DR59-16 - Conditional Use - Applications for borrow pit locations

ACTION

DATE

COMMITTEE _____ ____

M.A.P.C. Directed staff to ____
prepare set of additions to be
attached to future CU's
B.C.C./B. CO. C._____ ____

DR—
(Borrow Pit)

THE CITY OF WICHITA

OFFICE OF Public Works Maintenance **DATE** July 9, 1959

TO L. L. Little, Director of Planning

FROM G. H. Wilton, Supt. Public Works Maintenance

SUBJECT : Borrow or Sand Pits adjacent to the Flood Control Project

Reference is made to our discussions concerning open pits in the vicinity of the Flood Control Project. I am forwarding the following comments for your information:

1. An earthen levee is in danger whenever there is water against it.
2. The danger is in direct proportion to the height of the water, the duration of flood stage, and the intensity of either the current or wave action against the levee.
3. The danger is inversely proportional to the cross-sectional area of the levee, the height of the levee, the degree of maintenance.
4. A well constructed levee should, if maintained and if not overtopped, hold throughout any major flood.
5. Levee foundation troubles can result in sand boils.

Before we define a sand boil, a few fundamental definitions and hydraulic facts should be understood:

1. Water is a liquid, it is only slightly compressible, and it always seeks its own level.
2. Water is heavy (62.4 pounds per cubic foot) and exerts head or energy dependent upon its height above a given datum plane.

3. Head can be expressed as elevation head (head due to height) and velocity head (head due to the kinetic energy of moving water) which is equal to $V^2/2g$, where V equals the velocity of the fluid and g is the acceleration of any free falling body due to gravity.

4. Energy from velocity head and elevation head are interchangeable, thus 1 cubic foot of water falling one foot in elevation can produce 62.4 ft-lb of work and the kinetic energy of a moving mass of water which equals $V^2/2g$ also has its units in ft-lbs. It can be shown that pressure in pounds per square inch and head in feet can be equated by the following constants:

$$h = 2.308\ p$$
$$p = 0.433\ h$$

The quantity of water moving through a channel, conduit or even the pores of soil (if steady flow conditions exist) is a function of the velocity of the water and the area of the conduit and is written $Q = Av$ where Q is the quantity (usually cubic feet per second), A is the cross sectional area in sq. ft., and v is the average speed or velocity of the water in ft. per second. In the case of an open pit landside of the floodway system, head, h, would be the difference between elevation of the water in the floodway and the water in the pit. The horizontal distance between the water in the floodway and the water in the pit is L and h/L equals the hydraulic gradient, i. Both Q and v are linear functions of i.

If the soil is homogeneous and rather densely compacted, the velocity will be relatively low so that the value of the velocity head ($V^2/2g$) is insignificant and for all practical purposes, the energy gradient coincides with the hydraulic gradient. The hydraulic gradient then defines the limit of pressure available to maintain flow through the soil toward the pit. More simply stated it could be said that the difference in water surface elevation of the pit and the floodway controls the amount of pressure available to cause the water to flow through the soil between the two. The difference in head between the water in the floodway and the water in the pit represents a loss of head due to the resistance to flow offered by the soil particles. Thus, each soil particle which offers resistance must be subjected to pressure by the water as the water attempts to flow to the lower level. Pressure exerted on the particles is equal to the head loss and is applied in the direction the water is flowing.

If we consider a point just landside of the landside toe of a pervious or semi-pervious embankment such as a levee, model tests show that the direction of flow of the water which is passing through the embankment will tend to be upward. Should the pressure on the soil particles, exerted by this upward flow, equal the gravitational force (weight) of the submerged soil, the soil particles would be at the point of flotation, and any slight addition to the dynamic force of the flowing

water would cause them to move upward. This condition is critical and occurs most often when the hydraulic gradient approaches unity. If a critical area exists, it will always be at the point of emergence, since the particles have a path of free escape and since the direction of water pressure is always steepest in this region.

Beginning at the surface and progressively working deeper, there will be a tendency for the flow to remove the soil particles whose grain size is equal to, or less than, 0.01 millimeters. What happens after emergence occurs in any particular situation is beyond the limits of generalization. The structure of the soil might be such that there would be a rearrangement of the larger soil particles, in which case the pores would become enlarged, the pressure would lessen, and the removal of soil particles might be halted. Or, continuous removal of particles may cause the collapse of the soil mass which would again reduce the pore size, increase the flow pressure, and regenerate the removal process. This is the condition which is called a sand boil and which might result in levee failure. If, however, a pool is formed (as in a typical spring) to dissipate the pressure and permit the soil particles to drop back into the water without being carried away, the boil may continue indefinitely without causing structural failure. This is the method used to stop the damaging effects of a sand boil, that is to form a sand bag ring, or levee, around the boil of sufficient height to cause

the water to rise high enough in the ring to reverse the pressure--gravity ratio so that the particles fall back into the water and are not carried away from the boil.
The effect of a toe drain system on a typical levee embankment is to draw the lines of flow into the filter material which is porous enough to permit the water to escape without carrying soil particles with it.

