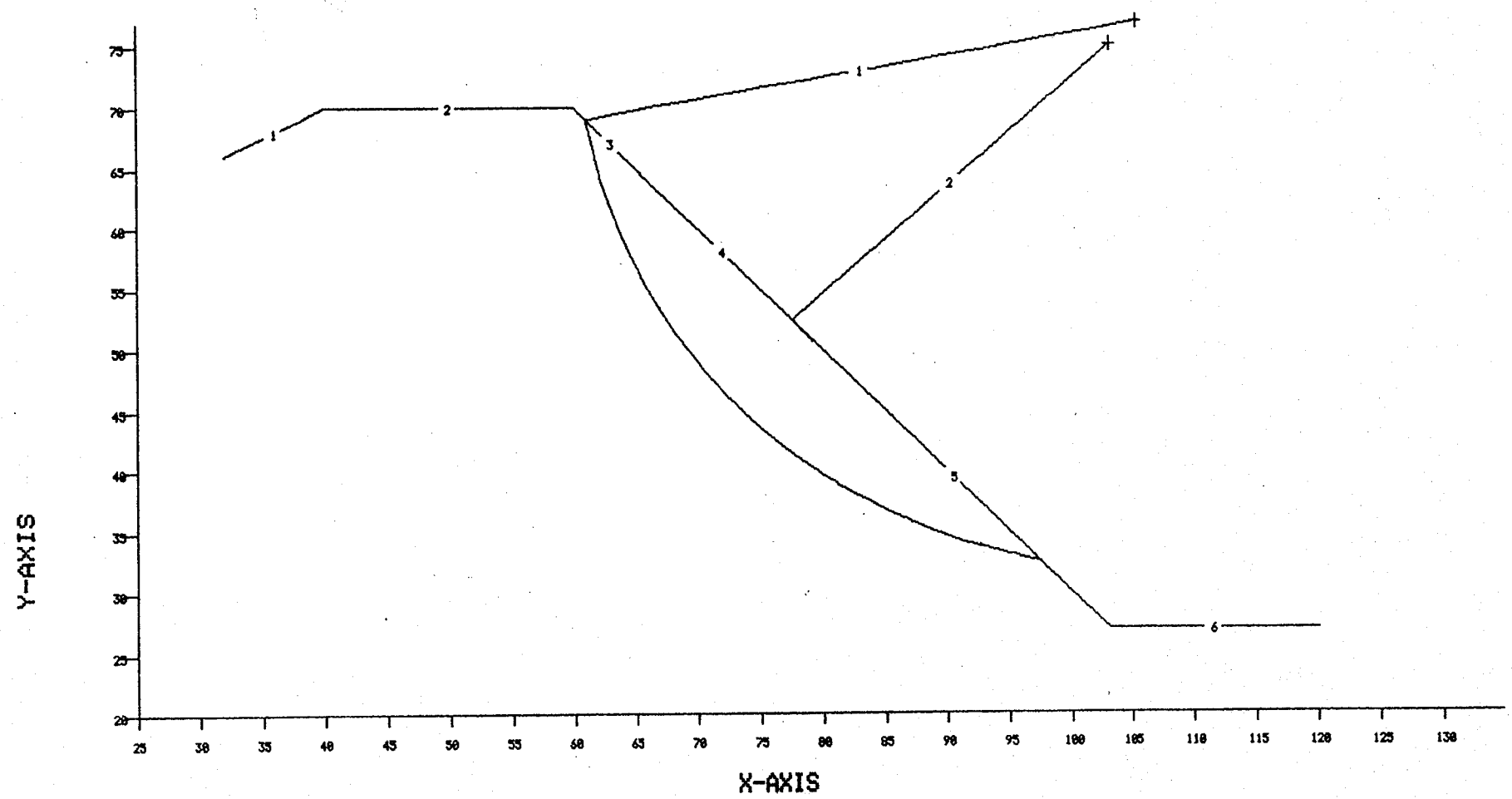


SB-SLOPE

Simplified Bishop Slope Stability Analysis

PROJECT: NEW RIVER
LOCATION: OLIVE AVENUE TO BETHANY HOME ROAD
FILE: SLOPE
COMPLETE SLOPE CROSS SECTION

CIRCLE	X	Y	RADIUS	FS
1	105.3	76.9	45.0	1.00
2	103.0	75.0	34.0	0.78



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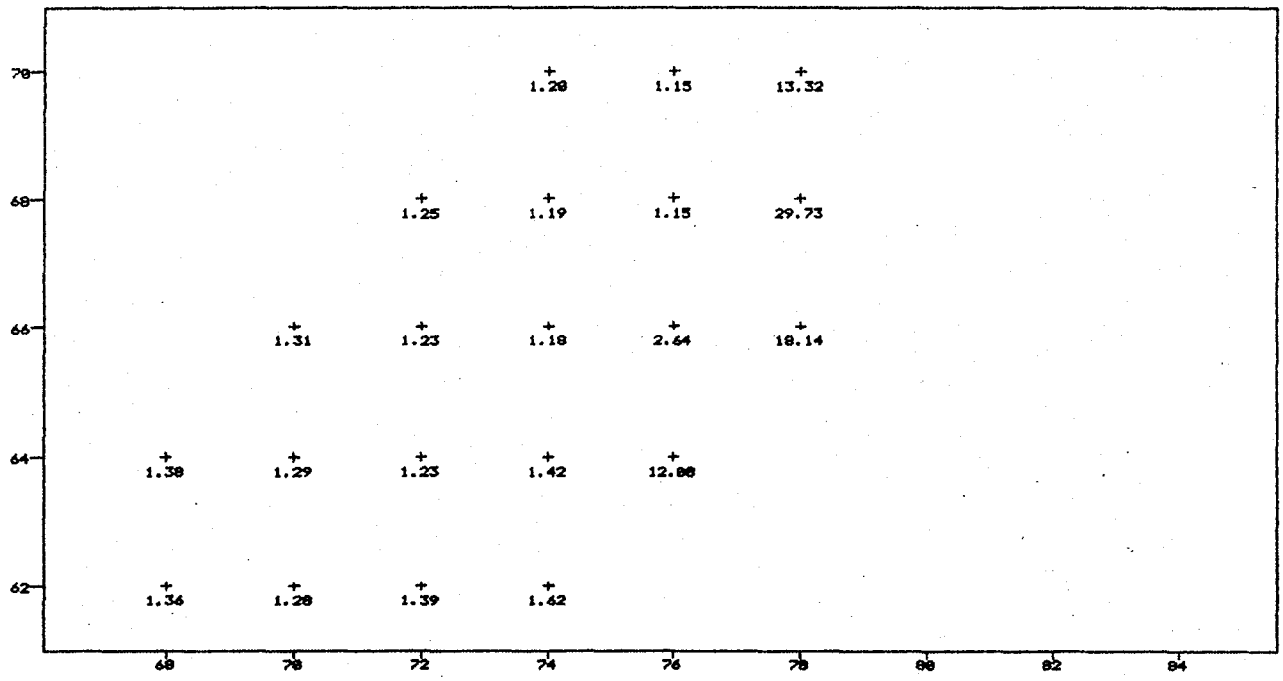
SB-SLOPE

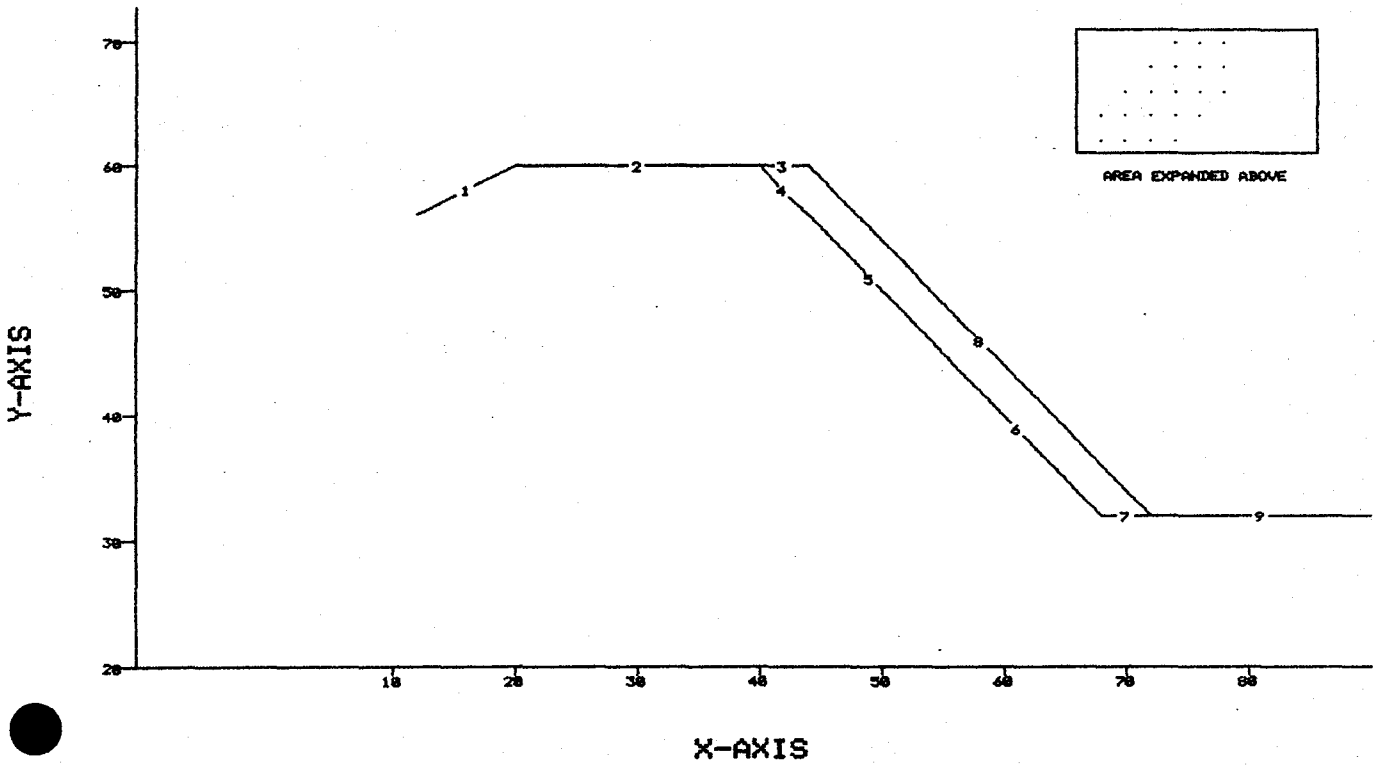
Simplified Bishop Slope Stability Analysis