It can be seen from this discussion that many factors influence the forming of a sand boil, and that even if a boil is prevented, the flow of water through porous soil is certain. Relating these facts to the case of open pits adjacent to the floodway, we see that the rate of rise in the water surface of the pit will be governed by the amount of head differential between the two water surfaces, the density of the soil between the two and the horizontal distance between the two. This rise in the pit water surface presents the possibility that the pit might overflow causing flooding without ever endangering the stability of the levee embankment. Of the two possibilities, embankment failure would be the most disasterous; however, it is the less certain to occur and more difficult to remedy. Pit rises are less likely to cause the damage that a quick outbreak of floodwaters thru a breach in the levee would; however, if the pit were to overflow and to cause flooding it would be small reward indeed to know that the levee embankment was still structurally sound. In all

probability, continuous rise and fall of water between the pit and the floodway would have some adverse effect on the foundation material.

We would also like to review recent and past history of the sand or borrow pit problem:

During my appearance before the Commission on June 22, 1959, I pointed out that the matter of open pits adjacent to the floodway system had been investigated a few years ago, after the City and County received a request from the Corps of Engineers to control sand pits adjacent to the floodway project. The only recourse open to the City and County was to file injunctions to prevent operation of sand pits in the vicinity of the project, and in order to obtain a permanent injunction, it would be necessary to show that pit operations would endanger the stability of the Project Levees and in that way could cause damage to both public and private property. In order to prove this, testimony from experts in soils and hydraulics would be required. Since the only source of these experts was the Corps of Engineers, we addressed a letter to the Corps requesting that they establish a safe limit outside of which sand pit operations would have no adverse effects upon the flood control project. We were advised that the distance would vary considerably, dependent upon the soil conditions, height of flood above ground level, and duration of flooding.

It was the opinion of the City and County attorneys that since definite proof could not be shown that the operation of sand

pits at any particular location would, or would not, be a hazard to the safe operation of the Flood Control Project; further study of the matter should be deferred.

With construction of interstate route 235, the demand for fill material is, of course, quite pressing. We are in a position where the restriction of borrow operations within the vicinity of the highway may result in increased costs of construction to the State and Federal Governments, and perhaps to the City of Wichita. This office, of course, cannot neglect its primary responsibility of protecting the flood control project.

I also informed the Planning Commission that the only solution this office could offer at the present time to the problem of protecting the floodway system and lands adjacent to open pits was to propose the construction of a loop levee which would completely encircle the open pit or pits. Loop levees would protect against pit overflow and would also provide protection in case of levee failure. Since there is some element of doubt as to whether or not seepage into the pit from the Flood Control Project will occur, and that the water surface will raise to a sufficient height to discharge out of the pit, the Planning Commission may not want to require construction of a loop levee by the property owner or sand pit operator. In that case, it is suggested that sufficient land within the property on which the borrow rights will

be permitted be retained for construction of a loop levee at a later date should seepage warrant.

G. H. Wilton, Supt.
Public Works Maintenance

GHW:jag
Enc.
cc: M. S. Mitchell
cc: Interstate Highway

APPROVED BY:

E. W. Smith
Director of Public Works

0 30,104

METROPOLITAN PLANNING

July 1, 1959

OR 59-16

Frank H. Backstrom, City Manager

LeRoy L. Little, Director of Planning

Conditional Use Applications and Permits for Borrow Pit Operations.

As you are aware, the Interstate Route 235 is to be built mostly on fill and requires a great deal of borrow.

After informal discussions earlier this year and prior to the letting of the contracts, a number of contractors informally requested a meeting with the Metropolitan Planning Commission and with the Board of County Commissioners regarding the location and the conditions to be attached, if any, to these borrow pits.

To date, two applications have been approved and operations are under way in the construction of the interstate route.

As per our usual proceedure, a copy of the Planning Commission Agenda has been forwarded to other departments and agencies so that the other departments and agencies may be advised of the matters coming before the Planning Commission in which they would conceivably have an interest.