PROJECT: NEW RIVER

LOCATION: OLIVE AVENUE TO BETHANY HOME ROAD

FILE: SUR4





SB-SLOPE

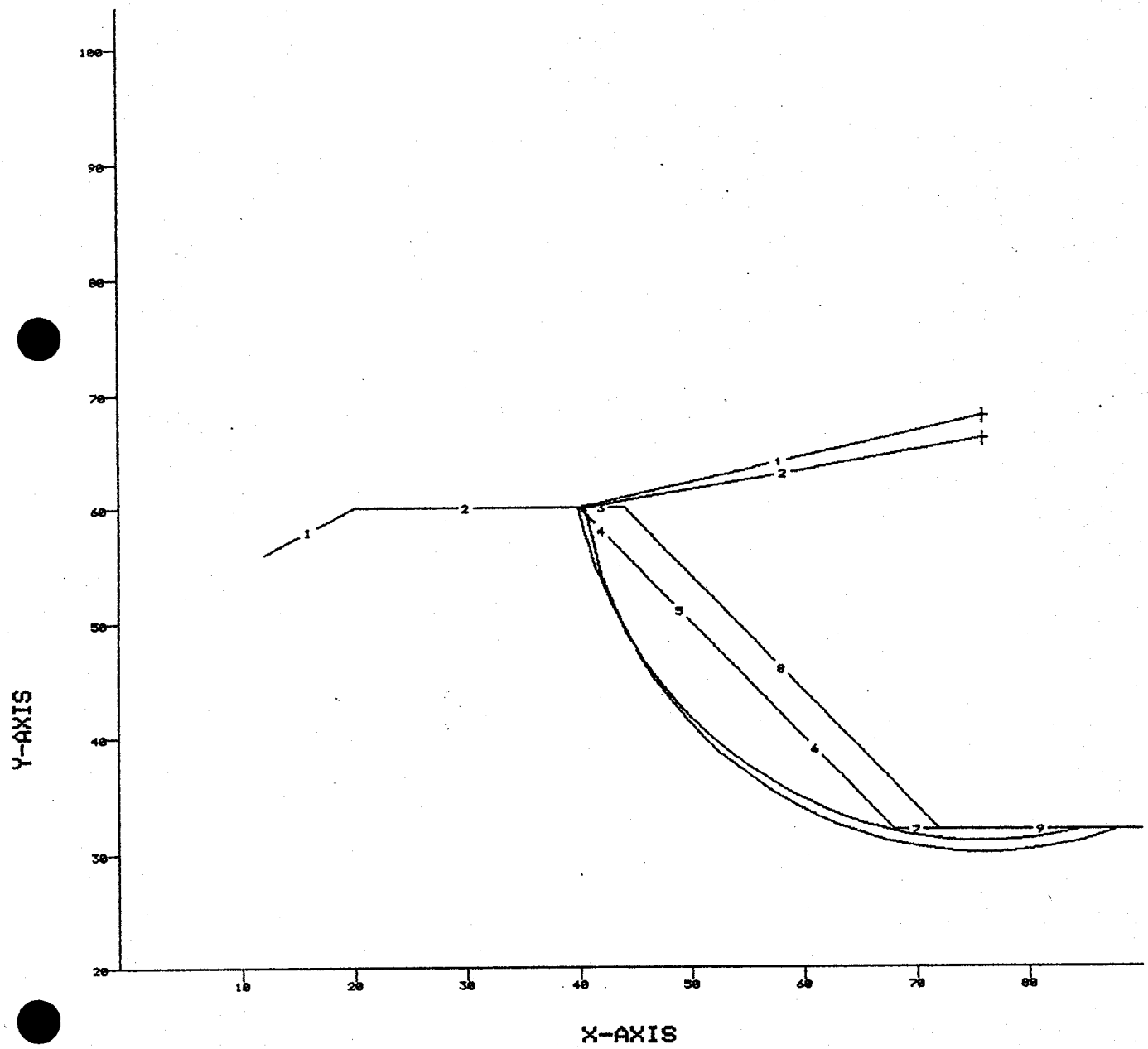
Simplified Bishop Slope Stability Analysis

PROJECT: NEW RIVER

LOCATION: OLIVE AVENUE TO BETHANY HOME ROAD