After the first two applications have been approved and in operation, it appears that a question of the establishment and operation of the borrow pits in relationship to the floodway raises serious engineering problems.

With this in mind the Planning Commission has requested the assistance and review of the Department of Public Works and in particular the Division in charge of this facility, headed by George Wilton. All further action on Borrow Pits in relationship to this route and in the vicinity of the floodway have been deferred subject to the review and technical report by the Department of Public Works, which report is scheduled for presentation to the Planning Commission on its regular meeting on Thursday, July 16.

I am given to understand that the Corps of Engineers has been invited to participate in the review of the possible effects of borrow pit operations and will keep you advised from this department's viewpoint.

LeRoy L. Little,
Director of Planning

LLL:sdh

WICHITA-SEDGWICK COUNTY
METROPOLITAN AREA PLANNING COMMISSION

OFFICE OF Metropolitan Planning **DATE** June 26, 1959

TO L. L. Little, Director of Planning

FROM Leland R. Edmonds, Senior Planner

SUBJECT

Conditional use
Applications for Borrow
Pit Locations

You will recall three borrow pits have been approved by the Planning Commission and the Board of County Commissioners. Two of these three pits were located approximately 300 feet, more or less, from the Flood Control Project. The third of the locations was immediately adjacent to a portion of the Flood Control Project.

On June 22, 1959, Conditional Use Application No. 17 concerning property south of Harry and east of the Big Ditch was further considered by the Planning Commission and was deferred pending a determination of the need for the earth to be obtained from this site. At this meeting of June 22 Mr. Wilton, with the express approval of the Director of the Department of Public Works, attended the Planning Commission meeting to discuss the locational problems which could or do exist in regard to locating borrow pits in the close proximity to the Flood Control Project. Mr. Wilton discussed this matter in generalities and was unable to provide the specific detailed answers which the Planning Commission would like to have had.

The Planning Commission has directed the Planning Department to prepare revised sets of conditions to be attached to future conditional use approvals. They have also requested the Department to determine from the county counselor whether the Commission has the right, through formal public hearing and re-consideration, to attach further conditions to those locations already approved.

The Commission directed that all appropriate engineers be contacted with a request for assistance in preparing the revised suggested conditions. Accordingly, a memorandum was sent to Mr. E. N. Smith requesting assistance of the Department of Public Works and generally outlining the problem to him. A similar memorandum was forwarded specifically concerning a Commission request for information relating to the sand pit proposed at 21st Street and the Big Ditch. Copies of this memorandum are attached for your examination.

Mr. Douglas of the Beacon has looked upon this problem as the source of an excellent story. In a discussion some two hours in length a couple of days after the special Planning Commission meeting it became apparent that there might be an attempt to assign blame for not having given this problem proper consideration in the cases previously approved. He was

also interested in the possible inconsistency which might exist between the Planning Department's Drainage Report and the Planning Department's apparent failure to give adequate consideration of the effect of the borrow pits on the Flood Control Project. I would prefer to discuss this in much greater length at your convenience.

There appeared to be actually three determinations which should be made with respect to this Flood Control Project - borrow pit location problem. These questions as I see them are:

1. Is this problem "real or fancy"? Does it actually exist to a degree that it could be termed probable or is this merely one of those things which could conceivably happen, but for which the chances are so slight as to be virtually inconsiderable.

2. If it is determined that the problem is real, what protective measures should be ascribed both to the prior approvals and to future approvals which the Commissions will be called upon to make. Levees have been suggested and if this technique is used it would be necessary to determine the appropriate cross section for such levees around the borrow pits.

3. If it is determined that the problem is real and that appropriate protective measures can and must be taken, who then must bear the responsibility of payment for these protective measures? This is a particularly valid question when considering the three conditional uses previously approved prior to raising this problem. Is the responsibility that of the City, the County, the State Highway Commission because of its interest in the highway facility, the Bureau of Public Roads, the corp of Engineers or is it a responsibility of all of these groups in some proportion?

This matter has not been discussed either verbally or in writing with the City Manager. It has been suggested, however, that there is an apparent failure of communication which has resulted in this rather difficult situation and that because of this failure in communication, it becomes a matter for consideration by the City Manager. In discussing this with Jack and Jerry, however, I decided that I should not forward any comments to the Manager until your return. I believe that the Manager has been advised, however, of this apparent failure in communications, by others and I would anticipate, therefore, that the problem should be discussed with him at some early date.

I would suggest that the senior staff should arrange to discuss this entire problem at your earliest convenience upon your return.