FILE: SUR4 COMPLETE SLOPE CROSS SECTION

CIRCLE	X	Y	RADIUS	FS
1	76.0	68.0	37.0	1.15
2	76.0	66.0	36.0	2.64



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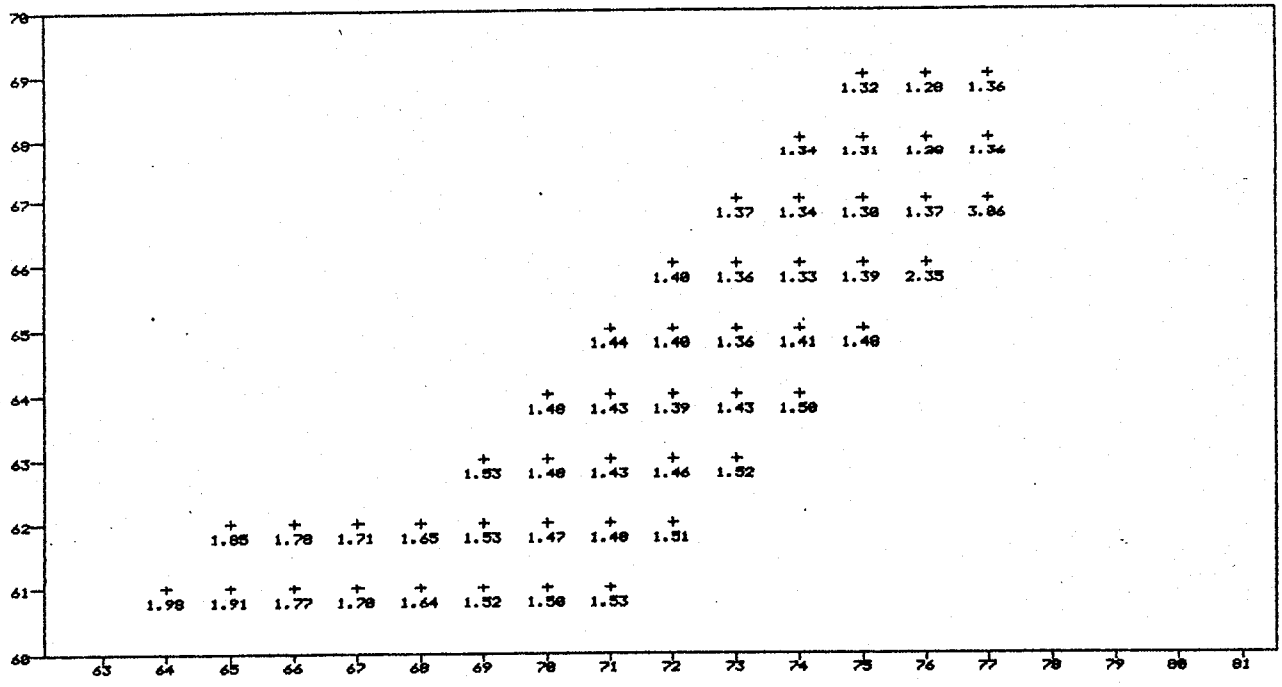
SB-SLOPE

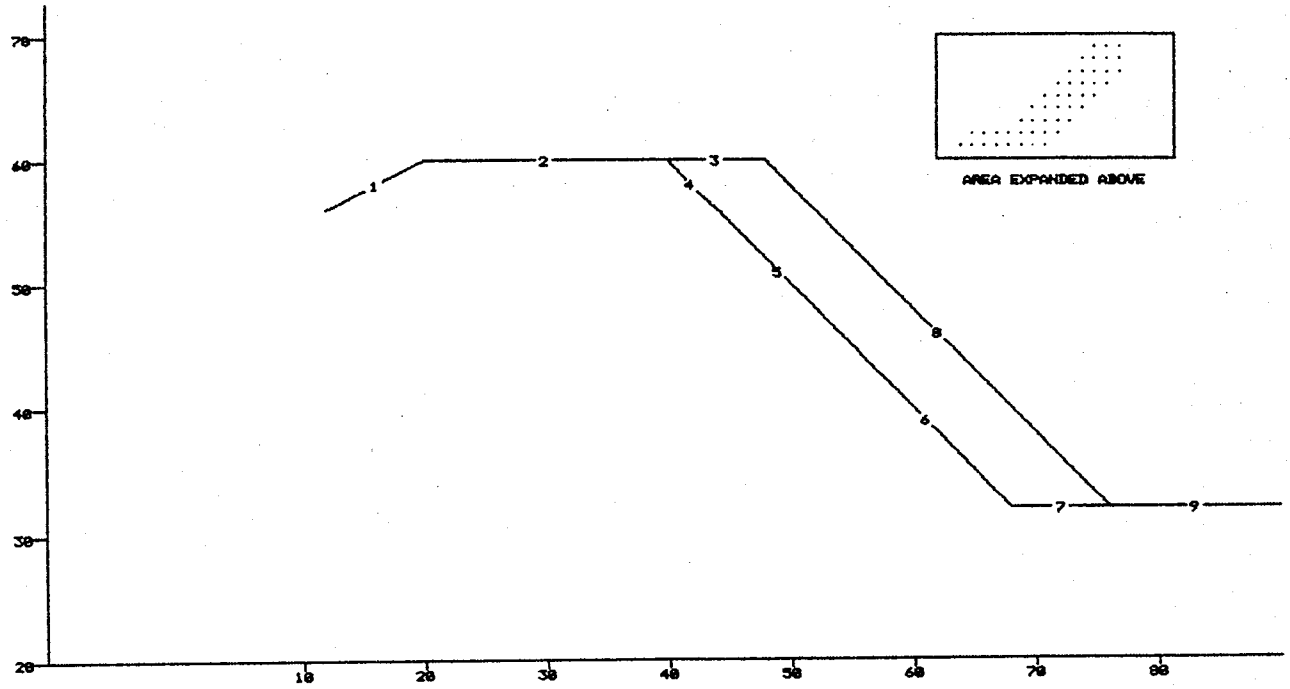
Simplified Bishop Slope Stability Analysis