LRE

Leland R. Edmonds
Senior Planner

LRE:DW

THE CITY OF WICHITA

OFFICE OF Director of Public Works DATE June 25, 1959

TO George H. Wilton, Supt. Public Works Maintenance

FROM E.N. Smith, Director of Public Works

SUBJECT CU-16-a Request to establish Sand Plant, 21st and Big Ditch

I am sending you copies of memorandum from Leland R. Edmonds, Senior Planner, in regard to the above subject. You will note that action on this matter has been deferred until July 16, 1959.

Will you please give this your consideration and submit a report or be prepared to discuss the matter at the meeting of the Planning Commission?

E.N. Smith
Director of Public Works

ens:oh
Attch

cc: Leland Edmonds
Senior Planner

THE CITY OF WICHITA

OFFICE OF Director of Public Works DATE June 25, 1959

TO Geo. H. Wilton, Supt. Public Works Maintenance

FROM E.N. Smith, Director of Public Works

SUBJECT

Conditions Applied to Borrow Pit Approvals

Attached are two copies of a memorandum from Leland R. Edmonds, Senior Planner, in regard to the above subject.

You and I have discussed this matter at some length, but I will appreciate it if you will give this memorandum your consideration and let me have a report.

You will note that Mr. Leland requests our assistance and will welcome a discussion of the matter at an early date.

E.N. Smith
Director of Public Works

ens:oh

cc: Leland R. Edmonds
Senior Planner

WICHITA-SEDGWICK COUNTY
METROPOLITAN AREA PLANNING COMMISSION

OFFICE OF Metropolitan Planning DATE June 25, 1959

TO E. N. Smith, Director of Public Works

FROM Leland R. Edmonds, Senior Planner

SUBJECT CU-16-a request to establish sand plant, 21st and Big Ditch

An application has been filed with the Planning Commission for a conditional use permit to establish a sand plant on the north side of 21st street immediately west of and adjacent to the Big Ditch. At its meeting of June 18, 1959, the Planning Commission deferred further consideration of this request until July 16, 1959.

As noted in a memorandum to you, dated June 24, 1959, it has been suggested to the Planning Commission that such an operation could adversely affect the Flood Control Project. Accordingly, the Commission has requested that a report and recommendations be obtained from the Flood Control office concerning this matter. Specifically, the Commission wishes to obtain, if possible, suggested conditions which might serve to protect the project from damage from a sand plant use in the event the application is ultimately approved by the Board of County Commissioners.

Attached is a legal description of the property in question as included in the application. If we can provide additional information or material which would be of value to you, we shall be pleased to do so.

COPY

L.R.E.

Leland R. Edmonds,
Senior Planner and
Acting Director of Planning

LRE:sdh

Enc.

LEGAL DISCRIPTION OF PROPERTY IN

CONDITIONAL USE REQUEST, CU-16

A tract of land beginning 1244+ ft. West from the Southeast Corner of the SE $\frac{1}{4}$, thence west 1384 ft.; thence north 1317 ft.; thence east 1244 ft.; thence south 658$\frac{1}{2}$ ft.; thence east 140 ft.; thence south to beginning; in Section 2, T27S, R1W; except for floodway.

WICHITA-SEDGWICK COUNTY
METROPOLITAN AREA PLANNING COMMISSION

OFFICE OF Metropolitan Planning DATE June 24, 1959

TO E. N. Smith, Director of Public Works

FROM Leland R. Edmonds, Senior Planner

SUBJECT Conditions Applied to Borrow Pit Approvals

COPY

The Wichita-Sedgwick County Metropolitan Area Planning Commission has received applications for Conditional Use Permits in six locations near the Wichita-Valley Center Flood Control Project. One of these joins the Project right of way while the other five are removed fror it by a distance of from 300 to 1000 feet. Three of the six have been approved.

In each of the three instances of approval, certain conditions were attached. In brief form, these conditions were:

1. Excavate tc a minimum of 5 feet below present water level;

2. Approach with excavation no nearer than 6 feet to property lines;

3. Maintain a 4 to 1 slope;

4. Fence with 58" V-mesh fence;

5. Performance bond to guarantee meeting conditions imposed.

You will note that these conditions were aimed at three basic problems:

1. Blowing dust;

2. Aesthetics;

3. Safety for adjacent residents.

The conditions did not consider the possibility of damage to the Project in any way.

In considering an application for a sand plant near 21st and the Project; a protestant suggested that it could result in levee failure if certain conditions existed after excavation. This suggested to the commission that such might also be the case with Borrow Pits adjacent to or near the Project.