PROJECT: NEW RIVER

LOCATION: OLIVE AVE. TO BETHANY HOME ROAD

FILE: SUR2





Y-AXIS

X-AXIS

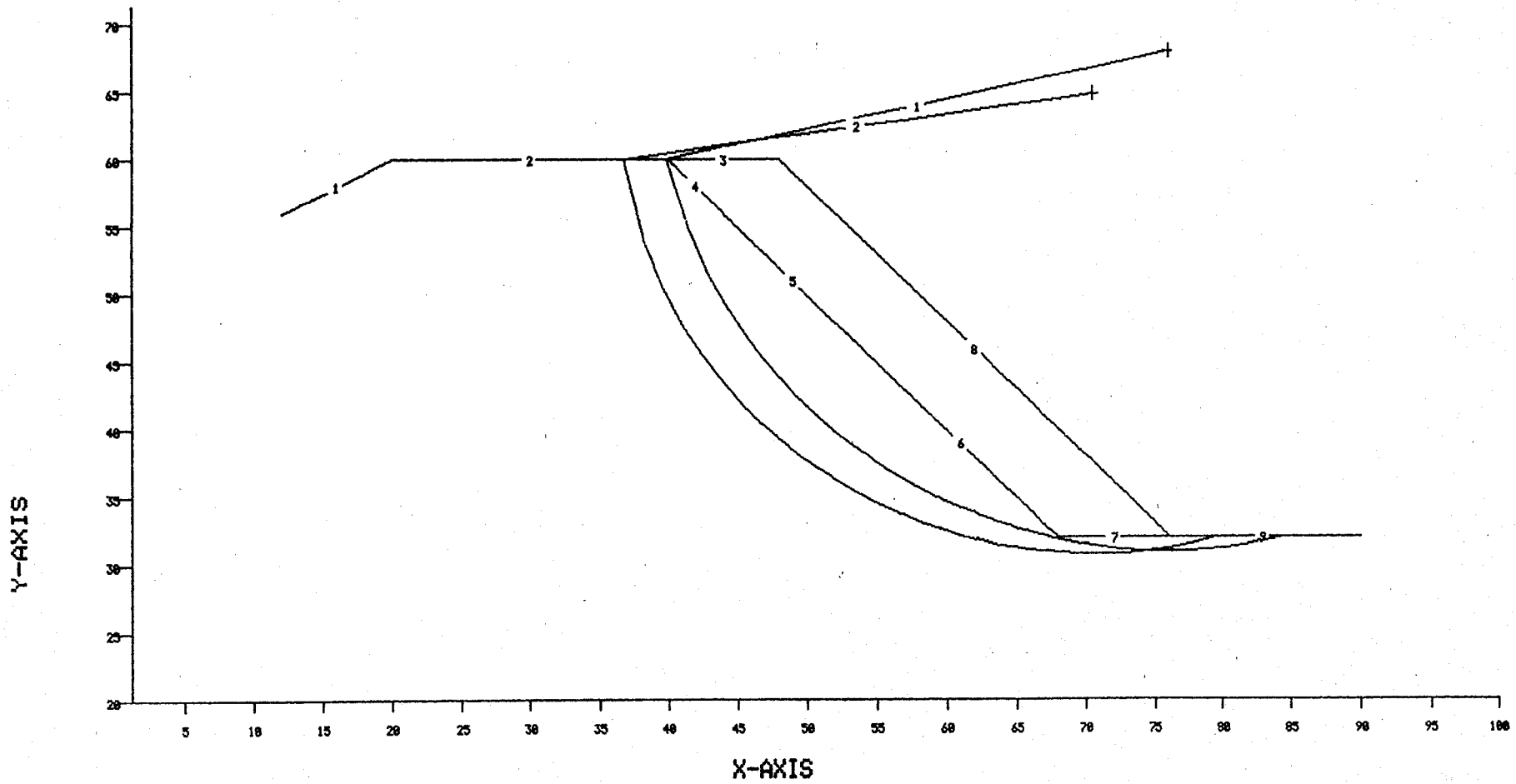
Western Technologies Inc. - Phoenix, AZ

SB-SLOPE

Simplified Bishop Slope Stability Analysis

PROJECT: NEW RIVER
LOCATION: OLIVE AVE. TO BETHANY HOME ROAD
FILE: SUR2
COMPLETE SLOPE CROSS SECTION

CIRCLE	X	Y	RADIUS	FS
1	76.0	68.0	37.0	1.28
2	70.5	64.9	34.1	1.48



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