Accordingly, the Planning Commission has directed the Planning Department to evolve a revised listing of conditions to be applied

to Borrow Pit approvals. The Department has been specifically directed to pay especial attention to problems associated with the Project and to recommend conditions which will eliminate or reduce to a minimum the possibility of damage to the Project. The Department was finally directed to develop such recommendations with the advise and assistance of appropriate engineering officials.

The Planning Commission and Department was fortunate in receiving a very good discussion of the problem by Mr. George Wilton at the special Planning Commission meeting of June 22. While Mr. Wilton was a great assistance at that meeting, the Planning Commission would also benefit from more specific suggestions and recommendations if it be possible to devise them. The Planning Department is not qualified to devise the suggestions and recommendations which will guarantee the best possible protection for the project.

In the preceding paragraphs we have attempted to outline the problem facing the Planning Commission in its consideration of Borrow Pit applications. In an effort to obtain the best available information and devise the best possible recommendations the Department requests the assistance of your Department. We would welcome the opportunity of discussing this matter with you or any other you may designate at your earliest convenience.

Leland R. Edmonds,
Senior Planner and
Acting Director of Planning

LRE:sdh

Date By

Answered _____ _____

Filed _____ _____

June 24, 1959

Flood Control &
Stream Maintenance
4th Floor

District Engineer
Corps of Engineers, U. S. Army
P. O. Box 61
Tulsa 2, Oklahoma

Subject: Interstate Route 235

Dear Sir:

Forwarded under separate cover is one complete set of construction plans for Interstate Route 235 covering the area from K-42 to U. S. 81.

Reference is made to a conversation held on June 19, 1959 between Mr. Myron DeGeer of your office and Mr. G. H. Wilton and myself of the City-County office, regarding borrow pits for subject project. In the course of our conversation, Mr. DeGeer asked that plans mentioned in the paragraph above be forwarded immediately. On these plans and on a Planning Commission map of Wichita and vicinity, we have marked in red the areas in which contractors have either asked for or have received permission to establish borrow pits adjacent to the Flood Control Project works.

At 2:00 PM on June 22nd, 1959, Mr. Wilton appeared before the Metropolitan Planning Commission to explain our position regarding these pits and to supply the Commission with technical information on which they could base their decision. The request for CU-17 was subsequently deferred by the Planning Commission pending a more detailed engineering report by this office.

Reference is further made to your letters of 24 July 1953, 22 September 1953, and 28 September 1953, in which you expressed concern for the effects of sand pits adjacent to project works and in which you state that the control of pumping operations adjacent to the project is a responsibility of local interests.

As you have been advised on previous occasions, past local control of pit operations adjacent to the project has generally taken the form of discouraging all persons who ask this office

for advice prior to the opening of pits by relating the opinion of our counsel that pit operators and/or owners may be liable for damages in the event of levee failure adjacent to pits. Recently, however, we have acquired a new tool which may give local governmental agencies a more positive form of control over pumping or borrow operations. Under present Planning regulations, a Conditional Use Permit must be granted before these operations can begin within the metropolitan limits of the City of Wichita (city limits plus 3 miles periphery).

We can be reasonably sure that the Metropolitan Planning Commission will look favorably on valid objections to borrow pits and sand pits - if sound engineering principles and data accompany the objections. We can also be sure that this is only the first phase of this problem since future FAI 235 contractors are sure to make many similar requests. Local project officials may also be criticized for not allowing highway contractors to borrow from the Floodway Channel between the levees and outside of the maximum 260' bottom width channel, and for insisting that no borrow material be excavated from Floodway Channels below plan channel grade.

Another factor which should be mentioned is the fact that the City of Wichita was unable to secure a Conditional Use Permit for a sanitary land fill operation without first guaranteeing that no rubbish would be deposited within 2' above the maximum ground water table elevation. This requirement, requested by Public Health officials, was backed up by the Metropolitan Planning Commission and if used as a pattern, would virtually prohibit a future filling of sand or borrow pits in the project vicinity.

This office requests that you make a study of borrow and sand pits as they affect the operation and maintenance of the project works and attempt to arrive at a set of minimum conditions which are compatible with project operation. We request that you make the results of this study known to this office at the earliest practical date.

Very truly yours,

M. S. Mitchell

MSM:fb
cc: Mr. G. H. Wilton
Metropolitan Planning
Mr. Rudy Hudaj - Corps
CofE - General, File
Interstate Route 4 & 8, File